Digital Breast Tomosynthesis

Policy Number: MM.05.012  
Original Effective Date: 06/28/2013

Line(s) of Business: HMO; PPO; QUEST  
Current Effective Date: 06/28/2013

Section: Radiology

Place(s) of Service: Outpatient

I. Description

Digital breast tomosynthesis (DBT) is being developed as an approach to generate images that may improve the sensitivity and specificity of mammography. Current radiographic approaches to mammography produce two-dimensional (2D) images. These 2D systems can have limitations due to overlapping tissue in the breast that may hide lesions (cancers) or cause benign masses to appear suspicious. DBT, also called 3D mammography, may be utilized along with full-field digital mammography (FFDM) in screening for breast cancer and may also be used as a technique for the diagnosis of breast cancer in helping to clarify equivocal mammographic findings.

In evaluating DBT, studies must consider test accuracy (sensitivity and specificity), as well as recall rates. In addition, the incremental value of DBT might be compared to using additional views from traditional mammography. Radiation exposure is also a very important consideration. Finally, issues such as the duration of the examination (breast compression) are also important.

DBT utilizes a three-dimensional (3-D) breast imaging technique based on full-field digital mammography. During DBT, a woman is typically positioned for the conventional mammography. A machine takes multiple images (slices) approximately one milliliter or less as it rotates around the breast. The images are then digitally manipulated by a computer and displayed as a 3-D, high-resolution image on a workstation. Developers of this technology propose that a 3-D reconstruction of the breast will eliminate the problem of overlying tissue that might be mistaken for lesions or that might mask small cancers.

II. Policy

Digital breast tomosynthesis is not covered in the screening or diagnosis of breast cancer because it is not known to be effective in improving health outcomes when compared to conventional breast imaging technologies.
III. Administrative Guidelines

A. Member Agreement of Financial Responsibility

The patient must be informed of the financial implications of choosing to have the breast tomosynthesis and must acknowledge that the procedure is not covered by HMSA by signing the Member Agreement of Financial Responsibility prior to the service. If the aforementioned criteria are met, modifier GA should be appended to the digital breast tomosynthesis. When the modifier is GA billed, HMSA will process the claim to indicate member responsibility for this procedure.

The Member Agreement of Financial Responsibility needs to be kept on file by the servicing provider. To view, please see Agreement of Financial Responsibility for Digital Breast Tomosynthesis

B. There is no specific CPT code for this test. The testing would be reported with the appropriate breast mammography code along with an unlisted code for additional views.

<table>
<thead>
<tr>
<th>CPT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>77055</td>
<td>Mammography, unilateral</td>
</tr>
<tr>
<td>77056</td>
<td>Mammography, bilateral</td>
</tr>
<tr>
<td>77057</td>
<td>Screening mammography, bilateral</td>
</tr>
<tr>
<td>76499</td>
<td>Unlisted diagnostic radiographic procedure (when specified as digital breast tomosynthesis)</td>
</tr>
</tbody>
</table>

IV. Rationale

*Literature Review*

The primary outcomes to be examined include the number of cancers detected and the number of unnecessary biopsies performed. The recall rate is also a potentially useful outcome, as it is a surrogate measure for the false positive rate and will likely also correlate with the rate of unnecessary biopsies. Improvement in sensitivity and specificity of testing is an intermediate outcome that will impact the ultimate health outcomes, but is not by itself sufficient to establish that outcomes are improved. If the sensitivity of breast cancer detection is improved by tomosynthesis, then the number of cases detected will increase. If the specificity of cancer detection is improved, then the number of biopsies performed on patients without cancer will be decreased.

The studies below are divided into 2 groups based on the use of tomosynthesis as an adjunct to screening (comparator is standard 2-view, screening mammography) or in the evaluation of suspicious lesions (comparator is diagnostic mammography, also called spot-view mammography). However, all of the studies on its use as an adjunct to screening have samples enriched with cases with suspicious findings on initial mammography. In some studies, all of the women have been recalled for a diagnostic workup. Studies are underway that examine the use of tomosynthesis as a
substitute or adjunct to mammography in a true screening population, as described below in the section on Ongoing Research.

