

Identifying Local Facilitators and Barriers to Screening Mammography Within a Rural Acute Care Hospital Service Area

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ABSTRACT

Introduction: Women living in rural areas are more likely to be diagnosed with advanced-stage breast cancer than their urban counterparts. The advanced stage at diagnosis is potentially attributable to lower rates of mammogram screening. We aimed to elucidate factors affecting women in decision-making about mammogram screening in a rural area in Wisconsin served by a critical access hospital.

Methods: We conducted an observational cross-sectional mixed-methods study, collecting data from various sources using 3 methods. Virtual interviews with hospital staff, virtual focus groups with community members, and a survey of women 40 years and older occurred from September 2021 through February 2022. Qualitative data were organized into themes of facilitators and barriers to mammogram screening. Survey responses were reported descriptively.

Findings: Eleven hospital staff interviewed and 21 community members who joined 1 of 3 virtual focus groups voiced similar perceptions of facilitators and barriers to mammogram screening. Clinician recommendation was among facilitators, while insurance concerns were the primary barrier. Among survey respondents (N=282), mean age was 58.7, 98% self-identified as White, and 91% saw a health care provider in the past year. Top reasons for having their first mammogram were doctor recommendation (70%), family history (19%), and personal decision (18%). Top reasons they did not have a mammogram screening at least every year were putting it off (23%), lack of problems (17%), and pandemic-related reasons (15%).

Conclusions: Improving patient education and supporting clinicians to deliver screening recommendations may increase appropriate screening. Future studies should focus on reaching women not engaged with the health system.

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INTRODUCTION

More than 20 million adult US women live in rural areas.¹ Mortality rates for all cancers, including breast cancer, are higher in rural than in urban areas.² Multiple factors contribute to this increased mortality.²⁻⁹ Residents in rural areas may face socioeconomic disadvantages, such as lower levels of education,^{2,4} lower income,^{2,4} and increased distance to health care facilities.^{2,5-7} Moreover, up to 14% of women in rural areas do not have health insurance, which further limits access to care.¹ A study with data from the Pregnancy Risk Assessment Monitoring System reported that, between 2016 and 2019, during pregnancy, rural residents were more likely to be uninsured compared to urban residents (15.4% vs 12.1%; adjusted odds ratio 1.19; 95% CI, 1.11–1.28).¹⁰ Many rural women have decreased access to preventive health care due to the shortage of rural primary care clinicians,⁷ obstetrician/gynecologists,⁷ and care facilities in rural areas.⁵

In addition, effects of inclement weather—particularly winter—in many US rural areas can interfere with the ability to seek preventive care.⁶

Women residing in rural areas are more likely to be diagnosed with advanced stage breast cancer (disease stage III and IV) than women in urban areas,^{1,5,6,8}—potentially attributable to lower rates of screening mammography^{1,4-6,8,9}—although there are conflicting results in the literature. A study of women in 11 states found disparate screening rates for colorectal cancer but similar rates for mammogram screening between rural and urban women.¹¹ However, less access to medical treatment for breast cancer and decreased

treatment with chemotherapy have been described for rural women, which may impact mortality.⁹ Importantly, advanced stage at diagnosis is a prognostic factor affecting relative 5-year survival rates (99% for women with localized breast cancer, 86% for women with regional disease, and 30% for women with distant disease).¹² Presenting with advanced stage at diagnosis also decreases the possibility of receiving breast-conserving surgery.¹³ Thus, early detection of breast cancer is important to increase the probability of achieving better outcomes.

Columbia County, located in south central Wisconsin,¹⁴ is the primary site for this research. Approximately 60% of the nearly 58000 residents are considered rural,¹⁵ 48% are women, and 94.5% are White.¹⁶ Breast cancer is the most common cancer diagnosed among women in Columbia County.¹⁵ However, data from the Behavioral Risk Factor Surveillance System 2020 survey show that the estimated age-adjusted prevalence of mammogram screening for women ages 50-74 in the county is lower compared with the state (71.9% vs 80.9%).¹⁷ Prairie Ridge Health Hospital (PRHH) is a critical access hospital in Columbus, Wisconsin, with a service area that includes rural ZIP codes from neighboring counties (Figure 1).^{14,18,19} Two other facilities offer mammogram screening in the area and are located approximately 13 and 30 miles from Columbus. Prairie Ridge Health partnered with researchers at the University of Wisconsin–Madison Carbone Cancer Center to evaluate barriers and facilitators to mammogram screening among eligible women residing in the service area, aiming to elucidate specific factors that affected women’s decision-making about mammogram screening.

METHODS

Study Design

We conducted an observational cross-sectional mixed-methods study. Our multidisciplinary team is comprised of researchers from Prairie Ridge Health, the University of Wisconsin–Madison Carbone Cancer Center, and the Wisconsin Research and Education Network (WREN). Implied consent was obtained and the project was deemed exempt by Institution A’s Institutional Review Board, which reviewed and approved all study procedures.

