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Impact of Age and Comorbidity on Cervical and Breast Cancer Literacy of African Americans, Latina, and Arab women

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Abstract

Background—Appropriate and timely screening can significantly reduce breast and cervical cancer morbidity and mortality. Racial/ethnic minorities and immigrant populations have lower screening rates and delays in follow-up after abnormal tests.

Purpose—In this study, we examined the relationship between age, comorbidity, breast and cervical cancer literacy in a sample of African American, Latina, and Arab women (N=371) from Detroit, Michigan.

Methods—Age-adjusted Charlson Comorbidity Index (ACC) was used to characterize the impact of age and comorbidity on breast and cervical cancer literacy; Breast Cancer Literacy Assessment Tool was used to assess breast cancer literacy; Cervical Cancer Literacy Assessment Tool was used to assess cervical cancer literacy. ANOVA was used to assess the relationship between ACC, breast and cervical cancer screening and group differences.

Results—There was a statistically significant difference between breast cancer literacy (Breast-CLAT total scores) scores ($F(2,367) = 17.31, p < 0.01$). ACC had a greater impact on breast cancer literacy for African American $F(2,214) = 11, p = < 0.01$.

Keywords

Cervical cancer; Breast cancer; Literacy; Age-Adjusted comorbidity; Chronic disease

INTRODUCTION

Appropriate screening and early detection can significantly reduce breast and cervical cancer-associated morbidity and mortality, and the U.S. Preventive Services Task Force,^{1,2}

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American Cancer Society, American College of Obstetricians and Gynecologists, and several other national guidelines recommend regular screening.³⁻⁵ In this study, we will use the American Cancer Society (ACS) guidelines for breast and cervical cancer screening, which are depicted in Box 1 and Box 2. Many women do not obtain breast and cervical cancer screening at recommended regular intervals and experience delays in diagnostic follow-up after an abnormal mammogram.⁶⁻⁹ Untimely screening and inappropriate follow-up after an abnormal mammogram increase the risk for late-stage diagnosis and larger size tumors.^{8,9} Late-stage diagnosis negatively impacts treatment, disease course, and survival.^{10,11} Approximately 33% of eligible women (aged 40 years and older) have not received breast cancer screening within the past two years.¹² Breast cancer screening rates are lowest in women that are uninsured (38%) followed by immigrant women who have been in the U. S. less than 10 years (39.9%). In 2013, 11% of women (aged 21 to 65) have not been screened for cervical cancer in the past 3-years.^{12,13} Cervical cancer screening has been consistently lower in women who are uninsured (61%), recent immigrants (66%), and women with less than a high school education (69%).

Several factors contribute to low breast and cervical cancer screening rates, including, low socioeconomic status, low educational attainment, membership in a minority race/ethnic group, foreign-born or immigrant status, lack of a regular care provider, lack of a doctor's recommendation, lack of healthcare access, inconvenience, cultural beliefs, and lack of social support.^{14,15} Lower screening rates in immigrant women may be partially attributed to language barriers (English proficiency). Limited English proficiency can lead to decreased access to health care, dissatisfaction with care, decreased quality of care, and limit knowledge about cancer prevention and screening guidelines.¹⁴⁻²⁰ For example, in a study examining mammography screening among "Asian Indian" women, researchers reported that length of stay in the United States, marital status, knowledge of mammogram guidelines, age, having health insurance, physician recommendations, and number of relatives who had a mammogram were positively associated with having a mammogram within the past 2 years.²¹ These findings suggest that women who have difficulty understanding spoken recommendations about breast and cervical cancer screening may be at risk for non-adherence to screening guidelines.²² Knowledge (health literacy) about breast and cervical cancer and screening benefits are important determinants screening adherence.^{23,24}

Health literacy is a strong predictor of cancer screening rates. Health literacy is defined as a "wide range of skills and competencies that people develop to seek out, comprehend, evaluate, and use health information and concepts to make informed choices, reduce health risks, and increase quality of life."²⁵ Women with limited health literacy and limited English proficiency may have difficulty understanding screening guidelines, accessing and navigating the healthcare system, and difficulty with clinical decision making.²⁶ Moreover, because provider recommendation is an important factor in obtaining cancer screening, limited health literacy affects patient/provider communication. Low health literacy is associated with limited awareness about cancer screening, lack of desire for screening and limited access to care.²⁷⁻²⁹

