Advantages and Disadvantages of Mammography

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Abstract

For many countries, mammography screening is no longer a new concept. Screening has been a universal achievement in the sense that it has improved women's condition about cancer. Besides, the community appreciates screening for its role in identifying those infected. For many decades, the benefits and cons of screening the tragedy have been a subject for many groups. As such, researchers have been on the task to bring more invention relating to the same.

However, mammography is still a threat to life not only to the female gender but also to the young ones who need healthy mothers for parenting. There are also significant threats when screening is conducted making it more controversial.

The research also delved into the association of women's ages and the susceptibility to cancer. The research aims to determine both the advantages and disadvantages of mammography screening and establish why the advantages outweigh the disadvantages. It also aimed to determine the chances of obtaining accurate and false results of mammography screening.

I systematically identified and reviewed 14 peer-reviewed articles on mammography that were published between 2007 and 2017 to identify and extract information regarding the benefits and harms of mammography screening and the chances of obtaining accurate or false screening results. Information was obtained from three databases: PubMed, Scopus, and ScienceDirect. The analysis of the 14 articles, in combination with web-based literature, indicated that mammography contributes greatly to the reduction of cancer mortality rates among women aged 40-74. Mammography screening benefits are greater than the risks for women aged 50 and older compared to women 49 younger. Cost-effectiveness was also observed to be greater for the group of women aged 50 years and above. The susceptibility of developing cancer was found to increase with age.

The final part is the conclusion and it concentrates on the awareness of the benefits and potential harm of mammography that should be embraced. Additionally, further research should be conducted to develop existing breast cancer screening methods or identify newer and safer techniques.

Keywords: Mammogram, Mammography screening, Benefits, Risks, advantages, disadvantages

Introduction

Mammography is a technological process whereby X-rays with low natural energy are used in the examination of the breasts to diagnose or screen for breast cancer. Ionizing radiation is used to create the images. The presence of a mass or masses within the breast anatomy raises the alarm for breast cancer (Mammography, 2017, p. 450). Mammography is mostly used as a confirmatory diagnostic approach when a physical examination, which involves inspection and palpation of the breasts, reveals the presence of a mass or masses within the breast; however, sometimes women with no breast masses can undergo mammography as a screening test for breast cancer. On average, women between 50-74 need to undergo a mammogram at least once biennially, although the ideal screening frequency for all women of reproductive age is once a year. The radiological procedure has helped healthcare providers to diagnose breast cancer at an early stage and successfully treat it without posing any additional danger to the general health of the body. This has helped many women, especially those who frequently go for screening. Breast cancer can develop in any woman of reproductive age. However, the disease is common among women who are 40 or older and it is the second leading death in USA. Consequently, they are strongly urged to undergo regular mammography tests (Mammography, 2017, p.452).

Mammography confers numerous benefits for the client undergoing it. First, it enables early detection and treatment of breast cancer before it progresses to advanced stages, where treatment is difficult. Secondly, it can be used to assess the prognosis of breast cancer in patients already diagnosed with the disease. In spite of these advantages, however, mammography has various disadvantages. First, it is associated with potential danger, caused by exposure to harmful ionizing radiation emitted by the machines used. Prolonged exposure to this ionizing radiation can, in itself, induce carcinogenesis within the breast tissue. Secondly, the mammography procedure is painful; most clients report experiencing pain or some form of discomfort during the procedure. Additionally, women fear being diagnosed with breast cancer as it is perceived as a deadly illness and (because of) the associated stigma and isolation post-diagnosis by the society" (Beeker et al., 2000, p. 1274).

Moreover, the process has financial consequences. Mammography is quite costly for most people, and the accessibility of healthcare facilities where mammography can be done presents a challenge, as well, because the procedure can only be done in specific facilities. Consequently, most patients travel long distances to undergo the process. This compounds the pre-existing high cost of undergoing the procedure (Stout et al., 2017, p. 875). Some states lack mammography facilities making the procedure inaccessible to some.

Research problem

According to Dr. Habib Rahbar, a clinical director of breast cancer at Seattle Cancer Care Alliance, mammography has been proven beyond a reasonable doubt to have saved many lives (Mapes, 2017). He asserts that when people make a habit of being screened routinely, it will help to detect cancer at very early stages and therefore, make it easier to treat (Mapes,

2017). When breast cancer is noticed and diagnosed at an early stage, it increases the chances of survival for many patients and improves their overall disease outcome.

