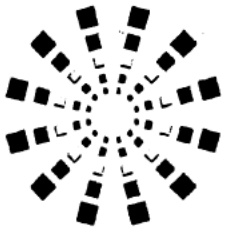

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Age Differences in Post–Breast Cancer Lymphedema Signs and Symptoms

KEY WORDS
Age
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This secondary data analysis was designed to explore the age differences in lymphedema (LE) occurrence and self-reported symptoms in post–breast cancer LE. A descriptive-exploratory cross-sectional design was used with a convenience sample composed of 102 women treated and followed for breast cancer at a midwestern cancer center. Sequential circumferential arm measurement was used to estimate limb volume differences. Self-reported symptoms were assessed by the Lymphedema and Breast Cancer Questionnaire (LBCQ) designed and tested by the research team. Lymphedema occurrence was relatively higher (41.2%) in breast cancer survivors younger than 60 than in those older than 60 (30.6%). Six subjectively reported symptoms were found to occur more often ($P \leq .05$) in the younger women with LE: numbness now and in the past year, tenderness in the past year, aching now and in the past year, increased temperature in arm now. Numbness, tenderness, and aching were the most prevalent symptoms among women in both age groups regardless of LE presence. Our findings suggest that younger breast cancer survivors may have increased LE risk and report LE-related symptoms more often. Future research should focus on age differences in LE risk, occurrence, and perceptions of LE-related symptoms in women treated for breast cancer.

Analyses of a portion of these data were presented previously: Armer JM, Fu M. Age differences in post-breast cancer lymphedema signs and symptoms. Paper presented at: 5th International National Lymphedema Network Conference; August 2002; Chicago, Ill.

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As many as 20% to 40% of women treated currently for breast cancer will develop lymphedema (LE) in their lifetime.[1–5] Breast cancer survivors with LE experience a wide range of potentially debilitating outcomes. Lymphedema occurs as both an acute and chronic condition in which significant and persistent swelling is associated with an abnormal accumulation of protein-rich fluid in the affected area due to an interruption or obstruction of the lymphatic vessels.[6,7] The swelling often causes discomfort and disability and predisposes the patient to infection.[8] The impact of LE on the quality of life of breast cancer survivors is extensive, encompassing functional status and occupational roles, psychosocial and financial aspects, as well as lifestyle changes.[5,6,8–13]

With increasing age as a risk for breast cancer,[14] understanding the impact of breast cancer and the comorbidity of LE on older women is important. Although age is usually thought to be a factor related to risk for LE, to date, no epidemiological or intervention studies have documented the age-related LE incidence and prevalence, signs and symptoms experienced, or efficacy of LE treatment for breast cancer survivors. The purpose of this secondary data analysis was to explore the differences in post–breast cancer LE signs and symptoms experienced by survivors younger than 60 in comparison to those aged 60 and older.

■ Background

Aging Issues Related to Post–Breast Cancer LE

Breast cancer has been the leading carcinoma occurring in women of various ages. In 2005, the American Cancer Society estimated that there would be 211,240 new invasive breast cancer cases among women in the United States.[14] Lymphedema is a chronic complication resulting from breast cancer treatment, including surgery and radiation therapy.[2,5,15] Early detection and advances in treatment options have increased long-term breast cancer survival rates.[14,16] With increased cancer survivorship, the quality of life of breast cancer survivors has become a renewed focus. Of the 2 million breast cancer survivors in the United States, at least 1 in 4 is likely to have LE within 11 years of treatment.[3] The impact of unmanaged and unresolved LE on the quality of life of women surviving breast cancer is great, encompassing interpersonal and family relationships, functional abilities, occupational roles, and, perhaps most important, self-esteem.[13] In addition, significant health-related complications of unmanaged LE include cellulitis, lymphadenitis, and potentially life-threatening septicemia.[17] Many breast cancer survivors with LE experience various degrees of functional impairment that impede satisfactory daily life.[8,18] The heaviness and bulkiness of the affected arm may prevent women from wearing their usual clothing, completing household chores, or carrying out their occupational roles.[8,10,12,19]

Similar to other cancers, the risk for breast cancer increases as individuals age, with most cases occurring in women older than 60.[14,20] Risk increases rather dramatically with the years: the age-specific incidence rate for breast cancer for all races combined for the period 1994–1998 varied from 1.5 cases per 100,000 population for women aged 20 to 24 to 489.7 cases per 100,000 for women aged 75 to 79 years, the group with the highest incidence rate.[20] Although age is assumed to be a factor related to risk of post–breast cancer LE, few studies to date have documented the age-related incidence and prevalence of LE, signs and symptoms, or efficacy of LE treatment. Rather, it has been assumed that older women, known to be at higher risk of breast cancer, are also at higher risk of LE.

Little is known about how women may deal with personal and psychosocial factors that make coping effectively with the chronic life-altering nature of LE difficult. In addition, very little is known about the full impact of LE on women's psychosocial health, functional abilities, and quality of life as they age.

The historic lack of attention to these topics inhibits understanding of LE, its differential impact on women as they age, and the development of effective intervention strategies to reduce a wide array of debilitating outcomes that make LE a major health risk. Further study is needed in relationship to the onset, progression, and management of LE among younger and older breast cancer survivors. In addition, the effect of aging on limb volume measurement in normal and lymphedematous limbs has been unexplored. This secondary data analysis was designed to provide information concerning LE occurrence and its related signs and symptoms experienced by survivors aged 60 and older in comparison with those younger.