**Tomosynthesis Use as an Adjunct to Screening**

The premarket approval (PMA) by the FDA was based on review of 2 multi-reader case studies supported by the sponsor, Reader 1 and Reader 2, and a separate publication referred to as the Pittsburgh study. The studies varied in the number of tomosynthesis views that were used (1 or 2). The study populations were enriched in that additional cases of patients with cancer were added to the study population. Radiologists knew or learned that the case set is highly enriched with cancer cases. As a result, these were not the ideal patient populations, which would be prospective evaluations of this technology in a clinical relevant population.

**Reader Study 1.** The Reader 1 study compared the accuracy of 2-view two-dimensional (2D) full-field digital mammography (FFDM) with the 2-view 2D FFDM supplemented by 2-view three-dimensional (3D) digital breast tomosynthesis. (1) The study involved interpretation of a sample of 312 sets of images, 222 from a screening group and 90 (29%) from a biopsy group. Of the cases in the study, 48 (15%) had biopsy-proven cancer; 5 cancers were from the screening group and 43 were from the biopsy group; 16 were ductal carcinoma in situ (DCIS) only and 32 cancers were invasive. Images for the screening patients were selected randomly from a larger cohort of 1,083 subjects. This interpretation was not done as part of clinical care. In addition, copies of prior studies were not available to the readers. Fourteen radiologists participated in this study. However, only the results of the 12 radiologists who successfully completed the reader training were included in the analysis (2 did not complete training). The 12 readers included: 5 highly experienced, 2 experienced, and 5 less experienced radiologists.

Scores were compiled for each reader for each of the 312 sets of images. For all readers, using receiver-operator characteristics (ROC) analysis, the area under the curve (AUC) was superior with 2D plus 3D imaging (i.e., FFDM plus DBT) compared with 2D (i.e., FFDM) alone. The average increase in AUC was 0.072 (95% confidence interval [CI]: 0.037 to 0.107, p=0.0001) using the measure “probability of malignancy.”

Estimates of sensitivity and specificity were calculated based on “forced BIRADS” scores. The addition of the 3D tomosynthesis images to standard mammography increased the sensitivity by 8.0% (from 70.8% to 78.8%), and the specificity by 8.7% (from 76.9% to 85.6%), when a positive scan was defined as BIRADS 3, 4, or 5. Using BIRADS 4 or 5 as positive, sensitivity increased 10.7% (65.5% to 76.2%), and specificity increased 5.1% (84.1% to 89.2%). Improvements with use of 3D images were more modest in patients with calcifications; this occurred in 83 of the study patients.

There was a significant reduction in the recall rate among the screening cases. For screening cases, the recall rate decreased from 51.5% with 2D to 12.9% with 2D plus 3D.

**Reader Study 2.** The Reader Study 2 was conducted in response to deficiencies noted from the FDA. In particular, the results of Reader Study 2 were provided to support a lower dose tomosynthesis protocol (i.e., 2D plus one 3D-view, the 3D mediolateral [MLO] image), as well as to address concerns with the reader scoring methodology (identification of the correct location of a malignant lesion was not required for crediting readers with a true-positive result). Reader Study 2 used new readers and a new random selection of only non-cancer cases. Reader Study 2 reused the cancer
cases from Reader Study 1 with the addition of 3 more cancers. This again represented an enriched sample of cases.

The study involved interpretation of a sample of images from 310 cases, 220 selected from a screening group and 90 (29%) from a biopsy group. In this set, there were 51 cases with cancer. Images for these patients were selected randomly from a larger cohort of 1,083 subjects. Again, this interpretation was not done as part of clinical care. In addition, copies of prior studies were not available to the readers. Fifteen new radiologists (5 highly experienced, 6 experienced, and 4 less experienced) were used in this study. Readers received additional 3D-training based on the types of errors made during Reader Study 1. In Reader Study 1, the readers were trained not to dismiss lobulated masses even if they were circumscribed, however, based upon review of the dismissed cancer cases, approximately half of the readers did not adhere to that. In Reader Study 2, the readers were again trained not to dismiss lobulated circumscribed masses, and their training was reinforced in written format and with further examples.

This study compared the accuracy of 2-view 2D FFDM with the 2-view 2D FFDM supplemented by 1-view 3D digital breast tomosynthesis (MLO-view) and with 2-view 3D digital breast tomosynthesis (as in Reader Study 1).

