Arm Morbidity and Disability After Breast Cancer: New Directions for Care

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This article has been chosen as particularly suitable for reading and discussion in a Journal Club format. The following questions are posed to stimulate thoughtful critique and exchange of opinions, possibly leading to changes on your unit. Formulate your answers as you read the article. Photocopying of this article for group discussion purposes is permitted.

1. Do we routinely assess patients preoperatively for arm motion and circumference?
2. What is our experience regarding postoperative symptoms in patients undergoing breast surgery and axillary lymph node dissection or sentinel lymph node biopsy?
3. Is there a difference between postoperative education for patients undergoing axillary lymph node dissection versus sentinel lymph node biopsy? Should there be a difference?
4. Do we have a routine follow-up assessment strategy for women following breast cancer surgery? Does the strategy vary depending on the type of surgery?
5. What techniques do we routinely employ to assess patients postoperatively? Are they adequate?
6. What changes should we consider in our pre- and postoperative routines to reflect the findings discussed in the study?

At the end of the session, take time to recap the discussion and make plans to follow through with suggested strategies.

Purpose/Objectives: To chart the incidence and course of three types of arm morbidity (lymphedema, pain, and range of motion [ROM] restrictions) in women with breast cancer 6–12 months after surgery and the relationship between arm morbidity and disability.

Design: Longitudinal mixed methods approach.

Setting: Four sites across Canada.

Sample: 347 patients with breast cancer 6–12 months after surgery at first point of data collection.

Methods: Incidence rates were calculated for three types of arm morbidity, correlations between arm morbidity and disability were computed, and open-ended survey responses were compiled and reviewed.

Main Research Variables: Lymphedema, pain, ROM, and arm, shoulder, and hand disabilities.

Findings: Almost 12% of participants experienced lymphedema, 39% reported pain, and about 50% had ROM restrictions. Little overlap in the three types of arm morbidity was observed. Pain and ROM restrictions correlated significantly with disability, but most women did not discuss arm morbidity with healthcare professionals.

Conclusions: Pain and ROM restrictions are prevalent 6–12 months after surgery, but lymphedema is not. Pain and ROM restrictions are associated with disability.

Implications for Nursing: Screening for pain and ROM restrictions should be part of breast cancer follow-up care. Left untreated, arm morbidity could have a long-term effect on quality of life. Additional research into the longevity of various arm morbidity symptoms and possible interrelationships also is required.

Key Points . . .

- Lack of standardized and substantiated measures for assessing arm morbidity symptoms may inhibit the response of healthcare professionals.
- Arm morbidity pain significantly affects activities of daily living and the quality of life of breast cancer survivors.
- Healthcare professionals may increase their ability to assess, treat, and educate patients through pertinent questioning of patients regarding activities of daily living.

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Numerous researchers have called for large-scale studies of the epidemiology of arm morbidity and its effect on quality of life, impact on functionality, prevention, and psychosocial aspects because even underreported symptoms can have a substantial impact on survivors (Bosompra, Ashikaga, O'Brien, Nelson, & Skelly, 2002; Carter, 1997; Hack, Cohen, Katz, Robson, & Goss, 1999; Hull, 2000; Kwan et al., 2002; Stevens, Dibble, & Miaskowski, 1995). However, many gaps in the literature remain, and knowledge about the effect of arm morbidity on quality of life is limited. Although current research suggests that sentinel lymph node biopsy (SLNB) may reduce lymphedema—one form of arm morbidity—SLNB has not been adopted exclusively and axillary lymph node dissection (ALND) still is widely practiced in the clinical setting, particularly in Canada (Rietman et al., 2003). In addition to ALND, other possible risk factors for lymphedema include having more than five lymph nodes removed, the presence of postoperative infection, radiation to the axilla, and a body mass index (BMI) greater than 30 (Goffman, Laronga, Wilson, & Elkins, 2004; Soran et al., 2006; van der Veen et al., 2004). Importantly, the literature revealed that little attention has been paid to other forms of arm morbidity such as pain or limitations in range of motion (ROM). The effect of arm morbidity on activities of daily living (e.g., work, pursuit of sports, hobbies) has not been documented thoroughly, despite the fact that challenges associated with breast cancer survivorship now are widely recognized to have a long-term impact on a significant proportion of the population.

