BREAST CANCER SCREENING RECOMMENDATIONS: A REVIEW FOR

PRIMARY CARE NURSE PRACTITIONERS

By

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The incidence of breast cancer has declined in recent years, however, it remains a significant health problem in the United States. The reduction in incidence may be attributed to both a decrease in combination hormone therapy due to increased breast cancer risk and an increase in the use of screening mammography. Controversy in the guidelines continues regarding the frequency of screening mammography, the use of clinical breast examination and the value of breast self examination. This paper provides nurse practitioners with information to assist them in making recommendations for breast cancer screening to patients.
Breast Cancer Screening

Introduction

It is estimated that in 2007 there will be 180,000 new diagnoses of breast cancer in the United States, accounting for approximately 26% of all new cancer diagnoses in women, and 40,000 deaths from the disease (Jemal et al., 2007). Nearly all breast cancer occurs in women who have a one in eight lifetime risk of developing breast cancer. Breast cancer is the most common cancer among women, excluding cancers of the skin (American Cancer Society [ACS], 2005-2006). Deaths in women from breast cancer are second only to lung cancer and this trend is expected to continue in for 2007 (ACS, 2005-2006; Jemal et al., 2007).

The incidence of breast cancer has declined over the last five years, after a steady increase since 1980. This decline may be attributed to increased use of mammography screening and decreased use of hormone therapy (HT) (Jemal et al., 2007). The impact of the reduction in HT may be particularly significant. An analysis of Surveillance Epidemiology and End Results (SEER) data from 1992 to 2003 revealed a decrease in breast cancer incidence by approximately 7% in 2003, which was thought to be most consistent with the reduction in hormone therapy (Ravdin, Kronin, Howlander, Chlebowski, & Berry, 2006).

Despite the reduction in the incidence of breast cancer, it remains a significant health problem in the United States (Gloeckler Ries, Reichman, Riedel Lewis, Hankey, & Edwards, 2003). Globally, breast cancer accounts for almost one in four cases of cancer diagnoses in women, with more than 1.1 million women diagnosed annually (Cancer Research UK, 2005, figure 3).

Multiple professional organizations have issued recommendations to guide primary care providers in the screening and early detection of breast cancer. There is conflicting information on the frequency of screening practices as well as what should be included in screening. Nurse
practitioners (NPs) need to understand current recommendations and the controversies surrounding them. NPs can use this knowledge to advise patients on screening guidelines and to make sound clinical decisions for patients with unique or high-risk circumstances. Although men are also diagnosed with breast cancer, the focus of this article will be limited to screening practices to detect cancers of the female breast.

Risk Factors for Breast Cancer

The etiology of breast cancer is largely related to risk factors that influence a woman’s lifetime risk of the development of breast cancer. These include both modifiable and non-modifiable factors. Modifiable risks include post-menopausal obesity, post-menopausal hormone use, activity level and alcohol consumption. Non-modifiable risk factors include being female, age, family history (genetic predisposition), age at first full term pregnancy, early menarche and late menopause (Hankinson, Colditz, & Willett, 2004). Risk factors with the most impact on breast tissue are those that increase its exposure to ovarian hormones. These include early menarche, late menopause, obesity and hormone use.

Other risk factors for breast cancer include benign breast disease, radiographically dense breasts and radiation exposure (National Cancer Institute [NCI], 2007). Race and ethnicity are also important factors in cancer disparities with minority women having lower rates of screening mammography and higher stages of cancer at the time of diagnosis (Ward et al., 2004). Poverty, inadequate education and lack of health insurance may be more important than biologic differences as risk factors in certain populations.

Age

Age is the most important risk factor in the development of breast cancer (ACS, 2005-2006). The risk of breast cancer increases with age and may be higher or lower depending on
personal risk factors. For example, the highest relative risk is found in women age 65 or above, women with an inherited genetic mutation, personal history of breast cancer, women with two or more first-degree relatives with breast cancer and women with dense breast tissue (ACS, 2005-2006). According to the NCI, the majority of breast cancer occurs after the age of 50. Other age related factors which moderately increase risk are early age at the onset of menarche, late age at first full term pregnancy and late onset of menopause. Interestingly, some studies have found the frequency of screening mammograms decreases for women age 65 and older, a time at which a woman is more likely to develop the disease (Michielutte et al., 2005). According to the ACS women aged 20-24 had the lowest incidence of breast cancer with 1.3 cases per 100,000, while women aged 75-79 had the highest incidence at 496 per 100,000 (ACS, 2005-2006).

