Knowledge, Attitudes, and Practices Surrounding Breast Cancer Screening in Educated Appalachian Women

Nan S. Leslie, PhD, RNC, Pamela Deiriggi, PhD, CPNP, Suzanne Gross, PhD, RN, M. Elizabeth DuRant, MSN, RNC, Cynthia Smith, MSN, RNC-FNP, and Jennifer G. Veshnesky, MSN, RNC-FNP

Purpose/Objectives: To determine how and what women learn about breast cancer and screening practices and which factors influence women's breast cancer screening practices.

Design: Descriptive analysis of questionnaire data collected at the time of enrollment in a clinical trial.

Setting: Breast care center of a mid-Atlantic academic health sciences center.

Sample: 185 women in a predominantly Appalachian, entirely rural state.

Methods: Participants completed the Modified Toronto Breast Self-Examination Inventory and questions related to personal mammography practices at the time of enrollment before randomization in a longitudinal clinical intervention study.

Main Research Variables: Women's demographics, knowledge of breast cancer screening practices, adherence to breast cancer screening guidelines, and motivation, knowledge, and practice proficiency surrounding breast cancer screening.

Findings: These educated women had knowledge deficits about breast cancer, breast cancer risk factors, and screening guidelines, particularly the timing and practice behaviors of breast self-examination. Women who had received healthcare and cancer-screening instruction by healthcare providers, including advanced practice nurses, had greater knowledge of breast cancer and detection practices.

Conclusions: Women still have knowledge deficits about breast cancer, breast cancer detection, and personal risk factors. In addition, some educated women in this study failed to practice breast cancer screening according to current guidelines.

Implications for Nursing: Practitioners must continue to remind and update women about breast disease, and women's cancer-screening practices must be reinforced. All levels of providers should improve their rates of performing clinical breast examinations with physical examinations. Nurses, who greatly influence women's health care, must remain current in their knowledge of breast disease, screening, and treatment.

Key Points . . .

- Women, even those with high levels of education, have knowledge deficits about breast cancer, breast cancer risks, and recommended age-appropriate breast cancer screening.
- Some educated women in this study failed to practice recommended age-appropriate breast cancer screening.
- Healthcare providers must improve their rate of performing clinical breast examination with women's physical examinations.
- Women were more knowledgeable about breast cancer and breast cancer screening if they had been taught by healthcare professionals.

In 1980, the American Cancer Society published its first set of guidelines for cancer-related checkups in asymptomatic people. Among these recommendations were routine mammography, clinical breast examination (CBE), and breast self-examination (BSE) aimed at early detection of breast cancer (Smith, Mettlin, Davis, & Eyre, 2000). Since that time, intensive education campaigns have been launched to increase women's awareness and knowledge of this breast healthcare triad and women's engagement in early breast cancer detection activities. The National Breast and Cervical Cancer Early Detection Program (NBCCEDP), funded by the Centers for Disease Control and Prevention, is an example of a grassroots-level community outreach program aimed at bringing breast and cervical cancer education and screening services to underserved women. NBCCEDP, initiated as a pilot program in 1991 in several U.S. states, targeted older women, women with low incomes, and women in racial and

Nan S. Leslie, PhD, RNC, is a women's health nurse practitioner, Pamela Deiriggi, PhD, CPNP, is an associate professor, Suzanne Gross, PhD, RN, is the assistant dean for student services, M. Elizabeth DuRant, MSN, RNC, is a women's health nurse practitioner and instructor, Cynthia Smith, MSN, RNC-FNP, is a graduate, and Jennifer G. Veshnesky, MSN, RNC-FNP, is a family nurse practitioner and instructor, all in the School of Nursing at West Virginia University in Morgantown. *This study was funded by the National Institutes of Health, National Institute of Nursing Research, and the West Virginia University Research Corporation. (Submitted July 2001. Accepted for publication October 25, 2002.) (Mention of specific products and opinions related to those products do not indicate or imply endorsement by the* Oncology Nursing Forum *or the Oncology Nursing Society.)*

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ethnic minorities. The NBCCEDP program now is available in every state in the United States (Blackman, Bennett, & Miller, 1999). Statistics available through 1995 show that 556,003 screening tests had been provided for uninsured or underinsured women (Henson, Wyatt, & Lee, 1996) and that racial and ethnic minority women were availing themselves of the service (Schootman & Fuortes, 2001).