Although mammography has been shown to save lives, it can also pose a great danger to women as they get screened. During the process of screening, the machines used release necessary but harmful radiations. Long exposure to this radiation increases the likelihood of developing cancer. Additionally, in some instances, during screening the radiation produce false results (Bick & Diekmann, 2009). On the one hand, when the results are wrong, the patient will be subjected to medications, therapies and surgeries, something which affects them mentally, physically and also financially. On the other hand, the screening may fail to detect cancer cells growing and therefore the patient may live without worry and wrongly consider themselves safe and healthy. If the patient fails to take routine screening, cancer may not be detected until a later stage, when it becomes difficult to contain (Byers, et al., 1997). Due to the sudden increase cases in breast cancer in the recent past, fewer women are taking chances, and many have started to get mammography screening. The biggest questions remaining are whether is mammography screening worth taking and should women continue getting them ("Mammography," 2017).

Research objectives/questions/hypotheses

The objective of this project is based on the investigation of positive and negative impacts of mammography screening. In the recent past, there has been a heated debate about the benefits and possible harm related to screening (Mapes, 2017). One thing that everyone knows is that screening has helped many women to know their breast cancer status. This study, however, wants to dig deep into details about the possible harmful effects associated with mammography screening. The three main objectives of this study are as follows:

- To determine the benefits as well as dangers of breast cancer screening with mammograms.
- To determine the chances of accurate and false results of mammography screening.
- To identify cancer susceptibility of women over 40 years.

The study looks forward to meeting and finding answers to these objectives and questions respectively to provide useful information, which will help to end the controversies and debates about the benefits of mammography screening and also its dangers.

Methodology

This research was conducted using an organized review. The review was done to assess the limitations and quality of the published articles examining mammography advantages and disadvantages. Systematic reviews of mammography published between 2007 and 2017 were identified and extracted information regarding mammography. The reason this time frame was selected is that of the valuable research and literature that has been published between that time. The keywords that were searched included 'risks and benefits' of mammography or 'advantages and disadvantages' of mammography.

A systematic search of the electronic search engines was also conducted, and it included PubMed, Scopus, and ScienceDirect. Information from primary sources such as journal and books were also used. For each of the study, data regarding design, setting, estimates of harm or benefits, screening schedule and quality were extracted. To limit the findings, the applied for a systematic review. Titles and abstracts for relevant articles were screened, and as a result, ten articles out of the titles that were screened met the inclusion criteria. I found a total of 139 researches and articles from three databases. I excluded 125 articles and researches due to several reasons:

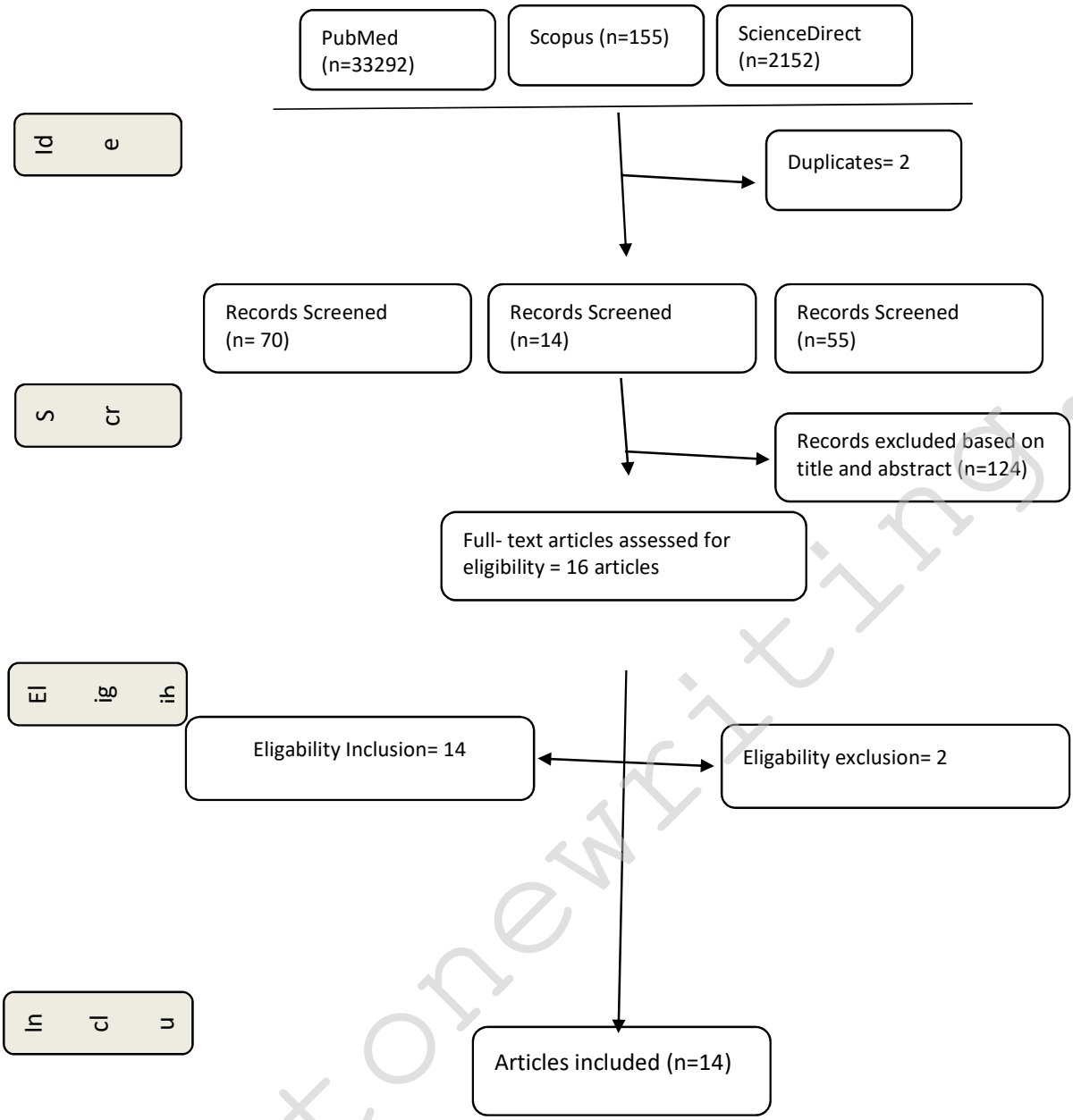
1- Several articles were published in Denmark, Sweden and Germany.