Figure. Wisconsin County Map With Rural-Urban Continuum Codes County Classification

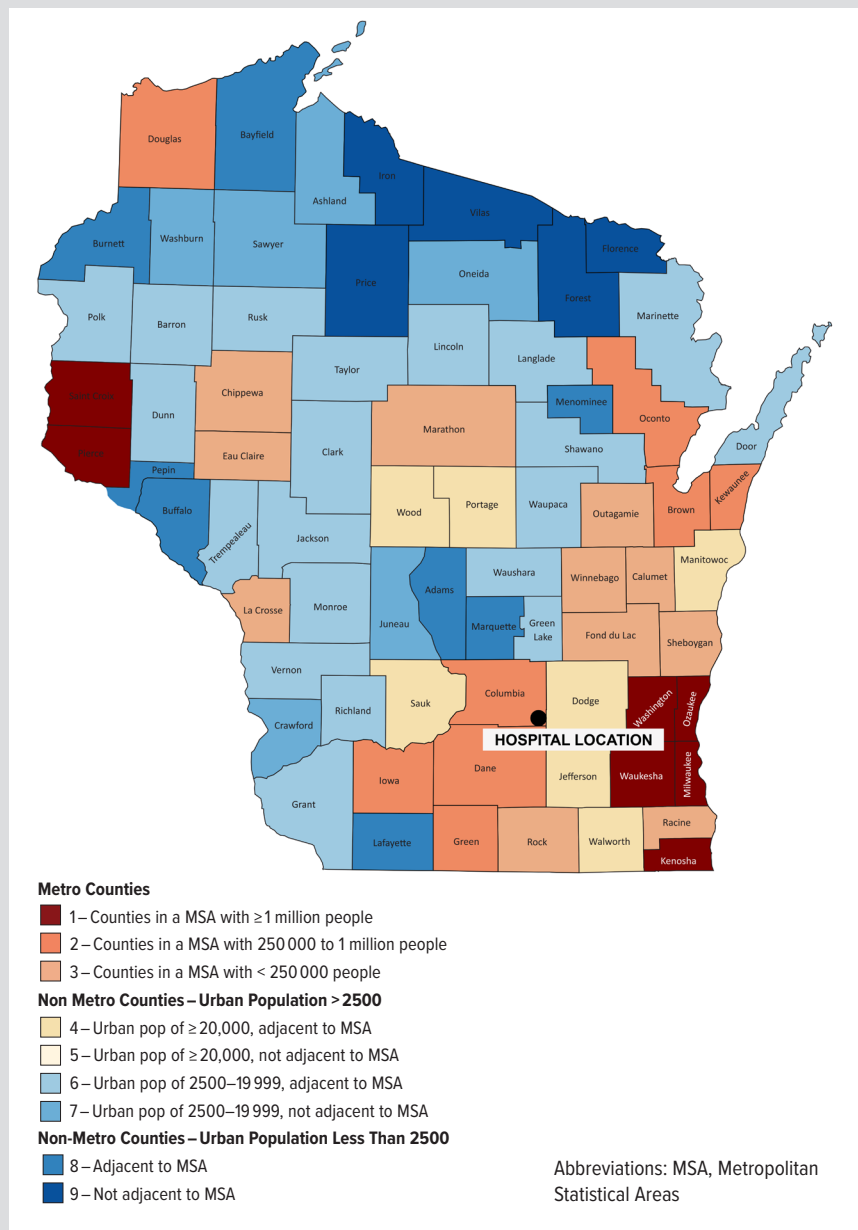


Figure adapted with permission from the University of Wisconsin-Madison, Division of Extension.¹⁴

Setting

In the 2013 Rural-Urban Continuum Codes (RUCC) classification, counties are assigned codes from 1 to 9, and those with codes 1 through 3 are considered metropolitan, while those with codes 4 through 9 are rural (Figure 1).¹⁴ Columbia County is classified as metropolitan 2 based on the 2013 RUCC,¹⁴ and the hospital catchment area includes neighboring nonmetropolitan counties classified as RUCC 4, 6, and 8. In addition, many ZIP codes within Columbia County have rural characteristics based on land utilization and local culture.^{18,19} The Area Health Education Center System’s Wisconsin Urban-Rural Classification system¹⁸ was utilized to better characterize rural locations within metro-

politan counties and allowed our team to identify rural ZIP codes served by PRHH.¹⁸

The hospital performed approximately 1780 screening mammograms in 2022. It utilizes several strategies to improve mammogram screening utilization in the service area. Besides regular scheduled screening mammography, a “walk-in” option is offered without referral or appointment scheduled. The “walk-in” occurs every week in October and on the last week of the remaining months. Walk-in days had an average of 15 exams per day in 2022 and 19 per day in the first 2 months of 2023. In addition, an oncology nurse navigator follows up with patients regarding mammogram screening results. If results are abnormal, the oncology nurse navigator facilitates referrals to additional imaging, breast biopsy, and medical appointments.

