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Poor compliance despite equal access: Military experience with screening breast MRI in high risk women

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ABSTRACT

Background: Using the military as a model for an equal-access, no-cost healthcare system, we sought to (1) describe screening breast MRI compliance rates and (2) identify patient-perceived barriers to screening.

Methods: In this retrospective cohort study of a prospectively maintained database at a tertiary level center, we compared compliance among women at ≥20% risk of developing breast cancer (Tyrer-Cuzick) and conducted structured phone interviews with women at ≥30% risk.

Results: From 2015 to 2016, 1,052 women met criteria for screening MRI. Of these, only 251 (24%) underwent MRI screening. Compliance among women with a 20–24%, 25–29%, 30–39%, and ≥40% risk was 16%, 24%, 37%, and 51%, respectively ($p < 0.02$). 37 of 128 unique patients (29%) with ≥30% risk agreed to interview. 43% cited time/inconvenience as the key barrier to screening; 22% cited questions regarding screening recommendations; and only 3% cited fear/concerns as the key barrier.

Conclusions: Even in an equal-access system, there is poor compliance in patients who are at high risk for developing breast cancer. Patients cited time/inconvenience and questions regarding screening as key barriers to screening.

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Introduction

Screening breast MRI plays a controversial but important role in the clinical management of women at high risk for developing breast cancer. Current guidelines recommend that women with a lifetime risk of breast cancer >20% undergo an annual breast MRI starting 10 years prior to the age of the youngest family member with breast cancer, but not before the age of 25.[1]

As the role of screening breast MRI continues to evolve, compliance rates for these emerging screening guidelines are unknown. Moreover, patient-perceived barriers to screening breast MRI are unknown. Barriers to screening can be challenging to study due to the complex interplay of confounding variables such as socioeconomic status, cultural norms, and educational level that impact access to care. We sought to study these barriers within the military's healthcare system, where issues surrounding access to care and financial cost are nullified.

The objectives of this study were to (1) describe screening breast MRI compliance rates and (2) identify patient-perceived barriers to screening breast MRI in an equal-access, no-cost healthcare system. We hypothesized that in an equal-access, no-cost healthcare system, compliance to screening breast MRI would be high. We further hypothesized that patients would perceive factors such as time, inconvenience, and fear (previously described barriers to screening mammography)[2–5] as key barriers to undergoing screening breast MRI.

Material and methods

Data source

In our institution's breast center, we prospectively maintain a database of all female beneficiaries (active duty military,

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dependents, and retirees) identified as having a ≥20% lifetime risk of developing breast cancer using the Tyrer-Cuzick model. Patients enter the database in one of two ways: (1) review and analysis of the mammography worksheet information provided by the patient, or (2) referral to the breast center by an outside provider such as a primary care manager. Each patient in the database is contacted by a dedicated nurse practitioner (H.F.M.) via phone call and/or mailed letter, to verify high risk status and discuss screening options. Recommendations are discussed and appropriate imaging (e.g., breast MRI or mammogram) is then ordered. Patients are tracked to confirm they undergo the ordered studies.

Study design and study participants

This was a retrospective cohort study of the aforementioned prospectively maintained database of female beneficiaries with ≥20% lifetime risk of developing breast cancer. Patients were stratified into four groups based on their risk (20–24%, 25–29%, 30–39%, and ≥40% risk).

All patients with ≥30% risk were called for structured phone interviews. Phone interviews were conducted by four designated providers using a script to limit interrater variability (Appendix A). Data regarding patient-reported barriers to compliance (i.e., time vs. inconvenience vs. fear vs. questions about screening vs. other), race, monthly household income, and number of children were collected.

Outcome variables included compliance to screening breast MRI and patient-perceived barriers to screening.

Statistical analysis

Comparisons of groups were performed using Chi-square/Fisher's exact testing for categorical variables and independent samples t-testing and ANOVA for continuous variables. Statistical tests were two-tailed and significance was set at $p < 0.05$. Analysis was performed using SPSS version 21.

Results

From 2015 to 2016, 1,052 women met inclusion criteria and were offered screening MRI. Table 1 shows demographics of the overall sample. Of these, only 251 (24%) underwent MRI screening. The remaining women who did not pursue MRI screening were stratified by risk group and their compliance rates were compared (Table 2).