Lymphedema is the most recognized form of arm morbidity after breast cancer, but an in-depth review of the literature shows that the condition remains mired in uncertainty, with various forms of measurement being proposed and evaluated. See Table 1 for selected literature from an environmental scan. Pain and limited ROM are two other types of arm morbidity that may have an impact on quality of life. To what extent the clinical presentation of those three types of arm morbidity is associated and whether early indicators of pain or problems with ROM may be predictive of lymphedema are unknown. Although some progress has been made in this area (Armer & Fu, 2005), supported by assertions that early detection and treatment of lymphedema are imperative, a detailed investigation of the relationship between early pain symptoms and disability has not been completed. This article provides a cross-sectional report of the initial findings from a multisite longitudinal study of all three types of arm morbidity after breast cancer (lymphedema, pain, and ROM limitations), with an emphasis on pain and associated disability. The three-year study had four overarching goals: (a) to provide rigorous documentation of the incidence of arm morbidity in breast cancer survivors by charting the course of lymphedema, pain, and ROM every six months, (b) to identify possible triggers of arm morbidity symptoms, (c) to document the psychological and social impact of arm morbidity, and (d) to compare guidelines for provision of care and access to appropriate treatment across four Canadian sites. This article focuses on the quantitative data generated through medical chart reviews and the first clinical assessments that were conducted 6–12 months after surgery, thereby documenting the prevalence and degree of all three types of arm morbidity and their initial effects on quality of life.

Methods

Participants

Patients were recruited consecutively from oncology and surgical clinics at four sites in Canada (Fredericton and Saint John, Montreal, Surrey, and Winnipeg). Participants were recruited within 6–12 months following surgery. The time frame was chosen based on coinvestigators' clinical experience and literature that indicated that acute arm morbidity symptoms attributable to surgery diminish by six months (Marcks, 1997). Depending on the arrangement at the site (i.e., structure of the clinic), patients with breast cancer who met the inclusion criteria were introduced to the study by a receptionist, nurse, or physician who sought permission for the research associates to approach them. If potential participants indicated they were willing to be approached, the research associates explained the study to them, asked if they would like to participate, and if they were interested, obtained informed consent.

The inclusion criteria for the study were women 18 years and older, able to speak English or French, able to provide informed consent, and diagnosed with unilateral stage I–III breast cancer. Women with bilateral breast disease were excluded because comparative assessment of the contralateral and ipsilateral arms was precluded. Women with insitu disease were excluded because they would be unlikely to experience arm morbidity.

Procedures

Research ethics boards at each site approved the study prior to the commencement of data collection. Consenting patients participated in the initial clinical assessment. At each clinical assessment, the research associates obtained sequential and circumferential arm measurements, completed goniometric measurements of the affected limb, and administered four questionnaires. Medical chart data also were collected.

Clinical Assessments

All research associates were trained extensively in the protocol by a physiotherapist. In addition, each research associate received a training manual with visual aids and a DVD of the training session. Each clinical assessment took about one hour to complete.

Lymphedema: Sequential circumferential arm measurements were obtained, providing one measurement of lymphedema, which was defined as greater than 2 cm difference between the ipsilateral and contralateral arm on any measurement (Armer & Fu, 2005; Wilke et al., 2006). The measurements then were entered into a spreadsheet that uses a truncated cone formula to calculate arm volume in milliliters. The contralateral arm volume was compared with the ipsilateral arm volume to provide the percentage volume increase of the affected arm. The calculation served as a second measurement of lymphedema (Hayes, Cornish, & Newman, 2005; International Society of Lymphology, 2003; Karges, Mark, Stikeleather, & Worrell, 2003; Kligman, Wong, Johnston, & Laetsch, 2004; McNeely et al., 2004; Sagen, Karesen, & Risberg, 2005).

Range of motion: The research associates assessed the point of discomfort for two movements: shoulder abduction and external rotation. Using the more conservative thresholds