Recruitment and Data Collection

Recruitment approaches are discussed below, with attention to each data collection method. Data were collected from various sources (which aided in data triangulation) and through different methods (methodological triangulation).^{20,21} Given concerns about the COVID-19 pandemic, all interviews and focus groups were conducted virtually.

Interviews With Hospital Staff

Hospital research team members recruited staff involved in mammogram screening services, including primary care clinicians, mammography technicians, and schedulers/registration staff. A snowball approach²⁰ among staff also was utilized to generate potential participants. Virtual structured interviews occurred from September 2021 through February 2022. Participants were compensated for their time.

Focus Groups With Community Members and Hospital Patients

Multiple approaches were used to encourage diverse participation. Study advertisements were posted on the hospital website and Facebook page. In addition, focus group invitations were mailed with the survey to 1800 women aged 40 to 75 years who resided in the 9 rural ZIP codes^{18,20} within the hospital’s service area. The mailing list was purchased from Madison Media Partners, which facilitated the printing and mailing of the survey, and had a list of 10705 women ages 40 to 75 residing in the 9 rural ZIP codes within the hospital’s service area. Among these women, 1800 were selected randomly for the mailing as weighted by the percentage of Hospital market share for each community (proportionally to the number of patients from each location seen at the hospital). Potential participants who contacted the research team were screened for eligibility criteria (40 years of age or older, female sex at birth, and residing within the hospital’s service area). Participants did not need to receive medical care at the hospital to be eligible. Three 60-minute virtual focus groups were conducted between November 2021 and February 2022.

Survey for Women Within the Hospital’s Service Area

A 28-question survey, including 3 questions on exclusion criteria, was developed to examine community members’ attitudes, perceived barriers, and facilitators to mammogram screening. An additional field was provided for open comments. The survey link was available online on the hospital’s website from September 2021 through February 2022. Printed surveys were mailed with the focus group advertisements. Women were eligible to complete the survey if they were 40 years or older, did not have a personal history of breast cancer, and did not participate in the interview or focus groups for this project.

Data Analysis

Interviews and focus groups were recorded and transcribed. Content analysis was conducted.²⁰ After removing identifiers, transcripts were coded inductively by 3 independent coders. The coders met to resolve discrepancies and create a final codebook. The codes that emerged were thematically organized as barriers, facilitators, or neutral comments. Data from online and paper surveys were combined, and descriptive statistics were calculated.

The research team used triangulation—a combination of multiple data sources or methods—to provide robust data, whereby different sampling methods can complement each other in understanding a particular phenomenon.²⁰ In addition, complex health issues may require consideration of multidimensional perspectives.²¹

RESULTS

Interviews With Hospital Staff

Eleven hospital staff participated in interviews, including 4 physicians (specialized in family medicine, internal medicine, or obstetrics and gynecology), 3 mammography technicians, 2 schedulers/registration staff, 1 medical assistant, and 1 advanced practice nurse. Thirty-two codes were created and organized into themes of facilitators (n = 12), barriers (n = 13), neutral (n = 5), not within the scope of position or not applicable (n = 1), or no code (response could not be coded). A total of 257 responses were recorded, and a total of 349 codes were assigned. Each response could have been assigned up to 4 codes. Overall, 45% (158/349) of codes were for facilitators to mammogram screening, 21% (75/349) were barriers, 17% (61/349) were neutral, and 16% (55/349) were either not coded, not applicable (N/A), or not within scope of the staff member’s position. Some questions and responses were considered neutral, such as probes on which guidelines were followed for mammogram recommendations.

Among codes reported by hospital staff, the scheduling process was the top facilitator of mammogram screening (23%; 37/158), followed by marketing and advertising strategies utilized by the hospital (15%; 23/158). Clinician communication/recommendations (12%; 19/158) was another mammogram screening facilitator reported by hospital staff. Of the codes determined to be

Table 1. A Sample of Facilitators and Barriers Reported by Interview and Focus Group Participants

