Breast Cancer in 2007: Incidence, Risk Assessment, and Risk Reduction Strategies

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Research continues to advance breast health practices, risk assessment, risk reduction strategies, and early detection of breast cancer. Nurses must maintain a current knowledge base to appropriately screen, educate, and counsel women in their fight against the number-one cause of cancer in women and the second-largest source of cancer death in women in the United States (Jemal et al., 2007).

Incidence

Breast cancer continues to be the most commonly diagnosed cancer in women in the United States, accounting for 26% of all female cancers. In 2007, approximately 178,480 women and 2,030 men will be diagnosed with invasive breast cancer and 40,460 women and 480 men will die from the disease. This year marks the first *decrease* in the incidence of breast cancer since 1980. The etiology of this exciting trend is speculated to be related to the continuing use of screening mammography, breast cancer prevention interventions, and a decrease in the use of postmenopausal hormone-replacement therapy (HRT) (Jemal et al., 2007). The marked decrease in HRT usage is related to early findings in the Women's Health Initiative Study in which women who took estrogen plus progesterone had a statistically significant increase in the risk of breast cancer (Rossouw et al., 2002). Although the impact of that research finding remains controversial, it has led peri- and postmenopausal women to rethink the previously widespread recommendation to take HRT and healthcare providers to assess women as individuals who have individual risk factors, symptoms, and potential outcomes.

The gradual decline of breast cancer deaths in women, from 43,844 in 1995 to an estimated 40,460 in 2007, is attributed to improvements in early detection with mammography and more effective therapies for women who develop breast cancer. Currently, 89% of women diagnosed with breast cancer reach their five-year survival mark, free of active disease. Women who initially present with stage I disease have a greater likelihood of remaining disease free after five years than women presenting with stage II–IV. Although 61% of women with breast cancer present with local disease (stage I), 31% present with regional disease (stages II–III) and 6% present with metastatic disease (stage IV). One strategy to continue improvement is to ensure that women obtain an annual mammogram and clinical breast examination (CBE). In reviewing recent census data, epidemiologists postulated that 58% of women 65 years of age or younger obtain an annual mammogram and 51% obtain an annual mammogram and annual CBE (Jemal et al., 2007). Nurses have countless opportunities to make a difference through breast health education and screening adherence strategies to further improve the stage at presentation and extend disease-free survival.

Screening Instruments

Mammography provides radiographic images of the breasts with at least two sets of images, the mediolateral oblique and cranial-caudal views. It remains the most reliable and widely used method of breast cancer screening (Jemal et al., 2007). Radiation exposure to the breast and surrounding structures is limited to one rad per breast when performed with a modern mammography unit. Ultrasonography, another imaging tool, uses sound waves that pass through a gel-covered skin probe to determine whether nodules or densities found on a mammogram or physical examination are

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solid or cystic. The benefit of total breast ultrasound continues to be studied, and it is not considered a replacement for screening mammography but is an additional tool to further define abnormalities detected on CBE or mammography.

Digital mammography employs detection software that can highlight suspicious lesions in the breast not initially seen by a radiologist. It also allows manipulation of the image after the patient has completed a mammogram screening and left the radiology unit. However, the improved sensitivity carries the increased potential for additional imaging and biopsy, without an accompanying increased specificity. The balance between the potentially higher number of false positives and improved breast cancer detection in digital mammography continues to be offset by the hope of finding true breast cancer in its earliest stage (Smith, Cokkinides, & Eyre, 2007).

In addition to annual mammography, magnetic resonance imaging (MRI) is recommended as a screening tool for women who have a 20%–25% or greater increased lifetime risk of breast cancer. That includes women with a strong family history of breast and/or ovarian cancer and women who are survivors of a previous malignancy that was treated with chest radiation therapy, such as Hodgkin disease. Although a patient who presents with mammographic density is considered four to six times more likely to develop breast cancer, MRI is not currently recommended as a screening tool in that subgroup of women. The imaging scan also is not recommended for screening in women with a personal history of atypia, lobular carcinoma in situ, or ductal carcinoma in situ, unless other conditions preclude its use. MRI is not routinely indicated for women with a personal history of breast cancer, despite a 5%–10% increase in risk of a second primary cancer in the first 10 years after diagnosis, as the use of adjuvant chemotherapy and/or hormonal therapy significantly decreases overall risk to less than 5% (Saslow et al., 2007).

