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Explaining Breast Density Recommendations: An Introductory Workshop for Breast Health Providers

Rachel S. Casas, MD*, Ambili Ramachandran, MD, Christine M. Gunn, PhD, Janice M. Weinberg, ScD, Kitt Shaffer, MD, PhD

*Corresponding author: rachel.casas@gmail.com

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Abstract

Introduction: High breast density is an independent risk factor for breast cancer and can decrease the sensitivity of mammography. However, evidence surrounding recommendations for patient risk stratification and supplemental screening is evolving, and providers receive limited training on breast density counseling. **Methods:** We implemented an introductory, interactive workshop about breast density including current evidence behind supplemental screening and risk stratification. Designed for providers who counsel women on breast health, this workshop was evaluated with internal medicine providers, primary care residents, and radiology residents. We surveyed participants about knowledge and attitudes at baseline, postintervention (residents and providers), and 3-month follow-up (providers only). We compared baseline and postintervention scores and postintervention and 3-month follow-up scores using paired *t* tests and McNemar's tests. **Results:** Internal medicine providers had significant gains in knowledge when comparing baseline to postintervention surveys (6.5-8.5 on a 10-point scale, $p < .0001$), with knowledge gains maintained when comparing postintervention to 3-month follow-up surveys ($p = .06$). Primary care and radiology residents also had significant gains in knowledge when comparing baseline to postintervention surveys ($p < .004$ for both). All learner groups reported increases in their confidence regarding counseling women about breast density and referring for supplemental screening. **Discussion:** Through this breast density session, we showed trends for increased knowledge and change in attitudes for multiple learner groups. Because we aim to prepare providers with the best currently available recommendations, these materials will require frequent updating as breast density evidence and national consensus evolve.

Keywords

Faculty Development, Women's Health, Breast Density

Appendices

- A. Breast Density Presentation .pptx
- B. Breast Density Letter.pdf
- C. Breast Density Algorithm .pptx
- D. Baseline Provider Survey .pdf
- E. Postintervention Survey.pdf
- F. Three-Month Follow-up Survey.pdf
- G. Baseline Resident Survey .pdf
- H. Survey Answer Key.docx

All appendices are peer reviewed as integral parts of the Original Publication.

Educational Objectives

By the end of this session, learners will be able to:

1. Define breast density and its impact on mammography.
2. Compare the relative risks of clinical factors for breast cancer.
3. Describe breast density notification legislation.
4. Perform a risk assessment for women with dense breasts.
5. Apply an algorithm to assess the need for supplemental imaging.
6. Discuss counseling techniques for risk communication.

Introduction

High breast density, defined as the amount of radiopaque (fibroglandular) relative to radiolucent (fatty) tissue on mammography, has emerged as a risk factor for breast cancer. Women with dense breasts have an increased risk of breast cancer compared to women without dense breasts (odds ratio 4.7, 95% confidence interval, 3.0-7.4, comparing highest to lowest breast density categories).¹ Breast density also decreases the ability of mammography to detect abnormalities through a masking effect.^{1,2} Given these

factors, breast density should be considered when determining breast cancer risk and if supplemental imaging modalities may be indicated.

The topic of breast density is receiving increased attention as more states across the country pass legislation requiring patient notification about mammographic breast density. The intent of such legislation is to raise awareness among women about the implications of breast density so that they can make informed breast health decisions. Breast density notification legislation requires mammography centers to inform patients with dense breasts of these clinical implications; however, there is limited scientific evidence to guide appropriate use of supplemental screening.³

Providers who care for women undergoing mammography screening, such as practitioners in internal medicine, family medicine, obstetrics and gynecology, and radiology, receive limited training in the clinical implications of breast density and may be unprepared to counsel patients with dense breasts. Surveys of primary care providers in states with mandatory notification legislation found that a third to a half of participants lacked awareness of these laws and that about half were uncomfortable answering patients' questions about breast density.^{4,5} The majority of these survey respondents were interested in additional education about breast density through brief educational presentations or a synopsis of the literature. At our own institution, a prior needs assessment confirmed that 85% of providers surveyed were interested in training about breast density (C.M. Gunn, personal communication, April 2017).