	Interview With Hospital Staff	Focus Group With Community Members
FACILITATORS		
Scheduling	"I would say that as far as screening (mammography), yes, I would say that's straightforward. It gets a little more complicated when there are issues and we do need to do the diagnostic mammograms. So, I would say that is a little bit more confusing and, in some cases, frustrating for the patients, because they don't quite understand it."	"Yeah, I had all my mammograms recently at Hospital C, and they have so many different times, including there were weekends where you could go in on the weekend and have it done too. So it was really, really easy to get it scheduled."
Marketing/advertising	"I think the hospital does a good job of marketing advertising I know now. The next 4 or 5 months, they're going to have walk-in [screening mammography without scheduling or referral] Wednesdays all day on the last Wednesday of the month. So, things like that, and getting the word out for that, where people seem to really respond to those types of things."	
Clinician communication/recommendations	"Well, in the 50 and up, I talk to them, and I say, you know, we don't know the right answer. Like, it's reasonable to get mammograms every 2 years. If you want to get an annual mammogram, insurance pays for it, is usually [how] I'll bring it up. And then in the 40s, it's an even longer conversation for me...I tried to do shared decision-making with the patient, in the 40s especially."	"I would say I have discussed it with my health care provider... I've now gotten myself in a rhythm where I have my mammogram before my annual."
Family history		"You know, my mom had breast cancer, and at 35, it never would have occurred to me to get a mammogram. But her doctor was the one who advocated to both my sister and I because of the type of cancer she had."
Knowing somebody with breast cancer		"It seems like everyone I know who has died, who's older and who's died has died from some kind of cancer. And so, like at age 50, I went right away for my colonoscopy, and that's why every year I go for my mammogram. Even though there isn't any family history or anything, the earlier you catch cancer, the better your chances are of surviving from cancer. So as soon as I know I can go get a screening of one cancer or another, I'm going."
BARRIERS		
Insurance	"I feel like sometimes women might avoid a mammogram, even if they have insurance, because they don't believe that it would be fully covered or maybe they would have some kind of a copay that they can't afford. ...I feel like that comes up quite frequently: 'Will my mammogram be covered?'"	"...people that don't have health insurance, they probably aren't going to pay for it if they don't need it, if they don't think that they're sick or have any symptoms."
Transportation	"Sometimes there's some transportation issues. They don't have a way to get in. There's one car in the family. And that's used during the day, and ...they can't get in. There's no public transportation for that."	
Scheduling	"The hours that we offer the mammograms. With people's work schedules. Probably about 15 years ago, I worked just the weekend program so then we did do mammograms on Saturday mornings, which helped a lot of women, but we don't offer that any more because we're just too busy with ER/urgent care. But that worked out really nice for a lot of the working women."	"I was just going to say maybe it's hard to schedule, you know. If it's a working woman who works, you know, 8 to 4 or 9 to 5, maybe she needs some alternative hours to be able to schedule that."
Fear of procedure	"Maybe some women think they should wait for their age to get mammograms. Maybe that of personal fear, like, they don't want to get it done."	"Well, I think sometimes it's a woman's fear, or maybe for whatever reason, I don't have the experience, but maybe for whatever reason, they've had one before, it was very uncomfortable, so they don't want to go back."

barriers to mammogram (n=75), the top barriers were insurance (19%), lack of appointments or convenient appointment times (15%), transportation (12%), COVID-19 (11%), and discomfort/pain from the procedure (9%).

Focus Groups With Community Members and Hospital Patients

The first focus group had 1 participant due to cancellation and dropouts. There were 12 potential participants initially; however, 3 declined and 8 did not attend. As a result, the first session was

conducted as a one-on-one interview, using the focus group guide to maintain consistency. The following 2 focus groups had 9 and 11 participants (for total of 21 unique community members). Twenty-four codes were created and organized into themes of facilitators (n = 14), barriers (n = 9), or no code (response could not be coded). A total of 162 (80%) codes assigned were facilitators and 41 (20%) were barriers to mammogram screening. Clinician recommendation/patient education (23%; 37/162) was the top facilitator of mammogram screening. Having a family history

of breast cancer (11%; 18/162) was also a facilitator. Insurance/financial issues (39%; 16/41) were the most frequently reported barrier. Issues with scheduling a mammogram (17%; 7/41), such as lack of convenient times for appointments, were reported as a barrier to getting screened, as was fear of the procedure (pain, discomfort; 15%; 6/41). Excerpts presented in Table 1 exemplify some of the facilitators and barriers reported by hospital staff and focus group participants.

Survey for Women Within the Hospital's Service Area

A total of 307 women responded to the survey (140 online, 167 paper copy). While the online survey response rate cannot be calculated, the mailed survey had a response rate of 9.2% (167/1800). Of the 307 respondents, 25 women were ineligible (4 were younger than 40 years of age, 9 were part of the focus groups, and 12 were diagnosed previously with breast cancer); these data are not included in analysis. Among survey respondents (N = 282), the mean age was 58.7 years (40-82 years), 98% (266/272) self-identified as White, and 62% (165/265) as menopausal (Table 2).

Family history of breast cancer was reported by 42% (114/270) of women surveyed, 93% (250/270) knew someone with breast cancer, and 91% (246/270) reported seeing a health care provider in the past year. Awareness of mammogram was high, as 99% (267/268) of women indicated that they know what a mammogram is and 90% (240/268) had seen or heard an advertisement encouraging them to get a mammogram. A total of 85% (227/268) of women indicated that a clinician had recommend that they get screened for breast cancer. A majority of respondents (88%; 197/225) indicated that the recommendation for screening was communicated to them in-person. Conversely, 15% (41/268) of women responded that a clinician had never recommended screening mammography. Half of respondents (50%; 129/259) wrote that they thought the age at which starting mammograms is recommended was 40 years old. Survey respondents' answers regarding mammogram screening are represented in Tables 3 and 4.