Post–Breast Cancer LE Assessment

Lymphedema can be categorized as mild, moderate, or severe, and staged as Grade I (reversible) to III (severe with irreversible skin changes).[6] All breast cancer survivors have the risk of developing LE in their hand, arm, breast, and trunk throughout their lifetime.[2,21] Lymphedema in the ipsilateral arm is the most common location of swelling, exerting the greatest impact on women's lives after breast cancer.[2]

Assessment of post–breast cancer LE is largely dependent on the evaluation of objective signs and subjective symptoms. Although LE can be verified objectively once it passes the latent stage, assessment of the subjective symptoms remains essential in diagnosing and managing LE. Changes in fit of jewelry/clothing, skin changes, decrease in range of motion, and feelings of heaviness, pain, and swelling are all indicators of LE.[19,21–25] Usually, it is the distress caused by LE symptoms that leads breast cancer survivors to seek treatment and continue self-management. Some researchers and healthcare providers advocate that the subjective presence of LE symptoms warrants the institution of early interventions.[23,26] Some further suggest that subjective assessment, including feelings of heaviness, pain, and difficulty in limb movement, are indicators for assessing the effectiveness of LE treatment.[25]

The most commonly used objective assessment of LE has been a finding of 2 cm difference or more in arm circumference (or

200 mL difference in limb volume) between affected and nonaffected limbs.[2] Sequential circumferential arm measurement has been the method used most frequently to quantify LE in the clinical setting and in research studies.[21]

Methods

Design

The findings reported here result from the secondary analysis of data from a research study that used concurrent and retrospective methods in combination with a descriptive-comparative cross-sectional design to examine the occurrence of LE and related signs and symptoms among breast cancer survivors followed at a midwestern cancer center. Anthropometric circumferential measurements, interviews, and retrospective chart review were used to collect data from participants. Findings from the preliminary data analysis of the study regarding the overall LE prevalence[1] and the primary analysis of LE occurrence comparing lymph node–related diagnostic procedures (sentinel lymph node biopsy [SLNB] versus axillary lymph node dissection [ALND])[27] have been reported elsewhere, along with analyses focused on validation of the symptom assessment tool.[28] This secondary analysis focuses on age differences in LE occurrence and symptoms.

Sample/Settings

A convenience sample of 102 patients from a cancer center was recruited during routine follow-up for breast cancer treatment. Eligibility for enrollment in the study included history of breast cancer (Stage I–IV); prior history of surgical treatment with/without radiation therapy, with/without chemotherapy; age 18 or older; ability to read and understand English; and ability to give informed consent.

Instruments

Anthropometric measurements. Sequential circumferential arm measurements were used to determine the presence of LE. A 5-point sequential circumferential measurement technique was applied on both the ipsilateral and contralateral limbs at the following points: hand proximal to metacarpals, wrist, fullest part of the mid-forearm below elbow, elbow, and fullest part of the upper arm above elbow.[1,27,28] Both arms were measured at similar anatomic landmarks, with placement of measurements confirmed by distance in centimeters above the styloid process and above/below the antecubital crease. A special nonstretch, weighted Gulick tape measure calibrated in centimeters was used to obtain the measurement. Three measurements at each of the 5 points on both limbs were carried out, with mean girth measurements calculated for analysis. Test-retest sequential circumferential arm measurements were performed on 3 volunteer breast cancer patients with arm LE. Consistency across raters was compared on these 3 volunteers 3 months later to assess drift on the part of the measurers. The presence of LE was confirmed if there was 2 cm circumferential difference or more between the affected and nonaffected arm at any of the 5 points at the time of the measurement.

Lymphedema and Breast Cancer Questionnaire (LBCQ), an interview tool, was developed and piloted prior to collecting the data reported in this study to assess the experience of LE symptoms. The LBCQ consists of 58 items. The first 38 items are questions concerning subjective symptoms related to LE. For each of the 19 symptoms, participants may make an affirmative response for current experience of the symptom (now, in the past 30 days) or experience of the symptom in the past year (past 12 months). Answers of "yes" or "no" are recorded; if yes, a follow-up question elicits the participant's action (if any) in managing the symptom. Scores for total current symptoms and total symptoms in the past year are calculated, resulting in a maximum total symptom score of 38. The remaining items are questions about demographic information and LE management. Prior to the study, face and expert validity were established by multidisciplinary researchers, clinicians, and patients (ie, oncology nurse clinicians, surgical oncologist, physical therapist, oncology social worker, biostatistician, and breast cancer survivors). Reading level and format were reviewed by expert patient educators. The instrument was piloted with 8 breast cancer survivors with LE, leading to minor changes in the ordering of items. Reliability of the LBCQ has been evaluated using Kuder-Richardson-20 and the test-retest method. Kuder-Richardson-20 reveals an acceptable measure of internal consistency ($r = 0.785$) for all 19 items. Test-retest reliability was evaluated using a sample of healthy women without breast cancer or LE ($n = 35$) with a 2-hour test-retest interval. Findings reveal a high degree of reliability ($r = 0.98$).[28]

Procedure

Following approval by the Health Sciences Center Institutional Review Board, recruitment and data collection were completed over a 3-month period. The researchers explained the purpose, risks, and benefits of the study to breast cancer survivors meeting the study criteria who were referred to them by healthcare providers. Informed consent was obtained. Upon agreeing to participate, women were interviewed to complete the LBCQ through a face-to-face interview. The researchers measured arm circumferences on each woman.