For ROC-AUC results, the best reader performance was achieved when using 2D plus 3D (all views). The lower dose 2D plus 3D MLO option was also superior to 2D alone. The following are the results using the probability of malignancy scores; the 2D plus 3D mode was superior to 2D alone; ROC AUC improved by 0.068 (95% CI: 0.041 to 0.095); the 2D plus 3D MLO mode was superior to 2D alone; ROC AUC improved by 0.036 (95% CI: 0.009 to 0.063); the 2D plus 3D mode was superior to 2D plus 3D MLO; ROC AUC improved by 0.032 (95% CI: 0.005 to 0.059). These differences were all statistically significant with p-value <0.025.

For Reader Study 2, when taking BIRADS 3, 4, or 5 as positive, the sensitivity increased 12.0% and specificity increased 1.7% when comparing 2D plus 3D with using 2D alone.

**Table**: Sensitivity and specificity from “Forced BIRADS” (using BIRADS scores 3, 4, and 5 as positive).

<table>
<thead>
<tr>
<th>Mode</th>
<th>Sensitivity (N=48)</th>
<th>Specificity (N=264)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reader Study 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2D</td>
<td>70.8%</td>
<td>76.9%</td>
</tr>
<tr>
<td>2D plus 3D</td>
<td>78.8%</td>
<td>85.6%</td>
</tr>
<tr>
<td><strong>Reader Study 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2D</td>
<td>70.5%</td>
<td>78.3%</td>
</tr>
<tr>
<td>2D plus 3D MLO</td>
<td>75.0%</td>
<td>80.8%</td>
</tr>
<tr>
<td>2D plus 3D</td>
<td>82.5%</td>
<td>80.0%</td>
</tr>
</tbody>
</table>

For Reader Study 2, when BIRADS scores of 4 and 5 were considered positive, the sensitivities for the 3 groups were 62.7%, 71.4%, and 78.7% for 2D, 2D plus MLO, and 2D plus 3D, respectively. (Presumably the analysis for Study 2 was based on 51 cancers.) Specificities for the 3 groups were 86.2%, 86.0%, 84.5%, respectively.

Again, the recall rate decreased for the screening group with use of the 3D digital breast tomosynthesis, dropping from 44.2% to 24.0%.
**Pittsburgh Reader Study.** As part of the premarket approval (PMA) process, the company (sponsor) also submitted a research study performed by the University of Pittsburgh. The study was felt to be relevant to the review, but it was not designed or intended for the PMA submission. The study used different cancer cases than Reader Study 1 and Reader Study 2 above.

In this study, 8 readers read 125 cases in each of 4 display conditions: 2-view FFDM alone, 11 low-dose projections, reconstructed digital breast tomosynthesis images (MLO and craniocaudal [CC]), and a combined display mode of FFDM and digital breast tomosynthesis images. The cases were read in 4 reading sessions separated by at least one month. A single mode was used in each reading session. Two readers initially read by FFDM alone, 2 readers began with the frames, 2 readers began with the digital breast tomosynthesis images, and 2 readers began with the combined FFDM and tomosynthesis display. This also was an enriched case sample, with 35 of 125 cases (28%) having cancer.

Consistent with the 2 prior studies, this study also showed that ROC AUC increased with use of 3D tomosynthesis. This study also showed a decrease in the recall rate around 12 percentage points for non-cancer patients, a smaller reduction than noted in the other 2 studies.

A subsequent article reports on an additional analysis using a free-response ROC curve analysis, which indicated that readers had a higher true-positive fraction when using tomosynthesis and mammography combined.

**Other studies.** Gennaro and colleagues reported on a study of 200 women from Italy who had at least one breast lesion discovered by mammography and/or ultrasound classified as doubtful or suspicious or probably malignant. The patients underwent tomosynthesis with one view (mediolateral oblique [MLO]) of both breasts at a radiation dose noted to be comparable to that of standard screen-film mammography in 2 views (craniocaudal [CC] and MLO). They used a prototype tomosynthesis system by GE Healthcare that is not FDA-approved as of June 2012. Images were rated by 6 breast radiologists using the breast imaging reporting and data system (BIRADS) score. Ratings were compared with the truth established according to the standard of care. A multiple-reader multiple-case (MRMC) receiver-operating characteristic (ROC) analysis was performed. Clinical performance of digital breast tomosynthesis (DBT) compared with that of FFDM (digital mammography) was evaluated in terms of the difference between areas under ROC curves (AUCs) for BIRADS scores. Overall clinical performance with DBT and FFDM for malignant versus all other cases was not significantly different (AUCs 0.851 vs. 0.836, p=0.645). The authors concluded that the clinical performance of tomosynthesis in 1 view at the same total dose as standard screen-film mammography is not inferior to digital mammography in 2 views. Another study used a digital tomosynthesis prototype developed by Siemens, which is not FDA-approved, to compared single-view tomosynthesis and 2-view mammography. The researchers reported that the sensitivity using tomosynthesis was statistically significantly higher than for mammography, but there was no statistically significant difference in the specificity, which varied across readers.

