Digital Breast Tomosynthesis Utilization in the United States: A Survey of Physician Members of the Society of Breast Imaging

Lara A. Hardesty, MD[a], *Sarah M. Kreidler, DPT, MS*[b], *Deborah H. Glueck, PhD*[b]

Abstract

Purpose: To assess utilization of digital breast tomosynthesis (DBT) and examine criteria for offering DBT to patients.

Methods: We created an online survey for physician members of the Society of Breast Imaging to assess their use of DBT. The questions covered availability of DBT at the participant's practice, whether DBT was used for clinical care or research, clinical decision rules guiding patient selection for DBT, costs associated with DBT, plans to obtain DBT, and breast imaging practice characteristics. Fisher's exact tests and logistic regression were used to compare DBT users and nonusers.

Results: In all, 670 members responded (response rate = 37%). Of these, 200 (30.0%) respondents reported using DBT, with 89% of these using DBT clinically. Participants were more likely to report DBT use if they worked at an academic practice (odds ratio [OR], 2.07; 95% confidence interval [CI], 1.41 to 3.03; $P < .001$), a practice with more than 3 breast imagers (OR, 2.36; 95% CI, 1.62 to 3.43; $P < .001$), or a practice with 7 or more mammography units (OR, 3.05; 95% CI, 2.11 to 4.39; $P < .001$). Criteria used to select patients to undergo DBT varied, with 107 (68.2%) using exam type (screening versus diagnostic), 25 (15.9%) using mammographic density, and 25 (15.9%) using breast cancer risk. Fees for DBT ranged from $25 to $250. In addition, 62.3% of nonusers planned to obtain DBT.

Conclusion: DBT is becoming more common but remains a limited resource. Clinical guidelines would assist practices in deciding whether to adopt DBT and in standardizing which patients should receive DBT.

Key Words: Digital breast tomosynthesis, mammography, breast cancer

J Am Coll Radiol 2014;11:594-599.

INTRODUCTION

Digital breast tomosynthesis (DBT), used in combination with digital mammography, has been shown to improve the diagnostic accuracy of breast cancer screening and diagnosis [1-21]. However, little is known about how and where DBT is being used in the United States. Without understanding which radiologists have or have not chosen to employ DBT, it is difficult to identify barriers to adoption of this new technology. In addition, knowledge of current use of DBT will inform the development of clinical guidelines for DBT.

DBT obtains multiple low-dose images of the breast from multiple angles and reconstructs those images into a 3-dimensional data set that is processed into thin slices for interpretation [22]. The thin-slice interpretation helps minimize the interference of overlapping normal breast tissue when the radiologist is searching for breast cancer on a DBT study [2,15].

Existing literature on DBT has focused on the description of the technology [2,15,22,23]. Additional authors have described the diagnostic accuracy of DBT for cancer detection in observer performance studies [1,3-11,13,14] and the diagnostic accuracy of DBT for breast cancer screening [12,16-21]. No studies to date have described where and how DBT is being utilized.

In this study, our goal was to describe the current use of DBT for clinical practice and research. We sought to identify practice characteristics that encouraged or inhibited adoption of DBT. In addition, we examined fees for DBT and whether these costs were passed on to

[a]Department of Radiology, School of Medicine, University of Colorado Denver, Aurora, Colorado.

[b]Department of Biostatistics, Colorado School of Public Health, University of Colorado Denver, Aurora, Colorado.

Corresponding author and reprints: Lara A. Hardesty, MD, Department of Radiology, University of Colorado Denver, Leprino Building, 12401 East 17th Avenue Mailstop L954, Aurora, CO 80045; e-mail: lara.hardesty@ucdenver.edu.

There are no conflicts of interest to disclose.

