



Intervention to Improve Mammography Screening at a Student-Run Free Clinic

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Abstract

Background: Most late-stage breast cancer occurs in those who have never been screened. Uninsured women have lower screening rates than insured women. Student-run free clinics (SRFCs) caring for uninsured women can test interventions that attempt to increase screening rates.

Methods: The United States Preventive Task Force guidelines were used to determine patient eligibility for screening mammography in a SRFC. Medical students began receiving education on screening mammography on May 31, 2013 while a simultaneous intervention to streamline workflow related to mammography referrals was implemented. We assessed the change in counseling and referral rates pre- and post-intervention as well as the impact of race/ethnicity, chronic disease status, and preferred language on the likelihood of getting counseled and referred for screening mammography. We also investigated the impact of the intervention on screening mammography attendance rates.

Results: We collected data from the medical records of 106 women (171 patient visits) pre-intervention and 113 women (193 patient visits) post-intervention. The intervention significantly improved the rate of mammography counseling (from 54.4% to 81.9%) and mammography screening referrals (from 37.7% to 70.6%). Preferred language, race/ethnicity, and chronic disease status were not associated with counseling and referral rates. The intervention did not improve mammography attendance.

Conclusions: An education and workflow intervention in a SRFC that improved counseling and referral rates did not improve mammography attendance. Further studies are needed to investigate patient-level barriers that may be affecting mammography appointment attendance.

Introduction

Breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer death among American women.^{1,2} In order to address this, the United States Department of Health and Human Services, through the Healthy People 2020 initiative, has made reducing the death rate from female breast cancer one of its objectives. Healthy People 2020 aims to increase the proportion of women counseled about mammography, to increase breast cancer screening

rates, and to reduce the proportion of women with late-stage breast cancer.³

The majority of late-stage breast cancer occurs in women who have never been screened.⁴ While many factors influence access to mammography, studies have consistently shown that women without health insurance have lower mammography screening rates than those with health insurance.⁵⁻¹⁰ Since many uninsured patients use student-run free clinics (SRFCs) to obtain primary care, SRFCs are positioned to improve breast cancer screening rates among uninsured patients.¹¹⁻¹⁵

Einstein Community Health Outreach (ECHO) is a SRFC in the Bronx, New York, affiliated with the Albert Einstein College of Medicine (Einstein) and operated at the Walton Family Health Center, Institute for Family Health (the Institute). The clinic sees exclusively uninsured adult patients. Patients receive screening tests such as mammography at no personal financial cost. However, even with these free and accessible services, conducting screening referrals for patients with complex medical and social issues remains challenging.¹⁶ Thus, monitoring and facilitating the utilization of preventive screening services is essential to improving patient care at ECHO.

A number of medical institutions have improved their preventive screening rates by implementing educational and quality improvement interventions. One study at the University of Rochester showed that preventive health screening could be improved by sending a letter and automated phone call to patients who were overdue for screening.¹⁷ A meta-analysis of 11 randomized control trials of organizational changes demonstrated an improvement in cancer screenings through non-physician staff interventions such as calling patients overdue for screening, helping them make appointments, and connecting them to community resources.¹⁸ At the University of Nebraska SRFC, investigators found that a multifaceted intervention including patient and provider education and targeted chart review led to increased preventive health screening rates, better enabling the clinic to meet Healthy People 2020 goals.¹⁹ These studies demonstrate that educational and quality improvement interventions can increase preventive health screening rates in clinical settings and motivated the implementation of the intervention discussed in this study. However, none of these studies were specifically targeted at improving breast cancer screening rates.

The primary aim of this study is to a) investigate whether implementing an education and workflow intervention for medical student clerks at ECHO improved mammography counseling and referral rates and b) explore how preferred language, race/ethnicity, and chronic disease status influenced the likelihood of an ECHO patient receiving counseling and referral for a screening mammogram. The secondary aim of this study is

to investigate the effect of the medical student education and workflow intervention on screening mammography attendance rates.