Two open-ended questions and 1 free-text comments field were included at the end of the survey. A sample of the write-in responses and comments are presented in Supplemental Table 5 (Appendix) and include mention of walk-in appointments, challenges with insurance, and beliefs about the need for a physician referral for mammography.

DISCUSSION

Our study represents a community-based mixed-methods approach to elucidate facilitators and barriers affecting decision-making on mammogram screening by women in a critical access hospital serving a high proportion of rural women. Acknowledging that rural health disparities have their roots in multilevel interdependent factors,² capturing perspectives of different stakeholders is a crucial step to developing community-

Table 2. Demographic Data for Survey Respondents

	No. Respondents	Results n (%)
Mean age, y (Range)	266	58.7 (40-82)
Race ^a	272	
White		266 (98)
African American or Black		3 (1)
Native American or Alaska Native		2 (<1)
Prefer not to answer		2 (<1)
Education	270	
Less than high school		1 (<1)
High school graduate		66 (24)
Some college		72 (27)
College graduate and above		128 (47)
Prefer not to answer		3 (1)
Past pregnancy	272	
Yes		229 (84)
No		41 (15)
Prefer not to answer		2 (1)
Mean age at birth of first child, years (range)	224 ^b	25.5 (16-44)
Menopausal	265	
Yes		165 (62)
No		95 (36)
Prefer not to answer		5 (2)
Family history of breast cancer	270	
Yes		114 (42)
No		155 (57)
Prefer not to answer		1 (0.5)
Knows someone with breast cancer	270	
Yes		250 (93)
No		19 (6.5)
Prefer not to answer		1 (0.5)

^aCould select more than 1 response.
^bIncludes 2 respondents who indicated "Prefer not to answer." Nonresponses (blanks) were excluded from this analysis.

engaged multilevel interventions to improve rural women's access and adherence to screening mammography recommendations.

The utilization of data and methodological triangulation is a strength of this study.^{20,21} Clinicians, hospital staff, patients, and community members—vassed via varying data collection methods—voiced similar perceptions of barriers and facilitators. Hospital staff identified insurance, lack of convenient appointment times, and transportation as potential barriers to mammography. Focus group participants also identified insurance/financial issues and appointment scheduling as barriers. Fears about the procedure (pain, discomfort) were noted as barriers by both focus group participants and hospital staff, suggesting that interviewed staff recognize community's perceptions. Among survey participants, the top reasons for not having a mammogram at least every year were "put it off," "haven't had any problems," "pandemic/COVID-related reasons," the perception that mammography is "not needed/necessary," and "don't have a family history of breast cancer." Previous research showed that positive family history for breast cancer affects the perception of being at risk of developing breast cancer and the decision for getting screened.²² These

Table 3. Survey Respondents' Answers to Questions Regarding Mammogram Screening

	Results n (%)
Multiple-choice question "At what age did you have your first mammogram?" (n = 256)	
≤ 29 years old	27 (11)
30-39 years old	70 (27)
40-49 years old	133 (52)
50-59 years old	19 (7)
60-69 years old	1 (<1)
70-74 years old	0
≥ 75 years old	0
Don't remember	2 (<1)
Prefer not to answer	4 (2)
Multiple-answer question "Why did you have your first mammogram?" (n = 257)	
Doctor told me to/referred me	181 (70)
Family history	50 (19)
Personal decision	47 (18)
Found a lump or something concerning	32 (12)
Know someone with breast cancer	14 (5)
Family/friend referral	4 (2)
Other ^a	3 (1)
Heard an advertisement	1 (<1)
Prefer not to answer	1 (<1)
Multiple-choice question "How often are you having a mammogram?" (n = 256)	
Once a year	172 (67)
Twice a year	3 (1)
Every other year	43 (17)
Once every 5-10 years	31 (12)
Prefer not to answer	7 (3)
Write-in answers to the question "At what age do you think it is recommended that women should start having mammograms?" (In years) (n = 259)	
16	2 (1)
18	5 (2)
20	9 (3)
21	6 (2)
24	1 (<1)
25	12 (5)
30	31 (12)
35	22 (8)
40	129 (50)
45	11 (4)
50	12 (5)
Prefer not to answer	6 (2)
Other ^b	13 (5)
Multiple-choice question "How often do you think it is recommended that a woman should get a mammogram?" (n = 268)	
Once a year	195 (73)
Twice a year	6 (2)
Every other year	47 (18)
Once every 5-10 years	9 (3)
I do not know	9 (3)
Prefer not to answer	2 (<1)

Multiple-answer question: multiple responses could be selected.

^aThree participants selected Other, although only one specified with the write-in answer "Health."

^bOther represents responses such as ranges of numbers, question marks, and text regarding family history.

