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# Functional Status and Survival After Breast Cancer Surgery in Nursing Home Residents

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## Abstract

**Importance:** Breast cancer surgery (BCS), the most common cancer operation performed in nursing-home residents, is viewed as a low-risk surgical intervention. Outcomes in patients with high functional dependence and limited life expectancy are poorly understood.

**Objective:** To determine overall survival, functional status changes after BCS in nursing-home residents stratified by surgery type.

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Authors Contributions:

Dr. Tang had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Study concept and design:** Tang, Boscardin, Covinsky, Finlayson

**Acquisition, analysis, or interpretation of data:** All Authors

**Drafting of the manuscript:** Tang, Boscardin, Finlayson

**Critical revision of the manuscript for important intellectual content:** Tang, Boscardin, Sudore, Covinsky, Walter, Esserman, Mukhtar, Finlayson

**Statistical analysis:** Zhao, Boscardin

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Dr. Finlayson reports her role as founding shareholder from Ooney, Inc, outside the submitted work; all other authors report no conflict of interest.

Disclaimer:

The views expressed in this article are those of the authors and do not necessarily represent those of the National Institute on Aging.

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**Design:** We used Medicare claims 2003–2013 to identify nursing-home residents who underwent inpatient BCS. Using the Minimum Data Set for Nursing Home Activities of Daily Living summary score (MDS-ADL), we examined pre and post-operative function and identified patient characteristics associated with 30-day, 1-year mortality and 1-year functional decline after surgery.

**Setting:** All U.S. Medicare nursing homes.

**Participants:** Nursing-home residents who underwent inpatient BCS.

**Main Outcomes and Measures:** Functional status, death.

**Methods:** We used cox regression to estimate unadjusted and adjusted hazard ratios (HR) of mortality; Fine-Gray competing risks regression to estimate unadjusted and adjusted subhazard ratios (sHR) of functional decline.

**Results:** During 2003–2012, 5,969 nursing-home residents (mean age 82±7, 57% cognitively impaired) underwent BCS: 11% lumpectomy, 28% mastectomy, 61% lumpectomy or mastectomy with axillary lymph node dissection (ALND). 30-day mortality after lumpectomy was 8%, mastectomy was 4%, and ALND was 2%. 1-year mortality was 41% in lumpectomy, 30% in mastectomy, and 29% in ALND. Among 1-year survivors, functional decline rate was 56–60%. On average, MDS-ADL score increased (signifying greater dependency) by 3 points lumpectomy, 4 points mastectomy, and 5 points ALND. In multivariate analysis, poor baseline MDS-ADL score (20–28) was associated with higher one-year mortality risk (lumpectomy: HR 1.92 95%CI[1.23–3.00], p=0.004; mastectomy: 1.80[1.35–2.39], p<0.001; ALND: 1.77[1.46–2.15], p<0.001). After multivariate adjustment, pre-operative decline in MDS-ADL and cognitive impairment were significantly associated with 1-year functional decline across all BCS groups (pre-operative decline--lumpectomy: sHR 1.59[1.25–2.03], p<0.001; mastectomy: 1.79[1.52–2.09], p<0.001; ALND: 1.72[1.56–1.91], p<0.001; cognitive impairment--lumpectomy: HR 1.27 95%CI [1.03–1.56], p=0.024; mastectomy: 1.26[1.09–1.45], p=0.002; ALND: 1.14[1.04–1.24], p=0.003).

**Conclusions:** For women nursing-home residents who underwent BCS, 30-day mortality and survival, 1-year mortality and functional decline are high. 1-year survivors had significant functional decline. This information should be incorporated into collaborative surgical decision-making processes.

## INTRODUCTION

Breast cancer surgery is the most common cancer operation performed in nursing home residents, comprising 61% of such procedures.[1] Over half of nursing home physicians report encountering residents with suspected breast cancer either through screening or physical exam. 67% of these are referred for diagnosis and treatment.[2] Because most breast cancer clinical trials have excluded women who are older, frail, and cognitively impaired, treatment outcomes in this population are uncertain.[3] Clinical practice guidelines in oncology demonstrate consensus that breast cancer treatment decisions for older women, including surgery, should be individualized based on treatment benefits and harms, and patient preferences.[4] The benefits of breast cancer surgery may not be realized in patients who have competing risks from significant co-morbid disease. For those with limited life expectancy, long-term mortality benefits from surgical treatment of breast cancer are unlikely to be gained.