2- The majority of the articles are not focused directly on my topic for example, comparison between mammography Ultrasound, and MRI.

3- Two researches based the study on Japanese women.

4- One research was published by Sydney University.

I included 14 articles and all of them are relevant to the advantages and disadvantages of mammography. The following diagram will demonstrate the search mechanism I used.



Inclusion Criteria and Exclusion Criteria

The inclusion criteria for this was for women of the age of forty years living in the United States. The articles selected were related to the advantages and disadvantages of Mammography on the breasts. The articles were also written in English and published in the United States. The study sought to find a better understanding of the benefits and dangers of using mammograms for breast cancer screening in women.

The Exclusion criteria were male as participants, women outside the United States, not related or relevant to the advantages or disadvantages of mammography. The study also excluded participants who were below forty years and articles that were not written in English. It also excluded articles that included studies not conducted in the United States as well as those not related to the topic. The studies that did not contain results were also excluded.

Data Extraction

The data extraction process considered the essential elements of the study such as the publication date, the participants, results, methodology, and the conclusion. All the studies focused on the mammography screening advantages and disadvantages or the risks and benefits related to mammography screening. The greatest data value was extracted from the results and conclusion sections where the analysis, recommendations, and the potential benefits of the study. (Look at the table).

Data Analysis Thoughts

I believe the outcomes of this study will ensure that people understand the breast cancer screening risks or benefits. The present literature on this issue has been a bone of contention on whether the screening should be done or not. However, research indicates that

there are the associated risks and benefits. This study shows the importance of having mammography screening especially for women of forty years and over. Women who are in this age bracket are considered to be at risk of developing breast cancer.

There is no strong evidence to support the benefits of routine breast cancer screening. Most of the studies indicated that there is potential for harm and there is no clear evidence on whether the magnitude of the benefits is enough to warrant regular screening. The medical practitioners and specialists need to reconsider these factors for them to decide on whether to go on with the screening or stop it all the same. More study is necessary to find out the total mortality that is associated with breast cancer screening. Its advantages and disadvantages need to be researched more to determine its safety.

Data extraction table

No	Researchers, Date	Participants	Results	recommendations	Conclusions
1	Schueler Chu, and Rebecca Smith-Bindman, 2008	195 studies describing 47775,110 women which comprised of racial and ethnic distribution of white, African American, Latina and Chinese	Without the insurance consideration, several socioeconomic barriers did not seem to have an important impact on screening. The aspect of having cost, African American and Latina women were more concerned with the safety of mammography while white and	Physicians visits should be made available and affordable as well. Care providers should improve the frequency and scope of mammography recommendation as a direct contribution to enhancing mammography use.	Women with poor access to physicians, their chances of undergoing mammography were meager.

			Chinese women perceived having no insurance to be more critical.		
2	Pace and Keating April 2 2014	Women aged 39-74 years.	Mammography screening indicated a reduction of breast cancer deaths of women by 19% comprising 15% of women aged at 40 years and while 32% were women at their 60s. Women aged 4-50 undergoing mammography annually for ten years, the cumulative risk for false result cases is about 61%. Overdiagnosis rate was found to be approximately 19% for cancers diagnosed within the ten years period.	More research should be conducted in regards to risk models and decision aids tools for further quantification of overdiagnosis. Also, more research conducted to explore other possible strategies for screening breast cancer.	Decisions based on screening time and intervals should be made by the women depending on their perception of risks and advantages and their preferences as well.
3	Ravesteyn, Stout, Schechter, Eveline Alagoz, Trentham-Dietz, Mandelblatt, Harry,	A cohort of women born in 1960 at the age above 74 years.	A cohort of women born in 1960 at the age above 74 years. It was found that approximately 7.8-	An upper age limit deemed to be more appropriate in which it should be determined by weight at which the woman attaches	The balance between the harms and benefits of screening is less favorable for the age above 74 years.