Women of national prominence using mass media campaigns also have been credited with raising women's awareness of breast cancer and the need for screening, early detection, and treatment. In 1974, weeks after her husband was sworn in as the 38th president of the United States, Betty Ford was diagnosed with breast cancer. Mrs. Ford discussed her disease and treatment in the press and public media, including radio and television. As a result of her openness, many women sought mammography screening (ABCNEWS.com, 1998). In general, the public often views the media as a main source of its healthcare information (Johnson & Meischke, 1993). Four years after the media coverage of Mrs. Ford's mastectomy, one study indicated that BSE practice in women of all ages increased significantly (Turnbull, 1978).

Corporate America also has become involved in the fight against breast cancer. In 1993, Avon Products, Inc. (2000), founded the Avon Breast Cancer Crusade, whose mission is to provide women, especially underserved women, with access to breast cancer education, screening, and treatment. Avon's familiar pink ribbon has become a symbol of breast cancer education, service, and research. Other companies have taken up Avon's crusade. The Yoplait® (2001) yogurt company, for example, printed the pink ribbon on the lids of its products and raised more than $1.5 million, which it donated to the Susan G. Komen Foundation Race for the Cure® (Susan G. Komen Breast Cancer Foundation, 2001).

Despite extensive efforts to educate women about breast cancer risk reduction and early detection and extensive public and private funding that has been dedicated to such efforts, little is known about the impact of these endeavors on the knowledge and beliefs about the disease among women living in the Appalachian region. The purpose of this article is to report baseline data from volunteer women who participated in a randomized, prospective clinical trial. These data include information about adherence to breast cancer screening guidelines and proficiency, motivation, and knowledge about BSE.

Literature Review

From the early 1990s to the present, cancer has increased from being the eighth leading cause of death to the second (Seffrin, 2000). The high incidence of the disease strikes fear in the general public; however, hope exists for a more promising outlook in the future. In 1996, scientists from the American Cancer Society, National Cancer Institute, and the Centers for Disease Control and Prevention announced that statistical evidence indicated that the United States was experiencing the "first-ever sustained decline in overall, age-adjusted cancer mortality rates" (Seffrin, p. 4). Since that time, overall cancer incidence rates and mortality have progressively declined. This trend has been attributed to several factors, such as an emphasis on early disease detection, cancer prevention when possible, newer cancer treatment methods, and education of professionals as well as the public.

The modest downward trend in breast cancer mortality, in part, can be attributed to earlier detection and treatment stemming from aggressive screening initiatives, especially mammography (Blackman et al., 1999). Results of clinical trials indicate that breast cancer deaths could be reduced by as much as 30% if guidelines for regular breast cancer screening are followed (Brownson, Reif, Alaavanja, & Bal, 1993; Fletcher, Black, Harris, Rimer, & Shapiro, 1993; U.S. Preventive Task Force, 1996).

In the 1980s and 1990s, extensive efforts were undertaken to heighten women's awareness and knowledge of breast cancer and positively affect breast cancer screening and detection practices. Several early studies focused on factors that affected women's adherence to BSE guidelines as well as their proficiency in lump detection. Factors such as self-confidence, knowledge of correct BSE behaviors, health belief factors (e.g., higher self-concept, self-confidence in the efficacy of BSE), higher self-concept, low perceived barriers to BSE, and sociodemographic characteristics, including age (i.e., younger age) and education (i.e., more education), tended to predict more frequent BSE (Alagna & Reddy, 1984; Hallal, 1982; Holtzman & Celentano, 1983; Rutledge, 1987). Lump detection performance was better among women who had been given the opportunity to practice BSE on silicone breast models and received corrective feedback (Assaf, Cummings, Graham, Mettlin, & Marshall, 1985).

Breast cancer remains the most common form of cancer among North American women (Jemal et al., 2003). Although mortality from the disease has declined an average of 1.8% annually from 1990–1996 in American women (Greenlee, Murray, Bolden, & Wingo, 2000), breast cancer claimed the lives of almost 40,000 women in 2002 (Jemal, Thomas, Murray, & Thun, 2002) and is predicted to claim the lives of 40,200 women in 2003 (Jemal et al., 2003). Downward trends in breast cancer death rates among Caucasian and younger women are promising; however, a similar trend does not exist among African American women. Whereas Caucasian women develop the disease more frequently than other racial and ethnic groups, African American women, especially those aged 75 and older, are more likely to die from breast cancer (Jemal et al., 2003; Woolam, 2000). In fact, African American women tend to have lower five-year survival rates than Caucasian women at each stage of disease (Jemal et al., 2003).