Of the 128 unique patients with ≥30% risk, 37 (29%) agreed to interview. Table 3 shows the demographics stratified by patient-reported barriers to screening. Fig. 1 shows the patient-reported barriers to screening compliance, comparing risk groups of 30–39% vs. ≥40%. A sizable portion (32%) of patients identified a barrier "other" than time/inconvenience, fear/concerns, and questions regarding screening recommendations. Fig. 2 shows the breakdown of those "other" barriers.

Table 2
Compliance rate stratified by risk group.

Risk[a]	Total number of recommended MRIs (n)[b]	Compliance Rate
20–24%	547	16%
25–29%	271	24%
30–39%	160	37%
≥40%	74	51%

$p < 0.02$.
[a] Lifetime risk of breast cancer calculated using Tyrer-Cuzick model.
[b] Note that a given patient could have been recommended up to 2 MRIs: one in 2015 and a second in 2016.

Discussion

The objectives of this study were to (1) describe screening breast MRI compliance rates and (2) identify patient-perceived barriers to screening breast MRI in an equal-access, no-cost healthcare system. Our results suggest that even in an equal-access, no-cost medical system, high risk patients poorly comply with the recommendation to undergo screening MRI. While patients at higher risk were more likely to undergo MRI screening, even a ≥40% lifetime risk did not ensure uniform adherence to screening. Patients cited time/inconvenience and questions regarding screening as key barriers to screening.

Implications

This study is the first in the surgical literature to identify compliance rates and barriers pertaining to screening MRI in women at high risk for breast cancer. Outside of the surgical literature, one single-institution series demonstrated compliance rates as high as 88% for women with lifetime risk ≥20%.[6] A second single-institution series showed that compliance rate varied among high-risk women depending on their BRCA status (74% for carriers vs. 18% for high risk women without the BRCA mutation).[7] Our data appear to fall within the lower end of the available, albeit highly variable, range of 18–88% compliance.

With only a limited number of comparable studies on screening MRI, we sought to further evaluate our findings within the broader context of screening mammography. We acknowledge that this is an imperfect comparison, as MRIs impose a greater burden in terms of both time and financial cost on both the patient and the healthcare system. Even for the cheaper mammogram, we know insurance status, socioeconomic status, level of education, and race impact adherence.[1–4] In a recent publication by the American Cancer Society, only 31% of those without insurance underwent screening mammography within the past two years compared to 68% of those who were insured.[8] Presuming the costlier modality should amplify the effect of healthcare disparities, we felt the military setting afforded us a unique opportunity to study screening MRIs, which were provided at zero financial cost to uniformly insured patients. This allowed us to focus our attention on other potentially modifiable barriers to screening.

Table 1
Demographics of overall sample stratified by risk groups (n = 733 unique patients).

	20–24% (n = 428)	25–29% (n = 177)	30–39% (n = 93)	≥40% (n = 35)	Overall (n = 733)	p
Age, mean (SD)	43.09 (11.56)	41.32 (9.97)	39.06 (10.45)	32.11 (11.99)	41.63 (11.34)	<0.01
	20–24% (n = 0)	**25–29% (n = 0)**	**30–39% (n = 24)**	**≥ 40% (n = 9)**	**Overall (n = 33)**	
Caucasian Race, %	N/A	N/A	70.8%	77.8%	72.7%	0.791
	20–24% (n = 0)	**25–29% (n = 0)**	**30–39% (n = 18)**	**≥ 40% (n = 7)**	**Overall (n = 25)**	
Monthly Household Income, mean (SD)	N/A	N/A	$6717 (3466)	$3757 (1629)	$5888 (3319)	0.043
	20–24% (n = 0)	**25–29% (n = 0)**	**30–39% (n = 23)**	**≥ 40% (n = 9)**	**Overall (n = 32)**	
Number of Children, mean (SD)	N/A	N/A	1.61 (0.94)	1.78 (1.39)	1.66 (1.07)	0.693

Table 3
Demographics of overall sample stratified by patient-perceived barriers (n = 33).