	May 6 2015		11.4 LYG in every 1000 screens within the age of 74, at the period of 80 years it was estimated to be 4.8-7.8 LYG per 1000 screens which was a decrease for this group. After the adjustment for quality-for-life decrements, the LYG at the age of 74 years reduced by 5%-13% while at the age of 80, decreased by 11% to 22%. However, at 90-92 years the LYG counterbalanced with a loss in quality-of-life resulting from the increased number of overdiagnosed breast cancer per 1000 screens. The age within which harms starting to outweigh benefits shifted to a younger age.	to certain benefits and risks. Individual willingness to cater for QALY needs in terms of costs should be taken into account. Identification of DCIS that progress for the prevention of treating non-progressive diseases.	Overdiagnosis makes the harms to outweigh the benefits at the age of 90%.
4	Nelson, Tyne, Naik, Bougatsos, Chan, and Humphrey. 17th November 2009	Women at Average aged 40-49 and 70 years and above.	Average aged 40-49 and 70 years and above. Mammography reduces the mortality rate by 15% for women between 39-49. Radiation exposure was found to be low, and the patient's adverse experiences did not affect the	Special consideration is necessary for those women exposed to additional radiation for those susceptible to radiation and breast cancer.	Mammography screening reduces the Mortality rate related to breast cancer for women 39-69. It's conventional for false-positive results and additional imaging as well.

			screening practices. The estimated overdiagnosis rate was 1-10%. The results also implied that young women were more prone to false-positive results which resulted in additional imaging with few biopsies cases about the women at their old age. Additionally, the clinical breast examination's trials that were undertaken depicted that mammography didn't contribute to mortality reduction. Instead of the mortality reduction, it resulted in the increment of results on benign biopsy.		
5	Myers, Moorman, Gierisch, Havrilesky, Grimm, Ghate, Davidson, Mongtomery, Crowley, McCrory, Kendrick, Sanders. 20th October 2015	All women at all ages who were at average risk.	Mortality rate reduced by 20%. Those that underwent screening for the first time at the age of 40, their cumulative risk in regards to false-positive results was higher at 7%(95% CI, 6.1% to 7.8% annually compared to biennial screening which indicated 4.8% (95%CI, 4.4-5.2). The chances of obtaining	The research findings generated from the undertaken research and the uncertainties found as well needs to be considered in recommending in regards to judgments on the ratio between the benefits and harms related to screening.	All women within all the age brackets at average risk, screening reduced the mortality rate resulting from breast cancer.

			falsified results for those women at 40, undergoing screening the fast time was still similar to the results of women at the age of 50 years.		
6	Stout, Sandra Lee, Schechter, Kerlikowske, Alagoz, Berry, Buist, Cevik, Chisholm, Koning, Huang, Hubbard, Miglioretti, Munsell, Trentham-Dietz, Ravesteyn, Tosteson, Mandelblatt 14 March 2014	Women aged at 40-74 years	For every 1000 women aged 50-74 who underwent biennial screening transitioning from film to digital screening gave a median improvement of two years, additional deaths by 27%, additional false-positive of 220 and an additional cost of o.35 million. For a single woman, the results translated a health gain of 0.73 days. The biennial screening was cost-effective for women's age ranging from 40-49.	In regards to decreased quality of life resulting from screening advancement and other unintended consequences should always be evaluated especially their impact on the population health and costs as well with the adoption of new technology.	Decisions should be personal as per the patient preferences and risks profile thus individualized.
7	Niell, Freer, Robert Jared Weinfurtner, Elizabeth Arleo, Jennifer S. Drukteinis,	Women aged at 40-84 years.	Use of mammography helped in the detection of cancer at an early age with a 20-40% reduction of mortality rate whose results were derived from RCTs estimate. Women aged 40-84 through annual mammography screening more	Clinicians should own the empowerment in engaging women in informed discussions about the advantages and disadvantages related to regular mammography screening. Educating patients on the need to have breast cancer screening and early detection advantages should be embraced. This will help reduce the	The transition from film to mammography has resulted in increased costs for breast cancers screening with very few benefits in the extension of life in the USA especially those aged 40-49 years. The value attached to digital screening depended on the women preferences on false-positive results especially women aged at 40-49