Although no certain means of preventing breast cancer exist, established risk factors are associated with the disease. Women with first-degree relatives (i.e., mother, sister) who have had breast cancer are at higher risk for the disease than women who do not have first-degree relatives with the disease (Lynch & Lynch, 2002). Gynecologic and endocrine factors are related strongly to breast cancer development (Kelsey, Gammon, & John, 1993; Spicer, Krecker, & Pike, 1995; Vogel, 2000). Studies have identified a strong inverse relationship between age at menarche and breast cancer risk and a positive relationship between later age at menopause and risk of contracting the disease (Butler et al., 2000; Kelsey et al.; Spicer et al.). Vogel identified a way of conveying breast cancer risk in relationship to gynecologic events by counting the number of ovulatory menstrual cycles during a woman's lifetime. Early menarche (≤ age 11–14 years) and late menopause (≥ 55 years) lead to a lifetime increase in the number of menstrual cycles and a corresponding increase in breast cancer risk. Early pregnancy, especially before age 20, that produces a live baby, is associated with a

reduced incidence of breast cancer. Nulliparity and first pregnancy that produces a live baby after age 30 are linked with nearly twice the risk of breast cancer (Kelsey et al.; Spicer et al.). A positive association is believed to exist between alcohol consumption and breast cancer in selected groups of women, such as postmenopausal women and those with a family history of breast cancer (Smith-Warner et al., 1998; Vachon, Cerhan, Vierkant, & Sellers, 2001; van den Brandt, Goldbohm, & van't Veer, 1995; Vogel). Certain events that are associated with good health and believed to be somewhat protective against breast cancer include weight control, exercise, and the avoidance of cigarette smoking and nondiagnostic ionizing radiation (Vogel).

Over time, the National Cancer Institute has supported a variety of strategies aimed at early detection of breast cancer. However, little understanding exists about the factors underlying women's behavior as it affects screening utilization and treatment compliance (Holtzman, Powell-Griner, Bolen, & Rhodes, 2000). Although some reports indicate that breast cancer screening has improved significantly among several groups of women, several subgroups, including women with inadequate income, insufficient healthcare insurance, and low education, persistently underutilize breast cancer screening (Blackman et al., 1999).

The effectiveness of BSE in early breast cancer detection currently is being questioned. Several studies suggest that BSE does not diminish mortality from the disease (Semiglazov et al., 1992; Semiglazov, Sagaidak, Moiseyenko, & Mikhailov, 1993; Thomas et al., 1997, 2002); however, a Japanese study found a positive association between BSE frequency and earlier disease detection that results in a more favorable disease outcome (Kurebayashi, Shimozuma, & Sonoo, 1994). Canadian researchers found a positive link between BSE skill proficiency, such as correct palpation technique and visual breast inspection, and reduced breast cancer mortality (Harvey, Miller, Baines, & Corey, 1997). Although BSE effectiveness in cancer detection is undecided, mammography is not recommended routinely for women younger than age 40 and, similar to CBE, rarely is performed more than once a year. In addition, associated expenses deter some women from having an annual mammogram. Breast cancer might develop in the interval between mammograms or CBE or in women younger than age 40, which is the recommended age for initial mammogram screening. In these instances, BSE could be a valuable supplement to mammography and CBE. BSE also may be the best opportunity for women who do not have sufficient access to other forms of breast cancer screening.

Conceptual Framework

In the current study, breast cancer screening practices, beliefs, and attitudes were viewed within the context of the Health Belief Model (Becker et al., 1977; Becker & Maiman, 1975), which explains the predisposition or likelihood for patients to engage in health-protecting or disease-preventing behaviors (Pender, Murdaugh, & Parsons, 2002). The perceived threat of disease and benefits of action taken to protect health directly affect the likelihood of disease-preventing behaviors. These benefits must be viewed as outweighing any barriers to preventive action that may be encountered. The perceived threat of disease arises from patients' perceived susceptibility to and severity of the disease. The perceived threat of disease may be influenced by modifying factors such as demographics, sociopsychological variables (e.g., reference group pressure), and structural variables (e.g., knowledge of the disease, prior experiences with the disease). The perceived threat of the disease also is influenced directly by cues to action, including advice from others or the media and illness in family or friends.