Table 1. Selected Literature From an Environmental Scan

Study	Description	N	Measurement of Lymphedema (LE)	Criteria for LE
Armer & Fu, 2005	Age differences in post–breast cancer LE	102 women treated for breast cancer	Sequential circumferential arm measurements (5 points)	Greater than 2 cm from baseline when compared with contralateral arm
Hayes, Battistutta, et al., 2005	Objective and subjective upper-body function six months following diagnosis of breast cancer	214	–	–
Hayes, Cornish, et al., 2005	Diagnosis methods for LE in breast cancer survivors	176 women with unilateral breast cancer	Arm circumference measurements, arm volume calculations, self-reported arm swelling, and multifrequency bioelectrical impedance (MFBIA)[a]	2 cm difference or more in arm circumference or 200 ml difference in limb volume
International Society of Lymphology, 2003	–	–	Arm volume	Difference between the sum of arm circumferences greater than 5 cm, greater than 10% difference in arm volume, self-reported arm swelling, or greater than three standard deviations above the reference score
Kligman et al., 2004	Treatment of LE related to breast cancer	–	Water displacement and arm circumference measurements	Mild LE: 150–400 ml difference between arms or 15%–22% volume increase, moderate LE: 400–800 ml difference between arms or 25%–35% volume increase, and severe LE: 800 ml difference between arms or above 35% volume increase
McNeely et al., 2004	The addition of manual lymph drainage to compression therapy for breast cancer–related LE	50 women with LE	Arm volume calculated using circumferential arm measurements (5 points plus hand measurements)	Mild LE: less than 250 ml difference in limb volume, medium LE: 250–500 ml difference in limb volume, and severe LE: greater than 500 ml difference in limb volume
National Cancer Institute, 2007	–	–	Arm volume calculated from circumferential arm measurements and water displacement	Mild LE: up to 15% greater arm volume in affected arm, moderate LE: from 16%–37% greater arm volume in affected arm, and severe LE: 37% or greater arm volume in affected arm in comparison to nonaffected arm
Sagen et al., 2005	Reliability of a simplified water displacement instrument	23 right-handed subjects	Simplified water displacement method[b]	A difference in limb volume greater than 200 ml, a displacement value of 200 ml
Wilke et al., 2006	Surgical complications associated with sentinel lymph node biopsy	4,069 (2,904 with available LE data)	10 cm proximal and distal to medical epicondyle	Minimal LE: less than 20% difference in limb volume, moderate LE: from 20%–40% difference in limb volume, and severe LE: greater than 40% difference in limb volume between affected and nonaffected arms

[a] Hayes, Cornish, et al. (2005) described MFBIA as a "between arms" comparison of values referring to the impedance of extracellular fluid calculated from measurements taken by a bioimpedance monitor.

[b] This method involves the use of a transparent cylinder into which a tape measure is placed on the wall of the cylinder. Water is added to fill the cylinder with the arm immersed. The level of the water is recorded on the arm, using a marker. The displaced water is measured using the difference in water level with and without the arm immersed, and volume is then calculated (formula provided in the article).

of established cutoffs for ROM impairment (i.e., less than 80° for rotation and less than 170° for abduction), ROM limitations were noted. Impairment in the ipsilateral arm also was measured through a comparison between both arms (i.e., the degrees of motion lost). Abduction refers to movement of the arm that begins with the palm facing up and the hand alongside of the body with fingers pointing toward the toes. The arm is extended toward the head to complete a half circle, with the body as the center. The movement associated with rotation is comparable to signaling a left turn on a bicycle. Figure 1 shows the completion of the abduction motion, the rotation starting position, and the position at completion of rotation.

Weight and height: Because postoperative weight gain and BMI are positively correlated with lymphedema development, each participant was weighed at the time of first clinical assessment. Height also was obtained during the initial assessment to establish BMI.

Instruments

The **Short-Form McGill Pain Questionnaire (MPQ-SF)** captures a variety of sensory changes, including pain, tenderness, aching, and heaviness, and has been used in previous research addressing arm morbidity (Hack et al., 1999; Melzack, 1975). The instrument consists of 15 descriptors

Abduction completion position | Rotation starting position | Rotation completed position

Figure 1. Abduction and Rotation Positions

that are rated on a four-point Likert scale. The instrument also includes a visual analog scale and a present pain index (rated from 0–5). Researchers may use the item scores as indicative of pain, but calculating the most frequently used descriptors or examining those descriptors with the highest scores also provides information about pain. The MPQ-SF takes 5–10 minutes to complete.

The **Profile of Mood States Short Form (POMS-SF)** captures the psychological impact of arm morbidity and includes six subscales: confusion, anxiety, depression, anger, fatigue, and vigor. The POMS-SF is a validated instrument that has been shown to be useful for measuring changes in mood states over periods of time (Baker, Denniston, Zabora, Polland, & Dudley, 2002; Lev, Paul, & Owen, 1999). This instrument is completed in five minutes.