In another study from Europe, Teertstra et al. evaluated mammography and tomosynthesis in 513 women with an abnormal screening mammogram or with clinical symptoms. The tomosynthesis was performed using prototype equipment by Hologic, which manufacturer the mammography/tomosynthesis equipment the FDA approved for marketing. Cases were prospectively classified according to the American College of Radiology (ACR) BI-RADS criteria. In
112 newly detected cancers, tomosynthesis and mammography were each false-negative in 8 cases (7%). In 3 patients, both mammography and tomosynthesis missed detecting the carcinoma. The sensitivity of both techniques for the detection of breast cancer was 92.9%, and the specificity of mammography and tomosynthesis was 86.1 and 84.4%, respectively. The authors noted that tomosynthesis can be used as an additional technique to mammography in patients referred with an abnormal screening mammogram or with clinical symptoms. They also comment that the additional lesions detected by tomosynthesis are also likely to be detected by other techniques used in the clinical work-up of these patients.

In a retrospective European study by Wallis et al., ten experienced mammography readers read mammograms and tomosynthesis results for women with breast density of 2-4 (using ACR criteria) who had breast symptoms or were recalled after routine screening. Of the 130 women, 64 had abnormal images, 40 of which turned out to be malignant, and 66 had normal images. The reference standard was cytology or pathology reports or one-year follow-up. The tomosynthesis was performed on a device not approved by the FDA, and two of the authors are employees of the equipment’s manufacturer. The readers had a minimum of 2 hours of tomosynthesis training. Two-view mammography (film or digital) was compared to both single- and double-view tomosynthesis. Only the area under the receiver operator characteristic curve was reported. Subgroup analyses were performed (e.g., masses vs. calcifications and readers with ≥10 years of experience reading mammograms vs. <10 years). According to the authors, mammographers in Europe typically read a higher volume of mammograms than those in the U.S., and all of the readers would be considered high-volume readers. The researchers found that diagnostic performance was better for 2-view tomosynthesis than 2-view mammography (average area under the ROC curve [AUC]: 0.772 for mammography, 0.851 for 2-view tomosynthesis; average difference: −0.078 [95% CI: −0.144, −0.0129], p=0.021). The result was similar among relatively less experienced readers (<10 years; AUC difference: −0.110 [95% CI: −0.204, −0.015], p=.03) but not among more experienced readers (≥10 years; AUC difference: −0.047 [95% CI: −0.135, 0.040], p=0.25)). For all other comparisons (e.g., single-view tomosynthesis vs. 2-view mammography, masses vs. calcifications) the difference in accuracy between tomosynthesis and mammography was not statistically significant. No statistical adjustment for multiple comparisons was reported. It took about twice as long for readers to review 2-view tomosynthesis results vs. mammography (124 seconds on average [range, 97-158 sec] vs. 67 seconds [range, 46-91 sec], respectively; 97 seconds [range, 73-136] for single-view tomosynthesis), but the readers were clearly much more experienced in reading mammograms. The precise location of the findings identified using each modality were not compared.