Methods

Setting

ECHO is a Saturday clinic that accepts appointments or walk-in visits. The clinic is run by Einstein medical students, supervised by Institute and Montefiore Medical Center family practice providers, and facilitated by Institute nurses and staff. ECHO offers limited primary care services to uninsured patients free of charge, including laboratory testing and preventive care screenings. Referrals and medications are also provided for free or at reduced cost. Patients referred for screening mammography from ECHO are enrolled in the Viva Mujer Cancer Screening Program at Lincoln Hospital and the Lincoln Cancer Center Program in the Bronx. These state-funded programs provide screening mammograms for women over the age of 40, as well as additional imaging and biopsies if indicated, at no charge.

At ECHO, the patient encounter begins with a third- or fourth-year medical student obtaining a history and physical exam and a first-year medical student helping the patient navigate the clinic visit, including getting referral paperwork and seeing social work. A Spanish interpreter is present, if necessary. The patient is then presented to a supervising provider, who evaluates the patient and develops an assessment and plan for the patient's care with the students. Patients eligible for mammography screening are referred to a free appointment at either Viva Mujer or the Lincoln Cancer Center at the time of their ECHO visit. The clinic adheres to the United States Preventive Service Task Force (USPSTF) guidelines for mammography screening, which recommend that women between the ages of 50 and 74 receive biannual breast cancer screening.²⁰

Patients are allowed two visits at ECHO. After their allotted number of free visits, patients are transferred to the Institute, where they are given continuous care and cost is determined on a sliding scale.

Intervention

The intervention was implemented beginning on June 1, 2013. The main goal of the intervention was to educate medical student clerks about the importance of preventive care, specifically mammography, with the goal of increasing the number of eligible women counseled and referred for screening mammography. The intervention consisted of two parts. First, a short PowerPoint presentation was added to the training that third-year medical student clerks receive before they work at ECHO. This presentation highlighted the importance of mammography, the USPSTF screening recommendations, and resources available to ECHO patients. Second, ECHO implemented the use of a "Chart Review Form" for front desk volunteers to document, prior to the clinical encounter, whether each patient was eligible for a mammography referral. The form was filled out indicating if the patient was due for mammography (female, aged 50-74, without mammography results in ECHO's electronic medical record system for the past two years). This form was then given to the medical student clinical team prior to their visit with that patient.

This study was approved by the Institutional Review Boards at Einstein and the Institute.

Chart Selection and Data Collection

We analyzed the charts of female patients between the ages of 50 and 74 who visited ECHO between June 1, 2011 and April 30, 2015. For the purposes of this study, we chose not to include women younger than 50, including those with a strong family history of breast cancer. We queried the electronic medical record to determine whether each patient was asked when her last mammogram occurred ("counseling") as well as whether or not a referral for a mammogram was ordered ("referral"). If a patient was counseled and referral was determined as not indicated, we marked them as successfully counseled, and then excluded them from the "referral" and "attendance" portions of the analysis. We defined appointment attendance as the presence of mammography results in the patient's chart after the date of the mammography referral appointment. We also collected data on age, preferred language, race/ethnicity, and the number of diagnosed chronic diseases from each patient's chart.

Pre-clinical volunteers did initial demographic data collection, and one of the authors re-evaluated each chart. When data collection was completed, the authors also rechecked 10% of all data collected from charts to confirm its validity.

Statistical Analysis

In order to analyze the effect of the intervention, we reviewed charts from the start of the intervention (June 1, 2013) until the end of the study (April 30, 2015). This group was deemed the "post-intervention" group. Charts from the two years prior to the intervention (June 1, 2011-May 31, 2013) were used as a historical comparison. This group was deemed the "pre-intervention" group. We used Chi-square tests or Fisher's exact tests to compare categorical variables between the pre- and post-intervention groups, and Wilcoxon-Mann-Whitney tests to compare continuous variables between the pre- and post-intervention groups.

We calculated the rate of successful counseling and successful referral for both the pre- and post-intervention groups and used Chi-square tests to investigate associations of variables such as preferred language, race/ethnicity, and chronic disease status with successful counseling or referral.