			deaths were protected as compared to the use of biennial screening for women at 50-74 years	unnecessary deaths from breast cancer.	
8	Albert L. Siu, MD, MSPH,	Women aged at 40 years and who already developed cancer and others that had breast lesions but they were vulnerable to generating cancer due to the genetic mutation.	Over a 10-year period screening of 10000 women 60-69 years which resulted in a 21% reduction of deaths. The benefit was smaller for younger women. In most cases, the results obtained indicating the presence of breast cancer is usually false-positive. MRI helps in the detection of cancer especially for those having dense breast and also the discovery of the additional disease in the short-term.	Recommends biennial mammography screening for women aged between 50-74 years. The decision to when one should start screening for women below 50 should be individual-based.	USFT concluded that current evidence was not sufficient to determine the balance between the benefits and harms concerning mammography for women aged 75 years. Also, it's not enough to assess the implications of the digital breast on both harms and benefits of DBT as a primary screening method.
9	Nothacker, Duda, Markus Hahn, Warm, Degenhardt, Madjar, Weinbrenner and Albert, 20th September 2009	Women with dense breasts.	The systematic search indicated that there were RCTs or Systematic reviews, in which six cohort studies were found with an intermediate level of evidence. The tumor size was .9mm having a 90% status for a negative lymph node. Most of the cancer detected was found to occur to the dense	The health should utilize quality assurance assessment on the mammography screening programs that have been established, performance indicators and for surrogate which will be utilized in the healthcare analysis of outcomes. Validation of studies should not only be based on positive predictive value but instead should also include sensitivity as well as specificity and the negative predictive value as well.	Supplemental ultrasound for those women with dense breast tissue only permitted detection of microscopic breast cancers. This category of women with ACR 3 and 4 suffered adverse effects of increased biopsy rate. Three times more women have to undergo a biopsy in every detection of carcinoma by supplemental ultrasound than it would for mammography screening.

			mammographic breast especially ACR types 3 and 4.		
10	Archie Bleyer and Gilbert Welch Nov 22 2012	Women aged 40 years and above	The rate of women under the last stage of cancer has decreased as reflected by the decline from 102-94 for every 10000 women. Breast cancer for around 1.3million women was overdiagnosed I the past 30 years while in 2008 the overdiagnosis was estimated to be 31% equivalent to 70,000 women for all cancers diagnosed.	Strategies on the overdiagnosis risk mitigation should be embraced for the intervention group.	Although mammography has demonstrated an increase in cancer detection on women breasts, it has only reduced the rate of advanced cancers cases. There is also substantial overdiagnosis almost a third for all the diagnosed cancer currently.
11	Monticciolo, Newell, Hendrick, Helvie, Moy, Monsees, Kopans, Eby and Sickles. 2017	Women at all ages	Results obtained through regular mammographic screening highly contributes to the reduction of mortality across various study designs.	Assistance should be offered to women on the better understanding of risk associated with screening as weighing of risks and benefits as well should solely do by the women.	Overdiagnosis should not be considered in deciding when to start screening or in the selection of screening interval. Also, the decision concerning when to stop screening should solely base on health status and not the age of the woman.
12	Niell, Freer, Weinfurtner, Arleo and Drukteins. 2017.	Women of age 40 to 84 and a comparison to those aged 50 to 74 years.	For every 100 women screened, 22% were successfully treated. A 20% reduction rate of death was realized when the random controlled trials were conducted. A total of 255,180 breast cancers were dragonized in the year 2016. There were 773,100 reported	Random days should be put in place to enhance continuous screening for early detection of cancer when it can be cured or minimized.	Early screening plays a greater role in the detection of cancer so that corrective measures can be taken before the condition worsens. Therefore, the randomized controlled trials (RCT's) should be carried out so that the mortality rate caused by mammography can be reduced.

			deaths in the year 2013, and after RCT's were implemented, a 20% reduction in mortality rate was realized.		
13	Donald Berry August, 2013	Women at all ages.	Overdiagnosis magnitude ranges within 20-25%. Also, in comparison to what breast cancer mortality would be without mammography, mammography indicated a reduction of mortality by 30%.	Relevant ways should be embraced for communicating with the women in regards to the risk associated with mammography.	A tradeoff exists between harms and advantages when it is a matter of mammography screening. It is subject to risk factors and age.
14	Nicolien, Miglioretti, Stout,Schechter, Buist, Huang, Heijinsdijik, Dietz, Nelson, Maldebaltt and Koning.	Women aged 40-49 years.	For women aged between 50-74 years screening biennially reflects similar false-positive results in comparison to screening for women starting at the age of 40 years with digital mammography for those having 2-fold increased risk above the average. The ratio between film mammography is more preferred in comparison to digital mammography as it yields lower false-results. On sensitivity analysis, the researcher's results portrayed that with the use of a more	The rate of false-positive should be mitigated to raise benefits when it is a matter of women screening regardless of age.	Women within the range of 40-49 years who particularly have 2-fold risk increment have a similar balance between harms and benefits in regards to biennial screening for those aged 50-74 years. Screening methods, interval as well as outcome measure highly determines the level of the favorable harm-benefit ratio for the required RRs.

			comprehensive measure in regards to mammography harms, there was a slight change in the threshold RRs. Additionally, there was an indication of relative insensitivity to adherence assumptions.		

