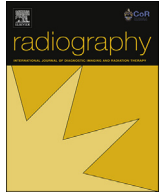




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Breast compression techniques in screening mammography – A Maltese evaluation project

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ABSTRACT

Introduction: In screening mammography, the radiographer should be responsible for providing mammograms of high diagnostic value, possibly without subjecting clients to a painful experience. This skill is demonstrated via the technique of breast compression and is explored in this study by analysing insights about methods and underlying principles in regards to this procedure.

Methods: One-to-one semi-structured interviews were conducted with radiographers who perform screening mammography in Malta. For data analysis, a descriptive phenomenological approach following a simplified version of Hycner's (1985) method was adopted.

Results: Five general themes were extracted from the data; meeting the client, preparing the client, the mammography procedure, pain from compression and client turnout. It was determined that the participants alter their breast compression technique according to the client rather than following a rigid step-by-step process and that explanation and requesting client feedback are essential to obtain cooperation. Additionally, mammography positioning and compression application are tailored in a way that encourage compliance, however not at the expense of degrading image quality. Ultimately, it is also believed that a proper breast compression technique positively influences client turnout.

Conclusion: The results of this study demonstrate that radiographers should be flexible in their approach in order to carry out a successful breast compression technique. However, it has also been shown that such effectiveness in practice is gained from experience rather than initial training. If exposed to this study's findings, new mammographers would be able to form a robust core of knowledge before embarking on the challenging specialisation of mammography.

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Introduction and background

According to the Malta National Cancer Registry, carcinoma of the breast is the most commonly occurring cause of female cancer mortality in Malta.¹ Breast screening has the potential to effectively reduce breast cancer mortality^{2–4} by at least 40%.⁵ In Malta, the breast screening programme was established in 2009 and it currently invites women aged 50–66 years for free breast screening every 3 years. It operates 2 state-owned direct digital mammography units, which are fully quality assured in-line with the European Guidelines for Quality Assurance in Breast Cancer Screening and Diagnosis.⁶

During screening, the radiographer acquires cranio-caudal (CC) and medio-lateral oblique (MLO) projections of each breast, where the breast is positioned on the image receptor at 0° and 50° respectively and compressed with a compression paddle.⁷ Compression uniformly thins out the natural varying thickness of the breast from chest-wall to nipple and creates a contact area with the paddle, which varies according to the breast's size and elasticity.⁸ This reduction in thickness leads to less breast tissue overlap, less image motion blur and a decrease in breast radiation dose, the latter meaning less scattered radiation and hence higher image contrast.^{8,9} Insufficient compression may therefore result in low image quality with a detriment on lesion detection and misdiagnosis.¹⁰

When Rosenkratz et al. (2016)¹¹ reviewed 464 tweets from women talking about mammography, breast compression was found to be the most commonly discussed topic. 50% of breast screening clients suffer moderate to severe pain from compression

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and while many of them may accept the pain as a normal part of the procedure, 8% delay or do not go for their appointment¹² and also discourage others from accepting the invite.¹³ Some radiographers tend to set their own compression force tolerance levels without paying enough attention to the breast type and this may negatively affect the client and may also give them more radiation dose than necessary.^{14–16} A positive experience as well as highly diagnostic mammograms are more likely if the breast compression technique is adapted to the client through communication, proper positioning, machine adjustment and careful manoeuvring of compression paddle application.^{1,10,12,17,18}

The objective of this study is to evaluate the way breast compression techniques in screening mammography are performed and to establish what determines the chosen methods. Quantitative research may be able to provide significant findings from a mechanical view; however, qualitative methods may perform superiorly in terms of offering a more in-depth and insightful report.¹⁰ Furthermore, qualitative studies which evaluate the way radiographers practise are extremely scarce.¹⁹ Data provided directly by radiographers will contribute a different perspective on breast screening for the first time in the local scenario and may also have the potential to shape practice and even policy and future development.

The aims of this evaluation project are:

- to obtain descriptions of how radiographers in breast screening carry out their breast compression techniques and what motivates their choice of methods,
- to establish whether these radiographers are willing to reach a compromise between sufficient compression force and the client's tolerance to pain,
- to evaluate whether they recognize the impact they may have on client turnout,
- to determine whether there is any significant variation in technique amongst them.