There is also evidence that comorbidities often serve as a barrier to timely and appropriate cancer screening.^{30,31} Some studies document that specific comorbidities are an independent risk factor for cancer (e.g., diabetes, hypertension).³²⁻³⁴ For example, women with diabetes are at increased risk for development of cancer and are 40% more likely to die from breast cancer than women who do not have diabetes.^{35,36} In addition, women with diabetes are less likely to obtain breast and cervical cancer screening than women who do not have diabetes.^{31,37} In one study, women with cardiovascular and lung disease were less likely to be up to date on breast cancer screening and women with diabetes, arthritis, and hypertension were less likely to be up to date with cervical cancer screening compared to women without comorbidities.³⁸

Although there is evidence that regular breast and cervical cancer screening and timely follow-up of abnormal tests lead to decrease mortality,³⁹⁻⁴² racial/ethnic minority women, particularly immigrant women, continue to underuse cancer screening. Given the long-standing low screening rates of racial/ethnic minorities and the increasing number of immigrants to the U. S., information that contributes to our understanding of factors that contribute to lower screening rates is important.⁴³⁻⁴⁵ Moreover, information obtained from this study may be helpful in understanding screening patterns and facilitation of timely and appropriate screening. The present study addressed this need by examining the association between age, comorbid conditions, and breast and cervical cancer literacy of African American, Latina, and Arab women. These populations were selected for this study because they have lower screening rates, African American and Latina women have higher cancer-related mortality rates than White women, and Latina and Arab women are among the largest group of U. S. immigrants.⁴³ Additionally, Michigan is among the states with the largest percent increase of immigrants and has one of the largest concentrations of Arab Americans.^{43,46,47} Few studies have addressed the association between age, comorbidity and cancer health literacy in a sample of African American, Latina and Arab women.

Breast and Cervical Cancer

For women in the U. S., breast cancer is the most common cancer and the second leading cause of cancer death. In 2015, 231,840 new cases of invasive breast cancer is expected to be diagnosed and 40,290 women are expected to die from the disease.⁴⁸ Routine breast cancer screening can reduce morbidity and mortality from late-stage diagnosis and treatment.^{49,50} Mammography Some women experience a delay in follow-up after an abnormal mammogram.⁵¹

Despite having a lower incidence of breast cancer than White women (Figure 1), African American, Latina, and Arab women are more likely to be diagnosed at a younger age, more advanced stage of disease, and to have more aggressive forms of breast cancer.⁵²⁻⁵⁶ Advanced stage of cancer diagnosis has been attributed to lower screening rates, inadequate knowledge about screening guidelines, and delayed followed up for abnormal findings.^{57,58} Studies have reported that racial/ethnic minority and low income women are more likely to delay follow-up.^{51,59-61} For example, in a study of African American, Latina, Asian and White women, researchers from that African American race, income, perceived discrimination, not fully understanding the results of the mammogram, and being notified of

abnormal finding by letter or phone instead of in-person.⁶¹ A 3 to 6 months delay in treatment of breast cancer can reduce survival and delays of over 1 year increases the odds of lymph node metastasis and larger tumors.^{62,63} Breast cancer is the most commonly diagnosed cancer in Latinas and the leading cause of cancer death.⁵⁴ African American women are more likely to die from cancer than any other racial/ethnic group.⁴⁸ Arab American women have similar stage, age, and hormone receptor status as African Americans, but a better survival rate.^{64,65}