The Health Belief Model has explanatory utility for understanding adherence to breast cancer screening (e.g., BSE); in fact, descriptive studies have revealed that perceived threat, susceptibility, benefits, and barriers are related to such practices (Champion, 1990, 1992; Fletcher et al., 1990; Shepperd, Solomon, Atkins, Foster, & Frankowski, 1990). In this study, data were collected that operationalize the major concepts in the Health Belief Model.

Methods

These data are part of a longitudinal, randomized clinical trial undertaken to assess the effects of an educational intervention on breast cancer understanding and screening practices of a group of women in a rural Appalachian state. During the course of a year, participants were asked to complete a questionnaire at baseline, three months after intervention, and one year after intervention. The questionnaire assessed how and what the women learned about breast cancer screening and which factors are associated with women's knowledge, proficiency, and motivation surrounding breast cancer detection practices. Also reported are baseline data from participants before they were randomized to either the educational intervention or control group.

Setting and Sample

This study was conducted at a large mid-Atlantic university in a predominantly rural, entirely Appalachian state. The university houses a health sciences center and inpatient and outpatient care facilities. Study approval was secured from the university's institutional review board for the protection of human subjects prior to study initiation. Over the course of 17 months, a convenience sample of 185 female volunteers was recruited and tested for their knowledge, practices, and beliefs about breast cancer and breast cancer screening. Women older than age 18 who could read and speak English and had no personal history of breast cancer met the inclusion criteria for participation. Women were recruited from community health fairs, breast-screening events, healthcare providers' offices, and a breast care center; from among the students and employees of the university itself; and by word of mouth from other participants.

Instrument

The **Toronto Breast Self-Examination Inventory** (TBSEI) questionnaire solicits information regarding modifying factors, such as women's knowledge, motivation, and confidence levels in practicing BSE. Questions about perceived personal risk for breast cancer and barriers to and perceived benefits of practicing BSE also were included on the questionnaire. Information regarding cues to action was available from the questions (e.g., whether primary care providers, the media, screening campaigns, etc., had taught patients BSE). Adherence to mammography recommendations also was obtained in the study.

The TBSEI is a 69-item, standardized, self-administered questionnaire with known estimates of reliability and validity (Ferris, Shamian, & Tudiver, 1991). In addition to eliciting demographic information and a health history, the instrument contains three scales designed to assess proficiency (frequency and personally perceived ability in BSE: 11 items), motivation (perceived susceptibility and reasons for practice: 16 items), and knowledge (knowledge of breast cancer and BSE: 19 items). The instrument was developed and tested in a group of 729 Canadian women sampled using survey methods from four settings: ambulatory settings, the community, colleges and universities, and nonhealth-related industries (Ferris et al.). Although the educational level of the sample tended to be high, the numbers of women who practiced and did not practice BSE did not differ according to education. Their ages ranged from less than 20 years to more than 69 years, with 70% of the sample falling from ages 20–49. Normative data for scales according to age group were determined. The internal consistency coefficients for the scales were 0.91 (proficiency), 0.69 (motivation), and 0.85 (knowledge). Test-retest reliability was found to be 0.89 for 48 women who were tested two weeks apart on two separate occasions. Face and content validity were established through evaluations from experts who rated items using a scoring method for relevance and clarity. The internal consistency of the TBSEI scales also was determined in the present study. Ferris et al. reported coefficient alphas that were similar to those found in the current study: 0.89 (proficiency), 0.65 (motivation), and 0.80 (knowledge).

Because Canadian researchers developed the TBSEI, the current study's investigators believed that its language reflected cultural differences that might confuse American participants; therefore, the researchers modified the language in the demographic and health history section. Because the population from which the participants in this study were recruited often seeks out advanced practice nurses as their healthcare providers, with the permission of the instrument's authors, the researchers amended language in such a way that "doctor" was replaced with "healthcare provider." These modifications were made to the demographic and health history section without compromising the instrument's psychometric properties. Other additions to the instrument included three questions pertaining to age at which women had their first mammogram, how often they had mammograms, and the date of their most recent mammogram.

Results

Data were analyzed using SPSS® Version 10 (SPSS Inc., Chicago, IL). Descriptive statistics were computed for TBSEI items and subscales. Statistical comparisons and relationships were examined for major variables in the study according to selected demographic and situational variables.