While operative mortality after breast cancer surgery is low in the general population, the burdens of surgery (e.g., functional disability) can be substantial. Regardless of procedure type (e.g., lumpectomy, axillary lymph node dissection), over a third of middle-aged women report poor range of motion or pain affecting their upper body function 6 months after breast surgery, even after lumpectomy alone.[5–7] Poor range of motion in the arm can result in diminished ability to perform important activities of daily living (ADLs), such as feeding and toileting independently in older populations. In nursing home residents with limited life expectancy, because death from other causes may occur before breast cancer itself causes symptoms and suffering, a better understanding of surgical morbidity is important for decision-making in this population. Additionally, understanding the functional trajectory following breast cancer surgery in nursing home residents is essential for making realistic informed decisions.

Using Medicare and national nursing home data, we evaluated mortality and functional decline in women residents who underwent inpatient breast cancer surgery in the United States and identified patient characteristics associated with mortality and functional disability following surgery.

## METHODS

### Patients and Databases

We identified a cohort of long-term, women nursing home residents, age ≥67 years who underwent an inpatient breast cancer surgical procedure by linking data from 100% national Medicare Inpatient Files (2003–2013) with the Minimum Data Set for Nursing Homes (MDS, 2003–2013). The Medicare Inpatient Files contain discharge information for all fee-for-service inpatient hospitalizations for Medicare beneficiaries. The MDS is a mandatory assessment of all nursing home residents who reside in facilities participating in Medicare or Medicaid programs. MDS assessments of a resident's health and functional status are administered by nursing staff and are completed at the time of admission or readmission to the nursing facility, quarterly, and when the resident experiences a change in clinical status.

The cohort was identified using International Classification of Disease, version 9 (ICD-9) diagnosis codes for breast cancer and procedure codes for lumpectomy, mastectomy, and axillary lymph node dissection with either a lumpectomy or mastectomy (ALND) in the Medicare Inpatient File (Appendix S1). For the small number of residents who underwent multiple breast procedures, we used the first index case. Subjects were classified as long-term nursing home residents if they underwent two or more consecutive MDS assessments, over 90 days apart, during the 6 months prior to surgery, confirming a pre-operative nursing home length of stay for more than 90 days.

### Data Collection and Measurement

**Outcome Variables—**We assessed 30-day mortality, 1-year mortality, and 1-year functional decline after surgery. Death was assessed from the Medicare Denominator file. Functional status was measured by trained evaluators using MDS assessments of a resident's self-performance of the ADL. Data on ADL performance in the MDS include questions

about physical function in 7 activities: dressing, eating, toileting, personal hygiene, bed mobility, transferring, and ambulation. Performance of each of these activities is rated using a scoring system from 0 (independence) to 4 (total dependence). The Minimum Data Set-Activities of Daily Living (MDS-ADL) score is a sum of these 7 scores and has been validated against standardized measures of function and ranges from 0 indicating independence in all activities to 28 indicating total dependence in all activities.[8] Consistent with previously published studies, we defined functional decline as an increase of 2 or more points on the MDS-ADL score.[9,10]

**Resident Characteristics—** Resident characteristics were obtained from Medicare claims and MDS assessments: demographic data were obtained from the Medicare Denominator file, and comorbid diagnoses from MDS assessments. Residents were categorized as having cognitive impairment if they had one of the following: (1) a dementia diagnosis in MedPAR File; (2) a dementia disease diagnosis on their MDS assessment; or (3) measured cognitive impairment using the MDS Cognitive Performance Scale (CPS) or Brief Interview of Mental Status (BIMS). The MDS-CPS (MDS years 2003–2009) and BIMS (MDS years 2010–2012) are validated scales of cognitive function.[11] A CPS score ≥3 or a BIMS score of 0–12 indicates moderate or worse cognitive impairment and has been used to define dementia.[12]

We defined baseline functional status as the MDS-ADL summary score reported on the most recent MDS assessment prior to the breast cancer surgery. In addition, we categorized residents as experiencing pre-operative functional decline by comparing the 2 most recent MDS reports collected prior to their surgery and determining whether there was an increase of ≥2 points on the MDS-ADL score. To explore the impact of pre-operative functional status on post-operative mortality and functional decline, we divided nursing home residents into 4 approximately equal sized quartiles of functional status based on their pre-operative MDS-ADL summary score.