In 2015, 12,900 new cases of invasive cervical cancer is expected to be diagnosed and 1,400 are expected to die from the disease.⁴⁸ Over half of the cervical cancer deaths occur in women who have never been screened or women who have not been screened in five years.⁴⁸ Cervical cancer is preventable with early detection and removal of precancerous cervical lesions.^{48,66} Routine cervical cancer screening (Papanicolaou [Pap] test) or human papillomavirus test allows for the detection of precancerous lesions that can be treated prior to progression to cancer. In addition, the time interval between cervical cancer screening, diagnosis, and treatment have a significant negative impact on health outcomes.⁶⁶ A longer interval between diagnostic identification of a precancerous lesion and treatment results in later stage disease, decreased survival, and increased economic cost (individual and society).^{67,68} In women with a precancerous lesion who receive timely and appropriate evaluation, treatment and follow-up, the probability of survival is almost 100%.¹² Racial ethnic minorities are less likely to meet the timeliness diagnostic interval.

The incidence of cervical cancer in the U. S. is highest in Latinas (10.5), followed by African American women (10.2) (Figure 1).^{48,54,55} African American women are twice as likely to die from cervical cancer as White women (Figure 2).⁵⁵ Available information in the literature about cervical cancer in Arab women indicate that in most Arab countries, cervical cancer is the second most common malignancy.⁶⁹ Studies examining cervical cancer among Arab American women indicate that cervical cancer screening is lower among Arab women than the general population.⁷⁰ Studies also report that Arab women have a lower level of knowledge about cervical cancer.^{71,72}

These findings suggest that early detection and treatment by adherence to established screening guidelines are critical to reducing breast and cervical cancer morbidity and mortality. For example, women who receive cervical cancer screening within 3-36 months prior to cervical cancer diagnosis have a lower mortality rate.³⁹ However, many women do not adhere to these guidelines and many are not aware of these guidelines.^{73,74} There is thus a clear need to identify factors that impact screening for racial/ ethnic minority women, particularly among immigrants and individuals with limited English proficiency to improve cancer screening rates.

Breast and Cervical Cancer Screening/Literacy/Age/Comorbidity

Symptomatic presentation is often the most common route for a cancer diagnosis. Screening, testing an individual who has no symptoms,¹² allows for early detection of disease. In 2013, 65.9% of U. S. women reported having a mammogram within the past two years.¹² Race/ ethnicity and immigration status play a role in predicting breast and cervical cancer screening. Mammography rates are particularly low for foreign-born individuals who

immigrated to the United States more recently or who are less acculturated (living in the US <10 years) (39.9%) and uninsured women (38%).^{12,75} The Pap test screening rate over the past three years for U. S. women is 80.1%. Similar to mammogram use, Pap test use was lowest in recent immigrants (65.9%) and uninsured women (60.6%).¹²

Knowledge (health literacy) about screening and its benefits is an important determinant of screening. One in five adults in the U. S., do not have the basic literacy skills to function sufficiently in our society, particularly in healthcare.²⁶ As healthcare consumers, these individuals often do not have the necessary information to make appropriate health care decisions. Underuse of breast and cervical cancer screening is associated with lower health literacy, particularly in ethnic/racial minorities. In a study examining the relationship between health literacy and screening mammography, health literacy had the strongest association with mammography screening.⁷⁶ Low health literacy contributes to social inequities and poor health outcomes.⁷⁷ Low health literacy influences decision making about cancer screening and prevention.

In a study assessing cervical cancer screening in underserved African American women and Latinas, screening was low; Latina and older women were less likely to adhere to screening guidelines. Age, knowledge of screening recommendations, and having a regular health care provider were independently associated with both breast and cervical cancer screening in a sample of Latinas.⁷³ Similar results have been reported by researchers in this patient population.⁷⁸⁻⁸¹ Knowledge about screening recommendations is also low in Arab women and some studies indicate that even in women with adequate knowledge, screening is low.^{69,82-86}

The risk of breast cancer increases with age. Aging is also associated with an increased risk of comorbidities and cancer. There are conflicting reports on the association between age, comorbidity, and cancer screening. Some studies report that comorbidity has little effect on the use of screening mammography and Pap testing. While, other studies indicate that specific comorbidities increase the likelihood of timely cancer screening (e.g., hypertension, digestive disorders).^{38,87,88} These researchers suggest that individuals with comorbid conditions have more contact with the healthcare system and are more likely to be screened. Other researchers suggest that women with comorbid conditions are less likely to be screened because of competing demands. They suggest that comorbid condition competes with the health care provider time and focus and that it impacts the individual's resources. Diabetes has been consistently related to cancer screening rates.⁸⁹⁻⁹¹