The **Disabilities of Arm, Shoulder, and Hand Questionnaire (DASH)** includes items that pertain to disability, such as activities of daily living (e.g., work, pursuit of sports, hobbies). The first section of the DASH asks about participants' ability to complete a variety of everyday tasks, including opening a jar, making a bed, and carrying heavy objects. The first section includes 21 items ranked on a five-point scale from 0 (no difficulty with the activity) to 4 (unable to perform the task). Two items then ask about limitations. Those items are followed by five items that inquire about symptoms. The instrument concludes with one item related to sleep and one item inquiring about confidence and capability in relation to arm problems. A formula is provided to calculate a score out of 100, with scores in the middle two quartiles (i.e., 25–75) indicative of some level of disability. Those scoring in the bottom quartile show little or no evidence of disability, whereas those in the highest quartile are considered extremely disabled. All of the questionnaires outlined above, including the DASH, have been validated in English and French (Beaton, Davis, Hudak, & McConnell, 2001; Gummesson, Atroshi, & Ekdahl, 2003). The DASH takes about seven minutes to complete.

The **Social Impact of Arm Morbidity (SIAM) Questionnaire** is an extensive survey developed for the present study that includes closed- and open-ended questions. The SIAM Questionnaire consists of demographic questions (i.e., income, education, employment status, age, and marital status); items that assess the social impact of arm morbidity, including labor force participation and leisure activities; and items that document possible triggers of arm morbidity. The SIAM Questionnaire also is used to collect data pertaining to treatment and comorbidity (diabetes, arthritis, and hypertension). Although the SIAM Questionnaire is not a validated instrument, the survey was pilot tested with several patients with breast cancer and individuals who have expertise in the area of breast cancer survivorship. The pilot test assessed the clarity of the questions and ease of completion (face validity) as well as content validity based on the insights provided by those with knowledge of the subject area. Following the pilot test, the SIAM Questionnaire was revised. The SIAM Questionnaire is completed in 15–20 minutes.

Results

As of August 2006, 347 women had completed their first clinical assessment. The mean time elapsed since surgery for those participants was approximately eight months. Site enrollments were Montreal (161), Surrey (115), Winnipeg (61), and

Table 2. Demographic Characteristics

Characteristic	n	%
Age (years)		
$\bar{X}$ = 54.2	–	–
SD = 11.6	–	–
Employment status		
Sick leave	119	34
Full-time	54	16
Part-time	48	14
Retired	78	23
Does not work	48	14
Marital status		
Married, common law	249	72
Children at home		
1–2	117	34
3 or more	22	6

N = 347

Note. Because of rounding, not all percentages total 100.

Table 3. Disease and Treatment Characteristics

Characteristic	n	%
Number of nodes dissected		
$\bar{X}$ = 10.0	–	–
SD = 7.1	–	–
Cancer type		
Infiltrating ductal	284	82
Infiltrating lobular	27	8
Inflammatory	2	< 1
Other	34	10
Stage		
I	146	42
II	164	47
III	37	11
Lymph node procedure		
Axillary lymph node dissection only	191	55
Axillary lymph node dissection and sentinel lymph node biopsy	75	22
Sentinel lymph node biopsy only	77	22
Does not apply	4	1
Adjuvant treatment		
Radiation	325	94
Chemotherapy	238	69
Hormonal	249	72

N = 347

Note. Because of rounding, not all percentages total 100.

Fredericton and Saint John (10). Table 2 provides a summary of sample demographic characteristics. The mean age for the sample was 54.2 years (range = 28–85 years). Most of the women were employed (64%), but 34% of those who were employed were on sick leave at the time of the first clinical assessment. Seventy-two percent of the participants were married or had a common-law partner, and 40% had children living at home.

Disease and treatment characteristics for the sample are listed in Table 3. Stages I and II were the most common disease stages for the sample, with only 11% of participants diagnosed with stage III breast cancer. The majority of the sample (77%) had ALND, either alone or in combination with SLNB. The mean number of nodes dissected was 10 and the majority of participants received adjuvant treatment.

Table 4 lists the percentage of women with four characteristics previously reported in the literature to be associated with lymphedema (Goffman et al., 2004; Soran et al., 2006; van der Veen et al., 2004). Seventy-one percent of the sample had more than five lymph nodes removed, whereas smaller proportions of the sample had postoperative infections or radiation to the axilla. Twenty-four percent of the sample had a BMI greater than 30. Approximately one-third of the sample (34%) had two or more of the four identifiable risk factors for lymphedema at clinical assessment.