Data Analysis

Data were coded, double-entered into an Excel 7.0 (Microsoft Corporation, Redman, Wash) spreadsheet, tested for accuracy, and corrected. Data were analyzed by a biostatistician using SAS 8.0 (SAS Institute, Cary, NC). For this secondary data analysis, descriptive statistics were utilized to analyze demographic data, occurrence of LE, and presence of LE-related signs and symptoms by age group. The Shapiro-Wilk test was used to test for normality of the data distribution. The Fisher exact test was used to determine if there was a significant difference in LE occurrence and symptom experience by age

group. The Fisher exact test was also performed for selected independent variables regarding LE-related signs and symptoms to ensure the validity of χ^2 testing. The signed rank test was used to determine whether the mean absolute difference in arm circumference for women with LE was different for women aged 60 and older and those younger than 60.

■ Results

Sample

Among the 102 women who originally participated in the study, 2 women were excluded from the analysis by age owing to extreme outliers in the circumferential measurements: one had a history of primary LE and bilateral mastectomy and the other had a history of morbid obesity with a recent 100 lb weight loss, which may have affected the accuracy of limb circumferences. Thus, the overall sample consisted of 100 predominantly Caucasian (95%) women with breast cancer: 49 women aged 60 or older and 51 women younger than 60. The sample was normally distributed in terms of age (58.7 ± 12.8 years; range = 31–88; $P = .5$). The typical participant in the study was 59 years old, with 12 years of education. Overall, the mean time since surgery was 28.1 ± 39.1 months (range = 1–294 months [24.5 years], median = 20.4 months). Participants with LE had a mean of 29 months (±53.3 months, range = 3–294 months, median = 17 months) since surgery, while those without LE had a mean of 27.7 months (±29.7 months, range = 1–142 months, median = 19 months).[27] Characteristics of the sample by treatment group (sentinel lymph node, axillary lymph node dissection, both, or neither) and mean ages are depicted in Table 1.

Analysis of weight within the age groups showed that the mean body weight was higher in women younger than 60 (80.2 ± 19.7 kg; median = 79.1) than in women aged 60 and older (73.6 ± 13.5; median = 73.2). There was a trend (Wilcoxon Rank Sum test: $P = .055$) for the mean body weight of participants with LE to be higher (79.1 ± 15.4 kg; median = 80.0) than of those without LE (74.5 ± 16.8 kg; median = 72.7).[27]

LE Occurrence

Overall LE occurrence among the total sample, regardless of age differences, is reported elsewhere.[1,27] In this secondary analysis ($N = 100$), of the 49 women aged 60 or older, 30.6% (15 of 49, Exact 95% CI lower and upper confidence limit: 18.3%, 45.4%) had measurable LE based on sequential circumferential tape measure. Of the 51 women younger than 60, 41.2% (21 of 51, Exact 95% CI: 27.6%, 55.8%) had measurable LE, the higher prevalence of the 2 groups. Figure 1 shows percentage of LE occurrence in the 2 groups.

There was no statistically significant difference in LE occurrence based on age as a continuous or categorical variable. The P for the χ^2 test on age as a categorical variable (age ≥60 or age <60) was .2712. The P for the Wilcoxon Rank Sum test on age as a continuous variable was .5061.

LE-related Signs and Symptoms

Sequential circumferential arm measurements were used to assess objective LE signs in this study. Figure 2 shows the mean absolute difference (±SE) in circumference at each of the 5 anatomical locations along the arm and hand for breast cancer survivors with LE and those without LE with regard to the age groups. However, the mean absolute differences in these 5 locations were not statistically significant at $P < .05$ level.[27]

Lymphedema-related symptoms occurred in women with LE of both age groups regardless of the presence of LE. Six subjectively reported symptoms were found to occur more often ($P \leq .05$) in the women with LE younger than 60 (Table 2). These signs and symptoms were numbness now ($P = .0312$) and in the past year ($P = .0156$), tenderness in the past year ($P = .0156$), aching now ($P = .0079$) and in the past year ($P = .0013$), and increased temperature in arm now ($P = .015$) (Table 2).

Women without LE in both age groups also reported LE-related signs and symptoms. Women without LE younger than 60 generally reported symptoms more often than those older than 60 (Table 2). Nine symptoms occurred more often ($P \leq .05$) in survivors younger than 60: limited movement in shoulder ($P = .0252$), breast swelling now ($P = .0255$), firmness/ tightness now

Table 1 • Sample Characteristics*

Sample	Overall ($N = 100$)	ALND ($n = 67$)	SLNB ($n = 9$)	SLNB and ALND ($n = 12$)	No SLNB or ALND ($n = 9$)	With Lymphedema ($n = 36$)	No Lymphedema ($n = 64$)
Mean age ± SD, y	58.7 ± 12.8	57.3 ± 12.2	56.8 ± 15.3	57.8 ± 9.3	70.1 ± 15.7	57.5 ± 12.2	59.4 ± 13.1
(Range)	(31–88)	(33–88)	(39–79)	(46–70)	(31–85)	(36–88)	(31–86)
(Median)	(59)	(56)	(61)	(56.5)	(74.0)	(56)	(61)
Mean time since surgery: (mo) ± SD	28.1 ± 39.1	33.3 ± 45.1	9.0 ± 3.9	9.0 ± 11.0	22.6 ± 17.8	29.0 ± 53.3	27.7 ± 29.7
(Range)	(2–294)	(2–294)	(4–14)	(3–41)	(2–60)	(3–294)	(2–142)
(Median)	(18)	(21.5)	(8.5)	(5)	(21)	(17)	(19)

*ALND indicates axillary lymph node dissection; SLNB, sentinel lymph node biopsy.