Race/Ethnicity and Socioeconomic Status

The highest incidence rates for breast cancer are found in Caucasian women. SEER data summarized by the ACS reveals that after the age of 35, white women have a higher incidence of breast cancer than their African American counterparts while the incidence is higher for African American women before the age of 35. African American women are also more likely to die from breast cancer at all ages (ACS, 2005-2006, p. 2). Along with Caucasian women, Asian/Pacific Islanders and Hispanic women have had an increasing incidence of breast cancer diagnoses.

Race as a risk factor is likely related to many variables including cultural differences, socioeconomic factors, diet, body mass index and both differences in the treatments and types of breast cancers that occur (Joslyn & West, 2000). In the United States, African American and Hispanic women are also more likely to be diagnosed with breast cancer at later stages. In comparison with white women, only about half of African American and Hispanic women had
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their cancers detected by screening mammography (Lantz et al., 2006). SEER data has been analyzed for differences in breast cancer stage, treatment and survival by race and ethnic background in an effort to identify the source of the differences. In one study, after adjusting for socioeconomic status and co-morbidities, approximately 12% of diagnoses of late stage disease occurred among African American women. This was attributed in part to the lack of screening mammography (Li, Malone, & Daling 2003).

Family History

A family history of breast cancer increases a woman’s individual risk. This risk is further increased depending on the number of relatives affected and an early age (pre-menopause) at diagnosis (Hankinson et al., 2004). Obtaining an accurate family history is an integral component of the identification of people at risk for developing cancer and gives the provider direction on initiation of further cancer risk assessments and possible genetic counseling (Ashcraft, Coleman, Lange, Enderlin, & Stewart, 2007). Identification of at-risk individuals may also lead to changes in the timing or frequency of screening. Having the patient complete a questionnaire related to family history is a timesaving measure for the provider who can then conduct a more detailed cancer history. If there is a family history of cancer the following information should be obtained: the type of cancer, age at the time of diagnosis and if the family member died as a result of the cancer (Ashcraft et al., 2007).

The National Comprehensive Cancer Network (NCCN), a non-profit consortium of several of the world’s leading cancer centers, places women with a family history or genetic predisposition toward breast cancer in an increased risk category for developing breast cancer (National Comprehensive Cancer Network [NCCN], 2007). While the majority of breast cancer is considered to be sporadic in nature, those cases identified as hereditary may be attributable to
genetic mutations, such as BRCA1 and BRCA2 mutations, which increases the risk of developing ovarian and breast cancers (Chen & Hunter, 2005). The American Society of Clinical Oncology [ASCO] (1996) developed criteria for consideration of genetic predisposition to breast cancer, specifically BRCA1 mutations, which are based upon family history. According to these guidelines, referral for genetic counseling should be considered in families where there are more than two diagnoses of breast cancer at any age, one or more diagnoses of ovarian cancer or if a family has more than three breast cancer diagnoses prior to the age of 50. Families where there are two cases of breast cancer and ovarian cancer before age 50, or one of each of these cancers, are also considered to be at higher genetic risk. The risk is higher for women with first-degree female relatives: a mother, sister or daughter. There is also increased risk for women with male relatives who have a history breast cancer or a history of prostate cancer (Susan G. Komen for the Cure, 2007).

Based on a 2003 update of the ASCO guidelines on genetic testing and cancer susceptibility, providers should consider offering genetic testing if the patient’s personal or family history reveals the possibility of genetic cancer susceptibility, particularly if the test may result in a diagnosis or lead to further prevention strategies for the patient and family (ASCO, 2003). Also considered at risk are women from small families in which there are diagnoses of breast cancer at uncommonly early ages or a history of breast cancer in male family members (NCCN, 2006). There are tools available to providers to assist them in identification of women at risk for breast cancer development. The Gail model is a tool that was developed to quantify a woman’s risk for developing breast cancer using the individual’s own history and has been tested in large populations of white women (National Cancer Institute [NCI], n.d.). A limitation of this tool is that it has not yet been validated in populations other than white women. Referral for
genetic counseling and testing is useful in identifying the proper screening and risk reduction in individuals with strong family history and/or genetic predisposition.

Guideline Review

Many organizations have published recommendations to guide practice with regard to breast cancer screening. The guidelines have changed over time as knowledge of the disease has expanded and due to advances in the technology available for screening. Current recommendations of five organizations are summarized in Table 1. Of the guidelines summarized, the ACS and Komen Foundation recommend annual screening mammography for women aged 40 and older in conjunction with clinical breast exam (CBE) (Smith et al., 2003 & Susan G. Komen Breast Cancer Foundation, 2006). Both organizations also recommend monthly breast self exam (BSE) and CBE every 3 years for women beginning at age 20. CBE is increased to annual intervals beginning at age 40.