Participants' Characteristics

The demographics of the sample are displayed in Table 1. Women who participated in the study were primarily Caucasian and married, and their average age was 45.9 years (range = 20–70). This was a well-educated sample with only one woman having less than a high school education and more than 52% possessing college or graduate degrees. Fifty-eight percent were recruited from a breast care center, even though multiple recruitment sites and strategies were used. Despite special efforts to encourage the participation of non-Caucasian volunteers, only 14 (8%) did. This reflects the local population in which minorities number approximately 3.1% (West Virginia Department of Health and Human Services, 1999).

Table 1. Demographic Characteristics

Characteristics	n	%
Age (years) (N = 184)		
20–29	12	6
30–39	36	20
40–49	70	38
50–59	43	23
60–69	18	10
70–79	5	3
Race or ethnicity (N = 185)		
Caucasian (non-Hispanic)	171	92
African American	5	3
Hispanic	1	1
Asian or Pacific Islander	3	2
Other	5	2
Education (N = 185)		
≤ High school	36	19
Some vocational or technical training or diploma	16	9
Some community college or diploma	13	7
Some college or university	24	13
College or university degree	32	17
Some graduate study	14	8
Graduate degree	50	27
Marital status (N = 185)		
Single (never married)	18	10
Married	134	72
Divorced	24	13
Separated	2	1
Widowed	5	3
Other	2	1
Recruitment site (N = 185)		
Health fair	6	3
Public screening	14	7
University breast care center	107	58
Word of mouth	28	15
Flyer (distributed throughout university)	20	11
Primary care office	4	2
Gynecologic or obstetric clinic	2	1
Free city health clinic	1	1
Missing information	3	2

Participants' Risk Factors for Breast Cancer

Seventy-five (41%) women had no relatives with breast cancer; 40 (21%) had a mother, sister, or maternal grandmother with breast cancer; and 25 (14%) had maternal aunts who had breast cancer. Thirty-five (19%) had paternal relatives with breast cancer. Of the 100 women who reported that they had relatives with breast cancer, 32 had more than one relative with the disease.

Generally, menstrual events, including age at menarche, menopause, and first pregnancy, placed the sample as a whole at lower risk for breast cancer. Age at menarche was greater than 12 years for 70% of the sample, and 67% had their first pregnancy by the age of 30. Women were asked whether they still were menstruating and, if they were not, to state the age at which they stopped. Further information, such as the reason

Table 2. Breast Cancer Risk Factors

Risk Factor	n	%
Relatives with breast cancer[a]		
None	75	41
Mother	23	12
Sister	5	3
Maternal grandmother	12	6
Maternal aunt	25	14
Paternal relatives	35	19
Do not know	10	5
Age at menarche		
≤ 12	56	30
> 12	129	70
Age at first pregnancy		
Nulliparous	46	25
≤ 30	125	67
> 30	14	8
Age at menopause		
Still menstruating	112	60
≥ 55	2	1
< 55	62	34
Missing	9	5

N = 185

[a] Multiple-response variable

for cessation of menses (e.g., surgical menopause) was not solicited. The majority of the participants (60%) still were menstruating at the time of study. Of those participants who reported age at menopause, the median age was 46 years (range = 22–57). Only two women reported that menopause occurred after the age of 55 (see Table 2).

Breast Cancer Screening Practices

Clinical breast examination: Most women reported that they consulted a physician for their health care, although advanced practice nurses, either nurse practitioners or certified nurse midwives, and physician's assistants also were listed as providers. The majority of the women (78%) received a CBE with their last physical examination (see Table 3).

Mammography: Frequency of mammography was examined according to age to determine the extent to which women in the study adhered to mammography screening guidelines. One woman in the study did not report her age, and some women did not report their mammogram histories. Eighty-five percent of the women younger than 40 responded to the question regarding frequency of mammography. Of those who responded, approximately 59% had at least one mammogram in their lifetime. Seventy women were aged 40–49 years, and 21% of them did not answer the mammography question. Of those who did, only 44 (80%) had a mammogram at least every two years as recommended. Of the 66 (82%) women in the study who were 50 years of age or older, 82% reported their mammography histories; of these, 83% reported having yearly mammograms as recommended (see Table 4). These data indicate that women are not practicing BSE according to current American Cancer Society guidelines (i.e., monthly BSE beginning at age 20, having a CBE every three years from ages 20–39, and having an annual CBE and mammogram by age 40 [Smith et al., 2002]). Thus, 11 women in the 40–49 age group and 9 women in the aged 50 or older group were not adhering to current recommendations. Furthermore, these data most likely underestimate the actual number of women failing to meet screening guidelines, given the number of missing data on this variable.