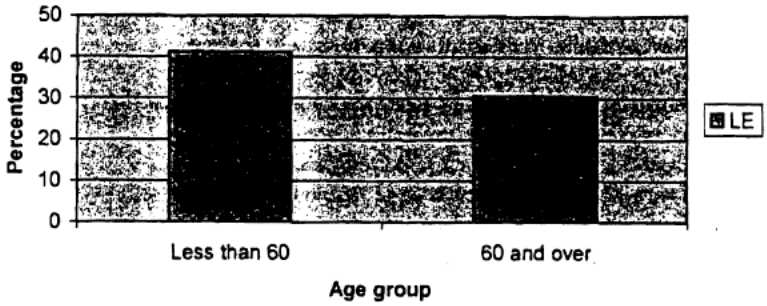

Figure 1 ■ Lymphedema prevalence by age. Proportion of women with lymphedema by age less than 60 versus age 60 and over. *P* (Chi-square) = .2712.

(*P* = .0277), heaviness now (*P* = .0118) and in past year (*P* = .0295), numbness now (*P* = .0005) and in past year (*P* = .0004), tenderness now (*P* = .0255), and aching now (*P* = .0143) (Table 2). Furthermore, more than 30% of women without LE older than 60 also reported numbness now (35%) and in the past year (39%), and tenderness in the past year (39%).

■ Discussion

LE Occurrence

It has been assumed that older women, known to be at higher risk of breast cancer, are also at higher risk of LE. The key finding from this secondary data analysis revealed that the occurrences of LE were 30.6% for women older than 60 and 41.2% for women younger than 60. Taken collectively, these findings are similar to the findings of LE prevalence reported by other researchers.[1,29] Although LE occurrence in both groups was not statistically different in this sample, women younger than 60 had the higher LE occurrence numerically (41.2%) in comparison to women older than 60 (30.6%). The relatively higher occurrence of LE in younger survivors was not expected. One interpretation of these findings suggests that assumptions of higher LE prevalence among older survivors may be in part a reflection of the higher overall number of breast cancer cases over age 65. As noted earlier, post–breast cancer LE exerts a wide range of impact on breast cancer survivors' quality of life, including interpersonal and family relationships, functional abilities, and occupational roles.[13] It should be noted that younger breast cancer survivors may hold jobs outside the home and share childrearing responsibilities, care for older parents, and/or household chores, more often than their older counterparts. Thus, the quality of life of younger breast cancer survivors may be more highly affected if LE occurs in this age group. While younger women may report increased interference with life secondary to LE, older women may have increased comorbidities and more overall symptoms from all sources. On the basis of findings from this secondary analysis, it is particularly important for future studies with larger samples to focus on age differences in LE occurrence so as to ensure preservation of quality of life in breast cancer survivors.

Although the absolute differences in arm circumferences in both age groups were found not statistically significant in this sample, it is important to note that when examining the data closely, the upper arm was the only anatomical site found to have relatively higher (albeit not statistically significant) mean circumferences in women younger than 60. Other anatomical sites (hands, wrists, forearms, and elbows) were found to have relatively higher mean girth in women older than 60. In addition, more than 50% of women with LE and more than 15% of women without LE in the over-60 group reported "sleeve fits tighter" and "sleeve cuff fits tighter." Implications are 2-fold. First, this finding may reflect changes in body composition with age. Second, this finding has important clinical implications in that it suggests observation of the hand, wrist, or elbow alone would not be sufficient for a preliminary diagnosis of LE by a physician or nurse during a routine clinic visit. Rather, circumferential measurement at the upper arm would most likely reveal LE, and thus is absolutely necessary for accurate LE assessment.

Anecdotally, it should be noted that arthritis often occurs in older women. The impact of arthritis on hand deformity cannot be ignored. The upper arm is one limb site less affected by arthritis. This further supports the use of the upper arm as a key measurement site.

LE-related Signs and Symptoms

Women with and without LE in these 2 age groups reported that they experienced a variety of signs and symptoms such as

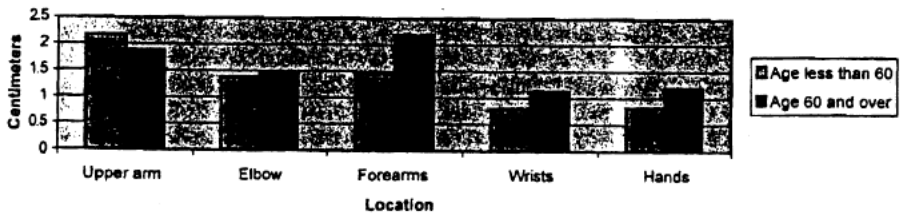

Figure 2 ■ Mean circumferential limb differences at 5 anatomic points by age. Absolute mean difference in arm circumference for women with lymphedema by age less than 60 versus age 60 and over. *P* >.05 in all comparisons by age.