Table 4. Responses to the Multiple-Answer Question "If you do not have a mammogram at least every year, what are some reasons why?" (N = 184)

Reasons	n (% respondents)
Not applicable, I have a mammogram every year	73 (40)
Put it off	43 (23)
Haven't had any problems	31 (17)
Pandemic/COVID related reason	28 (15)
Not needed/necessary	21 (11)
Don't have a family history of breast cancer	19 (10)
Not recommended by my doctor/PA/NP	17 (9)
Painful procedure	14 (8)
Didn't know that I should	11 (6)
Fear of finding cancer	10 (5)
Too busy	8 (4)
Couldn't get an appointment that fit my schedule	7 (4)
Problem with insurance coverage	6 (3)
Don't know	6 (3)
Too embarrassing	5 (3)
Other	5 (3)
I am not old enough to need yearly mammograms	4 (2)
I don't have health insurance	3 (2)
Have emotional health concern(s) (depression or anxiety)	3 (2)
Prefer not to answer	3 (2)
Didn't know how to schedule	2 (<1)
Too far away	1 (<1)
Couldn't get an appointment (full)	0 (0)
No childcare	0 (0)
Results take too long to come back	0 (0)

Multiple-answer question: multiple responses could be selected. Other represents write-in options and includes concerns with radiation exposure (n = 3, 1.6%), "lack of doctor" (n = 1, <1%), and the statement "too old and no more sex" (n = 1, <1%).

findings are important to inform the development of strategies to address educational gaps and misperceptions regarding the role of screening mammography.

Clinician recommendation/patient education were reported as the top mammography facilitator among those reported by focus group participants (23%). Clinicians' recommendation triggered the first mammography of 70% of surveyed women, followed by family history of breast cancer (19%), and personal decision (18%). Previous research demonstrated that cancer screening advice from a clinician is a strong modifiable factor influencing patients' behaviors.^{23,24} The quality of patient-clinician communication is important, as patients have a positive response when the cancer screening recommendation involves an explanation of procedures and addresses patient-specific barriers.²³ High-quality patient-clinician communication involves clinicians' time and willingness,²⁵ which are affected by multiple factors such as the time available for patient encounter, number of clinicians in the practice, and clinician workload, contextualized by the persistent low density of primary care clinicians in rural settings.^{7,26} Clinicians may inspire patients' personal decisions, as patients often rely

on recommendations from their physician to guide their health behavior.^{23,27} Clinician recommendation is particularly important among women 40 to 49 years, for whom starting screening mammography practices was based on shared-decision-making as suggested by the United States Preventive Services Task Force (USPSTF) until recently.^{25,28}

The USPSTF and the American Cancer Society (ACS) mammogram screening guidelines are the most commonly utilized among Wisconsin's primary care clinicians.²⁹ Per ACS recommendations, women ages 40 to 44 years should be offered annual mammogram screening, and women 45 to 54 years should get screened annually.²⁹ Women 55 years and older can maintain annual screening or get screened every other year. ACS suggests mammogram screening may continue while the woman is healthy, with life expectancy of at least 10 more years.²⁹ USPSTF recommends all women should get screened every other year between the ages 40 and 75 years,²⁸ and evidence is insufficient to evaluate benefits and harms of mammogram screening among women 75 years and older.²⁸ Evaluating guideline adherence and standard of care procedures is challenging in the face of multiple guidelines recommendation.²⁹

Among survey participants, the majority are getting screened annually (67%) or biennially (17%), corresponding to ACS and USPSTF guidelines recommendations. Beliefs regarding how often a mammogram screening should occur followed a corresponding pattern (73% annually, 18% biennially), similar to a previous study on barriers to mammogram between rural and urban women.²⁴ Beliefs regarding the starting age to get screened had more variability. Approximately 33% of survey participants wrote that they think the recommended age to start getting screened is before 40 years. Although this result exposes the misconceptions regarding mammogram screening, it may represent an improvement compared to previous research that reported 72% of rural participants answering that screening should start before 40 years.²⁴

Scheduling can be a barrier and a facilitator of mammogram screening. A straightforward scheduling process was reported as a main facilitator, while lack of convenient appointment times was reported as a barrier. Appointments outside of business hours may facilitate mammography for women with competing commitments and busy schedules. Pairing cancer screening as a "walk-in" option with an appointment for other reasons has been well received by patients and increases screening utilization in urban areas.³⁰⁻³² Same day clinical breast exam with mammography referral and cervical cancer screening following an acute care visit for nongynecological concerns have been shown to have high acceptance among patients (55%).³² Walk-in mammogram screening following a scheduled visit^{31,32} seems to be particularly beneficial for women at risk of not being screened (unemployed,³¹ with fewer mammograms in the past,³¹ non-

White,³² Medicaid-insured).³² Thus, mammography as a walk-in appointment has the potential to engage women who face a variety of barriers to get screened.