In a study from the U.K. in an unblinded clinical setting, Michel et al. reported on women recalled after routine screening. The reference standard was histology for women undergoing biopsy or surgery and clinical evaluation and other imaging results for women who did not. Film mammograms were read first, then with digital mammograms; and then breast tomosynthesis results were evaluated. Readers could change the thickness of the reconstructed section. The results are reported per lesion (n=792; 26.8% were malignant) rather than per person (n=738). The overall accuracy for breast tomosynthesis was increased compared to film and digital mammography. On AUC analysis the mean AUC was 0.7882±0.0198 [95% CI: 0.74945, 0.82702] for film mammography alone; 0.8949±0.0124 [95% CI: 0.87061, 0.91915] for combined film and digital mammography; and 0.9671±0.0050 [95% CI: 0.95732, 0.97683] for both types of mammography.
plus breast tomosynthesis. The difference in AUC between the 3 modalities, including tomosynthesis, and both types of mammography was 0.0722 (p=0.0001), and the difference in AUC between the 3 modalities and film mammography alone was 0.1789 (p=0.0001). However, it is not clear whether this accuracy applies to detection of lesions, or to detection of malignant lesions. The increased accuracy was limited to “soft-tissue” lesions (difference in AUC: 0.0704; p=0.0001) and not to microcalcifications (difference in AUC: 0.0077; p=0.3182). No difference across modalities was found based on breast density. No statistical adjustment for multiple comparisons was reported. Assuming that ratings of suspicion of malignancy of 3 (probably benign), 4 (suspicious), and 5 (malignant) using the rating system of the Royal College of Radiologists indicate malignancy, the sensitivity of film and digital mammography is 97.5%; the addition of breast tomosynthesis increases the sensitivity to 100%. The values for specificity are 51% and 74%, respectively, yielding positive predictive values of 42.3% and 58.8%, and negative predictive values of 98.3% and 100%, respectively. The use of rating 3 is open to question, given that it indicates that the finding is probably benign. The sensitivity is also reported using only rating 5 as an indication of malignancy, and the results are 39.7% for digital mammography and 58.3% for tomosynthesis. No statistical results were reported for these comparisons. The authors note the inherent bias in selecting the cases based on mammography, which is one of the modalities being compared. They state “these potential improvements in specificity and sensitivity will need to be carefully examined in large-scale trials.”

Bernardi et al. compared recall rates using tomosynthesis and mammography in a population of 158 consecutive cases of women in Italy recalled for a diagnostic workup based on mammography results. Tomosynthesis was performed using an FDA-approved Selenia Dimensions unit. Before the diagnostic workup, radiologists reviewed the tomosynthesis results and indicated whether or not the workup was necessary or unnecessary. The reference standard was the diagnostic workup performed on all study patients; ultrasound and biopsy results were included when those procedures were used. Twenty-one of the women (13.2%) had confirmed carcinoma. The 7 radiologists involved in the study were experienced mammographers who took a short course on interpreting tomosynthesis results taught by one of the study authors. Based on the tomosynthesis results, the radiologists found recall to be unnecessary in 102 (64.5%) of the cases; the remainder were deemed necessary. The necessary cases included all 21 cancer cases, as well as 35 false-positive cases. All 102 cases deemed unnecessary had benign outcomes. The positive predictive value of using the tomosynthesis to identify cancer in this population was 37.5%. This study was intended to be exploratory, and the researchers note the need for further research, which is already under way in other studies.

In a retrospective study, Spangler et al. compared the performance of full-field digital mammography and digital breast tomosynthesis for detecting and characterizing calcifications (malignant and benign), using 100 paired cases (FFDM and tomosynthesis on the same patient) and 5 readers. The cases included 20 biopsy-proven malignancies, 40 biopsy-proven non-cancer cases, and 40 randomly selected screening cases with normal results (i.e. a BIRADS rating of 1). The results yielded a sensitivity in detecting calcifications of 84% (95% CI: 79%, 88%) for FFDM and 75% (95% CI: 70%, 80%) for tomosynthesis. The specificity was 71% (95% CI: 64%, 77%) and 64% (95% CI: 56%, 70%), respectively. According to the authors, the FFDM results served as the reference standard. The difference in the area under the receiver operating characteristic (ROC) curve
between the 2 modalities was not statistically significant (p=0.13). However, the tomosynthesis procedures were performed on a research system, which may not be FDA-approved. Also, the researchers note that the cases with positive findings were initially identified using FFDM, so the results are biased in favor of that modality. The readers were also able to determine the thickness of the reconstructed section, and the location of the findings identified for each modality were not compared.