Table 2 • Lymphedema Signs and Symptoms by Mean Circumferential Limb Differences and Age

Reported Signs and Symptoms	Lymphedema		No Lymphedema	
	With ≥2 cm < 60 y (*n* = 21), %	With ≥2 cm ≥ 60 y (*n* = 15), %	With <2 cm < 60 y (*n* = 30), %	With <2 cm ≥ 60 y (*n* = 34), %
Arm size larger	57	57	13	15
Shoulder size larger	14	21	7	0
Neck size larger	14	7	0	0
Sleeve fits tighter	38	50	13	18
Sleeve cuff fits tighter	43	50	10	15
Swelling now	62	50	31	15
Swelling in past year	65	50	31	29
Swelling with pitting now	16	33	7	3
Swelling with pitting in past year	26	40	12	12
Firmness/tightness now	62	53	39†	15†
Firmness/tightness in past year	74	54	42	24
Heaviness now	48	31	24†	3†
Heaviness in past year	45	36	31†	9†
Numbness now	70†	33†	79*	35*
Numbness in past year	68†	27†	85*	39*
Tenderness now	67	40	55†	27†
Tenderness in past year	68†	27†	54	39
Aching now	57*	13*	34†	9†
Aching in past year	75*	20*	32	21
Breast swelling now	33	20	21†	3†
Breast swelling in past year	35	20	23	6
Increased temperature in arm now	24†	0†	10	6
Increased temperature in arm in past year	30	13	12	18
Stiffness in past year	35	13	15	15
Limited movement in shoulder now	43	13	31†	9†

*$P \leq .01$ and †$P \leq .05$ indicate that the differences in symptoms reported by women with mean circumferential limb differences ≥2 cm are statistically significant at $P \leq .01$ and $P \leq .05$ level in women younger than 60 versus women aged 60 or older.

larger neck and arm size, sleeve and sleeve cuff fit tighter, swelling, firmness/tightness, aching, swelling with pitting, numbness, tenderness, breast swelling, and heaviness. Successful management of signs and symptoms relies on prompt identification and accurate assessment. Future research studies should focus on further refining a reliable and valid clinical instrument such as the LBCQ[28] to assess LE-related signs and symptoms and management interventions.

Overall, women older than 60 with 2 cm differences or more had relatively less frequency of reporting LE-related symptoms. In addition, more than 50% of women younger than 60 without 2 cm differences or more also reported the symptoms of tenderness now (55%) and in the past year (54%), and numbness now (79%) and in the past year (85%). Meanwhile, more than 20% of the women older than 60 without 2 cm differences or more reported the symptoms of tenderness now (27%) and in the past year (39%), numbness now (35%) and in past year (39%). It is important to recognize that some symptoms experienced may be related to breast cancer treatment in the absence of LE. For example, Baron[29] found that tenderness, soreness, tightness, and numbness were severe and distressing symptoms that occurred in women post–breast cancer surgery. Our data support the work by Baron and colleagues[29] in that numbness, tenderness, and aching occurred frequently in all women treated for breast cancer regardless of LE presence (Table 2). However, our data show that these symptoms were more prevalent in women younger than 60 regardless of LE presence. These data suggest that some symptoms experienced may be related to the surgery alone (and not due to LE) and, further, that the reported experience of LE symptoms is associated with age. A review of treatment groups by age reveals the group with the oldest mean (70.1 years ± 15.7) and median (74 years) age is made up of participants who had surgical treatment with neither SLNB nor ALND, a protocol that may be associated with fewer LE-related symptoms. Additional research is needed to develop and test interventions to minimize symptoms experienced not only by breast cancer survivors with LE but also by breast cancer survivors without LE, especially for women younger than 60. The results of our study suggest that attention should be paid to age differences in self-reported LE signs and symptoms.

In addition, more than 60% of women younger than 60 regardless of LE presence reported numbness in the past year (Table 2). In this study, on the basis of the structure of the LBCQ item, the reported numbness may have occurred in the arm, breast, or chest. In general, posttreatment symptoms are attributed to surgical and/or radiation interventions. One possible explanation for this finding might be that younger women are more sensitive to this specific sensation. Specification

of location and duration of the symptom and time since surgery in association with age would be helpful data for further analysis. Further research is necessary to examine this issue.

An alternate explanation for the findings related to greater reporting of symptoms by younger survivors is that older participants who commonly experience chronic illness comorbidities in later years may anticipate (and accept) symptoms as a normal part of aging or may be taking medications for pain and thereby report less frequently symptoms that are experienced. Interviews documenting existing signs and symptoms at preop as a baseline comparison to later symptom experiences following treatment may be helpful in distinguishing in older patients symptoms related to LE versus those related to other comorbidities.

Another possible explanation for these differential findings is that the time period during which only subjective signs and symptoms can be detected may be a latent stage of LE. That is, symptoms may be experienced prior to the emergence of measurable limb volume changes. Once post–breast cancer LE becomes established, LE has a tendency to become more severe with time.[4] Successful management of LE and related signs and symptoms is dependent on early detection and intervention. Longitudinal studies that prospectively examine the self-reported signs and symptoms in combination with precise limb volume measurements will assist in determining if subjective signs and symptoms are accurate predictors of latent stage and emerging LE in breast cancer survivors of all ages. Future researchers should design a model to predict the occurrence of LE in terms of LE-related signs and symptoms in association with age differences so as to promote early detection and management of LE.

