

# Digital versus Plain Film Mammography: An Analysis of Three Articles

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## Introduction

Mammography is used as both a screening and diagnostic procedure whose objective is to detect breast cancer and it plays a key role in successfully diagnosing the disease.<sup>1</sup> Multiple studies indicate that mammography in both film and digital formats is effective in the early detection of breast cancer and, as a result, drastically reduces the mortality rate in both developed and developing countries.<sup>1,2</sup> In order to achieve a clear understanding of the differences between film and digital mammography, it is useful to conduct a critical analysis of different journal articles. This paper aims to identify and evaluate three academic journal articles that address the topic of film versus digital mammography by systematically analyzing the features of each article.

## Identifying the Articles type

The three journal articles were identified using the scholarly academic database CINAHL. The articles were chosen to be examples of three different formats with each designed to inform researchers and students with particular interest in exploring the topic of plain film versus digital mammography. The article by Pisano et al.<sup>2</sup> is an original article titled "*Diagnostic Performance of Digital versus Film Mammography for Breast Cancer Screening*". The second is an editorial article by Miller<sup>3</sup> titled "*Digital Mammography*". The third article is a review article by David<sup>4</sup> titled "*Status of Mammography after the Digital Mammography Imaging Screening Trial: Digital versus Film*".

## How and Why the Three Articles Were Chosen

The articles were chosen based on the scholarly reputation of their authors and source journals. The articles by Pisano et al. and Miller are written by authorities holding the titles of MD and PhD in the field of radiology. These two articles investigate the diagnostic value of digital mammography compared to film mammography. They explain the diagnostic value of both techniques in relation to successful treatment of breast cancer. The editorial article by Miller, published in 2014, is among the most recent sources of information on this topic. It provides information on several aspects of digital technology in mammography that allows medical professionals to make informed decisions on its use. All three articles are peer-reviewed, which further validates their credibility as sources of scholarly information. These criteria assure that the three articles are a strong basis for addressing the topic of film versus digital mammography.

## How the Three Articles Were Confirmed

To confirm the type of articles, the first pages were inspected to gather relevant details. The article by Pisano et al.<sup>2</sup> is clearly identified as an original article, and the article by David<sup>4</sup> is clearly identified as a review article. It is noted on the first page of the article by Miller<sup>3</sup> that it is an editorial. Original articles can also be identified by a section that summarizes the design, setting, objective, measurement, and results of the study. It is also important to read the abstract or the introductory part of an article to derive further information about its nature. For instance, the introductory section of the article by Pisano et al.<sup>2</sup> provides clarity that it is an original article.

## **Similarities between the Three Articles**

The three articles have several similarities which form the basis for their relevance in addressing the topic of 'Film and Digital Mammography'. The editorial,<sup>3</sup> review article,<sup>4</sup> and original article,<sup>2</sup> are similar in that they use scholarly language and they all make references to verifiable information from actual studies. All three articles point out merits and drawbacks of the two screening techniques. They all discuss why plain film technology is still the 'gold standard' when it comes to mammography. In addition, they all inform the reader on why digital mammography is not available in most medical centers across the world and, particularly, in developing countries. They all comment, however, on the possibility of digital technology replacing plain film mammography in the near future.

In the article by Pisano et al.,<sup>2</sup> there is an evaluation of whether or not digital mammography will ultimately avoid some of the shortcomings of film mammography. These include limited sensitivity in detecting breast cancer in women whose breasts are radiographically dense. In their study, 49,528 asymptomatic women who presented for screening mammography at sites in Canada and the United States underwent both film and digital mammography. They concluded that the overall diagnostic accuracy of film and digital mammography as a way of screening for breast cancer is the same. However, they state that the digital technique is more accurate in women below the age of 50 years, in women who have radiographically dense breasts, and in perimenopausal and premenopausal women. On the other hand, plain film is superior to digital mammography in women aged 65 years and above and in women with fatty breasts. Another similarity between the three articles is that they all conclude that digital mammography has higher diagnostic value than film mammography and, therefore, a greater impact on reducing the mortality rate in breast cancer patients.

The three articles also agree that film mammography is more popular and applicable in most medical facilities for several reasons. Film technology is easier to use for many radiologists since most of their experience is using plain films compared to newer digital machines. In addition, digital machines are extremely expensive when compared with film technology, so many hospitals and cancer centers continue to use the older technology. This is in part to minimize costs to patients who may find themselves unable to afford screening with the more expensive digital technology. In this respect, all three articles support the use of film mammography in breast cancer screening and diagnosis.

Finally, all three articles describe the importance of radiology in the medical field. They all address the critical role that breast cancer screening and diagnosis has in improving clinical outcomes. They assert that the choice of techniques should be based on which one offers the better diagnostic results, in terms of resolution and specificity, as well as duration of the procedure, for a given patient.