Literature Review

The role of Mammography

Mammography is normally utilized in most healthcare facilities in the detection of cancer at early stages for women having no symptoms. Moreover, it can be used in the detection of breast cancer for some who are having symptoms such as lumps, nipple discharge, and pain. Mammography has demonstrated effectiveness in reducing the rate of mortality in the second stage to cancer by 19 percent (Pace & Keating, 2014). This has instilled the need for people to be diagnosed so that cancer can be identified in its early stages. Furthermore, it has been indicated that the risk of breast cancer is increased due to the exposure to low-dose radiation among high-risk women (Niell et al., 2017, 1157). However, despite the increased utilization of mammography screening, a significant segment of women still remains under-screened or not at all (Schueller et al., 2008, 1478).

Similarly, it is disturbing for a cancer patient to emerge with new cancer following an investigative procedure. Even though mammography has a six percent risk of advancing the disease in women over 40 or stimulating malignancy in women under 30, it has advantages that outweigh the consequences (Stout et al., 2014, 6). Most of the preferred investigative techniques used in the 20th century, such as Randomized Controlled Trials (RCTs), have been revealed to have caused a higher number of false positives than the digital

mammography technique used today (Pace & Keating, 2014). The cumulative risk for false-positive mammography results has been reported as 21% - 49% after 10 mammography examinations for women in general (39-41 years) and up to 56% for women aged 40-49 years (Nelson, 2009, 732, para 4). The appropriate indication for the first-line investigation for breast tumors today is mammography (Bleyer & Welch, 2012).

Advantages, Disadvantages, and Controversies of Mammography use

Bleyer & Welch (2012) noted that mammography is key in the diagnosis of breast cancer. Mammography is a proven method to detect cancer (Monticciolo et al., 2017). Compared to traditional methods such as self-examination and early radiologic tools, mammography screening has enabled early diagnosis, which has helped increase diagnostic accuracy as one can identify cancer at an early stage, making it the preferred procedure when cancer is suspected (Monticciolo et al., 2017). Further, USPSTF found enough evidence that mammography screening reduces breast cancer mortality for women aged 40 to 74. Another benefit is early management, preventing progression to advanced stages of the disease. Another advantage of mammography over the RCT technique is that, unlike previous generations in which early radiographic tools increased the rate of cancer mortality in up to 20 percent of the cases, mammography has a much lower incidence of causing cancers (Schueler, Chu & Smith-Bindman, 2008). The highest rate of suspected breast cancer deaths was in 2013 that totaled to 773100 persons-years of life lost (Niell et al., 2017). Further indicated results from a study on the effectiveness of mammography indicated further that mammography has a higher chance of delivering long-term reliable results compared to other applicable methods used in screening (Myers et al., 2015).

However, there are disadvantages of employing the technique during diagnosis. First, since mammography uses radiation, there is a chance that exposed patients will develop new cancer. Radiation-induced breast cancer and resulting death can occur, although the number

is estimated to be low (Niell et al., 2017, pg.1157, par. 1). According to Niell et al., (2017), around 2-11 deaths would result from radiation-induced cancer for every 100,000 screened. The 2016 USPSTF recommendations stated that radiation induced cancer and the resulting death can occur although the number of these both invents is predicted to be low (Niell et al., 2017, pg. 1153). For example, in a more recent control study found that women exposed to diagnostic radiographs for screening or monitoring tuberculosis or pneumonia or even to therapeutic radiation for previous cancer increased risks for breast cancer (Nelson, 2009, pg. 731, para 1). Moreover, the risks likely outweigh the benefits for women over 74 due to the increased overdiagnosis (Van Ravesteyn et al., 2012, pg. 7 par. 8). In other cases, some women undergoing regular screening may find an invasive cancer or noninvasive condition that would never have caused problems in which there is about 19% chance that the cancer is overdiagnosed, and she will receive unnecessary treatment (Pace & Keating, 2014, Pg. 1333). Unfortunately, younger patients have a higher chance of false positives than older patients due to breast density (Stout et al., par. 13, Line 6). Similarly, overdiagnosis has raised awareness concerning small tumors that are misinterpreted as cancerous tumors (Pace & Keating, 2014, Pg. 4, par. 3).

The mammography screening services are usually associated with some cost for those being screened. The transition from film to digital screening for breast cancer among women in the U.S. has increased the costs with fewer benefits especially in life extension and more so for women aged 40-49 years (Stout, 2014, Pg. 7, para 4).