Breast self-examination: Most women (84%) acknowledged that they had been taught BSE at some time in their lives. Sixty percent had been taught BSE by a healthcare professional. Women also reported learning BSE from nonprofessionals (2%) or from an educational program (3%). Some women reported having taught themselves BSE (19%) (see Table 5).

The frequency of BSE practice is shown in Table 6. Only 15% of the entire sample practiced BSE monthly, 21% had not practiced at all in the last year, and the remainder practiced either too infrequently or too frequently. Others reported no practice, but these included women who had never been taught BSE.

Women were queried about whether their healthcare provider had asked whether they practiced BSE at their last physical examination. Healthcare providers asked 71% of the sample about BSE. The providers of those not asked were more likely to be physicians (98%) rather than advanced practice nurses (2%) (X^2 [4, N = 184] = 10.36, p = 0.03). Participants also were asked whether they had a CBE with their last physical examination. Women who had not had a CBE (n = 40) were more likely to have been examined by physicians rather than advanced practice nurses or physician's assistants (X^2 [12, N = 184] = 196.8, p < 0.001). Of the women examined by physician's assistants, 40% did not receive a CBE. Of the women examined by advanced practice nurses, 12% did not receive a CBE.

Breast Self-Examination Proficiency, Motivation, and Knowledge

Proficiency: The proficiency scale consisted of eight items about confidence and correct practice in performing BSE (see

Table 3. Adherence to Breast Cancer Screening Guidelines

	Do You Receive Clinical Breast Examination?			Do You Perform Breast Self-Examination?		
Provider	Yes n	No n	Do Not Know n	Yes n	No n	Do Not Know n
Physician	116	34	–	100	42	8
Nurse practitioner	14	2	1	15	1	1
Nurse midwife	5	–	–	5	–	–
Physician's assistant	6	4	–	10	–	–
Physician's assistant with medical doctor	2	–	–	2	–	–

N = 184

Table 4. Adherence to Breast Cancer Screening Guidelines: Mammography

	Frequency of Mammograms					
Age	**Never**	**Once**	**Yearly**	**Every Two to Three Years**	**Every Five Years**	**No Report of Mammogram**
< 40 (n = 48)	17	13	8	3	–	7
40–49 (n = 70)	1	8	35	9	2	15
≥ 50 (n = 66)	2	2	45	5	–	12

Table 7). Responses on individual items showed that only 13% felt sure they performed BSE correctly and only 19% felt confident they could detect a lump or change (14%) in their breasts. Also, participants failed to practice the full scope of BSE behaviors. Behaviors not practiced included inspection in front of mirror (31%), inspection with arms raised (24%), inspection with arms down (32%), and lying flat with pillow under shoulder (40%). All but 5% examined the area between the breast and axillae during BSE. Participants who reported that they did practice these BSE behaviors admitted that they did not consistently include all behaviors in their BSE.

Motivation: The motivation scale consisted of 16 items that appraised respondents' beliefs about perceived susceptibility to developing breast cancer and their reasons for practicing BSE. Women in this study agreed that BSE leads to early breast cancer detection (95%) and that they should perform BSE because they should be involved in their own health care. Most believed that breast cancer can be detected through BSE (72%) and that BSE is important because women are the best people to detect lumps or changes (88%). They disagreed that discomfort with touching their own breasts accounted for their BSE infrequency (87%), but 59% thought that other women do not perform BSE because they are uncomfortable touching their breasts. The participants (95%) disagreed that BSE is not good because it makes them worry about breast cancer, although some (54%) believed that other women do not practice BSE for this reason. They also thought that some women do not practice BSE because they will be unable to detect breast changes (68%). The women also practiced BSE because their healthcare providers did not examine their breasts (19%). Only four women reported that time prevented them from practicing BSE.

Perceived susceptibility for developing breast cancer was examined from responses to two items on the motivation scale. Generally, participants felt susceptible to breast cancer in that 94% disagreed that they had only a slight chance of developing breast cancer and 30% felt that their risk of getting breast cancer compared to other women their age was higher. Perceived susceptibility to breast cancer was not related to race, marital status, age at menarche or menopause, proficiency, or knowledge but was related to the frequency of practicing BSE and age. A small inverse relationship was detected between age and perceived susceptibility to breast cancer. The younger the women were, the more they believed that their chance of getting breast cancer was higher (rho = –0.16, p = 0.036). An inverse correlation was found between individuals' beliefs that their chance of developing breast cancer was slight and their frequency of BSE practice (rho = 0.24, p = 0.001). In addition, having a maternal relative with breast cancer was associated with a stronger belief that participants had a greater chance of developing breast cancer than other women their age (c^2 [df = 8] = 25.9, p = 0.001).