Limitations

A study limitation is that focus groups and survey participants tended to be highly engaged with the health care system, as evidenced by the high percentage of survey respondents who had seen a health care provider in the past year. In addition, focus group participants were supportive of mammography, which may suggest participation and social desirability biases. Thus, our outreach did not recruit participants who never had mammogram screening or who face significant barriers to mammography. Conducting the first focus group meeting as an individual interview may have limited the discussion on barriers and facilitators for mammogram screening for that particular subject. A limitation of the qualitative assessment by codes alone is that the interview questions specifically probed for facilitators and barriers to mammography and used primarily deductive coding and analysis. The survey was developed by the research team, and the wording utilized in survey questions may have influenced participants' responses, which may limit reliability. We cannot estimate the online survey response rate because the survey link was available for all individuals who landed on the hospital's website. Ninety-seven percent of the survey participants were White (consistent with the demographics of this county);^{15,16} 74% had at least some college education; and we did not register participants place of residence, limiting the ability to generalize our results to other non-White, more rural, groups with little formal education, who may face different challenges in obtaining a mammogram screening.

CONCLUSIONS

Understanding factors involved in women's decision-making regarding mammogram screening is important for improving screening utilization in rural areas. Our study suggests hospitals could focus on supporting health care professionals to deliver mammogram screening recommendations more efficiently to patients in rural communities. Health care teams should prioritize identifying and addressing patient education gaps²⁴ and improving mammogram screening scheduling options, because these are modifiable factors that have the potential to increase screening adherence. Future studies should focus on reaching and increasing awareness among women who are not engaged with the health system, as well as racial and ethnic minority women and migrant workers in rural communities. Other potential strategies for future work are addressing gaps in patient education on the benefits of preventive care (including screening mammography), increasing education and awareness that breast cancer can occur in the absence of family history, and providing clinician education on engaging women in shared decision-making regarding mammogram screening.

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Availability of Data and Material: Data elements are available upon request to the corresponding author (SS) to ensure that subject privacy is protected.

Previous Presentations: Data from this research were presented as posters at the following events: the 2023 Wisconsin Hospital Association Advocacy Day, April 18-19, 2023; the 2022 NAPCRG Practice-based Research Network (PBRN) Conference, June 2-3, 2022, in Bethesda, Maryland; the UW Women's Health Equity and Health Equity Research Lecture and Symposium, October 20, 2022, in Madison, Wisconsin.