■ Strengths and Limitations

Although age is assumed to be a factor related to risk of LE, few epidemiological or intervention studies to date have explored the phenomenon. This secondary data analysis provides information that challenges the assumption of higher prevalence of LE and related symptoms among older breast cancer survivors. However, further research is needed to explore age differences in terms of LE prevalence, signs and symptoms experienced, efficacy of LE treatment and symptom management, and comorbidities in all breast cancer survivors, particularly in those younger than 60. This study used circumferences at 5 anatomic points at one point in time and LE was defined dichotomously as ≥2 cm, a commonly used diagnostic and treatment criterion. Studies with larger samples and limb volume measurement as a continuous variable over time from preop through postop follow-up using well-validated and reliable methods are recommended to more rigorously examine these issues.[30]

■ Conclusion

This secondary data analysis examined the occurrence of post–breast cancer LE and the relationship between and among the presence of measurable LE and signs and symptoms in 2 age groups of breast cancer survivors: those older than 60 and those younger than 60. Surprisingly, our data revealed that breast cancer survivors younger than 60 had relatively higher LE occurrence and had relatively more frequently reported LE-related symptoms. These findings provide a starting point for examining the validity of assumptions of higher LE risk for older breast cancer survivors. Furthermore, as noted earlier, distress from the symptoms experienced is an important factor that affects the quality of life in breast cancer survivors. Our analysis shows that, regardless of LE presence, more younger survivors reported distressing symptoms, such as numbness, tenderness, and aching. The impact of these symptoms on the quality of life of younger women needs to be further researched. With increased years of survivorship, it is important to ensure special attention to the quality of life of breast cancer survivors of all ages.

References

1. Armer JM, Whitman M. The problem of lymphedema following breast cancer treatment: prevalence, symptoms, and self-management. *Lymphology.* 2002;35(suppl):153–159.
2. Meek AG. Breast radiotherapy and lymphedema. *Cancer.* 1998;83: 2788–2797.
3. Petrek JA, Heelan MC. Incidence of breast cancer-related lymphedema. *Cancer.* 1998;83:2776–2781.
4. Rockson SG. Precipitating factors in lymphedema: myths and realities. *Cancer.* 1998;83:2814–2816.
5. Velanovich V, Szymanski W. Quality of life of breast cancer patients with lymphedema. *Am J Surg.* 1999;177:184–188.
6. Casley-Smith JR. Modern treatment of lymphoedema. *Mod Med Aust.* 1992;5:70–83.
7. Mortimer PS. The pathophysiology of lymphedema. *Cancer.* 1998;83: 2798–2802.
8. Hull MM. Functional and psychosocial aspects of lymphedema in women treated for breast cancer. *Innov Breast Cancer Care.* 1998;3:97–100, 117–118.
9. Armer JM, Heppner PP, Mallinckrodt B. Post-breast cancer treatment lymphedema: the secret epidemic. *Scope Phlebolog Lympholog.* 2002;9: 334–341.
10. Carter B. Women's experiences of lymphedema. *Oncol Nurs Forum.* 1997; 24:875–882.
11. Newman ML, Brennan M, Passik S. Lymphedema complicated by pain and psychological distress: a case with complex treatment needs. *J Pain Symptom Manage.* 1996;12:376–379.
12. Passik SD, McDonald MV. Psychosocial aspects of upper extremity lymphedema in women treated for breast cancer. *Cancer.* 1998;83:2817–2820.
13. Tobin MB, Lacey HJ, Meyer L, Mortimer PS. The psychological morbidity of breast cancer-related arm swelling psychological morbidity of lymphedema. *Cancer.* 1993;72:3248–3252.
14. American Cancer Society. *Cancer Facts & Figures—2005.* Atlanta, Ga: American Cancer Society; 2005.
15. Pressman P. Surgical treatment and lymphedema. *Cancer.* 1998;83: 2782–2787.
16. Ganz PA. Long-term complications after primary therapy of breast cancer. In: Perry MC, ed. *American Society of Clinical Oncology 2000 Educational Book.* Baltimore: Lippincott Williams & Wilkins; 2002:393–399.
17. Mirolo BR, Bunce IH, Chapman M, et al. Psychosocial benefits of postmastectomy lymphedema therapy. *Cancer Nurs.* 1995;18:197–205.
18. Radina ME, Armer JM. Post-breast cancer lymphedema and the family: a qualitative investigation of families coping with chronic illness. *J Fam Nurs.* 2001;7:281–299.
19. Davis MA. Lymphedema following breast cancer treatment. *Radio Technol.* 1998;70:42–56.
20. American Cancer Society. Breast Cancer Facts and Figures 2001–2002. Available at: http://www.cancer.org/downloads/STT/BrCaFF2001.pdf. Accessed December 2, 2002.