Despite the increment in the detection of cancer at an early stage, mammography has only marginally reduced the rate for the present women having an advanced cancer (Bleyer and Welch, 2012). Another contention is that the method is not efficient for patient older than 74 years, yet older patients have the highest chance of developing with a cancerous growth (Monticciolo et al., 2017, pg. 4).

The Accuracy of the Technique

The efficiency of any screening method relies on the rate of its specificity and actual sensitivity (Neill et al., 2017). On average in mammography, both rates run as high as 90 percent, with the lowest rate of specificity at 74 percent and the highest rate of sensitivity at 94 percent (Neill et al., 2017). Nelson et al. (2009) suggest that the accuracy of diagnosing breast cancer increases when using mammography, indicating that the sensitivity rises to 95 percent while the specificity records similarly high rates of up to 97 percent (Nelson et al., 2009, p. 735). Despite the rarity of false positives, they affect all age groups (Nelson et al., 2009, p. 735). Niell et al. (2017) argue that the mammography screening technique decreases the risk of contracting and advancing malignant tumors in at least one-fifth of the cases. Hence, the use of mammography today is significantly better than the old techniques such as the regular self-exam and screen-film methods, which could advance the disease in women under 30 (Niell et al., 2017).

The number of false positive is highly dependent on the age of the women especially for women between 40 and 49, as the test is believed to be less effective for this age range. The findings from those scanned indicate that there were constant figures for ages above 74 years (Van Ravesteyn et al., 2015). Additionally, the ages of 40 to 49 revealed a high number of false positive outcomes (Cui et al., 2018).

However, compared to the previous RCTs which is a scientific medical experiment that focuses on reducing bias in a new treatment, mammography has been proven to have stable and efficient results through years of diagnosis. Unfortunately, more extended exposure to radiation can easily manipulate the progression of illness with up to six percent incidence rate. According to Bleyer & Welch (2012), treating a dormant tumor of at breast and screening it by radiation stimulates the tumor to become more active and can become metastatic. Therefore, treating cancer that could not imply to the patient reduces the

efficiency of mammography which has resulted in increasing people's anxiety concerning the effectiveness of mammography screening.

Mammograms can be abnormal in situations where women take menopausal hormone therapy. These drugs contain a combination of progestin plus estrogen or estrogen-only and cause the density of the breast to increase. As a result, there are increased chances of individual developing breast cancer. According to the Food and Drug Administration, it is recommended that the smallest effective dose of progestin since its combination with estrogen, increases the risk of breast cancer to women (Pace & Keating, 2014).

Cancer Susceptibility among Women above 40 Years

Since the age group of women contracting cancer is estimated at 40, there is the need for increased selection of appropriate diagnostic techniques (Stout et al., 2014). Unfortunately, women who have recorded the highest incidences of the disease averaged between ages 60-70. Women in this age group are warned against the use of mammography as a screening technique (US Preventive Services Task Force, 2009; Nelson, 2009). These women (between 40 and 49) also risk contracting the illness with continued exposure to radiation (Stout et al., 2014). The balance between the benefits and harms of mammography becomes less favorable beyond the age of 74years. mammography becomes less favorable beyond age 74 years (Ravestetyn et al., 2014, Pg. 7, last para).
because of the increasing amount of overdiagnosis. Contrarily, those who utilized mammography screening techniques recorded a lower incidence for the age group of 40-49 (Monticciolo et al., 2017).

The incidences of contracting the illness increase with previous family history. For instance, in the case of prior family history, there is an increased relative rate at which women in the same lineage acquire the occurrence of the illness. Breast cancer has genetic predisposition among its determining factors, apart from the considerations of age and

exposure to radiation (Nothacker et al., 2009). There is concern that women above 40 years who get exposed to radiation have a higher susceptibility to acquiring the illness since the radiation from the scan can easily trigger adipose tissue hyperplasia. Despite the risks involved with the used of mammography for screening, there have been reduced incidences of mortality and the advancement of the illness over the period it has been used.

The Risks of Screening Using Mammography

The uncertainties that accompany mammographic screening can be classified as either quantifiable or unquantifiable. The quantifiable risks are derived from the comparison of the statistics from the users of mammography screening with that from those who use other techniques such as biopsy and the other imaging methods, while those such as overdiagnosis and anxiety are unquantifiable (Monticciolo et al., 2017. Commonly, the screening of breast cancer is associated with the possibility of the recall for other diagnostic techniques. Monticciolo et al. (2017) estimate the approximate values of the risk from previous studies as between 9 and 11 percent. Recall rates for NHS screening program were higher than 14 percent which had distorted detection results (p. 1140). Therefore, there is need to use the full-digital mammography which helps reduce the recall rate in diagnosing.