The American Academy of Family Physicians (AAFP) follows the guidelines of the United States Preventive Services Task Force (USPSTF) which recommends screening mammography for women aged 40 and older every one to two years rather than annually (USPSTF, 2002). The decision to utilize screening mammography more frequently is at the discretion of the provider. The NCI also recommends screening mammography for women aged 40-70, however no specific frequency is noted (NCI, 2006). The NCI does not offer specific recommendations for CBE or BSE, but it is noted that CBE aids in the reduction of breast cancer mortality while BSE does not.

Part of the difficulty in interpreting the guidelines is differences found in their recommendations. Variance in the guidelines may be attributed to some uncertainty in the benefit of screening mammography for women in the 40 to 49 year age group, as well as
questionable benefit of both CBE and BSE when used as screening methods alone. However, evidence rated as fair quality has demonstrated that screening mammography does reduce deaths from breast cancer in women aged 40 to 74 years (Humphrey, Helfand, Chan, & Woolf, 2002).

How do primary care providers make a decision as to which guidelines are best to use for differing patient populations? For example, one of the most obvious differences in the guidelines is some organizations recommend screening mammography beginning annually at age 40 while others recommend mammography every 1 to 2 years beginning at age 40. This leaves the primary care provider with the challenge of deciding who should receive annual versus biennial screening. Cost and exposure to x-ray radiation are issues to consider when deciding on the frequency of screening. Another major issue is how to appropriately screen at-risk populations as most guidelines refer the patient back to the provider for recommendations. BSE is also inconsistently recommended with some organizations advocating its use and others that do not. BSE has not been shown to impact breast cancer mortality and increases the number of false positive results (NCI, 2006). BSE continues to be recommended because it may aid in the detection of interval cancers (NCCN, 2006). These are cancers detected not diagnosed on screening but appear prior to the next screening interval (Hofvind et al., 2005).

Discussion

*Screening Practices of Primary Care Nurse Practitioners and Physicians*

Previous studies have found wide variation in breast cancer screening practices of primary care physicians, partially due to inconsistencies in formal guidelines. “Ensuring that NP’s are confident in their knowledge and application of screening guidelines may represent an important first step in the delivery of an appropriate breast-screening recommendation to all eligible women” (Lawvere et al., 2004, p. 41). Another barrier to evidence based breast cancer
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screening is that primary care providers fail to recommend it, particularly in vulnerable populations and in older minority women (Davis, Emerson, & Husaini, 2005; O'Malley et al., 2001; Young & Severson, 2005). Although BSE is not uniformly recommended in the current guidelines relating to breast cancer screening, provider instruction of BSE has been identified as a positive factor in women receiving adequate screening (Young & Severson 2005). CBE is also not recommended uniformly in the guidelines. The recommendations for CBE range from every three years between the ages of 20 and 39 and annually beginning at age 40, to either no specific recommendation or not enough evidence to recommend for or against it (Susan G. Komen Breast Cancer Foundation, 2006, figure 3.1).

Frequency of Screening

Guidelines indicate screening with mammography every one to two years is adequate for most women. Is there a significant difference between screening every one versus two years and what factors should be considered in making the determination? The USPSTF evidence based recommendation is for screening with mammography every one to two years beginning at age 40 (Humphrey, et al., 2002). The USPSTF concluded there was no significant difference in the detection of breast cancer when mammography was performed at annual rather than biennial intervals. Other organizations including the American Cancer Society (ACS) (2003) and National Comprehensive Cancer Network (NCCN) (2007) recommend annual mammography for women beginning at age 40. The ACS bases this on updated data from breast screening trials (Malmo and Gothenberg, 1988 and 2003). The ACS (2003) and Susan G. Komen for the Cure (2006) note as rationale for the recommendation of annual screening mammography that breast cancers may grow more rapidly in younger women, there is increased potential for detection of breast lesions by up to two years before detection by CBE and a potential benefit in decreasing
mortality from breast cancer. However, there is continued concern over the usefulness of mammography in women aged 40-49, for those with radiographically dense breasts, and in women taking hormone replacement (USPSTF, 2002). In April 2007, the American College of Physicians (ACP) released guidelines for breast cancer screening for women in the 40-49 year age group. The ACP recommends that clinicians assess a woman’s risk for breast cancer every one to two years, and use the results of the assessment to guide decision making related to screening mammography (Qaseem et al., 2007). Also included in the guideline by the ACP is a discussion of the risks and benefits of screening mammography, individual patient preferences regarding screening mammography and a need for further research of the risk and benefits in the 40-49 year age group. Benefits of screening mammography identified by the ACP include a potential decrease in mortality associated with breast cancer in the 40-49 year age group. A limitation of the recommendation for an assessment of risk every one to two years is the frequency of assessment is not supported by current evidence.