Table 5. Methods of Prior Breast Self-Examination Instruction

Method	**n**	**%**
Never taught	30	16
Self-taught	36	19
Nonhealthcare professionals	3	2
Breast cancer screening or classes	6	3
RN	15	8
Physician's assistant	3	2
Advanced practice nurse	31	17
Physician	44	24
More than one healthcare professional	17	9

N = 185

Knowledge: Despite the relatively high educational level of the participants and the fact that all but 16% had some type of prior BSE instruction, these women displayed knowledge deficits about breast cancer and breast cancer screening. On the 19-item knowledge scale, the average number of correct responses was 13 (SD = 3.7, range = 1–19). In particular, women were misinformed about when to perform BSE. In fact, 34% did not know that premenopausal women should perform BSE during the week after their menstrual period and 26% were incorrect about the timing of BSE after menopause.

Participants also were misinformed about risk factors associated with breast cancer. Eighty-two percent of the sample was unaware that late menopause is associated with a higher risk of disease. Fifty-eight percent did not know that having their first baby when they were older than age 30 was a risk factor, and 42% did not know that older nulliparous women are at greater risk for developing breast cancer.

Participants' knowledge about breast examination varied. Although 90% of the women knew that a lump could be a sign of breast cancer, 30% did not know that a dimple or pucker also might be a sign. Some women were unaware that they should compare breasts (29%), inspect their breasts by looking in the mirror (20%), and lie down to palpate their breasts (25%).

Higher knowledge scores were related to perceived practice proficiency, meaning that those who knew more about breast cancer and screening practiced BSE more often and were confident in their skills (r = 0.21, p < 0.001). Those with more motivation to practice also had higher knowledge scores (r = 0.42, p < 0.001). Participants who had been taught BSE in the past by a professional had higher knowledge scores ($\overline{X}$ = 13.6) than those who had never been taught ($\overline{X}$ = 8.6) (F [1, 183] = 15.3, p < 0.001]. This finding suggests that women retained

Table 6. Adherence to Breast Cancer Screening Guidelines: Frequency of Breast Self-Examination

Frequency of Breast Self-Examination per Year	n	%
0	38	21
1–3	56	30
4–6	35	19
7–9	21	11
10–12	27	15
≥ 13	8	4

N = 185

at least some of what they had been taught previously. Knowledge scores differed according to who had taught them previously about BSE (F [8,176] = 2.21, p = 0.029). Post hoc analysis revealed that knowledge scores of those who had never been taught ($\overline{X}$ = 11.1) were no better than those who were taught by nonprofessionals or at screening events. The highest knowledge scores were achieved by those who were taught by advanced practice nurses ($\overline{X}$ = 14.3) and those who had learned from more than one professional ($\overline{X}$ = 14.1). Knowledge scores were higher for those having at least some college education (F [1, 183] = 9.35, p = 0.003). Knowledge scores were not associated with age or with having close maternal relatives with breast cancer.

Discussion

The findings of this study indicate that public educational campaigns (e.g., television, radio, print media) intended to educate women about breast cancer screening and early detection are not effective for all groups of women. Participants in this study, most of whom admitted that they had been instructed in BSE at some time in their lives, reported that they generally did not practice BSE according to American Cancer Society guidelines. They displayed knowledge deficits in terms of proper timing and execution of BSE and were uninformed about breast cancer risk factors and detection practices. Although most women older than 40 reported having had at least one mammogram in their lifetime, approximately 20% of women older than 40 did not adhere to the American Cancer Society screening guideline of an annual mammogram. Unfortunately, this finding is similar to that of other studies in which women often reported having an initial mammogram without subsequent interval-appropriate mammograms (Gordon, Hiatt, & Lampert, 1993; Miller & Champion, 1996; O'Connor & Perrault, 1995; Zapka, Stoddard, Maul, & Costanza, 1991). Consistent with findings from prior studies (Gardner, Mullan, Rosenman, Zhu, & Swanson, 1995; McCance, Mooney, Smith, & Field, 1990), breast cancer education for women in this study has been associated with increased initial use of mammography rather than BSE. Some possible explanations for this phenomena are that women believe that mammography is adequate to detect breast lesions making BSE unnecessary, education campaigns have heightened women's awareness of the need for mammograms but have not educated them about breast cancer and BSE practices that are intrinsic to health promotion, conflicting reports exist about the effectiveness of BSE in early cancer detection, and even though women have been educated about risk factors for breast cancer and the need for early screening, they are not sufficiently motivated to practice all facets of screening according to guidelines. Increasing women's knowledge about breast cancer and screening guidelines is imperative for practitioners who provide comprehensive health care. Nurses must never loose sight of the need to instruct all women, including those who are highly educated, about their bodies and age-appropriate screening guidelines.

