Dense Breast Tissue Notification: Impact on Women's Perceived Risk, Anxiety, and Intentions for Future Breast Cancer Screening

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Abstract

Purpose: The aim of this study was to explore how women respond to the wording of dense breast tissue notifications, which are increasingly required by state law after mammography. The specific aims were to (1) determine whether perceived lifetime risk for breast cancer and intentions to undergo mammography increase after reviewing a sample notification, (2) explore individual difference variables (eg, minority status, insurance coverage) that may influence intentions for additional ultrasound screening, and (3) assess whether anxiety mediates the relationship between perceived risk and screening intentions.

Methods: A total of 184 women aged >40 years in the United States were recruited from Amazon Mechanical Turk to respond to a dense breast tissue notification as if they had personally received it.

Results: After reviewing a notification, women reported greater perceived risk ($d = 0.67$) and intentions to undergo mammography ($d = 0.25$) than before. Most women intended to undergo additional ultrasound screening, although to a lesser extent when ultrasound was covered by insurance than when it was not ($d = 1.03$). All screening intentions were lower in women with ambiguity aversion, a tendency to avoid tests without medical consensus, and those who preferred an active decision-making role. Anxiety mediated the relationship between perceived breast cancer risk and all screening intentions.

Conclusions: Women who receive dense breast tissue notifications may generally increase their breast cancer screening intentions; however, intention strength varies depending on internal (eg, ambiguity aversion) and external (eg, insurance for ultrasound) factors. Although perceived risk increases after notification, it is anxiety that drives women's intentions for future screening.

Key Words: Dense breast tissue, screening intentions, perceived risk, anxiety

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Mandatory dense breast tissue notifications have gained momentum since Connecticut passed the first notification law in 2009. As of this writing (October 28, 2014), 19 states have required notifications, and legislation has been introduced in 13 additional states [1,2]. Because about 50% of all women aged >40 years have heterogeneously or extremely dense breast tissue [3], notification laws affect a tremendous number of women and may have far-reaching consequences on women's perceptions of breast cancer risk, anxiety, and breast cancer screening.

These laws have been controversial. Some editorials have promoted notifications as potentially beneficial in that they can increase patient awareness [4], whereas others have argued that notifications may inflate risk perceptions without improving patient health [5]. Although the ACR does not oppose notification laws, a 2012 ACR position paper [6] expressed concern that notifications may unduly increase anxiety about breast cancer risk, encourage widespread ultrasound and MRI screening before randomized controlled trials have established their utility in women with dense breast tissue, and increase screening disparities, as costs will prohibit some women, but not others, from receiving additional tests.

There is limited information about how women respond to dense breast tissue notifications. Notifications often include information that dense breast tissue may increase the

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risk for cancer but do not state to what extent [1], leaving women to interpret the notifications for themselves. Subsequently, patients' perceived breast cancer risk and anxiety may increase, which is important because both perceived risk and anxiety are known to increase intentions to undergo mammography [7,8]. Further research is needed to establish if perceived risk and anxiety increase ultrasound intentions as well. Additionally, it is important to identify individual differences in postnotification screening intentions to anticipate groups that may be at risk for over or underutilizing screening.

The overall goal of the study was to examine how women aged >40 years respond to a hypothetical dense breast tissue notification. Specific hypotheses were as follows: (1) notifications will increase perceived risk for breast cancer and intentions to undergo mammography, (2) women will have higher intentions to undergo screening with additional ultrasound when the test is covered by insurance, and (3) the amount of anxiety reported by women after reading the notification will mediate the relationship between perceived risk and screening intentions. A woman's perceived risk may seem more threatening in the context of anxiety, and elevated anxiety may explain how estimates of perceived risk become expressed in screening intentions. Last, we aimed to examine if intentions differ by individual difference factors, including demographics, how complex the notification passage is perceived to be, ambiguity aversion (a tendency to avoid medical tests when individuals perceive a lack of expert consensus) [9], distrust of the health care system [10], and active control preferences in decision making [11].

METHODS

Participants

Amazon Mechanical Turk (AMT) is an online marketplace advertising human intelligence tasks (HITs) to anonymous workers. AMT has a demographic composition slightly more diverse than American college samples [12], and studies have shown that workers are internally motivated to provide reliable and valid answers [13]. To enhance data validity [14], inclusion criteria required all participants to have completed ≥1,000 HITs and to have HIT approval ratings of ≥95%. Only AMT workers residing in the United States could view the advertisement for participation. Participants were also asked to complete the survey only if they were women and ≥40 years of age. A total 213 eligible women responded and were compensated with $1 each. Participants who reported previous diagnoses of cancer were excluded from analyses, as cancer survivors have different cancer screening recommendations than the general population.

Procedures

This study was approved by the Icahn School of Medicine at Mount Sinai Program for the Protection of Human Subjects. First, participants completed questions about their medical histories, perceived lifetime breast cancer risk, and intentions to undergo mammography. Then women were asked to read a sample dense breast tissue notification and respond to questions as if they had personally received the notification. The sample notification selected for this study was that of New York State (see Appendix 1), as it is similar in composition to many other notifications [1,2] and represents the home state where the research was conducted. Participants were informed that additional breast cancer screening after mammography was typically conducted via ultrasound, and if women intended to undergo ultrasound screening, physicians would recommend ultrasound in addition to (rather than in place of) mammography. After reviewing the notification, participants again reported their perceived lifetime risk for breast cancer and intentions to undergo mammography before completing the measures described below.

Measures

Primary Outcome Variables. Screening intentions were assessed with the Choice Predisposition (Leaning) measure, which is a validated 1-item scale [15]. Four separate items were used to assess screening intentions for (1) prenotification mammography, (2) postnotification mammography, (3) postnotification ultrasound that is covered by insurance, and (4) postnotification ultrasound without insurance coverage. Perceived lifetime risk for breast cancer was measured with two questions. All participants were asked the likelihood they would develop breast cancer in their lifetimes on a scale ranging from 0% to 100% before and after reading the notification. This is a commonly used measure of perceived risk for illness with construct validity [16]. Anxiety was assessed with the validated 6-item tension-anxiety subscale of the Short Form of the Profile of Mood States [17].

Individual Difference Variables. Perceived complexity of dense breast tissue notifications was assessed with a single item asking women "Do you think the information you just read about dense breast tissue was very complex?" Decision-making role questions were modeled on the Control Preferences Scale, a valid and reliable measure [11], assessing women's preferred role in decision making about ultrasound and mammography. The Ambiguity Aversion Medical Scale is a 6-item questionnaire that assesses individual avoidance of medical treatment or tests when individuals perceive a lack of medical consensus about said treatment or tests [9]. The Health Care System Distrust Scale [10] was administered