**Tomosynthesis Use in the Evaluation of Suspicious Lesions**

Another study by Noroozian and colleagues compared the performance of tomosynthesis and spot views on mammography in characterizing masses as benign or malignant. The tomosynthesis was performed on a combined tomosynthesis and whole breast ultrasound research system developed with GE Global Research, which is not FDA-approved. The mammographic spot views included digital, analog, spot compression, and spot magnification. The initial sample was composed of 260 consecutive women who had undergone tomosynthesis and who were referred for an interventional procedure and had clinical diagnostic breast imaging findings with a BI-RADS rating of 4 or 5. Cases with microcalcifications only were excluded (n=31), and a random sample of 108 benign cases were excluded to enrich the sample; 31 were excluded for other reasons. In selecting the cases from the resulting sample of 90, 20 were excluded because of issues with the tomosynthesis results, including truncated project artifacts (n=6), mass not included in field of view due to its location (n=13), and technical failure (n=1); 3 were excluded for other reasons. Four readers reviewed the results of mammographic spot views and tomosynthesis for 67 women with masses in random order. The readers had median breast imaging experience of 13.5 years (range, 3-20 yrs); one reader had no experience reading tomosynthesis, while the others had participated in another reader study. The reference standard was histopathologic results. Thirty (45%) of the masses were malignant. There was no statistically significant difference in the area under the ROC curve for the likelihood of malignancy (on a 12-point scale) between tomosynthesis and mammographic spot view results (average AUC: 0.91 for tomosynthesis and 0.90 for mammographic spot views; p=0.60 [95% CI: -0.7, 0.04]). The researchers note that wide confidence intervals indicate that the study had insufficient power. They also report that the readers would have recommended biopsy for 7 more cancers and 5 more benign lesions based on tomosynthesis versus mammographic spot views. Changes in recommendations for biopsy based on the 2 modalities were not statistically significant for any reader. However, all of these cases had been selected for an interventional procedure in the clinical setting.

**Radiation Dose**

The Executive Summary of the FDA Advisory Panel Meeting (September 2010) included information about radiation dosage. (1) The Mammography Quality Standards Act (MQSA) states: “The average glandular dose delivered during a single craniocaudal view of an FDA-accepted phantom simulating a standard breast shall not exceed 3.0 milligray (mGy) (0.3 rad) per exposure.”[21 CFR 900.12(e)(5)(vi)] The total dose for both the 2D FFDM and 3D DBT was measured using an ACR [American College of Radiology] breast phantom that simulates a 4.2 cm thick, 50% fat / 50% glandular equivalent compressed breast. The total dose to the phantom for the 2D plus 3D (4-views total) is approximately 5 mGy. The total dose to the phantom for the 2D plus 3D MLO (3-views
total) in Reader Study 2 is approximately 3.5 mGy. The total dose for 2-D alone (2-view FFDM) is approximately 2.0 mGy.

Hendrick estimated the lifetime attributable risk (LAR) of fatal breast cancer associated with several types of breast imaging. Using an estimate of mean glandular dose for 2-view digital mammography of 3.7 mGy, the LAR is 1.7 fatal breast cancers per 100,000 women aged 40 at exposure and less than 1 fatal breast cancer per 1 million women aged 80 at exposure. For women screened annually between ages 40 and 80 with film or digital mammography, the LAR for fatal breast cancer is estimated to be 20-25 fatal breast cancers per 100,000. Most of the risk is associated with screening at younger ages in this range. Hendrick also estimates that the mean glandular dose and therefore the LAR for fatal breast cancer associated with digital breast tomosynthesis is one to two times that for mammography, depending on how many tomosynthesis views are used. The risk would also presumably vary depending on how tomosynthesis is used, e.g., as a substitute or add-on to screening or diagnostic mammography.

### Ongoing Research

There are 12 ongoing research studies on breast tomosynthesis with an expected enrollment of more than 100 patients listed at online site clinicaltrials.gov. Hologic, Inc. is listed as a collaborator on 4 of the 12 studies. Six of the studies have a target enrollment of more than 1,000 patients. They include:

- two studies of tomosynthesis versus mammography for routine screening (sponsor: Region Skane; n=15,000; NCT01091545; and sponsor: Oslo University Hospital; n=25,000; NCT01248546);
- a comparison of tomosynthesis with mammography versus mammography alone in routine screening (sponsor: Case Comprehensive Cancer Center; n=12,000; NCT01593384);
- two comparisons of recall rates of tomosynthesis with or without mammography to mammography alone (sponsor: Rose Imaging Specialists, P.A.; n=10,000; NCT01569802; and sponsor: University of Pittsburgh; n=1,080; NCT01106911); and
- one study comparing tomosynthesis to mammography among women with histologically proven breast cancer, those with a history of treated cancer, or those with a detected anomaly requiring diagnosis (sponsor: Centre Oscar Lambret; n=1,172; NCT01612650).