21. Gerber LH. A review of measures of lymphedema. *Cancer.* 1998;83: 3803–2804.
22. Rinehart-Ayres ME. Conservative approaches to lymphedema treatment. *Cancer.* 1998;83:2828–2832.
23. Rockson SG, Miller LT, Senie R, et al. Diagnosis and management of lymphedema. *Cancer.* 1998;83:2882–2885.
24. Schrenk P, Rieger R, Shamiyeh A, Wayand W. Morbidity following sentinel lymph node biopsy versus axillary lymph node dissection for patients with breast cancer. *Cancer.* 2000;88:608–614.
25. Sitzia J, Stanton AWB, Badger C. A review of outcome indicators in the treatment of chronic limb oedema. *Clin Rehab.* 1997;11:181–191.
26. Brennan MJ, Miller LT. Overview of treatment options and review of the current role and use of compression garments, intermittent pumps, and exercise in the management of lymphedema. *Cancer.* 1998;83: 2821–2827.
27. Armer JM, Fu M, Wainstock J, Zagar E, Jacobs LK. Lymphedema following breast cancer treatment, including sentinel lymph node biopsy. *Lymphology.* 2004;37:73–91.
28. Armer JM, Culbertson SD, Radina ME, Porock D. Prediction of breast cancer-related lymphedema based on Lymphedema and Breast Cancer Questionnaire (LBCQ) symptom report. *Nurs Res.* 2003;52:370–379.
29. Baron RH, Fey JV, Raboy S, et al. Eighteen sensations after breast cancer surgery: a comparison of sentinel lymph node biopsy and axillary lymph node dissection. *Oncol Nurs Forum.* 2002;29:651–659.
30. Armer JM. The problem of post-breast cancer lymphedema: impact and measurement issues. *Cancer Invest.* 2005;1:76–83.

MEDIA NEWS

Reviews of selected media are presented in this feature. Nurses, other health professionals, and publishers are invited to submit books, videotapes, CD-ROMs, and other related oncology education materials to: Carol Reed Ash, Editor, *Cancer Nursing*, J. Hillis Miller Health Center, PO Box 100187, University of Florida, Gainesville, FL 32610. Selections of items for review will be based on their relevance to cancer care and the availability of space.

REVIEWERS WANTED FOR MEDIA REVIEWS. Cancer nurses interested in reviewing material for publication in the "Media News" feature should submit a letter and a short biographical sketch to the Editor at the address listed above.

Books Received

Mayo Clinic Guide to Women's Cancers

Lynn C. Hartmann, MD, and Charles L. Loprinzi, MD, Editors in Chief
Mayo Clinic Health Information
200 First St SW
Rochester, MN 55905; 2005
Phone: 800-291-1128
www.mayoclinic.com
638 pp.; ISBN: 1-893005-33-X

Positive Options for Colorectal Cancer

Carol Ann Larson
Hunter House Publishers
PO Box 2914
Alameda, CA 94501; 2005
Phone: 510-865-5282
www.hunterhouse.com;
publicity@hunterhouse.com
152 pp.; ISBN: 0-89793-446-6

Health Promotion in Nursing Practice (5th ed)

Nola J. Pender, PhD, RN, FAAN, Carolyn L. Murdaugh, PhD, RN, FAAN, and Mary Ann Parsons, PhD, RN, FAAN
Prentice Hall Health
Upper Saddle River, NJ 07458; 2006
www.prenhall.com/nursing
367 pp.; ISBN: 0-13-119436-4

Taber's Cyclopedic Medical Dictionary (20th ed)

Donald Venes, MSJ, MD, Editor
F.A. Davis Company
1915 Arch St
Philadelphia, PA 19103; 2005
Phone: 800-323-3555
www.fadavis.com; www.tabers20.com
ISBN: 0-8036-1207-9

CE Test

Age Differences in Post–Breast Cancer Lymphedema Signs and Symptoms

Instructions:

- Read the article on page 200.
- Take the test, recording your answers in the test answers section (Section B) of the CE enrollment form. Each question has only one correct answer.
- Complete registration information (Section A) and course evaluation (Section C).
- Mail completed test with registration fee to: Lippincott Williams & Wilkins, CE Group, 333 7th Avenue, 19th Floor, New York, NY 10001.
- Within 4-6 weeks after your CE enrollment form is received, you will be notified of your test results.
- If you pass, you will receive a certificate of earned contact hours and answer key. If you fail, you have the option of taking the test again at no additional cost.
- A passing score for this test is 11 correct answers.
- Need CE STAT? Visit www.nursingcenter.com for immediate results, other CE activities and your personalized CE planner tool.
- No Internet access? Call 800-933-6525, ext 6617 or 6621, for other rush service options.
- Questions? Contact Lippincott Williams & Wilkins: 646-674-6617 or 646-674-6621.

Registration Deadline: June 30, 2007

Provider Accreditation:
This Continuing Nursing Education (CNE) activity for 3.0 contact hours is provided by Lippincott Williams & Wilkins, which is accredited as a provider of continuing education in nursing by the American Nurses Credentialing Center's Commission on Accreditation and by the American Association of Critical-Care Nurses (AACN 00012278, CERP Category A). This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 3.0 contact hours. LWW is also an approved provider of CNE in Alabama, Florida, and Iowa and holds the following provider numbers: AL #ABNP0114, FL #FBN2454, IA #75.
All of its home study activities are classified for Texas nursing continuing education requirements as Type I.

Your certificate is valid in all states. This means that your certificate of earned contact hours is valid no matter where you live.

Payment and Discounts:

- The registration fee for this test is $19.95.
- If you take two or more tests in any nursing journal published by LWW and send in your CE enrollment forms together, you may deduct $0.75 from the price of each test.
- We offer special discounts for as few as six tests and institutional bulk discounts for multiple tests. Call 800-933-6525, ext 6617 or 6621, for more information.