1546-1440/16/$36.00 ■ http://dx.doi.org/10.1016/j.jacr.2016.09.030
Reprinted from: J Am Coll Radiol 2014; 11: 594-599.

the patient. Lastly, we reviewed breast imagers' criteria for offering DBT to their patients to determine if a consensus existed regarding clinical indications for DBT. In other aspects of breast imaging, clinical indications for use are specified clearly and are widely agreed upon [24]. Such guidelines do not exist for the clinical use of DBT.

METHODS

An online survey was created to assess breast imagers' use of DBT. The survey included a total of 23 questions. The questions covered several aspects of DBT use, including the availability of DBT at the participant's clinic; whether DBT was used for clinical care, research purposes, or both; the clinical decision rules guiding patient selection for DBT; the patient costs associated with DBT; the practice's future plans to obtain DBT; and general characteristics of the participants' breast imaging practices. To limit the time burden for participants, branching logic was used. Thus, a survey respondent would only be presented with questions that were relevant based on previous responses. For example, a participant working at a clinic without DBT would not be asked to respond to questions about whether DBT was used for research or patient care. The survey was built using Survey Monkey's "Select Plan" [25].

Written permission was obtained from the Society of Breast Imaging (SBI) to utilize its membership list for the study. An invitation to participate in the survey was sent by e-mail in November 2012 to all physician members of the SBI. These radiologists are experts in the field of breast imaging and are certified by either the ABR or the American Osteopathic Board of Radiology [26]. Radiologist members of the SBI were selected for 2 reasons: they are often the primary physicians interpreting breast imaging studies, and they commonly influence decisions regarding the adoption of new breast imaging technology into their practices. Only practicing members were invited to participate. Trainees and retired physicians were excluded.

Descriptive statistics were calculated for practice demographics, both overall and stratified by DBT use. The size of a respondent's practice was measured using 2 metrics: the number of radiologists at the practice reading breast imaging and the total number of mammography units at the practice. A map was produced showing the percentage of respondents using DBT in each geographic region of the United States.

Frequencies were calculated for each of the survey responses. Separate Fisher's exact tests [27] were used to examine the association between the odds of DBT use and practice type, and the association between DBT use and practice size. Logistic regression [28] was used to test the association between the odds of DBT use and the setting of the respondents' breast imaging practice (rural, small town, small city, suburban, or major metropolitan area). For all hypothesis tests, odds ratios, 95% confidence intervals, and P values were produced. All hypothesis tests were performed with an alpha level of .05. Analyses were performed using R version 2.15.3 [29] and SAS version 9.3 [30].

RESULTS

We identified 1,930 eligible physicians from the SBI membership list. For 127 members, delivery of the e-mail invitation failed. Survey invitations were e-mailed successfully to 1,803 SBI members. A total of 670 physicians responded to the survey (response rate = 37%).

Number of Digital Breast Tomosynthesis Units

Of the 670 respondents, 200 (29.9%) reported using DBT, 102 (51%) of DBT users had only a single DBT unit at their practice, and 12 (6%) worked in practices with 7 or more DBT units. Only 11 (5.5%) DBT users worked in practices where all mammography units were DBT units.

Demographics of Practices Offering DBT

Practice demographics are summarized in Table 1. Figure 1 shows the percentage of respondents using DBT by region of the United States.

Academics versus Private Practice. Of respondents working in an academic institution, 38.8% (73 of 188) had DBT available in their practices, whereas 23.5% (104 of 443) of those working in private practice had DBT. Clinicians working in an academic environment were 2.07 times more likely to report using DBT (95% confidence interval [CI], 1.41 to 3.03; $P < .001$) than those working in private practice.

Practice Size. Respondents from practices with more than 3 breast imagers were 2.36 times more likely to report DBT use (95% CI,1.62 to 3.43; $P < .001$) when compared with respondents from practices with 3 or fewer breast imagers. Similarly, respondents from practices with 7 or more mammography units were 3.05 times more likely to report using DBT (95% CI, 2.11 to 4.39; $P < .001$) when compared with radiologists in practices with 6 or fewer mammography units.