	Time/Inconvenience (n = 15)	Fear/Concerns (n = 1)	Questions (n = 5)	Other (n = 12)	Overall (n = 33)	p
Age, mean (SD)	35.3 (8.2)	35.0 (-)	44.4 (10.5)	39.3 (15.0)	38.5 (11.4)	0.332
Caucasian Race, %	73.3%	0.0%	40.0%	91.7%	72.7%	0.001
African American Race, %	6.7%	100.0%	0.0%	0.0%	6.1%	0.001
Monthly Household Income, mean (SD)	$5,276 ($2,195)	N/A	$10,125 ($5,170)	$4,820 ($2,361)	$5,887 ($3,318)	0.013
Number of Children, mean (SD)	1.3 (0.9)	3.0 (-)	2.4 (0.5)	1.6 (1.3)	1.7 (1.1)	0.141

Fear/anxiety is frequently cited as barriers to compliance with screening regimens.[2] In our study, fear/anxiety played a limited role, being cited as a key barrier for only one individual (3% of the study population). This appears to be low in relation to prior publications about mammographic screening that identified fear/anxiety as barriers for up to 20% of individuals.[3] While there are many potential definitions for fear (i.e., fear of monetary obligations, fear of the test itself, fear of a cancer diagnosis, or fear of ensuing treatment), the lack of fear responses in our study population raises the possibility that a component of the military healthcare system has assuaged these fears in some meaningful way. The most salient difference between healthcare in the military versus the general population is the access to care without need for payment or copay, which removes any direct financial obligations. Another meaningful difference is the fact that care within the military health system is not at risk of cancellation or revocation. This promised continuity of care may play a part in allaying the fear of required treatment or fear of financial instability due to follow-on testing and procedures. One thought is that unfettered access to free healthcare diminishes fear associated with screening; however, this is countered by a Canadian study in which fear was associated with a two-fold increased odds of noncompliance with family physicians' prescription of screening mammography.[4] The continued ambiguity suggests that more detailed questioning may be required before concrete conclusions about the role of fear/anxiety can be reached.

Far exceeding fear/anxiety, the most substantial barrier for our respondents was lack of time to complete the MRI. This echoes the aforementioned Canadian study wherein time limitations were associated with a three-fold increased odds of noncompliance.[4] Convenience certainly plays a significant part in the difficulty scheduling appropriate MRI screening. Many facilities only schedule these examinations during routine business hours when their most experienced MRI technicians are working, largely due to the specialized nature of breast MRIs, which involve the use of a dedicated breast coil. Federal regulations also stipulate that any facility that offers breast MRIs must also be able to perform MRI-guided breast biopsies, or have an agreement with a facility that does perform MRI-guided breast biopsies. Moreover, screening breast MRIs are most accurate when administered between days 7–14 of a patient's menstrual cycle. For the patient, this necessitates time away from work, family, or other obligations. The summation of these frustrating limitations amount to more than simple inconveniences.

Ultimately, “lack of time” becomes a complicated surrogate for the indirect costs of individual screening. Our findings underscore that even in a system that negates the impact of direct financial burden, matters of socioeconomic status and lack of social support continue to play a part.[4] This is most evident in the correlation of adherence to the mean monthly household incomes. Those individuals who noted time/inconvenience as his/her primary barrier reported a mean household income 48% lower than those who noted questions regarding the specifics of screening recommendations. While this correlation is by no means conclusive that indirect costs are at fault, our data does suggest one possible method for advancing adherence rates through diversification of scheduling options.

Approximately 20% of patients interviewed cited confusion about recommendations as a primary barrier. It is understandable for a patient to be unfamiliar with changes in screening recommendations and it is known that patients are poor predictors of their own lifetime risk. This information will guide the breast center's ongoing outreach efforts to educate our high risk population about the evolving role of screening MRI. It is also worth noting