Low income and African American women are more likely to have two or more comorbidities compared to White women. In this paper, we examined the association between age, comorbid conditions, breast and cervical cancer literacy among medically underserved women (i.e., African American, Latina, and Arab). To meet the needs of women with lower utilization of screening (racial/ethnic minorities, immigrants, low income), will requires that we understand the factors that contribute to lower screening rates.

METHODS

Design

This study used a quantitative, descriptive design. Breast and cervical cancer literacy, age and comorbidity were evaluated. The purpose of this study is to examine the association between age, comorbid conditions, and breast and cervical cancer literacy of African American, Latina, and Arab women.

Participants

This study used a purposive sample of women who participated in the community-based Kin KeeperSM Cancer Prevention Intervention studies, previously described in detail.⁹²⁻⁹⁴ The studies were approved by the Michigan State University Institutional Review Board. Criteria for inclusion in the current study included: (a) female sex, (b) age > 40years, and (c) self-identified as African American, Latina, or Arab. Our inclusion criteria yielded a total sample of 371 women (African American=161; Latina=107; Arab=103). For the original study, inclusion criteria were: female, age 21-70, self-identifies as African American, Latina, or Arab, receiving services from CHWs from one-of-the 3 community-based organizations, biological mother and grandmothers of the same race/ethnicity and willingness to recruit members of her female adult family to participate in a home education visit, and completion of 2 home-based educational sessions on breast and cervical cancer prevention and control.

Procedure

Participants were recruited from community-based organizations affiliated with the Detroit Department of Health and Wellness Promotion including: a) Village Health Worker Program, b) Community Health and Social Services, and c) the Arab Community Center for Economic and Social Services. Briefly, CHWs recruit women (age ≥ 21) of their respective race (African American, Latina, Arab) from their public health case load for 2 home-based educational sessions. After signing the consent during first home visit, the CHW and family unit completed the Historical Background Questionnaire and the breast cancer assessment (baseline). After completion of pretest to assess breast cancer literacy, the educational intervention was delivered, followed by a posttest. During the second educational session, the second posttest was delivered, followed by the cervical educational session and a posttest. During the second visit, participants also completed a personal-action-plan.

Questionnaire items

Sociodemographic Characteristics—Demographic factors on marital status, income, education, employment status, and age were considered in the current study.

Comorbidities—Data about comorbidities were obtained by the participants' response to the question, "Have you ever been told by a doctor or health professional that you had?" Based on the comorbidities, all patients were assigned a comorbidity score based on the Age-Adjusted Charlson index score as described by Charlson et al.^{95,96} The overall score is a weighted summation of medical conditions and age with higher scores indicating a higher medical comorbidity (Box 2).

Breast and Cervical Cancer Literacy—Breast cancer literacy was assessed with the Breast Cancer Literacy Assessment Tool (Breast-CLAT), a 35-item assessment instrument, that measures functional breast cancer literacy in three domains: (a) awareness (items 1-6), (b) knowledge and screening (items 7-19), and (c) prevention and control (items 20-35).⁹⁷ The Breast-CLAT uses a multiple choice and true/false format and is scored as a binary variable (0=Incorrect, 1=Correct). Scores range from 0-35, with higher scores indicating higher level of functional breast cancer literacy. The instrument has been validated in English, Spanish and Arabic with a total scale Cronbach $\alpha=.73$.⁹⁷ The total scale reliability was highest in African Americans and lowest in Latina (.81 and .61 [respectively]).^{98,99} Breast-CLAT total and subscale scores were assessed.

