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Complicated breast cancer–related lymphedema: evaluating health care resource utilization and associated costs of management

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Abstract

BACKGROUND: Lymphedema can become a disabling condition necessitating inpatient care. This study aimed to estimate complicated lymphedema incidence after breast cancer surgery and calculate associated hospital resource utilization.

METHODS: We identified adult women undergoing lumpectomy and/or mastectomy with axillary lymph node surgery between 2006 and 2012 using 5-state inpatient databases. Patients were grouped according to the development of complicated lymphedema. The primary outcomes were all-cause hospitalizations and health care charges within 2 years of surgery. Multivariate regression models were used to compare outcomes.

RESULTS: Of 56,075 women included, 2.3% had at least 1 hospital admission for complicated lymphedema within 2 years of surgery. Despite confounder adjustment, women with complicated lymphedema experienced 5 fold more all-cause (incidence rate ratio = 5.02, 95% confidence interval: 4.76 to 5.29) admissions compared with women without lymphedema. This resulted in substantially higher health care charges ($58,088 vs $31,819 per patient, $P < .001$). Although axillary dissection and certain comorbidities were associated with complicated lymphedema, breast reconstruction appeared unrelated.

This study was reviewed and exempted by the Institutional Review Board at the Hospital of the University of Pennsylvania.

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The authors declare no conflicts of interest.

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CONCLUSIONS: Complicated lymphedema develops in a quantifiable number of patients. The health care burden of lymphedema underscored here mandates further investigation into targeted, anticipatory management strategies for breast cancer–related lymphedema.

Upper extremity lymphedema is a well-recognized complication of operative treatment of breast cancer. Incidence estimates vary primarily according to the degree of axillary intervention. A recent meta-analysis reported a 20% incidence of lymphedema after axillary lymph node dissection, whereas sentinel node biopsy resulted in lymphedema in 5.6% of patients.[1] A number of other factors have been associated with increased lymphedema risk, including postoperative radiation therapy, obesity, and node-positive disease.[2,3] Although well recognized, the true burden of breast cancer–related lymphedema (BCRL) and its sequelae are perhaps underestimated.

This burden of BCRL is directly related to the severity of the lymphedema. For most women, symptoms can be managed through conservative outpatient-based treatment. The mainstay of therapy, compressive physiotherapy, involves regimens consisting of frequent physical therapy visits and often burdensome compression garments and may only afford marginal improvement over time.[4] For other women, lymphedema will become a severe and debilitating condition, complicated by frequent episodes of cellulitis, chronic painful limb swelling, and ultimately, diminished function; furthermore, the physical disfigurement seen with severe disease negatively affects psychosocial well-being and quality of life.[5–7] In addition, these recurrent episodes of cellulitis and systemic infection may necessitate hospital-based care.

In light of the growing emphasis on cost-efficacy in today's health care environment, management of highly prevalent and chronically debilitating conditions such as lymphedema is subject to increasing scrutiny.[8] A recent survey found nearly 30% of patients who had lymphedema experienced an infection warranting hospital admission for intravenous antibiotics within 1 year's time, whereas 80% of patients missed significant time from work.[9] There is a significant void in the literature concerning health care resource utilization for women with complicated lymphedema and the costs incurred with treating associated complications. Therefore, the goals of this study were to estimate the incidence of complicated lymphedema after breast cancer surgery in an attempt to quantify the resulting hospital resource utilization for lymphedema-related sequelae using the Healthcare Cost and Utilization Project (HCUP) inpatient database. We hypothesized that women who develop complicated lymphedema have more frequent hospital admissions and associated hospital costs of care.

Methods

We conducted a retrospective cohort study using the 2006 to 2012 Arkansas, California, Florida, Nebraska, and New York state inpatient databases available through the Agency for Healthcare Research and Quality's HCUP.[10] Because this study used publicly available data that do not include patient identifiers, they were considered exempt from review by the University of Pennsylvania Institutional Review Board. The inpatient data are a census of hospital discharges from acute care, nonfederal, community hospitals within each state. For each database, information is collected by partner agencies at the state level and reported to the Agency for Healthcare Research and Quality where data are standardized across states. Each discharge record includes all associated *International Classification of Diseases, Ninth Revision* (ICD-9) diagnostic and procedural codes, in addition to demographic, payer, and disposition information for each patient. These specific states were selected for analysis because of the availability of encrypted identifiers that allow for the longitudinal study of patients across the inpatient and ambulatory surgery setting. In addition, these data are from geographically diverse areas of the country, include all payer information, and collectively accounted for nearly 30% of the total adult US population in 2010.

Patient selection

From the state inpatient databases, we identified discharges for women aged at least 18 years who underwent lumpectomy (ICD-9–Clinical Modification [CM] 85.2, 85.20 to 85.25) or mastectomy (ICD-9-CM 85.4x, 85.33 to 85.36) with a concurrent axillary lymph node procedure for a diagnosis of breast cancer (ICD-9-CM 233.0, 174.x) between January 1, 2007 and December 31, 2010. Because a minimum of 2-year follow-up was required for inclusion and 2012 follow-up data for California were not available, the inclusion period for this state was shortened by 1 year (January 1, 2007 to December 31, 2009). Discharges with concurrent coding for both lumpectomy and mastectomy or lumpectomy with breast reconstruction were excluded. To ensure patients were likely to be at risk for our outcomes of interest, we sequentially excluded patients with known metastatic disease and where the discharge disposition was recorded as unknown or death. For patients who had more than 1 discharge meeting the previously mentioned criteria, we selected the 1st discharge for inclusion.