**Statistical Analysis—**For our primary analyses we examined the association of patient characteristics and outcomes stratified by procedure type. We used the Kaplan-Meier method to estimate cumulative incidence of one-month and one-year mortality from the date of surgery. Then, we used Cox proportional hazards models to estimate the adjusted and unadjusted hazard ratios for one-year mortality associated with individual resident characteristics. We fit Fine-Gray competing risk models[13] to estimate the subhazard ratios for functional decline over the 12 month follow-up associated with individual resident characteristics, taking into account the competing risk of mortality.

In all analyses, the patient was the unit of analysis. Statistical significance was defined as a P-value of 0.05 using 2-sided testing. This study was approved by the University of California, San Francisco Committee on Human Research. The funding organization had no role in the design and conduct of the study, the collection, analysis, and interpretation of the data, or in the preparation, review, or approval of the manuscript. Analysis was performed using SAS® (V9.4), SAS: SAS Institute Inc. Figures were drawn using R version 3.1.1.

# RESULTS

## Baseline Characteristics

Characteristics of the 5,969 women in the cohort are presented in Table 1 (mean age 82 [SD 7], 83% white). Baseline comorbidities were common: 57% had cognitive impairment, 36% had diabetes, 27% had rheumatologic disease, 22% had heart failure, and 22% had cerebrovascular disease. Mean MDS-ADL score was 13.9, indicating a high level of pre-operative functional dependence. A substantial proportion of residents (16%) had experienced functional decline in the 3 months prior to surgery. Breast surgery was performed during an elective admission in 75% of cases and over one-half (61%) had an ALND.

## 30-Day and 1-Year Mortality Outcome

Observed 30-day mortality rate was 3.2%., with highest rate in those who underwent lumpectomy alone (8.5%). In multivariate analysis, for all subcohorts, surgery performed during an urgent/emergent admission was associated with higher risk of 30-day mortality (adjusted HR 4.07[95%CI 1.85–8.95] p<0.001 for lumpectomy; 1.91[1.09–3.32] p=0.023 for mastectomy; 1.82[1.11–2.99] p=0.018 for ALND; eTable 2). For all subcohorts, age, comorbidities, functional decline prior to surgery, and hospital admission within 1 year prior to surgery were not significantly associated with 30-day mortality. In the ALND subcohort, severe functional disability at baseline was associated with the highest 30-day mortality risk (2.90[1.32–6.37], p=0.008).

One-year all-cause mortality was 31–42%. The residents in the most functionally dependent quartiles experienced very high mortality in all 3 subcohorts (Figure 1). In a multivariate analysis, MDS-ADL score of 20 to 28, (indicating significant ADL dependence) was strongly associated with death at 1 year as compared with an MDS-ADL score of 0 to 7—lumpectomy: HR 1.92(1.23–3.00, p=0.004), mastectomy: 1.80(1.35–2.39, p<0.001), ALND: 1.77(1.46–2.15, p<0.001) (eTable 3). Additionally, cognitive impairment was associated with 1-year mortality in mastectomy (1.26[1.03–1.54], p=0.026) and ALND (1.22[1.07–1.39], p=0.002), but not lumpectomy (1.22[0.93–1.60], p=0.15).

## Functional Decline

Among 1-year survivors, 55 to 60% of residents had a functional decline. Survivors experienced clinically significant functional decline at 1 year after surgery: on average, MDS-ADL score worsened 2.8 points after lumpectomy, 4.1 points after mastectomy, and 4.6 points after ALND. In multivariate analysis, for all subcohorts, ADL decline prior to surgery was associated with an increased risk of 1-year functional decline (lumpectomy: sHR1.59[1.25–2.03, p<0.001, mastectomy: 1.79[1.52–2.09, p<0.001], ALND: 1.72[1.56–1.91, p<0.001]). Cognitive impairment prior to surgery was also associated with a risk of 1-year functional decline (lumpectomy: 1.27[1.03–1.56, p=0.024], mastectomy: 1.26[1.09–1.45, p=0.002], ALND: 1.14[1.04–1.24, p=0.003]) (eTable 4). Using MDS-ADL score of 0 to 6 as reference, an MDS-ADL score of 20 to 28, which indicates severe functional dependence at baseline, was inversely associated with 1-year functional decline, MDS-ADL