Cervical cancer literacy was assessed with the Cervical Cancer Literacy Assessment Tool (C-CLAT).^{98,100} The 16-item instrument contains three domains: (a) Awareness, (b) Knowledge and Screening, and (c) Prevention and Control.¹⁰¹ The items are scored as a binary variable (0=incorrect, 1=correct). Scores range from 0-16, with higher scores indicating better literacy. The internal consistency of the cervical cancer literacy assessment tool was high (0.72). The CCLAT reliabilities in African American, Latina, and Arab women were 0.73, 0.76, and 0.60, respectively. The C-CLAT scores were assessed by subscale and total scores.

Data Analysis

Data were analyzed using Stata (version 12.1) software.¹⁰² Descriptive statistics (means, standard deviations [SD], frequencies, and proportions as appropriate) were used to describe the sample, including sociodemographic characteristics and comorbidities by racial/ethnic group. Analysis of variance (ANOVA), multivariate analysis of variance (MANOVA) and Tukey Honestly Significant Difference (HSD) post hoc tests were conducted to evaluate the effect of age-adjusted comorbidity on breast and cervical cancer literacy, plus measure the combined effect of age-adjusted comorbidity and race on breast and cervical cancer literacy. The main factors of interest were age-adjusted comorbidity and race; both categorical variables. This analysis was used, given the likelihood that the dependent variables (i.e., breast and cervical cancer literacy) are related to one another. Also, a two-way MANOVA allowed for not only tests of the main effects of the independent variables (i.e., age-adjusted comorbidity and race) but also for possible interaction effects between these variables, which is important, given the relatively high co-occurrence of low breast and cervical cancer literacy in these populations. The use of MANOVA also reduces the risk of Type I errors, which are more common with the use of repeated analyses of variance (ANOVA). Box's test of equality was used to test the assumption of homogeneity of variance–covariance matrices, and Levene's test of equality was used to test the assumption of equality of variances. No significant violations to these assumptions were noted. Statistical significance was based on Wilks' λ statistic and partial η^2 statistics were reported to illustrate effect size. The Tukey HSD tests were used to test all pairwise comparisons. The statistical significance of each result was evaluated according to its *P*-value (*P*<0.05 being significant) (Polit and Beck, 2012).

Results

The sample included 371 women ranging in age from 41 to 101 years. African American women were more likely to be unmarried (Table 1). Participants were also dichotomized into three groups based on age-adjusted comorbidity scores: (a) low= 0-1 (N=153); (b) mild=2-3 (N=144); and (c) severe= ≥ 3 (N=74).¹⁰³ The two most common comorbidities were hypertension and diabetes.

The distribution of age-adjusted comorbidity, breast and cervical cancer literacy scores (total and subscale scores) are summarized in Table 2. Analysis of variance was conducted to compare age-adjusted comorbidity, breast and cervical cancer literacy scores. Results of the ANOVA for breast cancer literacy (Breast-CLAT total scores) indicated that literacy was significantly different between groups ($F(2,367) = 17.31, p < 0.01$). Similarly, age-adjusted comorbidity scores indicated that there was a significant difference between groups ($F(2, 367)=3.08, p<0.05$). Given the statistical omnibus of the ANOVA F test, MANOVA and Tukey HSD tests were conducted to examine pairwise contrasts.¹⁰⁴ For breast cancer literacy (total score), Tukey post hoc comparisons indicated that Latinas scores (mean =19, SE=.43) were significantly different than African American (mean=22, SE=.34) and Arab (mean=22, SE= .43) women. Age-adjusted comorbidity scores were significantly different for African American women (mean=1.9, SE=0.06) compared to Latina women (mean=1.7, SE=0.06). Subscale scores were only significant for breast cancer awareness. For breast cancer awareness, Arab women scores (mean=2, SE=0.2) were significantly different than African American (mean= 4, SE=0.1) and Latina women (mean=4, SE=0.2). Cervical cancer literacy (total scores and subscale scores) comparisons were not significant.

Effect of Age-adjusted Comorbidity and Race on Breast Cancer Literacy

A factorial ANOVA was conducted to determine if breast cancer literacy differed based on age-adjusted comorbidity and race (African American, Latina, and Arab). The two-way factor analysis showed no significant main effect for age-adjusted comorbidity, $F(2,12) = 0.65, p = >0.05$. There was a significant main effect for race, $F(2,214) = 11, p < 0.01$; indicating that breast cancer literacy was influenced by race. The interaction between age-adjusted comorbidity and race was also significant, $F(2,70) = 3, p = <0.01$; indicating that differences in breast cancer literacy and age-adjusted comorbidity depends on race.