Although surveys have identified a need for additional education related to breast density, our review found limited educational resources in this rapidly developing area. We searched for recommendations about breast density educational materials on PubMed, *MedEdPORTAL*, institutional websites, and professional societies. One example of existing educational content comes from the University of Michigan Office of Continuous Professional Development.⁶ Although clinically robust, the content is specific to the state of Michigan and designed for online distance education. Another online course on breast density risks and counseling is offered through the University of Pittsburgh and the International Center for Postgraduate Medical Education.⁷ While materials on breast cancer screening do exist on *MedEdPORTAL*, we did not find published materials about breast density education designed for live implementation.⁸⁻¹⁰

We developed an educational workshop on breast density that discusses current national recommendations for risk stratification and supplemental screening and is designed for live implementation with a facilitator for practicing providers or advanced residents. We chose this format because it offered an efficient, engaging modality to deliver new content and the opportunity for participants to discuss their varied clinical experiences and knowledge of this controversial topic. We designed the workshop to implement concepts of adult learning theory by making the content relevant, practical, and goal oriented. More specifically, in the constructivist framework, participants are given the opportunity to compare new and existing knowledge and, by reflecting upon these differences, analyze concepts and apply them to new situations.¹¹ To promote reflection of session content, we included interactive elements such as multiple-choice questions, discussion prompts, and case application of a breast density algorithm. The content for this session was created by a multidisciplinary team of women's health educators in primary care and radiology based upon the best available evidence from existing literature and national societies (the American College of Radiology, the National Comprehensive Cancer Network, and the National Cancer Institute).^{4,12-16} The overall purpose of the workshop was to improve providers' knowledge about breast density risks and notification legislation and to increase confidence in counseling patients about supplemental imaging.

Methods

This workshop on breast density is designed as an introductory session for practicing clinicians (internal medicine, family medicine, obstetrics and gynecology, and radiology) who counsel women about breast health. Participants should have a basic understanding of breast cancer screening recommendations and shared decision-making counseling techniques. For reference, the most commonly used breast cancer screening recommendations for average-risk women are those from the American College of

Obstetricians and Gynecologists, the U.S. Preventive Services Task Force, and the American Cancer Society.^{3,17,18}

We implemented this session with a group of internal medicine primary care providers (both physicians and nurse practitioners), internal medicine residents in a primary care track, and all radiology residents at Boston University Medical Center (BUMC). All internal medicine providers in the section of general internal medicine were invited by email to attend the session. For residents, the sessions were part of regularly scheduled didactics.

Our session on breast density risk assessment is based upon the best available evidence from existing literature, national societies, and existing decision algorithms.^{4,12-16} We provide an example of supplemental screening based upon recommendations for Massachusetts but encourage future facilitators to contact their local radiology department or breast health center prior to facilitating this session in order to include local practice patterns (a prompt—slide 48—is included in the PowerPoint presentation [Appendix A] as well).

The session is a PowerPoint presentation (Appendix A) designed to take 50-60 minutes to complete and requiring a projector and an internet connection for delivery. Throughout the presentation, there are opportunities to engage the participants. For example, the presentation opens with a patient case intended to stimulate discussion about participant experiences with breast density counseling (slides 4-5). Facilitators can prompt participants to discuss the case in pairs or as a large group and then explain their answers. Frequent multiple-choice questions allow participants to test their knowledge during the presentation, and facilitators should use the questions to help identify areas of agreement or confusion. Additional session materials included to encourage audience participation are an example of a breast density letter (Appendix B) for discussion and a risk-stratification algorithm (Appendix C) for active application to included case examples. We recommend distributing copies of the sample breast density letter to participants when the corresponding slide (24) is displayed and allowing 1-2 minutes for participants to read the letter. We found that once participants had read the letter, asking them to talk about it with a partner and then as a large group (pair-share) led to active discussion and reflection. We recommend distributing the risk-stratification algorithm to participants at the beginning of the risk-stratification section of the presentation (slide 49) to allow participants to follow the algorithm as it is presented and use it for reference in the subsequent example cases section (slide 58).

For faculty, the session was delivered in the evening immediately after clinic hours to encourage voluntary attendance from practicing providers. For the primary care residents, the session was delivered during dedicated didactic time in an ambulatory block, and for the radiology residents, during a lunch noon-conference time.