Lastly, the ages of between 40 and 49 have been associated with incidences of reduced sensitivity, leading to the need for other screening techniques such as biopsy since the screening tests are not effective due to the dense breast tissue. There is also a 0.67% chance that a woman screened with mammography will have a benign biopsy (Monticciolo et al., 2017). Anxiety related to mammography entirely relies on personal traits such as courage and fear for the disease to which resulted in varying results in most studies. Some patients have reported short-term incidences of anxiety that have produced long-term effects. The rate of overdiagnosis varies up to 54 percent (Monticciolo et al., 2017). The false positive and false negative outcomes are also occurring with this technique (Pace & Keating, 2014). The

risk of false positive outcomes increases among people of a younger age (Pace & Keating, 2014). The chance of a false positive is as high as 61 percent in women between 40-50 years and 41 percent in women between 66-74 years (Pace & Keating, 2014).

Results of the Study

Advantages and disadvantages of mammography

According to the reviewed sources of data, it indicates that there is substantial evidence of mammography benefits for women above 50 however for the women below the age of 49, the benefits seem to be conflicting. The balance between mammography advantages and demerits was found to be more favorable as the women aged to which for the younger women, the absolute benefits were smaller as compared to harms.

Category	Assessment	Follow-up
0	Need additional imaging evaluation: means that more studies are necessary to gather more information.	Additional imaging needed before a category can be assigned.
1	Negative: means that there is no significant or noticeable abnormality to report.	Continue annual screening mammography (for women over age 40).
2	Benign (noncancerous) finding: means that there has been a finding, such as benign calcifications or fibroadenoma, which is not cancerous.	Continue annual screening mammography (for women over age 40).
3	Probably benign: means that there is a finding that is most likely benign, but should be followed in a shorter period of time to see if the area of concern changes.	Receive a 6-month follow-up mammogram.
4	Suspicious abnormality: means that there are suspicious findings that could turn out to be cancer.	May require biopsy.
5	Highly suggestive of malignancy (cancer): means that there are findings that look like and probably are cancer.	Requires biopsy.
6	Known biopsy-proven malignancy (cancer): means that any findings on the mammogram have already proven to be cancer through a biopsy.	Biopsy confirms presence of cancer before treatment begins.

Chances for Accurate or False Results

The table indicated the categories of the results found, assessment and follow up needed. The possibility of accurate and false results among women was more attributed to age in which 25% of patients with invasive cancer were not detected between the age of 40-49 years. On the other hand, the possibility of false results among women aged above 50 years was ranging between 10-12%. This indicated that women below 50 years are more prone to inaccurate results as compared to women aged 50-74 years. Moreover, accurate

results from mammography would be enhanced through continuous screening to ascertain the final results.

Cancer Susceptibility Among Women

The susceptibility of developing cancer was found to increase with age in to which the risk of developing cancer was found to increase as the age increased.

- Mammography screening reduces the mortality rate by 15-30% starting from the age of 39-74 years.
- Despite the harm associated with screening as it has been debated for years, however, the benefits of mammography screening outweigh the risks for women aged above 74 years.
- For women aged above 74 years, the harms were more as compared to the benefits.
- Radiation exposure harms were found to be low (Nelson et al., 2009).
- Decisions on when to start undergoing mammography should be individually based in which women should be the one making the decisions based on their preference and risk profile.
- The chances of overdiagnosis from mammography screening ranges between 1-10% and younger women are more susceptible to false-positive results as compared to older women (Nelson et al., 2009).
- Biennial screening is more cost effective for younger women aged 40-49 compared to the old women (Stout et al., 2014).
- Mammography enables early detection of cancer reducing the number of women under the last stage of breast cancer (Bleyer & Welch, 2012).

Conclusion

Awareness of potential problems should be enhanced. Women also should be informed of the consequences of mammography screening both positive and negative impacts. To strengthen the effectiveness of the mammography screening amongst patient, quality assurance should be embraced. Furthermore, based on the harms identified, further research would be recommended to identify and develop new safer screening programs for better results for both potential and actual patients of cancer. On average women of age bracket of 50-74 can undergo mammography at least once within two years although the best screening frequency for all women who are above 40 years should be once a year. If this is done, breast cancer can be diagnosed at an early stage thus making it easier for treatment to be done. A more advanced method that can overcome the barrier on screening breasts with the denser tissue should be considered.

The research was confined to 14 articles which may lead to biased results. Time was also limiting factor when reviewing relevant sources. The research focused on the advantages, and disadvantages of mammography, cancer susceptibility amongst women aged 40-74 in which the research limited other women that are not included in this age bracket. The medical practitioners and specialists need to consider risks associated with the use of mammography for them to decide if it is safe to use this method. More study needs to be performed to determine the total mortality that is associated with breast cancer screening. The advantages and disadvantages also need to be delved more to ascertain the harms and safety of the mammography screening. If mammography screening is found to have health implications, then it should cease to be used to avoid putting patients at more risk.

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