score of 20 to 28-lumpectomy: 0.41(0.30–0.56), p<0.001, mastectomy: 0.49(0.40–0.60, p<0.001), ALND: 0.54(0.47–0.62, p<0.001).

## DISCUSSION

In a national registry of all elderly women residing in nursing homes in the United States who underwent an inpatient breast cancer operation from 2003–2013, over half were cognitively and functionally impaired prior to their surgery. Over 60% of the breast cancer operations were of the most invasive type (i.e., a lumpectomy or mastectomy with an axillary lymph node dissection). For those that underwent the least invasive type of breast surgery (i.e., lumpectomy alone), 8.4% died within 30 days of surgery. Overall, a third (31%) died within a year of their breast cancer surgery and among those women who survived one year, over half (58%) experienced significant functional decline. Poor function prior to surgery was significantly associated with increased risk of 1-year mortality across all breast cancer surgery types. Additionally, those with the least functional dependency prior to surgery were most likely to have a 1-year functional decline in any of the breast cancer surgery operations. Cognitive impairment prior to surgery and ADL decline prior to surgery were both independent risk factors associated with 1-year functional decline in any of the breast cancer surgery operations, as well.

Our findings differ from prior analyses examining mortality after breast cancer surgery. Prior analyses of 30-day mortality in community-dwelling women after breast cancer surgery have reported mortality as 1%.[14] In our nursing home cohort, 30-day mortality ranged from 2–8% depending on surgery type. The highest mortality rate was associated with the least invasive procedure (i.e., lumpectomy at 8%), which appeared to be performed in the sickest patients. A higher mortality rate is somewhat expected due to advanced age and increased co-morbidities presents in nursing home residents. However, a 30-day mortality of 8% is much higher than would be anticipated for a surgical procedure that is generally considered very low risk. It is likely that the patients identified as high risk were offered lumpectomy only in an attempt to minimize morbidity. Additionally, since lumpectomies are typically outpatient procedures, this cohort of women represent patients in whom inpatient stay was deemed necessary after lumpectomy alone, likely implying a greater baseline risk than can be captured in administrative databases.

While this is the first study, to our knowledge, looking at long-term functional loss in older nursing home residents undergoing breast cancer surgery, long-lasting functional loss has been reported in younger cohorts. Regardless of procedure type (e.g., lumpectomy, axillary lymph node dissection), over a third of middle-aged women report poor range of arm movement, effecting their upper body function, 6 months after breast surgery, with some reporting up to 18 months after breast surgery.[5] In our nursing home cohort, 1-year functional decline occurred in 58% of those still alive at 1 year. A higher rate of worsening function after breast cancer surgery is expected in a nursing home population. Due to the high rates of cognitive impairment in this population and the association of cognitive impairment with poor functional recovery after surgical insults in older adults, the likelihood of undergoing a breast cancer surgery and having it impact a frail, elderly woman’s function in the long-term is plausible and likely.[15]

There are potential limitations to consider. First, we did not have information on outpatient services; thereby missing procedures performed in the outpatient setting. However, our goal was to evaluate the sickest patients, which would most likely have their procedure performed in the inpatient setting. Second, because the MedPAR file and the MDS do not have information about outpatient services, we do not have information about endocrine therapy, chemotherapy and radiation therapy that may be used in conjunction with or instead of inpatient surgery and may influence function and mortality. Additionally, we did not have information on staging of the breast cancer. Prior research, however, has found that only 6% of nursing home residents with cancer receive radiation or chemotherapy.[1] Finally, our dataset cannot identify nursing home residents with newly diagnosed breast cancer who did not have surgery or those who underwent outpatient surgery. However, sicker nursing home residents may not be deemed candidates for surgery at all. Therefore, these data may not be generalizable to the sickest of all nursing home residents and may underestimate the harms of surgery.