REFERENCES

1. Bennett KJ, Lopes JE, Spencer K, van Hecke S. National Rural Health Association policy brief: Rural Women's Health. Approved January 2013. Accessed July 29, 2022. [https://www.ruralhealth.us/getmedia/59200550-91c7-48c9-bd64-83621a7d93b6/RuralWomensHealth-\(1\).pdf](https://www.ruralhealth.us/getmedia/59200550-91c7-48c9-bd64-83621a7d93b6/RuralWomensHealth-(1).pdf)
2. Yabroff KR, Han X, Zhao J, Nogueira L, Jemal A. Rural cancer disparities in the United States: a multilevel framework to improve access to care and patient outcomes. *JCO Oncol Pract*. 2020;16(7):409-413. doi:10.1200/OP.20.00352
3. Obeng-Gyasi S, Obeng-Gyasi B, Tarver W. Breast Cancer disparities and the impact of geography. *Surg Oncol Clin N Am*. 2022;31(1):81-90. doi:10.1016/j.soc.2021.08.002
4. Thompson JA, Chollet-Hinton L, Keighley J, et al. The need to study rural cancer outcome disparities at the local level: a retrospective cohort study in Kansas and Missouri. *BMC Public Health*. 2021;21(1):2154. doi:10.1186/s12889-021-12190-w
5. Chandak A, Nayar P, Lin G. Rural-urban disparities in access to breast cancer screening: a spatial clustering analysis. *J Rural Health*. 2019;35(2):229-235. doi:10.1111/jrh.12308
6. Onitilo AA, Liang H, Stankowski RV, et al. Geographical and seasonal barriers to mammography services and breast cancer stage at diagnosis. *Rural Remote Health*. 2014;14(3):2738.
7. Barry J. The Relationship between the supply of primary care physicians and measures of breast health service use. *J Womens Health (Larchmt)*. 2017;26(5):511-519. doi:10.1089/jwh.2016.5830
8. Nguyen-Pham S, Leung J, McLaughlin D. Disparities in breast cancer stage at diagnosis in urban and rural adult women: a systematic review and meta-analysis. *Ann Epidemiol*. 2014;24(3):228-235. doi:10.1016/j.annepidem.2013.12.002
9. Andreason M, Zhang C, Onitilo AA, et al. Treatment differences between urban and rural women with hormone receptor-positive early-stage breast cancer based on 21-gene assay recurrence score result. *J Community Support Oncol*. 2015;13(5):195-201. doi:10.12788/jcso.0135
10. Admon LK, Daw JR, Interrante JD, Ibrahim BB, Millette MJ, Kozhimannil KB. Rural and urban differences in insurance coverage at prepregnancy, birth, and postpartum. *Obstet Gynecol*. 2023;141(3):570-581. doi:10.1097/AOG.0000000000005081
11. Shete S, Deng Y, Shannon J, et al; Rural Workgroup of the Population Health Assessment in Cancer Center Catchment Areas Initiative. Differences in breast and colorectal cancer screening adherence among women residing in urban and rural communities in the United States. *JAMA Netw Open*. 2021;4(10):e2128000. doi:10.1001/jamanetworkopen.2021.28000
12. Siegel RL, Miller KD, Wagle NS, Jemal A. Cancer statistics, 2023. *CA Cancer J Clin*. 2023;73(1):17-48. doi:10.3322/caac.21763
13. Giaquinto AN, Sung H, Miller KD, et al. Breast cancer statistics, 2022. *CA Cancer J Clin*. 2022;72(6):524-541. doi:10.3322/caac.21754
14. UW Extension. A Snapshot of Rural Wisconsin. Accessed October 17, 2022. https://www.rwhc.com//mediasite/5-App-Kures,%20Matt_%20Plenary_am_Demographics.pdf
15. Wisconsin Cancer Collaborative. Interactive County Cancer Data Dashboard. Accessed October 17, 2022. <https://wicancer.org/resources/12148-2/county-cancer-profiles/county-cancer-data-dashboard/>
16. QuickFacts: Columbia County, Wisconsin; United States. United States Census Bureau. Accessed October 22, 2022. <https://www.census.gov/quickfacts/fact/table/columbiacountywisconsin,US/SEX255221>
17. U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2021 submission data (1999-2019): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released November 2022. Updated June 2024. Accessed April 4, 2023. <https://gis.cdc.gov/Cancer/USCS/#/CancerScreening/>
18. Wisconsin Urban-Rural Classification (WURC) System. Area Health Education Centers System – Wisconsin. Revised July 2014. Accessed November 10, 2022. <https://ahec.wisc.edu/wp-content/uploads/sites/99/2017/02/Wisconsin-Urban-Rural-Codes-July2014.pdf>
19. Putting Rural Wisconsin on the Map. WisCONTEXT. Accessed November 10, 2022. <https://www.wiscontext.org/putting-rural-wisconsin-map>
20. Patton MQ. *Qualitative Research and Evaluation Methods*. 3rd ed. Sage; 2002.
21. Farmer T, Robinson K, Elliott SJ, Eyles J. Developing and implementing a triangulation protocol for qualitative health research. *Qual Health Res*. 2006;16(3):377-394. doi:10.1177/1049732305285708
22. Haber G, Ahmed NU, Pekovic V. Family history of cancer and its association with breast cancer risk perception and repeat mammography. *Am J Public Health*. 2012;102(12):2322-2329. doi:10.2105/AJPH.2012.300786
23. Peterson EB, Ostroff JS, DuHamel KN, et al. Impact of provider-patient communication on cancer screening adherence: A systematic review. *Prev Med*. 2016;93:96-105. doi:10.1016/j.ypmed.2016.09.034
24. Davis TC, Arnold CL, Rademaker A, et al. Differences in barriers to mammography between rural and urban women. *J Womens Health (Larchmt)*. 2012;21(7):748-755. doi:10.1089/jwh.2011.3397
25. Martinez KA, Deshpande A, Ruff AL, Bolen SD, Teng K, Rothberg MB. Are providers prepared to engage younger women in shared decision-making for mammography? *J Womens Health (Larchmt)*. 2018;27(1):24-31. doi:10.1089/jwh.2016.6047
26. Zhang D, Son H, Shen Y, et al. Assessment of changes in rural and urban primary care workforce in the United States from 2009 to 2017. *JAMA Netw Open*. 2020;3(10):e2022914. doi:10.1001/jamanetworkopen.2020.22914
27. Blanch-Hartigan D, Viswanath K. Socioeconomic and sociodemographic predictors of cancer-related information sources used by cancer survivors. *J Health Commun*. 2015;20(2):204-210. doi:10.1080/10810730.2014.921742
28. US Preventive Services Task Force. Final Recommendation Statement - Breast Cancer: Screening. April 30, 2024. Accessed August 26, 2024. <https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-screening#bcei-recommendation-title-area>
29. Nachtigal E, LoConte NK, Kerch S, Zhang X, Parkes A. Variation in breast cancer screening recommendations by primary care providers surveyed in Wisconsin. *J Gen Intern Med*. 2020;35(9):2553-2559. doi:10.1007/s11606-020-05922-y
30. Doyle JP, Parker RM, Jacobson TA, McNagly SE. Breast and cervical cancer screening in an inner-city medical walk-in clinic: taking advantage of an often missed opportunity. *Am J Prev Med*. 1996;12(5):345-350.
31. Dolan NC, McDermott MM, Morrow M, Venta L, Martin GJ. Impact of same-day screening mammography availability: results of a controlled clinical trial. *Arch Intern Med*. 1999;159(4):393-398. doi:10.1001/archinte.159.4.393
32. Wang GX, Pizzi BT, Miles RC, et al. Implementation and utilization of a "pink card" walk-in screening mammography program integrated with physician visits. *J Am Coll Radiol*. 2020;17(12):1602-1608. doi:10.1016/j.jacr.2020.07.007

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