Table 5 provides summary data for lymphedema, pain, and limited ROM, including the three measures of lymphedema. At the initial assessment 6–12 months after surgery, 39% of the participants reported some pain, with 18% reporting discomforting or distressing pain. The MPQ-SF pain descriptors reported most frequently were tender, aching, and tiring.

The three measures of lymphedema yielded three different proportions of women experiencing some arm or hand swelling. Table 5 lists the proportions based on three criteria that have been used in the literature. The proportions vary from 9% (based on a 150 ml or more difference between arm volumes) to 16% (based on a 5% or greater difference between arm volumes). The mean of the three measures (collapsing the two higher categories of the percentage difference calculation) was 12%.

Fifty-nine percent of women had restricted abduction (i.e., abduction limited to less than 170°) and 46% had restricted rotation (i.e., inability to rotate beyond 80°). If a difference of more than 10° between the two arms is used to define disability in ROM, 41% had problems with abduction, whereas 28% had rotation difficulties (Magee, 1997).

Unexpectedly, fewer than 10% of the sample reported experiencing some combination of lymphedema, pain, and ROM restrictions. Thus, little overlap exists among the three categories of arm morbidity (i.e., the presence of one form of arm morbidity is not indicative of the presence of other forms).

Women who experienced arm morbidity were asked whether treatment was discussed or received. The majority of the women had not discussed treatment for those problems with healthcare professionals. The percentage of women experiencing pain who did not discuss it was 61%; percentages for women experiencing lymphedema or ROM restrictions were 63% and 66%, respectively. Open-ended questions about the reasons for not discussing arm morbidity symptoms also were asked of participants. Although many women expressed the idea that symptoms were "not that bad," other reasons for not discussing treatment included a lack of awareness of treatment options, overworked healthcare professionals, perceptions that symptoms would diminish over time or that they were normal, and an expectation that symptoms would abate if certain activities were ceased.

As Table 6 demonstrates, pain and ROM restrictions were associated with disability. Pearson correlation coefficients were computed among arm morbidity and disability variables. Those types of arm morbidity were significantly correlated with disability, as measured using the DASH instrument, with the strongest correlations occurring between abduction and disability and pain and disability.

Pearson correlation coefficients between pain and the individual items on the DASH (related to activities of daily living) also were calculated. The strongest correlations (i.e., those greater than 0.30) were associated with performing heavy household chores, gardening and doing yard work, making a bed, carrying a shopping bag or briefcase, carrying an object heavier than 10 lbs, and putting on a pullover sweater. Pain also was correlated with problems with work and recreational activities involving arm motion. In addition, the sensations addressed in the DASH, namely arm,

Table 4. Incidence of Risk Factors for Development of Lymphedema

Risk Factor	n	%
Fewer than five lymph nodes removed	245	71
Postoperative infection	40	12
Radiation to axilla	69	20
Body mass index greater than 30	82	24
Two or more risk factors	119	34

N = 347

Table 5. Summary Data for All Three Types of Arm Morbidity

Variable	n	%
Lymphedema		
2 cm difference at one circumferential measurement	39	11
Greater than 150 ml difference between arms	31	9
Percentage difference		
Less than 5%	292	84
5%–15%	52	15
Greater than 15%	2	< 1
Pain (present pain index)		
No pain	210	61
Mild	74	21
Discomforting	57	16
Distressing	6	2
Range of motion		
Restricted abduction (< 170°)	205	59
Restricted rotation (< 80°)	161	46
Comparative restriction (difference > 10°)		
Abduction	142	41
Rotation	96	28

N = 347

Note. Less than 10% of the sample had any overlap in the three types of arm morbidity.

shoulder, or hand pain that was experienced when performing any specific activity, as well as stiffness, were correlated with pain.