In order to assess mammography attendance, we performed two analyses. First, we conducted an analysis limited to each woman's first visit. We used a Chi-square test to compare the percentage of women in the pre- and post-intervention periods who were referred to mammography and successfully attended their appointment. In the second analysis, we aggregated all of the women's visits in the pre- and post-intervention periods and compared mammography attendance rates between periods using a Chi-square test. P-value <0.05 is considered significant for all analyses.

We performed all statistical analysis using SAS software 9.4 (SAS Institute Incorporated, Cary, North Carolina) and STATA software 14.2 (StataCorp, College Station, Texas).

Table 1. Characteristics of 364 Patient Visits Eligible for Mammography Counseling at ECHO Free Clinic, June 1, 2011-April 30, 2015

	Pre-Intervention (n = 171)	Post-Intervention (n = 193)	p-value
Mean age, years (SD)	57.1 (5.3)	58.4 (5.8)	
Race/Ethnicity^a, n (%)			
Hispanic	64 (37.4)	99 (51.3)	0.01
Black	76 (44.4)	73 (37.8)	0.20
Other ^b	24 (14.1)	12 (6.2)	0.01
Not specified	7 (4.1)	9 (4.7)	0.79
Preferred language, n (%)			
English	115 (67.3)	118 (61.1)	0.23
Spanish	45 (26.3)	67 (34.7)	0.08
Other	11 (6.4)	7 (3.6)	0.22
Not specified	0 (0.0)	1 (0.6)	0.35
Chronic disease distribution, n (%)			
Diabetes	27 (15.8)	50 (25.9)	0.02
Hypertension	107 (62.6)	107 (55.4)	0.17
Hyperlipidemia	39 (22.8)	45 (23.3)	0.91
Asthma	13 (7.6)	23 (11.9)	0.17
Chronic disease burden, n (%)			
0	46 (26.9)	53 (27.5)	0.91
1	76 (44.4)	73 (37.8)	0.20
2	38 (22.2)	49 (25.4)	0.48
3	10 (5.9)	18 (9.3)	0.21
4	1 (0.6)	0 (0.0)	0.29

^aTotals exceed 100% because some patients identified with more than one group.

^bThe "Other" category includes all races or ethnicities except Hispanic and Black.

SD: standard deviation

Results

Study Population Characteristics

Over the course of the study (June 1, 2011-April 30, 2015), ECHO saw an average of 800 patients annually and provided an average of 1,000 visits per year. Approximately 90% of these patients had annual incomes of less than \$25,000.

We collected data from the medical records of 106 women (171 patient visits) pre-intervention and 113 women (193 patient visits) post-intervention. The population characteristics were similar between the pre-intervention and post-intervention groups except for the percentage of patients that identified as Hispanic or Other Race/Ethnicity and the percentage of patients with diagnosed diabetes (Table 1).

Compared to the post-intervention group, in the pre-intervention group, there were significantly fewer visits in which patients identified as Hispanic (64/171, 37.4% versus 99/193, 51.3%, $p=0.01$) and significantly more visits in which

patients identified as Other Race/Ethnicity (24/171, 14.1% versus 12/193, 6.2%, $p=0.01$). There were also significantly fewer patient visits including a history of diagnosed diabetes (27/171, 15.8% versus 50/193, 25.9%, $p=0.02$) in the pre-intervention group compared with the post-intervention group.

Effect of Intervention on Mammography Counseling and Referral

This intervention was associated with significant improvement ($p<0.001$) in the percentage of patient visits that included counseling about mammography (Figure 1A). Pre-intervention, only 93 (54.4%) of 171 eligible patient visits had documented counseling. Post-intervention, 158 (81.9%) of 193 eligible patient visits had documented counseling. This intervention was also associated with significant improvement ($p<0.001$) in the percentage of patient visits including referral for mammography (Figure 1B). Of the 171 patient visits in the pre-intervention counseled group,

Figure 1. Change in Mammography Counseling and Referral Rates Pre- and Post-Intervention