Using anonymous surveys at baseline, immediately following intervention, and after 3 months (intervention group), we evaluated the demographics, practice patterns, knowledge, and attitudes of participants. We additionally asked participants about planned changes in practice at postintervention and about experienced changes in practice at the 3-month follow-up. The surveys included 20-24 questions and were designed for completion within 5 minutes.

We created the knowledge questions based on the results of a needs assessment conducted in the general internal medicine section, which showed that none of the 82 providers surveyed could identify the required components of the Massachusetts notification and only 34 (41%) could identify that no current guidelines recommended the use of supplemental screening tests based solely on a finding of dense breasts (C.M. Gunn, personal communication, April 2017). We derived the attitude questions from a review of the literature and in accord with our learning objectives.⁵

Paper surveys were used at baseline (Appendix D) and postintervention (Appendix E) to maximize the response rate from the audience in the intervention group. Electronic surveys were emailed to providers 3

months following the intervention (Appendix F). All participants who completed the 3-month surveys were eligible for a \$10 online gift card, and nonresponders were sent one follow-up email.

Additionally, we recruited a referent group electronically, by anonymously surveying all general internal medicine providers who did not attend the breast density educational session. This survey was sent the same week as the intervention and included the same questions as the intervention baseline survey. We similarly evaluated resident demographics, knowledge, practice patterns, and attitudes using anonymous surveys at baseline (Appendix G) and immediately after the educational session. An answer key for knowledge survey questions is included (Appendix H). Electronic data were collected and managed using electronic data capture tools hosted at BUMC.¹⁹

Participant demographic information, including gender, number of years of practice (categories: 0-5, 6-10, 11-15, 16-20, and >20 years), and percentage of female patients (categories: 0%-20%, 21%-40%, 41%-60%, 61%-80%, 81%-100%), was descriptively summarized. Demographics were compared between the provider intervention and referent groups and the primary care and radiology residents using chi-square or Fisher exact tests (as needed for our small sample size).

We created a summation score from the 10 knowledge-based questions and used paired *t* tests to compare scores at baseline to postintervention (providers and residents) and postintervention to 3-month follow-up (providers only). Knowledge scores between the provider intervention and referent groups were compared using two-sample *t* tests.

Attitude questions were dichotomized into participants who strongly disagreed, disagreed, or were neutral and those who strongly agreed or agreed. McNemar's tests were used to compare responses to the four attitude questions at baseline compared to postintervention (providers and residents) and postintervention compared to 3-month follow-up (faculty only). We compared attitudes between provider intervention and referent groups and between primary care and radiology residents using chi-square or Fisher exact tests.

We completed data analysis with SAS 9.4 (SAS Institute, Cary, NC). For results of comparisons, $p < .05$ was considered statistically significant. This study was determined to be exempt by the Boston University Institutional Review Board.

Results

The sessions on breast density were delivered by two of the study authors. Both are internal medicine physicians who practice women's health primary care and have clinical training in breast health.

Faculty Participants

A total of 14 providers participated in the educational session (intervention group), with one participant excluded from analysis for not completing the baseline survey. All 150 internal medicine providers were invited to attend. The majority of participants were women (11, 86%) and had been in practice for less than 5 years since completing their training (six, 43%). Only two providers reported having 40% or fewer women in their clinic panel. The group contained two nurse practitioners and 12 physicians.

Twenty-one clinicians who did not attend the educational session participated in the baseline survey (referent group). There was no significant difference between the intervention group and the referent group by gender, years in practice, or percentage of female patients in their clinic panels ($p > .40$ for all comparisons).

At baseline, similar numbers of participants reported discussing breast density with their patients in the intervention (nine, 69%) and referent groups (14, 67%; $p > .99$). Two participants in the intervention group changed their response from not discussing breast density at baseline to discussing breast density at 3-month follow-up.

In the intervention group, knowledge scores were significantly higher on the postintervention compared to baseline survey (2.00 points, $p < .0001$), without statistically significant change in scores between

postintervention and 3-month follow-up surveys (0.87 points, $p = .06$; Table 1). The intervention and comparison groups had similar composite knowledge scores at baseline ($M = 6.50$, $SD = 0.88$, and $M = 6.70$, $SD = 2.00$, respectively; $p = .77$).

Table 1. Knowledge Scores of Provider Intervention Group at Baseline and Follow-up

Baseline $M (SD)^a$	Time Point		Baseline to Postintervention	p
	Postintervention $M (SD)^a$	3-Month Follow-up $M (SD)^b$		
6.50 (0.88)	8.50 (0.78)	7.70 (1.20)	<.0001	.06

^a $N = 13$.