Family History

Women and men with a family history of breast and/or ovarian cancer should obtain as much information as possible about those relatives, including age at onset and type of cancer. In addition, an accurate cancer family history should contain information about male and female relatives for three generations (see Figure 1). The type of cancer, age of onset, presence (or absence) of bilateral disease, and age at death are important genetic indices. Confusion often arises about the types of gynecologic cancers (i.e., cervical, uterine, and ovarian). Although the history of any gynecologic cancer is important, of most concern is the confirmation of familial ovarian cancer. Questions regarding family history can be validated by obtaining a copy of the relative's pathology reports. Only then is the family history without question. The risk of breast cancer development related to family history increases with the number of affected relatives, specific lineage, and age at diagnosis. The younger the age at diagnosis, the more likely that a genetic component may be involved (National Comprehensive Cancer Network [NCCN], 2007a).

- Breast cancer occurring before age 50 (premenopausal) in first- or second-degree relative(s)
- Two or more first- or second-degree relatives with breast or ovarian cancer
- One or more first-, second-, or third-degree relative(s) with breast and ovarian cancer or with two separate or independent breast cancers
- Male relative(s) with breast cancer
- One or more first-, second-, or third-degree relative(s) with *BRCA1* and/or *BRCA2* gene mutation

Note. First-degree relatives are mother, daughter, sister, father, son, and brother. Second-degree relatives are grandmother, aunt, niece, grandfather, uncle, and nephew. Third-degree relatives are great-grandmother, great-grandfather, great-aunt, great-uncle, and female and male first cousins.

Figure 1. Family History That Increases Breast Cancer Risk

Note. Based on information from Saslow et al., 2007.

Screening Recommendations

The American Cancer Society and NCCN have recommended that asymptomatic women without a family or personal history of breast cancer receive a mammogram annually, starting at age 40. CBE is recommended at least every one to three years from age 20–39 and annually starting at age 40. Self-awareness of changes in the breast is recommended starting at age 20, with monthly self-breast examination (SBE) encouraged but optional. Studies provide conflicting information about the survival benefit of SBE, but advocates uphold that SBE provides a means of examination between screenings with the healthcare team. SBE is easy to teach, is free, and enables women to identify changes in the breasts over time (NCCN, 2007b; Smith et al., 2007).

Symptomatic women or men who have a breast mass, nipple discharge, asymmetric thickening, nodularity, or skin changes should consult a healthcare provider and begin an age-appropriate workup, including at least CBE. If the patient is 30 years or older, a baseline mammogram should be performed. Additional imaging studies, as well as an aspiration or tissue biopsy, may be performed depending on the breast symptoms (NCCN, 2007b).

Women and men with a strong family history should begin screening with CBE every 6–12 months and be aware of changes in their breasts; monthly SBE is encouraged (see Figure 2). Women should obtain an annual mammogram starting 5–10 years before the age at which the youngest family member was diagnosed with cancer. Annual MRI also is recommended in this group of women. Women who have a strong family history of breast cancer but are younger than 25 years should have an annual CBE with imaging studies based on the physical examination (NCCN, 2007b; Smith et al., 2007).

Evaluation of Cellular Components

Early-detection methods continue to be investigated in an effort to develop a clinical tool that reflects the cellular makeup of a woman's breast. This would be most helpful for women at increased risk of breast cancer development. Most breast cancers arise from the epithelial lining of the duct cells of the breast. Researchers have hypothesized that the alteration of a normal breast cell with

resulting abnormal growth patterns and progression to an invasive breast cancer takes years to occur (Zalles et al., 2006). Evaluation of the epithelial layer of the duct cells in a breast can add important information to the breast cancer risk profile with insight as to the potential evolution of healthy breast cells to invasive breast cancer.

Research continues to validate a procedure that can easily, reliably, and reproducibly obtain breast duct cells for examination. If possible, duct cells would be obtained every 6–12 months, with minimal discomfort to the patient at increased risk of breast cancer development. Ductal lavage is a procedure that allows cytologic examination of nipple aspirate fluid. A sample can yield duct cells that may allow identification of abnormalities such as atypical hyperplasia, which can be a precursor to breast cancer. Unfortunately, despite a number of clinical trials, ductal lavage continues to present technical challenges in duct cannulation, inconsistent nipple aspirate fluid, patient discomfort, and a poor return rate of patients for sequential procedures. Ductal lavage often produces inadequate cellular material for cytologic examination, although when obtained, it yields morphology similar to fine needle aspirates (Danforth et al., 2006; Visvanathan et al., 2007).