Screening recommendations for women at increased risk of developing breast cancer are outlined by several oncology groups including the NCCN and the Children’s Oncology Group (COG). These are available on their websites (see appendix A). NCCN offers guidelines for those with genetic risks for developing breast cancer, including consideration of chemoprevention, medicines used to prevent breast cancer in women identified at high risk, or surgical intervention.

Risk of Radiation Exposure and Development of Cancer

The risk of developing cancer from routine exposure to diagnostic x-rays is small, however, studies have demonstrated an increased risk of breast cancer after both therapeutic radiation and repeated diagnostic exposures (Smith et al., 2003). These studies do not specify
the types of diagnostic exposure, i.e. plain films versus computed tomography (CT) scan. In a separate review of the evidence, the estimate of breast cancer deaths related to radiation exposure from annual screening mammography beginning at age 40 and continuing for 10 years is approximately 8 in 100,000 (Humphrey et al., 2002). The risk of development of cancer appears to be most significant in women who were exposed to medical doses of radiation, i.e. radiation to the chest for the treatment of malignancy, either in childhood or at an early age (NCCN 2007). Other sources of radiation exposure in childhood include repeated x-rays for monitoring of scoliosis (Andrieu et al., 2006). It has also been hypothesized that women with a familial risk or genetic risk of developing breast cancer may have an increased sensitivity to effects of radiation. A recent study of the effect of chest x-rays on breast cancer development in women with known genetic mutations (BRCA 1, BRCA 2) concluded that in the study population there was an increased risk of breast cancer though these results require further study (Andrieu et al., 2006). In March 2007 data analysis from the Breast Cancer Family Registry revealed an increased risk for the development of breast cancer for women with a history of radiation therapy for a prior cancer and radiation exposure due to chest x-rays for monitoring of tuberculosis or pneumonia (John et al., 2007). The researchers also recommend close monitoring for women with genetic mutations placing them at higher risk for the development of breast cancer.

The exposure to the breast from radiation for a two-view mammogram has been estimated at around 4 milligray (mGy) while the exposure to the breast from a single full-body CT scan is estimated to be 12.3 mGy (Humphrey et al., 2002 and Brenner & Elliston, 2004). Based on this research, it is evident that the annual use of screening CT scan confers a much higher exposure to ionizing radiation as opposed to screening mammography. Data analysis of available evidence found the risk of death related to radiation exposure from screening
mammography to be low with the benefit of reducing mortality related to breast cancer outweighing this risk. Nurse practitioners may use this information in counseling patients about the potential risks associated with exposure to diagnostic radiation.

*Impact of New Imaging Technology*

MRI and digital mammography are new imaging technologies that have begun to be utilized for breast cancer screening. Analysis of results from the Digital Mammographic Imaging Screening Trial (DMIST) Investigators Group reveal that digital mammography is more sensitive than film mammography for women under the age of 50, those with radiographically dense breasts, as well as pre- and peri-menopausal women (Pisano et al., 2005). It is noted that there was no significant difference between digital and film mammography in the detection of breast cancer for women age 50 or older. Cost and availability of this type of imaging are barriers to its use. In April 2007 an analysis of data compiled from multiple sites revealed computer aided detection resulted in a decrease in both specificity and positive predictive value, an increase in the rate of breast biopsy and overall did not positively impact the detection of invasive breast cancers (Fenton et al., 2007).

MRI has been shown to have a high sensitivity in imaging for breast cancer making it a possible tool for use in screening for breast cancer (Smith et al., 2003). One study of contrast enhanced MRI screening of women at high risk for breast cancer found that while specificity was higher for MRI, sensitivity was increased with a combination of MRI and mammography (Leach et al., 2005). MRI was most useful in women who were BRCA 1 carriers. A review of current evidence of breast cancer screening technology identified MRI as a potential test for screening women at high risk of breast cancer (Irwig, Houssami, & van Vliet, 2004). In March 2007, the ACS revised its recommendations to include MRI in conjunction with screening mammography.
in high risk populations: women with a 20-25% lifetime risk for breast cancer including women with a strong family history of breast or ovarian cancers and women who have been previously treated with radiation therapy to the chest (Saslow et al., 2007). The evidence was insufficient to recommend for or against the addition of MRI for women with a personal history of breast cancer including ductal carcinoma in-situ, a history of lobular carcinoma in situ (LCIS), atypical ductal or lobular hyperplasia (ADH, ALH) and mammographically dense breasts. Ultrasound was also identified as an adjunct to mammography, particularly for women with radiographically dense breasts. Further study is required before most new technologies are applied to larger populations of women.