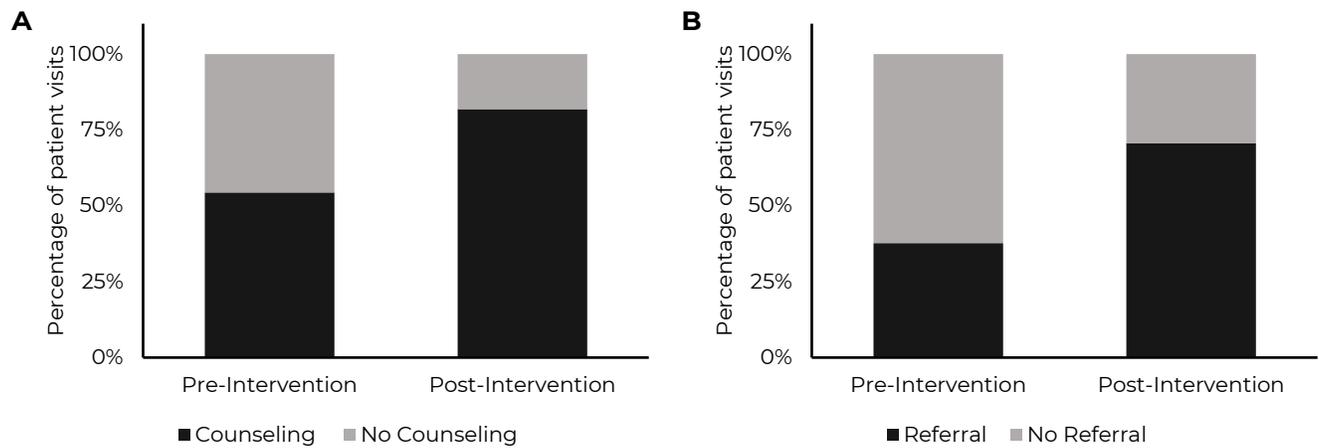


Table 2. Mammography Counseling Stratified by Preferred Language, Chronic Disease Status, and Race/Ethnicity for 364 Eligible Patient Visits at ECHO Free Clinic, June 1, 2011-April 30, 2015

	Counseled	Not Counseled	p-value	Referred	Not Referred	p-value
Preferred language, n (%)						
English (n = 233)	158 (67.8)	75 (32.2)	0.53	75 (49.7)	76 (50.3)	0.13
Other (n = 131)	93 (71.0)	38 (29.0)		48 (60.0)	32 (40.0)	
Chronic disease status, n (%)						
Chronic disease (n = 265)	180 (67.9)	85 (32.1)	0.49	82 (50.3)	81 (49.7)	0.17
No chronic disease (n = 99)	71 (71.7)	28 (28.3)		41 (60.3)	27 (39.7)	
Race/ethnicity, n (%)						
Hispanic (n = 163)	117 (71.8)	46 (28.2)	0.07	58 (57.4)	43 (42.6)	0.16
Black (n = 149)	95 (63.8)	54 (36.2)		46 (47.4)	51 (52.6)	
Other ^a (n = 36)	24 (66.7)	12 (33.3)		11 (47.8)	12 (52.2)	
Not specified (n = 16)	15 (93.8)	1 (6.2)		8 (80.0)	2 (20.0)	

^aThe "Other" category includes all races or ethnicities except Hispanic and Black.

referral was not indicated in 42 and refused in 7, leaving a total of 122 eligible patient visits. Of these, 46 (37.7%) included mammography referral. Of the 193 patient visits in the post-intervention counseled group, referral was not indicated in 76 and refused in 8, leaving a total of 109 eligible patient visits. Of these, 77 (70.6%) included mammography referral.

There was not a significant difference in counseling or referral rates when comparing visits in which the preferred language was English with those involving another preferred language, patient visits involving at least one chronic disease with those not involving chronic diseases, and visits in which patients identified as Hispanic with

visits in which patients identified as Black or Other Race/Ethnicity (Table 2).

Effect of Intervention on Mammography Appointment Attendance

We also assessed the effect of the intervention on mammography appointment attendance. When limited to each woman’s first visit, 35 (33.0%) of 106 patients were referred for mammography in the pre-intervention group and 64 (56.6%) of 113 patients were referred for mammography in the post-intervention group. Of these, 17 (48.6%) attended their appointments in the pre-intervention group and 32 (50.0%) attended their appointments in the post-intervention group.