- Presence of *BRCA1* and/or *BRCA2* gene mutation or strong family history and younger than age 25
  - Clinical breast examination (CBE) every 6–12 months
  - Self-awareness of changes in the breasts, with monthly self-breast examination (SBE) encouraged
- Presence of *BRCA1* and/or *BRCA2* gene mutation or strong family history, beginning at age 25
  - CBE every 6–12 months
  - Self-awareness of changes in the breasts with monthly SBE encouraged
  - Annual mammography
  - Annual magnetic resonance imaging

Figure 2. 2007 Breast Cancer Screening Guidelines for Women at High Risk

Note. Based on information from National Comprehensive Cancer Network, 2007b; Smith et al., 2007.

A promising procedure, random periareolar fine needle aspiration (RPFNA) obtains epithelial cell lines in fibrous breast tissue in premenopausal women or postmenopausal women taking exogenous estrogen. RPFNA harvests epithelial cells that may enable clinicians to examine the cellularity of a breast in an effort to evaluate risk assessment and cellular response to chemoprevention agents. Clinical trials have validated RPFNA as a procedure that is more likely to yield evaluable specimens than ductal lavage, but if comparable specimens can be obtained, the morphology is similar between the two procedures (Zalles et al., 2006).

Breast Cancer Risk Assessment

In a breast cancer risk assessment, a team approach is used to coordinate information from the medical and surgical history, physical examination, imaging studies, history of exposure to possible carcinogens, and a detailed cancer family history. A risk assessment profile should examine a variety of factors (see Figure 3). Multiple assessment tools exist that synthesize the elements of risk, producing a relative risk of breast cancer development pertinent to each individual (NCCN, 2007a).

Risk Reduction Strategies

Effective strategies to reduce breast cancer development are difficult to produce, as many of the elements of risk are nonmodifiable (i.e., related to genetic makeup or life circumstances). Surgical interventions such as bilateral total mastectomy and bilateral salpingo-oophorectomy (removal of the fallopian tubes and ovaries) have shown significant reductions in breast and ovarian cancer development, but they carry risks related to surgery, family planning, and long-term health (NCCN, 2007a).

Clinical trials of tamoxifen and raloxifene clearly indicate a reduction in breast cancer incidence in women at increased risk for the disease, but predicting which women will benefit from taking a drug that may have negative side effects is difficult. Clinical trials testing aromatase inhibitors as risk reduction agents are currently under way to evaluate their safety and efficacy. Short- and long-term side effects of the drugs must be weighed against the proposed benefit. The optimal duration of the drugs is not clearly known in women at risk for breast cancer.

- Increasing age
- Ethnicity or race, especially Ashkenazi Jewish individuals
- Family history of breast or ovarian cancer
- Age at menarche (i.e., beginning of menstrual cycles)
- Parity (no term pregnancies)
- Age at first live birth
- Age at menopause
- Number of prior breast biopsies
- Findings of atypical hyperplasia or lobular carcinoma in situ in breast tissue
- Prior thoracic radiation therapy, as in Hodgkin disease
- Known or suspected genetic mutations (e.g., *BRCA1, BRCA2, TP53, PTEN*)
- Hormone usage history with current or prior estrogen and progesterone use
- Body mass index
- Mammographic breast density
- Alcohol consumption
- Diet
- Exercise

Figure 3. Elements of a Risk Assessment Profile

Note. Based on information from National Comprehensive Cancer Network, 2007a; Ness, 2007.

Attention to lifestyle characteristics such as obesity, increased alcohol consumption, and the use of HRT is important as researchers try to define potentially avoidable habits that may affect the incidence of breast cancer. Modifications in diet and exercise may impact breast cancer incidence, but when those changes should be made (i.e., early in life or midlife) to alter the course of potential cancer cells is unknown. Nevertheless, a healthy lifestyle with behavior modifications can be beneficial for multiple disease entities.