Methodology

The methodology that was adopted for this study is descriptive phenomenology. This was founded by Edmund Husserl (1859–1938) and is characterised by findings that truly represent the study group's descriptions of their personal experiences. Descriptive phenomenology differs from interpretive phenomenology by not including the researcher's insights about the phenomenon,²⁰ its main aim being to describe and not to explain²¹ and to understand the essence of a concept without generating a theory.²²

Method

Ethical approval to commence data collection was granted by the higher education institute. Since descriptive phenomenology necessitates participants' spontaneity,²² will and capability to be able to give a detailed account of their lived experiences,²⁰ methods with minimum structure that obtain maximum depth should be used.²¹ Whilst participant observation and focus meetings are good examples of such data collection tools,²¹ interviews are generally considered the main method for gaining in-depth insight into a phenomenon.²³ The face-to-face interview was chosen for this study as it is the most likely to provide authentic and individual information, while allowing observation of facial expressions, gestures and other non-verbal cues.²⁰

Purposive sampling was applied to recruit the 9 radiographers who perform duties at one breast screening unit. More diverse

accounts may have been acquired if symptomatic mammographers, or screening mammographers from other sites had participated, leading to increased transferability. However, a homogenous sample allows an ideographic and a detailed examination of a lived experience. Information sheets and consent forms were distributed personally by the researcher to the eligible participants, providing the reason behind the invitation and the topics that could have been discussed during the one-to-one interview,²⁴ while guaranteeing anonymity and confidentiality and the freedom to withdraw from the study at any stage. The consent form also specifically asked the potential participants for permission to be recorded during the interview.²⁵

A maximum of 2 interviews per day were allocated throughout a month²⁶ and set up in concordance to the participants' duties in a private office in a quiet part of the screening establishment.^{25,27} An interview guide was used, which was compiled by extracting questions from the aims of the study. It consisted of specific and open-ended questions, so as to prevent the participants from deviating from the main purpose of the study and to encourage in-depth answers, rather than a simple "Yes" or "No". This guide also helped to keep track of the topics covered, while maintaining structure in responses so as to facilitate comparison among the participants' answers.

Since the researcher is also a radiographer with experience in mammography, it was ensured that a bracketed approach was adopted throughout all the interviews. This was done by accepting the answers provided by the participants as is and by only probing or asking follow-up questions if responses were vague or too brief. A field diary was used to record participants' non-verbal cues, as well as any further comments given after the recording had stopped. Non-verbal cues could also trigger probing.

A simplified 5-step version of Hycner's (1985) method was followed in order to analyse the data in a systematic phenomenological descriptive manner.²⁸ Firstly, the researcher listened carefully to each interview for multiple times, performed manual verbatim transcription and read the transcripts repeatedly, taking into consideration the para-linguistic cues. This process helped the researcher to become familiar with the words and to get a sense of the whole interview, also known as *gestalt*.²⁸ The second step consisted of scrutinising the transcripts and extracting the words, phrases, non-verbal or para-linguistic cues, which expressed a distinctive meaning, noticeably distinguished from one another; this produced Hycner's units of general meaning (UGMs). In the following step, the UGMs which responded to the phenomenon under evaluation were then selected and presented as Hycner's units of relevant meaning (URMs). It was then determined whether any of the URMs naturally clustered together to form a common theme. This procedure necessitated a to-and-fro process from the transcripts to the URMs to the clusters of URMs. In the fourth step, the interviews were summarised whilst merging in the extracted themes to provide context; this also provided *gestalt*.²⁹ Each summary was emailed to the respective participant for member-checking. In the final phase, themes that were common to most or all of the participants were grouped to produce general themes and a composite summary was written in order to place these themes into context and hence, to determine the phenomenon's meaning.²⁸

Methodological or data triangulation was not possible within the confines of this study. However, validation of the data was achieved via member checking, inter-rater agreement and bracketing. Reflexivity, which was originally implemented to separate the researcher's opinions from those of the participants', actually portrayed that the 'insider' experience was an asset because the participants' narratives could be easily followed and understood, including the mammography-specific terminology.^{30,31} Finally, the

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