^b $N = 6$. Mean (SD) scores for these six participants were 7.00 (0.89) at baseline and 8.80 (0.41) at postintervention surveys.

Agreement with attitude questions did not significantly differ between the intervention and referent groups at baseline (all $ps > .1$). In the postintervention survey compared to the baseline survey, more participants in the intervention group agreed or strongly agreed with attitudes stated in questions Q1, Q2, and Q3, with a statistically significant increase in agreement for Q2 ($p = .03$) and Q3 ($p = .02$; Table 2). There was no significant difference in responses to attitude-based questions between the postintervention and 3-month follow-up surveys ($p > .99$).

Table 2. Provider Intervention Group Participants Who Strongly Agreed or Agreed With Attitude Questions

Question	Time Point			Baseline to Postintervention p
	Baseline $N (\%)^a$	Postintervention $N (\%)^a$	3-Month Follow-up $N (\%)^b$	
Q1: It is my responsibility to counsel women about breast density.	6 (46)	11 (85)	3 (50)	.06
Q2: I am comfortable counseling women about breast density.	5 (38)	11 (85)	5 (83)	.03
Q3: I know when to refer a woman with dense breasts for supplemental imaging.	5 (38)	11 (85)	5 (83)	.02
Q4: I know how to risk-stratify women with dense breasts.	11 (85)	11 (85)	4 (67)	.99

^a $N = 13$.

^b $N = 6$.

Residents

A total of 14 primary care residents and 17 radiology residents participated in education sessions. More primary care residents were women (10, 71%) compared to radiology residents (four, 27%; two did not provide demographic information; $p = .03$). Primary care residents were earlier in their training (seven PGY1s, six PGY2s, one PGY3) compared to radiology residents (one PGY1, six PGY2s, four PGY3s, one PGY4, five PGY5s; $p = .004$), although total training years for these specialties differ.

Both primary care and radiology residents had significantly higher knowledge scores postintervention compared to baseline (changes in score: 2.8 and 1.4 points, $ps < .0001$ and $.004$, respectively; Table 3). Scores of primary care and radiology residents did not differ at baseline ($p = .39$), but primary care residents' scores were higher than corresponding radiology residents' scores at postintervention testing ($p = .04$).

Table 3. Knowledge Scores of Primary Care and Radiology Residents

Resident Group	Time Point		p
	Baseline $M (SD)$	Postintervention $M (SD)$	
Primary care ($N = 14$)	5.8 (1.8)	8.6 (0.6)	.0001
Radiology ($N = 17$)	6.4 (1.8)	7.8 (1.3)	.004

More residents agreed or strongly agreed with all attitudes questions in the postintervention compared to baseline survey, with significant change for Q1, Q2, and Q3 for primary care residents and for Q2 and Q3 for radiology residents (Table 4). More radiology residents stated they strongly agreed or agreed with

attitude questions at baseline compared to primary care residents ($p < .05$ for Q1, Q2, and Q3). There was no statistically significant difference between primary care and radiology residents' responses in the postintervention attitude surveys ($p > .10$ for all questions).

Table 4. Primary Care and Radiology Residents Who Strongly Agreed or Agreed With Attitude Questions

Question	Primary Care Residents			Radiology Residents		
	Baseline N (%)	Postintervention N (%)	p	Baseline N (%)	Postintervention N (%)	p
Q1: It is my responsibility to counsel women about breast density.	1 (7)	13 (93)	.0005	7 (41)	12 (71)	.06
Q2: I am comfortable counseling women about breast density.	0 (0)	13 (93)	— ^a	7 (41)	13 (76)	.03
Q3: I know when to refer a woman with dense breasts for supplemental imaging.	1 (7)	14 (100)	— ^a	7 (41)	13 (76)	.03
Q4: I know how to risk-stratify women with dense breasts.	8 (57)	13 (93)	.06	10 (59)	12 (71)	.63

^aA p value could not be computed for Q2 or Q3 using McNemar's tests.