High-Risk Breast Clinic

University settings as well as larger hospitals with formal breast cancer programs often have designated clinics for patients at increased risk of developing breast cancer. Patients can be referred by a gynecologist or primary healthcare provider, or can be self-referred. High-risk breast clinics ideally are staffed by support personnel,

an oncology nurse, clinical trial staff, a dietitian, a women's health and/or oncology nurse practitioner, a medical and/or surgical oncologist, a breast radiologist, and a genetic counselor. If possible, a gynecologist or gynecologic oncologist should be available specifically for women who are identified as carriers of breast cancer–related gene mutations.

Together, specialized practitioners can perform a comprehensive cancer risk assessment, history and physical examination, focused high-risk breast imaging, thorough CBE, gynecologic examination, and genetic counseling. Summarily, the patient leaves the appointment armed with knowledge about personal risk factors, recommendations for surveillance, specific interventions to reduce risk, available clinical trial options, education, and nonhormonal management of women's health issues.

A high-risk breast clinic is ideal in exposing women to all facets of risk management within one visit and setting. If a high-risk breast clinic is not an option for a facility or patient, segments of the concept can be provided easily, such as a focused breast and gynecologic examination, radiographic screening, education, and nonhormonal recommendations for women. Other components such as dietary concerns, genetic counseling, and clinical trials can be discussed, with appropriate referrals offered as needed.

Summary

The incidence of breast cancer in 2007 may have decreased from previous decades, but it remains the number-one cancer threat to women in the United States. Although breast cancer mortality rates have decreased, the disease remains a threat for women once diagnosed. Attention to breast cancer screening, risk assessment, and risk reduction strategies is necessary to eradiate breast cancer and the deaths it causes.

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References

Danforth, D.N., Abati, A., Filie, A., Prindiville, S.A., Palmieri, D., Simon, R., et al. (2006). Combined breast ductal lavage and ductal endoscopy for the evaluation of the high-risk breast: A feasibility study. *Journal of Surgical Oncology, 94,* 555–564.

Jemal, A., Siegel, R., Ward, E., Murray, T., Xu, J., & Thun, M.J. (2007). Cancer statistics, 2007. *CA: A Cancer Journal for Clinicians, 57,* 43–66.

National Comprehensive Cancer Network. (2007a). *NCCN clinical practice guidelines in oncology: Breast cancer risk reduction.* Retrieved June 24, 2007, from http://www.nccn.org/professionals/physician_gls/PDF/breast_risk.pdf

National Comprehensive Cancer Network. (2007b). *NCCN clinical practice guidelines in oncology: Breast cancer screening and diagnosis guidelines.* Retrieved June 24, 2007, from http://www.nccn.org/professionals/physician_gls/PDF/breast-screening.pdf

Ness, E. (2007). Eluding cancer: Breast cancer prevention meets success with new agents and a new thinking. *CURE: Cancer Updates, Research, and Education, 6*(3), 26–30.

Rossouw, J.E., Anderson, G.L., Prentice, R.L., LaCroix, A.Z., Kooperberg, C., Stefanick, M.L., et al. (2002). Risks and benefits of estrogen plus progestin in healthy postmenopausal women: Principal results from the Women's Health Initiative randomized control trial. *JAMA, 288,* 321–333.

Saslow, D., Boetets, C., Burke, W., Harms, S., Leach, M.O., Lehman, C.D., et al. (2007). American Cancer Society guidelines for breast screening with MRI as an adjunct to mammography. *CA: A Cancer Journal for Clinicians, 57,* 75–89.

Smith, R.A., Cokkinides, V., & Eyre, H.J. (2007). Cancer screening in the United States 2007: A review of current guidelines, practices, and prospects. *CA: A Cancer Journal for Clinicians, 57,* 90–104.

Visvanathan, K., Santor, D., Ali, S.Z., Brewster, A., Arnold, A., Armstrong, D.R., et al. (2007). The reliability of nipple aspirate and ductal lavage in women at increased risk for breast cancer—A potential tool for breast cancer risk assessment and biomarker evaluation. *Cancer Epidemiology, Biomarkers, and Prevention, 16,* 950–955.

Zalles, C.M., Kimler, B.F., Simonsen, M., Clark, J.L., Metheny, T., & Fabian, C.J. (2006). Comparison of cytomorphology in specimens obtained by random periareolar fine needle aspiration and ductal lavage from women at high risk of development of breast cancer. *Breast Cancer Research and Treatment, 97,* 191–197.