Discussion

The purpose of this study was to assess the association between age-adjusted comorbidity, breast and cervical and literacy for African American, Latina, and Arab women. In this study, medical comorbidity as measured by the validated Age-Adjusted Charlson Comorbidity Index indicated that it had a significant effect on health literacy. Medical comorbidities had a greater impact on African American women breast cancer literacy than Latina or Arab women. There are a limited number of studies that have used the Age-Adjusted Charlson Comorbidity index to assess the relationship between age, comorbidity and breast and cervical cancer in a racial/ethnic diverse sample of women. Most studies used the Age-Adjusted Charlson Comorbidity index as a predictor of mortality, survival prediction, and cancer treatment options.¹⁰⁵⁻¹⁰⁷

Studies examining the relationship between comorbidities and screening report that comorbidities are associated with adherence to breast and cervical cancer screening guidelines and later stage at cancer diagnosis.^{38,108,109} Vaeth et al.,¹¹⁰ evaluated comorbid conditions in women newly diagnosed with breast cancer and reported that women with two or more comorbid conditions were more likely to be diagnosed at an advanced stage of disease. Similar results were reported by Kiefe et al.,¹¹¹ who examined the role of chronic disease as a barrier to screening for breast and cervical cancer. The researchers reported that selected chronic diseases (e.g., heart disease, gastrointestinal disorders) contribute to lower screening rates. Studies also report the underuse of cancer screening by women with diabetes.^{112,113} These findings suggest that age and comorbid conditions may contribute to lower literacy levels for African American women and delay obtaining screening test. This is particularly important for African Americans because they are more likely to have chronic diseases.¹¹⁴ For example, African Americans have a higher rate of stroke (31%) and heart disease (23%) than Whites.¹¹⁵

The women in this study demonstrated a moderate to relatively low level of breast cancer literacy (African American and Arab: mean=22, SD= 4; Latina: mean=19, SD=4) and cervical cancer literacy (mean 10, SD=2 for all groups). Similar results were reported by Dumenci et al.,¹¹⁶ who reported limited cancer health literacy. In the study, 44% of African Americans believed that exposing a tumor to air during surgery cause the tumor to spread and that 23% of African Americans believe that rather than taking a pill twice a day as prescribed, taking it three times a day will help them get better faster. This inadequate knowledge can impact an individual's decision to seek screening. Research by Garger et al.,¹¹⁷ indicates that Spanish speaking women with inadequate health literacy are 16.7 times less likely to obtain cervical cancer screening.

There are limitations to this study that should be acknowledged. First, our findings may not generalize to other states, as our data come from only one state. However, Michigan has one of the largest Arab populations outside of the Middle East. The Age-Adjusted Charlson Index to is a valid and reliable instrument;¹¹⁸ however, it does not represent functional impairment, which could influence cancer screening, particularly in older adults.¹¹⁹⁻¹²¹ Future studies should also include functional impairment.

Summary

The results of this study support previous studies of racial/ethnic minorities and immigrant populations, indicating overall low breast and cervical literacy (awareness, screening, and prevention). The influence of comorbidity on stage at diagnosis and screening varies. However, our study supports the link between age-adjusted comorbidity in breast cancer literacy for African American women. This may be related to the fact that African Americans have higher number of comorbidities. Breast cancer screening among African American women may be better targeted by considering comorbidities in addition to race. Increased breast and cervical cancer knowledge could potentially lead to decreased stage at diagnosis and decreased mortality rates. Strategies to increase cancer screening at the primary and secondary level are essential to the reduction of advanced stage of cancer

diagnosis. These strategies should include: cancer literacy and assessing comorbid conditions that may delay screening in medically underserved and immigrant populations.