Table 7. Proficiency, Motivation, and Knowledge Scores

Scale	Maximum Possible Score	$\overline{X}$	SD
Proficiency (8 items)	40	19.0	9.10
Motivation (16 items)	64	42.8	7.21
Knowledge (19 items)	19	13.4	0.27

Almost all of the participants believed that they had more than a slight chance of developing breast cancer, and one-third of the women in the study perceived themselves as being especially vulnerable to developing the disease. Younger women believed that their risk was higher than older women's, which suggests a particular vulnerability because risk actually increases with age and 75% of this sample knew this fact. Despite their perceived vulnerability, women displayed knowledge deficits about risk factors associated with the disease. These findings are consistent with other studies that indicate that women's knowledge of breast cancer and disease risk often is inaccurate and, in some cases, increased knowledge is associated with increased perception of personal vulnerability to the disease (Hopwood, 2000; Paul, Barratt, Redman, Cockburn, & Lowe, 1999; Price, 1994).

Almost all of the participants believed that BSE leads to early cancer detection and that they should be involved in their personal health care. However, this belief in the efficacy of BSE was not congruent with their reported BSE practice. Volunteering to participate in a study that would provide overall breast health education and correct BSE practice indicates that they had some recognition of their knowledge deficits and were motivated to address those deficits.

Knowledge scores of this study's participants seemed to be influenced by the way they had learned about breast cancer and screening. Women were more knowledgeable if they were taught by a healthcare professional (i.e., nurse, physician's assistant, or medical doctor). This finding emphasizes that direct care providers consistently must teach female clients about breast care and cancer and repeatedly reinforce such knowledge. Written materials should be used as educational adjuncts to actual teaching by healthcare professionals and not as the only method of education, which is practiced in some settings. Because breast cancer knowledge is increasing and care guidelines change accordingly, the content of written educational materials must be current.

Women in this research study primarily sought health care from physicians, although advanced practice nurses and physician's assistants also were consulted as healthcare providers. Overall, providers performed CBE during the most recent physical examination. However, each type of provider could improve their rate of performing CBEs with physical examinations. Of the women who did not have CBE as a part of their examination, 85% were examined by physicians, 10%

by physician's assistants, and 5% by advanced practice nurses. In their study, Lane and Messina (1999) indicated that physicians, who account for the largest segment of women's healthcare providers, often have knowledge deficits concerning breast cancer, breast care, and current screening guidelines. Although women often are targeted justly for breast care and educational campaigns, healthcare providers also must be afforded with continuing education to address breast cancer knowledge deficits, enhancement of CBE skills, and current breast cancer screening needs and recommendations.

Limitations

The generalizability of the findings from this study must be viewed within the context that this was a volunteer sample; such samples typically are more educated, more motivated, and of higher socioeconomic levels. Therefore, these findings may not reflect the true population. In addition, women in the study reside in Appalachia, a geographically and culturally distinct region of the United States (Couto, Simpson, & Harris, 1994). Although data provided by these study participants are consistent with that of other women from various areas of the national and international community, many of those respondents also are likely to be volunteers. However, the current study's participants are somewhat atypical of Appalachian women in that they were generally well educated and worked outside the home.

Conclusion

Despite breast disease and breast cancer early detection education campaigns, women in this study, many of whom tended to be well educated, displayed knowledge and practice deficits. Participants demonstrated greater knowledge of breast disease and breast cancer screening guidelines if they had been taught by a healthcare professional. Written materials were a less effective educational medium. Healthcare providers, especially nurses who are in constant contact with patient groups, must educate women about their bodies. Advanced practice nurses must take every opportunity to enhance and reinforce women's breast health knowledge and self-care practices.

Author Contact: Nan S. Leslie, PhD, RNC, can be reached at nleslie@hsc.wvu.edu, with copy to editor at rose_mary@earthlink.net.

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