Discussion

The purpose of the present study was to explore the prevalence of three types of arm morbidity as well as the relationships between arm morbidity and disability in the 6–12 month period following breast cancer surgery. Before turning to a discussion of disability after breast cancer, note that the rates of ALND may seem high in comparison to those in the United States. A few possible explanations exist. Other studies conducted for the purpose of examining morbidity following SLNB may have targeted clinics where SLNB more commonly is used. In the present study, SLNB is not addressed specifically; instead, arm morbidity was defined broadly; rates of SLNB may be lower for this reason. Secondly, differences in the healthcare system between Canada and the United States may account for the large proportion of women in the present study who had ALND. Finally, variation in the rate of adoption of new technology is well known, which has generated much academic interest in the field of healthcare use. A good example is the adoption of breast-conserving surgery for treating breast cancer. Significant differences exist even within the United States and within each region of the United States based on the type of hospital, number of years the surgeon has been in practice, and age of patients, among others (Morrow et al., 2001). Additional research is needed into the prevalence of SLNB in Canada because it is not known how widely this procedure has been exclusively adopted.

Returning to a focus on arm morbidity and disability, research supports the idea that debates surrounding the measurement of various arm morbidity symptoms also are in need of further exploration because the use of various measurements produce different results. All measurements used in the present study were supported by numerous publications. Without a standardized and psychometrically validated set of measurements, however, determining exact incidence rates is difficult, and healthcare professionals may find responding to patients' queries about arm morbidity and associated disability challenging.

Although lymphedema was not common among the sample 6–12 months after surgery, pain and ROM restrictions were. Armer and Fu (2005) suggested that changes in sensation may be predictive of lymphedema; however, precursors have yet to be identified. The predictive power of ROM restrictions has not been explored, and additional research is required to ascertain the best approach to defining ROM restrictions (i.e., established cutoffs versus control and ipsilateral arm comparisons). The present study shows that all three types of arm morbidity are discrete conditions, but further research is needed to examine whether lymphedema, pain, and ROM restrictions are interrelated when women are more than one year after surgery. Further follow-up is needed to ascertain that those are indeed distinct entities, each having its own effects on quality of life in the rehabilitation of patients with breast cancer.

Few researchers have explored the experience of pain and its implications for disability. Results from the present study indicate that pain has a significant impact on everyday life at a time when patients may begin resuming paid and unpaid work. At that time, patients also may expect they have recovered from breast cancer. Thus, untreated pain has the potential to have a strong impact on quality of life.

Table 6. Correlation Coefficients for Pain and Disabilities of Arm, Shoulder, and Hand (DASH) Scores

Pain Variable	Correlation With DASH
Lymphedema	
Percentage difference	0.179
Present pain index	0.468*
Range of motion	
Abduction	–0.493*
Rotation	–0.346*

* p = 0.01

- Ask patient to reach both arms up overhead as far as possible to assess if the reach is equal or if an obvious lack of range of motion exists. If so, refer patient to a physiotherapist.
- Ask patient if she has experienced swelling in the arm, breast, or chest wall. Check for differences in visibility of knuckles on the hands when compared.
- Ask patient to hold out hands with palms facing downward. Alternatively, a few circumference comparisons between arms could be generated.
- If the patient is experiencing swelling, refer her to a physiotherapist trained to provide care for lymphedema.
- The following questions also could be used to assess arm morbidity.
  - Are you experiencing any arm or shoulder pain?
  - Are you experiencing any sensation of fullness or swelling in the arm, hand, or breast?
  - Do you experience any constriction of movement in the shoulder or arm that interferes with daily activities?

Figure 2. Assessing Arm Morbidity

Implications

The strongest correlations between pain and disability were associated with tasks described as difficult in a qualitative study of breast cancer–related lymphedema (Thomas-MacLean, Miedema, & Tatemichi, 2005). The finding suggests that healthcare practitioners should elicit valuable information about pain (and potentially lymphedema) with a few simple questions about sensations and activities of daily living (see Figure 2). The present study, in addition to prior research, suggests that screening for pain is comparatively easy when using the MPQ-SF, as is screening for ROM restrictions using a goniometer, whereas screening for lymphedema can be more time consuming. Early indications that pain and ROM limitations are more likely to be experienced and that they might impede daily functioning suggest that healthcare professionals may wish to concentrate on eliciting information about those two types of arm morbidity during the 6- to 12-month postoperative period, particularly because most patients do not discuss arm morbidity with healthcare professionals. Appropriate referrals to physiotherapists then could be initiated.

Additional research is needed to ascertain possible relationships among various types of arm morbidity and the duration of symptoms beyond the 6–12 months after surgery. The present ongoing, longitudinal study eventually will yield new information about the potential for the development of lymphedema and its possible associations with pain and ROM restrictions. Such research will provide the foundation for the creation of rehabilitation policies and practices for women with breast cancer.

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