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KEY POINTS

- Cancer literacy and cancer screening rates are lower among medically underserved populations
- Comorbidities (chronic medical conditions) may serve as a barrier to timely and appropriate cancer screening, particularly for African American women.
- Rates of screening are particularly low for foreign-born individuals who immigrated to the United States recently or who are less acculturated
- Health literacy about breast and cervical cancer can improve screening, reduce burden, and improve health outcomes
- Health care providers should consider age and comorbidity when designing screening interventions for underserved populations.

BOX 1

Comparison of USPSTF and ACS Screening
Guidelines for Breast Cancer for Women at Average
Risk

U.S. Preventive Services Task Force (USPSTF)	American Cancer Society (ACS)
Biennial screening <i>mammography</i> beginning at age 50.	Annual screening <i>mammography</i> beginning at age 40.
Not enough evidence to support assessing the additional benefits of screening mammography in women past age 74.	Annual screening <i>mammography</i> for as long as a woman is in good health.
Recommends against health care providers teaching women how to perform <i>breast self-examination</i>	Breast self-examination is optional. Beginning in their early 20s' women should be told about the benefits and limitations of <i>breast self-examination</i> . Instructions should be given to women who choose to do <i>breast self-examination</i> by their health provider.
Evidence is insufficient for assessing the additional benefits of <i>clinical breast examination</i> beyond screening mammography in women 40 years or older.	Recommends <i>clinical breast examination</i> every three years for women in their 20s and 30s, and annually for women aged 40 and older.
There is insufficient evidence to support the additional benefits and harms of MRI as a screening method for breast cancer	In addition to screening mammography, annual <i>MRI</i> screening is recommended for women with greater than 20% lifetime risk of breast cancer.

Data from references^{1, 12,122}

BOX 2

Comparison of USPSTF and ACS Screening
Guidelines for Cervical Cancer for Women at
Average Risk

U.S. Preventive Services Task Force (USPSTF)	American Cancer Society (ACS)
Cervical cancer screening should begin at age 21 years, regardless of the age of sexual initiation or other risk factors.	Cervical cancer screening should begin at age 21 years, regardless of the age of sexual initiation or other risk factors.
Screening recommended for women age 21 to 65 years with Pap test every 3 years or, for women age 30 to 65 years who want to lengthen the screening interval, screening with a combination of Pap test and HPV testing every 5 years.	Screening recommendations by age group: Aged 21 to 29 years, screening with Pap test alone every 3 years, no testing for HPV unless abnormal Pap test; Aged 30 to 65 years should be screened with Pap test and HPV testing every 5 years (preferred) or Pap test alone every 3 years (acceptable)
Recommends Against screening in women > age 65 years who have had adequate prior screening and are not otherwise at high risk for cervical cancer	Women over age 65 who have had regular screenings with normal results should not be screened
Recommends against screening for cervical cancer in women who have had a hysterectomy with removal of the cervix and who do not have a history of a high-grade precancerous lesion or cervical cancer	Women who have had their uterus and cervix removed in a hysterectomy and have no history of cervical cancer or pre-cancer should not be screened

Data from Moyer VA. Screening for Cervical Cancer: U.S. Preventive Services Task Force Recommendation Statement. *Annals of Internal Medicine*. 2012;156(12):880-891 and American Cancer Society. New Screening Guidelines for Cervical Cancer. 2012; <http://www.cancer.org/cancer/news/new-screening-guidelines-for-cervical-cancer>. Accessed January 10, 2015.

Box 3**Age-Adjusted Charlson Comorbidity Index Scoring**

Score	Comorbid Condition
1	☐ Myocardial infarction (MI) ☐ Congestive heart failure (CHF) ☐ Cerebral vascular disease ☐ Peripheral vascular disease ☐ Dementia ☐ Chronic obstructive pulmonary disease (COPD) ☐ Connective tissue disease ☐ Peptic ulcer disease (PUD) ☐ Mild liver disease
2	☐ Diabetes ☐ Hemiplegia ☐ Moderate/severe renal disease ☐ Diabetes with end-organ damage ☐ Any solid tumor ☐ Leukemia ☐ Lymphoma
3	☐ Moderate/severe liver disease
6	☐ Metastatic solid tumor ☐ Acquired immunodeficiency syndrome (AIDS)
Age	
41-50	☐ 1 point
51-60	☐ 2 points
61-70	☐ 3 points
71 or older	☐ 4 points