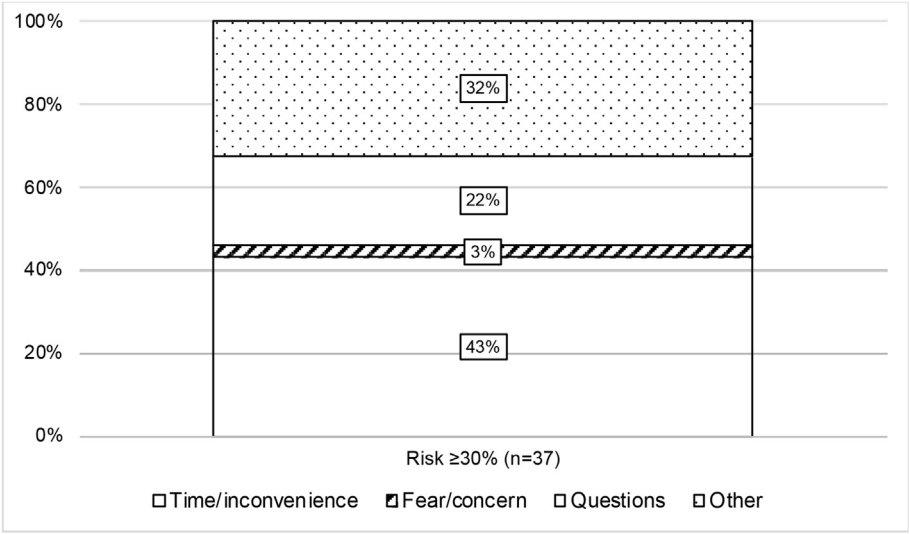

Fig. 1. Patient-reported barriers to screening compliance (n = 37).

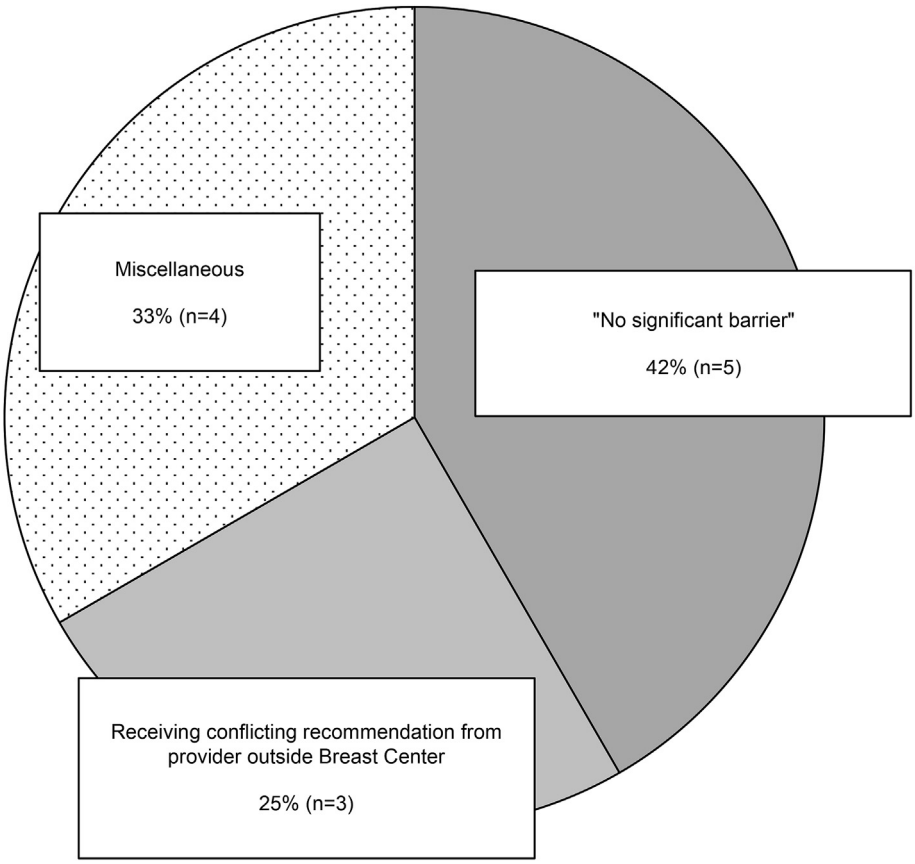

Fig. 2. Other barriers to screening compliance (n = 12).

that an additional 8% of patients reported receiving conflicting recommendations from providers outside the breast center. This suggests educational efforts must not only focus on patients, but also on primary care providers within the military health system who may be unfamiliar with the most current recommendations.