## **Differences between the Three Articles**

The review article by David<sup>4</sup> identifies the diagnostic advantages of digital mammography. It recognizes that, while film technology has been the 'gold standard', it is facing replacement by emerging digital technology. The original article by Pisano et al.<sup>2</sup> concentrates on the relative diagnostic value between the two techniques. It highlights the diagnostic performance of both digital and film mammography, and offers support for the film technique. However, it recognizes the changes that might improve the digital technique and lead to the replacement of film mammography in the near future. The editorial article by Miller<sup>3</sup> provides trial data for digital mammography. It asserts that the digital technology will become

more common due to its higher diagnostic value and potential for further improvement. It supports the use of digital technology in breast cancer imaging.

The review article by David<sup>4</sup> points out that digital technology offers advantages in magnifying images, storing new studies, and comparing them with prior ones with the benefit of images displayed on monitors. A disadvantage of digital mammography is that it requires exceedingly large storage space in computers. He indicates that due to the large pixels, digital images occupy between 35.2 and 216 megabytes as compared to a mere 25 megabytes for a four-film plain radiographic study. His article also makes reference to a study of women in Oslo, Norway who underwent both film and digital mammography and the results showed no difference. However, the study indicates that digital imaging results in fewer recalls than film imaging. Therefore, he goes on to emphasize that radiographers should make attaining the expertise required for digital mammography a priority.

The editorial article by Miller<sup>3</sup> is different from the other two articles since it largely focuses on comparing digital and film mammography in terms of the accuracy in detecting true or progressive cancers. In essence, it discusses digital mammography and how the technology can be implemented without increasing costs of healthcare. This makes the editorial article different from the other two article.

The review article by David<sup>4</sup> explores other dimensions of the digital and film controversy. It addresses the cost implications of digital mammography on patients and insurers and provides a critical analysis of the advantages of digital imaging over film. It is mainly based on an interpretation of the available research findings to help readers make informed choices when faced with a decision on which type of imaging to use. It is not based on a scientific exploration, but rather on a common sense approach. The original research article by Pisano et al.,<sup>2</sup> however, is based on primary research findings, and the author makes recommendations based on the empirical evidence obtained. This makes the original research article distinctly different from the other two articles. Both the review article and the original article discuss the advantages and disadvantages associated with the use of digital mammography and plain mammography. This makes them different from the editorial article which does not point out the pros and cons of using these two mammography techniques.

## **Lessons Learned From the Analysis**

The research and analysis has enabled me to learn more about film mammography and digital mammography, and this has helped me to advance my knowledge of these two techniques. In particular, I have learned the advantages and disadvantages of using each of these two techniques, as well as when to use one mammography technique over the other. For instance, I have learned that plain film mammography is equal or perhaps slightly better in the detection of breast cancer in breasts which are fatty, whereas digital technology is better in detecting cancer in breasts which are dense. As such, I have discovered that it is of major importance to evaluate the type of breast when determining which technology to use for a particular patient.

It has also increased my understanding of the implications that both film and digital imaging have on radiologists conducting large studies. It is imperative for radiographers to assess the best approach to ensure a less cumbersome process of analysis when striving to study a certain aspect of mammography. Furthermore, the knowledge gained from this exercise shall be instrumental in my future career,

particularly in advising patients on the most suitable mammography based on their age and breast density. This will contribute to reduced time and cost savings for the patients as well as the larger healthcare system. Accurate imaging reduces the chance of recalls, which is important for freeing resources for other patients and increasing access to health care. In summary, the information obtained in this exercise will be beneficial in my future practice as a radiographer.

## **Contribution of the Analysis to Future Research Projects**

As a scholar in radiology, the analysis of these three articles presents a challenge for future research projects. The exercise acts as a basis through which further research on imaging technology, particularly for breast cancer, can be pursued. Any improvement or development in digital mammography is sufficient reason to carry out a comprehensive study on its contribution towards diagnostic and screening value. Kerlikowske et al<sup>5</sup> assert that radiology and radiography scholars have an enormous role to play in establishing which technique is viable at present and in the future. There is ample opportunity for study as the changes occur in technology, and radiology scholars should play a leading research role in order to establish whether the transition to digital mammography ought to be pursued.

## **Conclusion**

From the analysis, it is clear that radiology and radiography play a key role in the screening and treatment of breast cancer. Treatment can only be successful when accurate results are obtained from the radiology department. Radiologists and radiographers should have adequate skills in using both digital and film technology in mammography. It is therefore a challenge for radiographers to upgrade their professional skills in order to provide the most suitable service available.

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