Discussion

In summary, this workshop is an interactive, introductory platform for discussing national recommendations for breast density risk stratification and supplemental screening. While recommendations for breast density stratification do exist for some states, development of this workshop was challenging because of limited studies and emerging national consensus on supplemental screening for women with dense breasts. We were encouraged by the number of internal medicine providers who expressed interest in learning more about this topic after the workshop was implemented (but who were not able to attend the first session).

We believe that this session is appropriate for practicing breast health physicians across a range of general practice and specialties. Internal medicine residents reported the most notable gains in knowledge and changes in attitudes from this session, but they required a slower pace and more emphasis on imaging background. With our practicing providers, we spent more time discussing practice patterns, patient reactions to breast density notification, and challenges to approaching risk stratification in clinic. We believe that this session is most appropriate for radiology residents earlier in training given the introductory level of the imaging content, but it can also provide a primary care perspective about counseling challenges. Adapting this curriculum for radiologists is important because many of the breast density notifications indicate that patients have the right to speak with the interpreting radiologist.

Our evaluation showed significantly increased knowledge of breast density for internal medicine providers and residents and radiology residents immediately following implementation of the module. This increase in knowledge was maintained at 3-month follow-up for providers. Primary care and radiology residents had similar baseline knowledge about breast density, but primary care residents had higher postintervention scores. More qualitative exploration is needed to determine why these scores were higher, but we hypothesize that the content is better suited to primary care interests and scope of practice.

We found a significant change in agreement for two of the attitude questions for providers and residents following the session: in their comfort discussing breast density and in knowing when to refer women with dense breasts for supplemental screening. Attitudes about responsibility for discussing breast density increased for primary care residents only. Internal medicine faculty may have more set opinions about this responsibility, and for our radiology residents, counseling about breast density is not in the scope of their general practice. For providers, changes in attitudes were maintained at 3-month follow-up. There were no changes in attitude about knowing how to risk-stratify patients for any participant group, although baseline confidence for these questions was relatively high. More clarity in the algorithm and number of examples may be needed in future versions of the session to impact this attitude.

While our data showed that knowledge and attitude changes were maintained at 3 months postintervention, conclusions from these data are limited by the low response rate to the 3-month follow-

up survey. Future evaluations of this session could benefit from more intensive follow-up recruitment or stronger incentives for participation. Additionally, the small sample size of surveyed groups could have led to underpowered analysis. Our provider participants had similar demographics, knowledge, and attitudes at baseline compared to the referent group of providers. Consequently, we believe that the results of our evaluation can be generalized to providers at our institution and potentially to providers at similar institutions. Providers, however, did self-select to participate in the intervention and may have been more motivated to learn material about breast density. It is also possible that participants differed from the referent group in demographics or characteristics not included in our surveys. Another limitation is that we do not have longer term follow-up data or a control group for the residents. While we have attempted to present a risk-stratification algorithm that can be applied nationally, our algorithm is based upon the recommendations of the Massachusetts Breast Risk Education and Assessment Task Force and may have limitations in national generalizability of content. We believe that our evaluation approach of knowledge- and attitude-based questions can be applied to both faculty and resident learners, but it may be less relevant for trainees in radiology, as discussed above. While this session was facilitated by women's health providers with experience in breast health, we have included detailed slides and notes that should allow for delivery by presenters less experienced in this content area.

In the future, it would be interesting to deliver this session in a combined multidisciplinary conference with residents and/or providers from different specialties. Breast density is an area of rapidly emerging data, and these materials will require frequent updating as recommendations evolve. We are hopeful that national consensus for breast density supplemental screening will occur in the near future, but this currently remains an area of clinical challenge for many providers. States with mandatory breast notification legislation should offer training or continuing medical education opportunities, such as this session, to prepare practicing clinicians for the patient inquiries and the clinical decisions that follow.

Rachel S. Casas, MD: Assistant Professor, Department of Medicine, Pennsylvania State University College of Medicine

Ambili Ramachandran, MD: Assistant Professor, Department of Medicine, University of Texas Health San Antonio

Christine M. Gunn, PhD: Assistant Professor, Department of Public Health, Boston University; Assistant Professor, Evans Department of Medicine, Boston University School of Medicine

Janice M. Weinberg, ScD: Professor, Department of Biostatistics, Boston University School of Public Health

Kitt Shaffer, MD, PhD: Professor, Department of Radiology, Boston University School of Medicine

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Disclosures

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Ethical Approval

The Boston University Office of the Institutional Review Board approved this study.

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