A high proportion of our cohort underwent axillary node dissection, which is consistent with a cohort who underwent inpatient surgery. However, since axillary dissection has no proven survival benefit in breast cancer, the potential benefit of axillary dissection would be for staging to determine need for adjuvant therapy such as chemotherapy, or, for locoregional control.[16] Given the hesitancy to administer chemotherapy to elderly nursing home residents, reflected in low chemotherapy usage in this population, the staging benefits of axillary dissection are significantly diminished.[1] While omitting surgery for locoregional disease management may be considered sub-optimal in the treatment of breast cancer, our findings of significant risk of morbidity and mortality after surgical intervention in this patient population may provide evidence that non-surgical treatment may be preferable.[17] Our data do not permit for analyzing outcomes by tumor subtype or stage, but multimodal therapy for breast cancer could potentially offer alternative non-surgical treatment options. Estrogen receptor positive tumors may be at least temporarily treated with endocrine therapy; for those with bulky adenopathy, radiotherapy without surgery could also be considered.[18,19] In addition to the pain and suffering reported in prior studies in younger women undergoing any breast surgery, the impact of breast cancer surgery on an even older and frailer population is likely to be even greater. For example, a qualitative study by Walter, et. al.[20] describes an 89-year old woman with angina and dementia who was functionally dependent in 2 ADLs and diagnosed with invasive ductal carcinoma. She subsequently received a modified radical mastectomy with no evidence of cancer in her axillary lymph nodes. The night after surgery, she pulled off all the bandages, requiring restraints. and developed a seroma. She died 15 months later of a myocardial infarction.

This study provides new benchmark data for women who are long-term nursing-home residents and provides essential information for individualizing surgical decision-making when breast cancer surgery is being considered. There is a paucity of data about the long-term functional and mortality outcomes of breast cancer surgery in the nursing home population. Realistic, evidence-based information about fatal and functional outcomes is needed to make informed consent and anticipatory guidance meaningful for those that decide to undergo breast cancer surgery.

While some clinicians, patients, and caregivers believe breast surgery is necessary to prevent morbidity and mortality from breast cancer, the risks of harm may outweigh the benefit in this frail, vulnerable population, in which many have a limited life expectancy. Our study found high mortality rates in nursing home residents who undergo breast cancer surgery. Overall nursing home resident mortality rate is 25%, and in this surgical cohort, it was 31%.[21,22] Additionally in those undergoing a more invasive and functionally impairing procedure (i.e., axillary lymph node dissection), their ability to care for themselves worsened. Breast cancer care should be individualized goal-oriented care and hormonal therapy or symptom management only should also be considered options for nursing home residents.

In summary, elderly women nursing home residents who undergo breast cancer surgery are at high risk of one-year mortality and functional decline. These findings establish benchmark data for this population and provide cautionary information for clinicians considering offering breast cancer surgery with the hope of prolonging life or improving functioning in frail older women with cognitive and significant functional impairment. Surgery often cures the cancer but can worsen other more life-limiting comorbidities and function of nursing home residents. This information is essential to guide surgical decision-making in frail older women with breast cancer, and suggests that multi-modality therapy be considered as an alternative to surgery in this population.

Further evaluation of breast cancer surgery in the long-term nursing home population should be performed. First, a study that evaluates specifically nursing home residents undergoing breast surgery in the outpatient setting should be designed. This group will provide information on outcomes after surgery in, likely, a less frail and sick nursing home population. Additionally, to better inform patients of outcomes specifically related to the surgery, a study comparing outcomes of nursing home residents with and without the surgical intervention will need to be developed and studied. Lastly, decision aids to support informed decision-making in frail, nursing home population that is considering breast cancer surgery should be developed and studied. This future direction will further inform surgical decision making in nursing home residents possibly faced with breast cancer surgery.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data Access, Responsibility, and Analysis:

Dr. Victoria Tang had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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## KEY POINTS

**Question:**

What are long-term functional and mortality outcomes among older nursing home women after breast cancer surgery?