**Special Circumstances**

For women 25 and older with a strong family history or genetic predisposition to breast cancer, consideration should be given to annual mammography beginning five to ten years before the youngest breast cancer diagnosis in the family (NCCN, 2007). Adjunct imaging, such as MRI, should also be considered in high-risk populations as previously discussed. It is recommended that women who received radiation therapy to the chest begin screening mammography 8 years post treatment or at age 25, whichever comes later (COG, 2006). CBE is recommended at 6 to 12 month intervals in both of these populations as is periodic BSE.

Minority and older women have been identified as receiving less screening for breast cancer. In one study it was found that primary care providers may be able to increase screening among minority populations by discussing the importance of screening with patients and teaching BSE (Young & Severson, 2005). Consideration of a woman’s overall health and life expectancy may be useful to the provider in recommending the frequency of screening for breast cancer in older women.
Conclusion

Nurse practitioners have a critical role in the early detection of breast cancer. A detailed history from patients and the use of standardized assessment tools, such as the Gail model, will assist in identifying women at risk for breast cancer by family history or genetic predisposition. Based on this information, patients can then receive screening appropriate for their individual circumstances. Patients identified as high risk may be referred for genetic counseling for recommendations or to an oncologist for consideration of risk reduction therapy. Areas for future research include analysis of screening practices of nurse practitioners, further impact of reduction in hormone replacement, and screening for minority and older women.


Lantz, P. M., Mujahid, M., Schwartz, K., Jantz, N. K., Fagerlin, A., & Salem, B. et al. (2006, December). The influence of race, ethnicity, and individual socioeconomic factors on


**Table 1. Summary of current breast cancer screening guidelines**

<table>
<thead>
<tr>
<th>Organization</th>
<th>BSE</th>
<th>CBE</th>
<th>Mammography</th>
<th>At risk populations</th>
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</thead>
<tbody>
<tr>
<td>ACS</td>
<td>Beginning in the 20’s, discuss benefits and limitations.</td>
<td>Every 3 years for women aged 20-39, then annually for women 40 and older.</td>
<td>Annually starting at age 40.</td>
<td>Women at risk may benefit from earlier screening at earlier ages. Add MRI for women with ≥ 20-25% lifetime risk of breast cancer: strong family history of breast or ovarian cancer and women treated with chest radiation, i.e. Hodgkin’s disease.</td>
</tr>
<tr>
<td>USPSTF</td>
<td>Insufficient evidence to recommend for or against teaching or performing routine BSE.</td>
<td>Insufficient evidence to recommend CBE alone (without mammography).</td>
<td>Every 1-2 years with or without CBE for women age 40 and older.</td>
<td>Begin routine screening of women in their 40's; strengthened by increased risk (i.e. family history, first childbirth after age 30).</td>
</tr>
<tr>
<td>AAFP</td>
<td>Insufficient evidence to recommend for or against teaching or performing routine BSE.</td>
<td>No recommendation found.</td>
<td>Every 1-2 years beginning at age 40 after counseling of risks and benefits by family physician.</td>
<td>Women should not be routinely screened for genetic mutations. Women at risk for genetic mutations should be referred for genetic counseling.</td>
</tr>
<tr>
<td>Komen Foundation</td>
<td>Monthly by age 20.</td>
<td>At least every 3 years from ages 20-39, then annually at age 40.</td>
<td>Every year beginning at age 40.</td>
<td>Women at risk may need to be screened early and more frequently.</td>
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<th>Resources for primary care nurse practitioners</th>
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<tr>
<td>National Comprehensive Cancer Network</td>
<td><a href="http://www.nccn.org/">http://www.nccn.org/</a></td>
</tr>
<tr>
<td>Children’s Oncology Group</td>
<td><a href="http://www.childrensoncologygroup.org/">http://www.childrensoncologygroup.org/</a></td>
</tr>
<tr>
<td>Susan G. Komen for the Cure</td>
<td><a href="http://cms.komen.org/komen/index.htm">http://cms.komen.org/komen/index.htm</a></td>
</tr>
<tr>
<td>Gail Model</td>
<td><a href="http://www.cancer.gov/bcrisktool/">http://www.cancer.gov/bcrisktool/</a></td>
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