CE TEST QUESTIONS

GENERAL PURPOSE: To acquaint the professional registered nurse with the occurrence of lymphedema and its symptoms in survivors of breast cancer who are younger than 60 compared to those aged 60 or older.

LEARNING OBJECTIVES: After reading this article and taking this test, you should be able to:

1. Explain the relationship between breast cancer treatment and lymphedema.
2. Describe the way in which the authors assessed the two patient populations.
3. Identify key findings of this study and discuss their implications.

1. Lymphedema can develop as a result of
a. poor circulation.
b. radiation therapy.
c. lack of treatment.
d. obesity.

2. In the 11 years after treatment, what number of breast cancer survivors will likely develop lymphedema?
a. 2 in 4
b. 3 in 4
c. 1 in 4
d. 4 in 4

3. Which group has previously been assumed to be at greater risk for developing lymphedema?
a. Young breast cancer survivors
b. Older breast cancer survivors
c. Those who have not had breast cancer
d. All cancer survivors

4. Which of the following statements is true?
a. Lymphedema will not significantly affect a woman's life.
b. The condition's impact on psychosocial health is well known.
c. The quality-of-life consequences are worse for women aged 70 or older.
d. Lymphedema's impact on psychosocial health is poorly understood.

5. The presence of lymphedema that has the greatest effect on the patient's life is located in the
a. arm.
b. trunk.
c. breast.
d. hand.

6. Objective assessment of lymphedema includes a difference in arm circumference between the affected and nonaffected limb of
a. less than or equal to 5 cm.
b. 1 cm.
c. 1.5 cm.
d. greater than or equal to 2 cm.

7. Patients in this study had to be
a. cancer free.
b. younger than 18.
c. undergoing chemotherapy.
d. previously treated for breast cancer.

8. The 5-point sequential circumferential measurement technique did not measure the circumference of which of the following?
a. Wrist
b. Hand
c. Trunk
d. Elbow

9. Study participants were interviewed
a. in person.
b. by phone.
c. in 1 day.
d. during the course of 1 year.

10. Which test was used to ascertain if patients of different ages experience symptoms differently?
a. The Shapiro-Wilk Test
b. Fisher's Exact Test
c. The Signed Rank Test
d. SAS 8.0

11. On average, how many months had passed since study participants with lymphedema had had surgery?
a. 27.7
b. 28.1
c. 29
d. 30

12. **The mean body weight for patients with lymphedema compared to those who did not have it was**
    a. less than those who did not have the disease.
    b. more than those who did not have the disease.
    c. the same as those who did not have the disease.
    d. not measured.

13. **The group that was found to have the highest prevalence of lymphedema included those**
    a. younger than 60.
    b. aged 60 to 65.
    c. aged 65 to 70.
    d. older than 70.

14. **Older women were found to have greater mean girth in which of the following sites?**
    a. Trunk
    b. Neck
    c. Upper arm
    d. Forearm

15. **Older participants reported fewer symptoms, possibly because**
    a. they thought the symptoms were just a part of aging.
    b. lymphedema does not affect them as severely.
    c. they were confused by the questionnaire.
    d. their symptoms tend to flare up occasionally.

CE Enrollment Form

***Cancer Nursing*™, May/June 2005: Age Differences in Post-Breast Cancer Lymphedema Signs and Symptoms**

A **Registration Information:**

Last name_____ First name_____ MI____

Address_____

City_____ State_____ Zip_____

Telephone_____ Fax_____ email_____

Registration Deadline: June 30, 2007

Contact Hours: 3.0

Fee: $19.95

❑ LPN ❑ RN ❑ CNS ❑ NP ❑ CRNA ❑ CNM ❑ other_____

Job Title_____ Specialty_____

Type of facility_____

Are you certified? ❑ Yes ❑ No

Certified by_____

State of License (1)_____ License #_____

State of License (2) _____ License#_____

Social Security #_____

❑ From time to time we make our mailing list available to outside organizations to announce special offers. Please check here if you do not wish us to release your name and address.

B **Test Answers:** Darken one for your answer to each question.

	A	B	C	D		A	B	C	D		A	B	C	D		A	B	C	D
1.	○	○	○	○	5.	○	○	○	○	9.	○	○	○	○	13.	○	○	○	○
2.	○	○	○	○	6.	○	○	○	○	10.	○	○	○	○	14.	○	○	○	○
3.	○	○	○	○	7.	○	○	○	○	11.	○	○	○	○	15.	○	○	○	○
4.	○	○	○	○	8.	○	○	○	○	12.	○	○	○	○					

C **Course Evaluation***

	A	B
1. Did this CE activity's learning objectives relate to its general purpose?	❑ Yes	❑ No
2. Was the journal home study format an effective way to present the material?	❑ Yes	❑ No
3. Was the content relevant to your nursing practice?	❑ Yes	❑ No

4. How long did it take you to complete this CE activity?____ hours____minutes

5. Suggestion for future topics_____

D **Two Easy Ways to Pay:**

❑ Check or money order enclosed

(Payable to Lippincott Williams & Wilkins)

❑ Charge my ❑ Mastercard ❑ Visa ❑ American Express

Card #_____ Exp. Date_____

Signature_____

*In accordance with the Iowa Board of Nursing Administrative rules governing grievances, a copy of your evaluation of the CE offering may be submitted directly to the Iowa Board of Nursing.