The correlation of race and cancer screening adherence has received significant attention in research. In general, the trend appears to show non-white race as a predictor of lower adherence. This is often rendered non-significant when controlling for socio-economic status and highest level of education received.[2,3,8] Given that race was assessed in only a portion of the subset of patients with ≥30% lifetime risk who agreed to be interviewed, there are few, if any, conclusions to offer. We did find that Caucasian respondents more commonly reported time/inconvenience or questions regarding screening as key barriers, whereas African-American respondents more commonly reported fear/concerns. However, we emphasize that the lack of power prevents us from drawing meaningful conclusions regarding whether differences in cultural norms between patient groups was truly related to compliance.

Finally, and perhaps this study's most startling insight into human nature, we found that 13% of high risk patients surveyed reported no barrier to screening, but declined anyway. This raises the possibility that "uniform compliance" with screening may be a lofty goal, albeit one worth pursuing.

Limitations

The first limitation that warrants discussion is that of sample size. Of the 128 non-compliant patients identified as having ≥30% lifetime risk, only 37 (29%) were able to be reached by phone and subsequently agreed to a structured interview. This response rate falls within the 27–61% range of responses obtained in similar studies looking at compliance with screening mammography.[2–5] This relatively low rate does, however, raise concern regarding the generalizability of our data to the greater military population. Despite these fears, the demographics of this sampled group appear to align well with the broader population enrolled within the military healthcare system (68.8% Caucasian vs. 31.2% minority, with a mean monthly household income of $5,200 when adjusted for inflation).[9,10]

Further related to generalizability, this study captures the experience at a single tertiary military medical center. While a military-wide analysis might offer more power, we must acknowledge that even within the military, variability exists in the way different military treatment facilities (MTFs) identify and longitudinally track high risk patients. Bearing such variability in mind, we felt it was important to minimize potential confounding variables and start with a focused look at one institution.

Our study was further limited in that we only contacted non-compliant patients. Due to this limitation in study design, we are unable to compare the demographics of our cohort against a "control" arm of patients who were compliant with screening MRI recommendations.

Additionally, we forced participants to select a single barrier, which they perceived to be the most significant barrier. While this focused our results, we may have missed out on multifactorial nature noncompliance.

Finally, we must acknowledge limitations inherent in conducting survey studies. Hindsight and recall bias were likely at play,

as patients were asked to retrospectively report what barriers they perceived. The potential impact of such biases cannot be overstated, particularly when we consider interviews were conducted by an interested party (the breast center) with intent to utilize findings to guide quality improvement. Despite these limitations, insight into patient-perceived barriers are otherwise challenging to obtain, and therefore, we hold that the information gathered herein, when interpreted critically, can inform future interventions to increase compliance.

Future directions

The categories for barriers to screening (Appendix A) tested within this study were designed *a-priori* with potential future interventions in mind. Theoretically, barriers of time/inconvenience might be reduced by implementing systems-level improvements. By contrast, barriers of fear/concerns with the study or its possible results might be reduced using measures to reassure patients. Barriers of questions about screening might be reduced through educational interventions. While an integrated approach to these issues is best, a focused implementation will allow for the greatest impact while limiting overall expenditures.

Conclusions

Even in an equal-access, no-cost healthcare system, there is poor compliance in patients who are at high risk for developing breast cancer. While patients at higher risk were more likely to undergo MRI screening, even a $\geq$40% lifetime risk did not ensure uniform adherence to screening. Patients cited time/inconvenience and questions regarding screening as key barriers to screening. Confusion regarding evolving screening recommendations may be at play, as 22% cited questions about screening, and another 8% reported receiving conflicting guidance from outside providers. These patient-perceived barriers to screening may be potential targets for quality improvement efforts aimed at increasing compliance.

Conflicts of interest

The authors have no conflicts of interest or financial disclosures which pertain to this study.

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Disclosure

The views expressed are those of the authors and do not reflect the official policy or position of the Army, the Department of Defense, or the US Government.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2019.02.021.

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