Most of the other studies with sample sizes between 100 and 1,000 also examine the use of breast tomosynthesis in routine screening, including an ACRIN multicenter trial (sponsor: American College of Radiology Imaging Network [ACRIN]; n=550; NCT01236781), which has a particular focus on recall rates. One of the other studies focuses on its use in younger symptomatic women (sponsor: Liz Coote, NHS Tayside; n=200; NCT01241981); and another compares breast tomosynthesis reconstructed slice thickness of 1 mm versus 5 mm (sponsor: Emory University; n=180; NCT00957567). Another study on the use of tomosynthesis among women with a finding of BI-RADS 3 (probably benign finding) has been completed, but the results apparently have not been published yet (sponsor: WellSpan Health; PI: Joanne Trapeni; n=690; NCT00763100).

Four additional trials are listed that are examining new modalities that incorporate breast tomosynthesis, including the use of computer-aided detection (sponsor: University of Michigan;
Digital Breast Tomosynthesis

n=800; NCT00723541), contrast-enhanced mammography and contrast-enhanced tomosynthesis versus contrast-enhanced MRI (sponsor: Hologic, Inc.; n=70; NCT01433640); and a combined tomosynthesis and ultrasound device (sponsor: University of Michigan; n=260; NCT00721435).

Summary

The evidence on tomosynthesis consists primarily of studies of diagnostic accuracy in various patient populations, compared to mammography alone. The outcomes reported in these studies are generally sensitivity, specificity, and recall rates. The available studies are consistent in reporting improvements in sensitivity and specificity, and a decrease in recall rates, when DBT is used in addition to mammography. However, these studies do not provide adequate data about these outcomes when DBT is used in clinical practice since the studies do not accurately reflect the population of patients who present for clinical care. One study was performed in a clinical setting by adding breast tomosynthesis to both film and digital mammography among women recalled after screening, but the comparison was not to spot-view mammography, which would be used in this situation.

There also are concerns about determining the impact on recall rates when studies with enriched numbers of cancers are used. In addition, there still seem to be open questions about the number of DBT views that are needed. A related question is how the impact of using additional views from standard mammography would compare with the impact from digital breast tomosynthesis. Questions also still remain about the impact of calcifications on interpretation. Finally, more information is needed about the learning curve regarding interpretation of these studies.

In summary, the use of digital breast tomosynthesis in generating images for screening or diagnosis of breast cancer is considered investigational. Studies of outcomes (including accuracy and recall rate) with use in clinical practice and with larger samples are needed. There are a number of large studies under way, which should provide more definitive information about the performance of tomosynthesis with and without mammography in several different clinical situations (e.g., screening, diagnosis). In addition, there are unanswered questions about the number of images needed, as well as concerns about radiation dose and time for interpretation.

Practice Guidelines and Position Statements

The current (Version 1.2013) NCCN guidelines for breast cancer screening and diagnosis do not discuss tomosynthesis. The breast cancer screening guideline of the American College of Obstetricians and Gynecologists (ACOG) states that digital breast tomosynthesis is not recommended for routine screening.

V. Important Reminder

The purpose of this Medical Policy is to provide a guide to coverage. This Medical Policy is not intended to dictate to providers how to practice medicine. Nothing in this Medical Policy is intended to discourage or prohibit providing other medical advice or treatment deemed appropriate by the treating physician.

Benefit determinations are subject to applicable member contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control.
This Medical Policy has been developed through consideration of the medical necessity criteria under Hawaii’s Patients’ Bill of Rights and Responsibilities Act (Hawaii Revised Statutes §432E-1.4), generally accepted standards of medical practice and review of medical literature and government approval status. HMSA has determined that services not covered under this Medical Policy will not be medically necessary under Hawaii law in most cases. If a treating physician disagrees with HMSA’s determination as to medical necessity in a given case, the physician may request that HMSA reconsider the application of the medical necessity criteria to the case at issue in light of any supporting documentation.

VI. References