The difference in attendance rates was not significant ($p=0.89$). When we compared the aggregated number of patient visits in the pre-intervention period with that in the post-intervention period, 46 (37.7%) of the eligible 122 patient visits included referral for mammography in the pre-intervention group and 77 (70.6%) of the eligible 109 patient visits included referral for mammography in the post-intervention group. Of these, 26 (56.5%) patients in the pre-intervention group and 43 (55.8%) patients in the post-intervention group attended their mammography appointments. The difference in attendance in this analysis was also not significant ($p=0.82$).

Discussion

As a SRFC, the main goals of ECHO are providing quality health care to the underserved population in our community in the Bronx and educating our medical student body, with a focus on preventive care. In this study, we evaluated an intervention which trained medical student clerks to counsel and refer eligible women to free mammography services in a SRFC setting. The primary goal of this intervention, to determine if targeted education and implementing a chart review form would increase counseling about and referral to mammography, was successful. The success of this intervention highlights two points. First, similar interventions can also be used to increase counseling and referral for other illnesses, such as cervical and colon cancer. Second, providing training on preventive screening at SRFCs not only ensures that it becomes part of each patient's care plan, but also that preventive health screening becomes a regular part of each medical student clerk's patient evaluation, regardless of the setting.

The implementation of the Affordable Care Act, which changed the insurance landscape for previously uninsured patients, as well as ECHO's expanded outreach efforts in the Bronx, could have contributed to the differences in race/ethnicity, preferred language, and chronic disease status between the pre- and post-intervention groups. However, these differences did not affect whether a patient was counseled or referred for mammography at ECHO. This strengthens the evidence that provider education and workflow

modifications can influence whether a patient is counseled and referred for breast cancer screening. This was the first time that a formal intervention on the impact of provider education on preventive disease screening was done at ECHO. Therefore, while it is possible that patients in this study received education on mammography from other providers prior to this intervention, we observed a clear, significant difference in counseling and referral after we implemented this intervention. Furthermore, our results demonstrate that ECHO was able to provide the same level of access to counseling and referral to all patients, regardless of their race/ethnicity, preferred language, and chronic disease status. One limitation of this study is that we did not collect data on the race/ethnicity and preferred language of the providers counseling the patients. However, given that race/ethnicity and preferred language did not significantly change counseling and referral rates, it appears that provider race/ethnicity and preferred language likely did not affect the patient's likelihood of being counseled and referred for a mammogram.

The second goal of this intervention was to determine whether the intervention increased screening mammography attendance. Unfortunately, there was not a significant difference between pre- and post-intervention mammogram appointment attendance rates in this study. This was not an anticipated result. We assumed that by increasing education about and referral to mammography, mammography attendance would also increase. It is likely that this intervention did not result in increased mammography attendance because it did not address issues specifically related to potential challenges that ECHO patients face when attempting to obtain a mammogram, namely lack of citizenship, lack of insurance, lack of English proficiency, loss of income, and the high provider turnover inherent at a SRFC. All ECHO patients are uninsured, many are non-citizen immigrants, and just over a third of patients in both the pre- and post-intervention groups had a primary language other than English. Studies have shown that non-citizens are less likely to receive breast cancer screening when compared with immigrants who are United States citizens.^{21,22} In this study, we did not query immigration status, and therefore cannot

comment on how this affected counseling, referral, and attendance rates. In addition, studies have also shown that uninsured patients are far less likely to receive cancer screenings than their insured counterparts.^{5-10,23-28} This is true even when analyses are adjusted for demographic variables such as income level, race/ethnicity, language, sex, and education levels.²⁵ Although patients are told that both their ECHO and outside referral appointments are free, many remain concerned that appointments will have a cost. Patients may also be concerned about losing income by taking off of work to attend an appointment or incurring travel costs to attend an appointment.²⁹ Some may also lack the moral support or childcare to comfortably attend their appointment.³⁰ To further investigate these and other barriers, studies that query patients about the factors that inhibit or facilitate obtaining a mammogram should be conducted at ECHO and other SRFCs, and this information should be used to inform future interventions.

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Disclosures

The authors have no conflicts of interest to disclose.

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