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Benefits of 3D Breast Tomosynthesis Combined with 2D Digital Mammography in Screening Women for Breast Cancer

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Abstract
- Breast cancer screening imaging options have progressed greatly over the years in the women's lifespan, specificity, and image quality. According to DynaMed Plus, in 2012 there were 522,000 deaths by breast cancer and 1,677,000 total cases of breast cancer documented (Dynam, 2018). For years, traditional mammography has been the gold standard for breast cancer screening which offers two views of each breast. With advances in technology, the use of 3D breast tomosynthesis has become an advancement for improving breast cancer screening protocols at many health care facilities.

- My literature review was found in PubMed, DynaMed Plus, Cochrane Library, and Clinical Key from the year 2011 on. The benefits of 2D digital mammography alone, 3D breast tomosynthesis alone, and a combination study of both with 2D digital mammography and breast tomosynthesis are compared. This study also examines the differences in radiation dose of each imaging option. The research demonstrated that 2D digital mammography combined with 3D breast tomosynthesis offers the lowest recall rates, the highest sensitivity and specificity, and increases the effectiveness of breast cancer screening.

- Key Terms: breast cancer screening, age 40 and older, 2D digital mammography, 3D mammography, and radiation dose mammography.

Introduction
- 2D digital mammography has been considered the gold standard breast cancer screening test. Each health care facility develops its own protocol for breast cancer screening. Some facilities have the resources to combine 2D digital mammography with 3D breast tomosynthesis in one imaging system.

- 2D digital mammography consists of two views of each breast under compression. 3D breast tomosynthesis consists of the same views under compression for each breast. During 3D breast tomosynthesis, the patient is under compression while the machine moves in a semi-circular pattern to obtain many views from different angles. While the machine rotates around the breast, the x-ray detector records images that are ultimately assembled into a set of 2D images that can be viewed and interpreted in any plane. By combining the two views together, the radiologist gets a more complete view of the breast.

- The purpose of this study is to compare the specificity, sensitivity, and radiation dose of 2D digital mammography alone, 3D breast tomosynthesis alone, and 2D digital mammography combined with 3D breast tomosynthesis. This study involves screening in women age 40 and older for breast cancer. The sensitivity and specificity of the imaging is achieved in cranio-caudal views accompanied by correlating magnification views.

- Radiation dose and a slight increase in time that the patient is under compression are the main limitations of this combination being standard screening, is a modest increase in radiation dose as well as a reasonable achievable. There are some imaging systems in which there is no increase in radiation dose when combining 2D digital mammography with 3D breast tomosynthesis, but increased cost to the patient and healthcare facility. There have been studies which represent a limitation especially when stratifying into subgroups.

Statement of the Problem
- When a patient receives a 3D breast tomosynthesis scan, it can reconstruct images in 2D digital mammography scan would provide. This could ultimately eliminate the need for 2D digital mammography. Further investigation is needed to determine the specificity, sensitivity, and radiation dose between 2D digital mammography, 3D breast tomosynthesis, and these studies combined. This will help determine the safest and most effective imaging protocol for screening of breast cancer as this is an annual recommendation.

Research Question
- In women age 40 and older, does screening for breast cancer using 3D breast tomosynthesis combined with 2D digital mammography offer increased accuracy, specificity, sensitivity, and less recall back for patients?

- In women age 40 and older, does screening for breast cancer using combination of 2D digital mammography with 3D breast tomosynthesis versus 2D digital mammography alone to 3D breast tomosynthesis alone offer increased accuracy, specificity, sensitivity, and less recall back for patients?

- In women age 40 and older, does screening for breast cancer using 3D breast tomosynthesis alone versus 2D digital mammography alone offer increased accuracy, specificity, sensitivity, and less call back tests for patients?

- In women age 40 and older, does screening for breast cancer using 3D breast tomosynthesis alone versus 2D digital mammography alone offer increased accuracy, specificity, sensitivity, and less call back tests for patients?

- At least every two years for average-risk women aged 50-74. Patients offered screening at age 40; this is based on shared decision making. Mammography is the imaging of choice for patients with average-risk of breast cancer. A limitation was that the study’s read time was estimated for each imaging option. The research demonstrated that 2D digital mammography combined with 3D breast tomosynthesis offers the lowest recall rate, the highest sensitivity and specificity, and increases the effectiveness of breast cancer screening.

- Key Terms: breast cancer screening, age 40 and older, 2D digital mammography, 3D mammography, and radiation dose mammography.

Literature Review
- Current screening recommendations and imaging options for breast cancer

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