*Rates are per 100,000 population and age adjusted to the 2000 US standard population; Data from American Cancer Society. Incidence – North American Association of Central Cancer Registries, 2014. Mortality – US mortality data. 2015; <http://www.cancer.org/research/cancerfactsstatistics/cancerfactsfigures2015/index>. Accessed April 20, 2015

Figure 1.
Breast and Cervical Cancer Incidence Rates* by Race/Ethnicity

*Rates are per 100,000 population and age adjusted to the 2000 US standard population; Data from American Cancer Society. Incidence – North American Association of Central Cancer Registries, 2014. Mortality – US mortality data. 2015; <http://www.cancer.org/research/cancerfactsstatistics/cancerfactsfigures2015/index>. Accessed April 20, 2015

Figure 2.
Breast and Cervical Cancer Mortality Rates* by Race/Ethnicity

Table 1

Sociodemographic Characteristics and Comorbidities by Racial/Ethnic Group (N=371)

	African American (N=161)	Latina (N=107)	Arab American (N=103)
Variables			
Age, years (Mean $\pm$ SD)	53 $\pm$ 9	51 $\pm$ 9	53 $\pm$ 11
Marital status			
Married, N(%)	42(27)	69(66)	80(78)
Education, N(%)			
< High school	14(9)	79(74)	43(42)
High school/GED	53(33)	17(16)	37(36)
>High school	93(58)	10(9)	22(21)
Income ^a N(%)			
< \$9,999	28(18)	62(60)	43(43)
\$10,000-\$19,999	38(24)	20(19)	32(32)
\$20,000-\$39,999	49(31)	18(17)	15(15)
\$40,000	43(27)	4(4)	10(10)
Employment status ^a N(%)			
Employed	99(61)	47(45)	19(19)
Unemployed	62(39)	57(55)	83(81)
Age-Adjusted Charlson Comorbidity (AAC), N(%)			
Low (AAC 0-1)	56(35)	47(44)	50(49)
Mild (AAC 2-3)	70(43)	44(41)	30(29)
Severe (AAC >3)	35(22)	16(15)	23(22)
Total no. of comorbid conditions			
Median	2	2	2
Range	0-6	0-5	0-5

^a 100 because of missing data; SD= Standard deviation

Table 2

Means and Standard Deviations of Age-adjusted Comorbidity, Breast and Cervical Cancer Literacy by Racial/Ethnic Group (N=371)

Measure	Racial/Ethnic Group				Total Sample
	African American (N=161)	Latina (N=107)	Arab (N=103)		
Age-Adjusted Comorbidity (Mean $\pm$ SD)	3 $\pm$ 2	2 $\pm$ 2	2 $\pm$ 2		2 $\pm$ 2
Breast Cancer literacy (Mean $\pm$ SD) Total score	22 $\pm$ 4.8	19 $\pm$ 4.3	22 $\pm$ 3.8		21 $\pm$ 4.6
Awareness	4 $\pm$ 1.0	4 $\pm$ 3	3 $\pm$ 1		4 $\pm$ 1
Prevention	10 $\pm$ 3	12 $\pm$ 4	12 $\pm$ 2		11 $\pm$ 2
Screening	7 $\pm$ 2	7 $\pm$ 2	8 $\pm$ 2		7 $\pm$ 2
Cervical Cancer Screening (Mean $\pm$ SD)					
Total Score	10 $\pm$ 3	10 $\pm$ 2	10 $\pm$ 2		10 $\pm$ 3
Awareness	1 $\pm$ 1	2 $\pm$ 1	1 $\pm$ 1		1 $\pm$ 1
Prevention	6 $\pm$ 2	6 $\pm$ 2	6 $\pm$ 2		6 $\pm$ 2
Screening	3 $\pm$ 1	3 $\pm$ 2	3 $\pm$ 2		3 $\pm$ 2

SD= Standard deviation