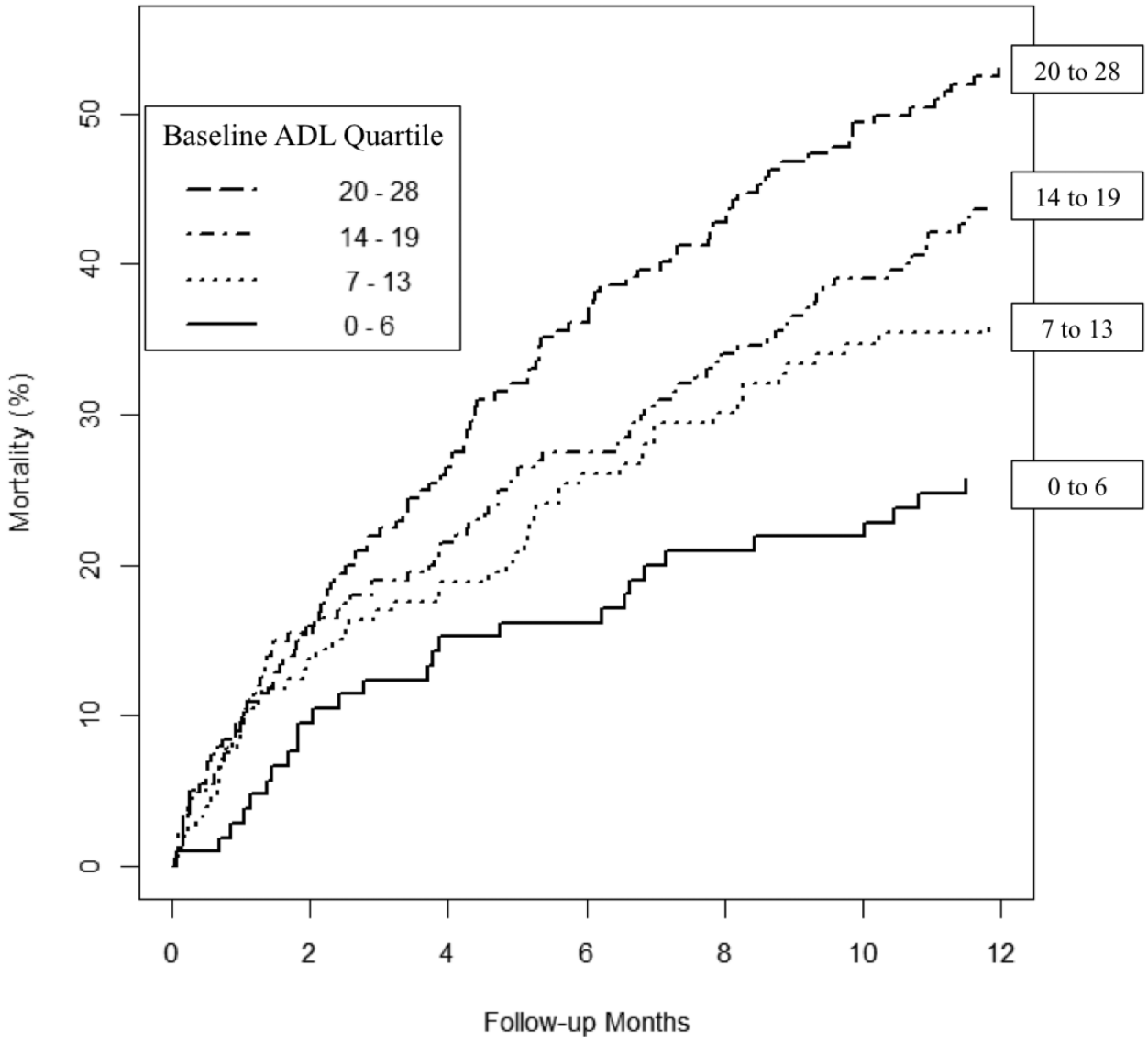
**Findings:**

In this observational study of 5,969 female NH residents, highest 30-day and 1-year mortality occurred following lumpectomy, least invasive procedure, and greatest 1-year functional decline occurred following lumpectomy or mastectomy with axillary lymph node dissection, most invasive procedure. In all breast cancer surgery, poor pre-operative function was associated with 1-year mortality, and pre-operative functional decline and cognitive impairment were associated with 1-year post-operative functional decline.

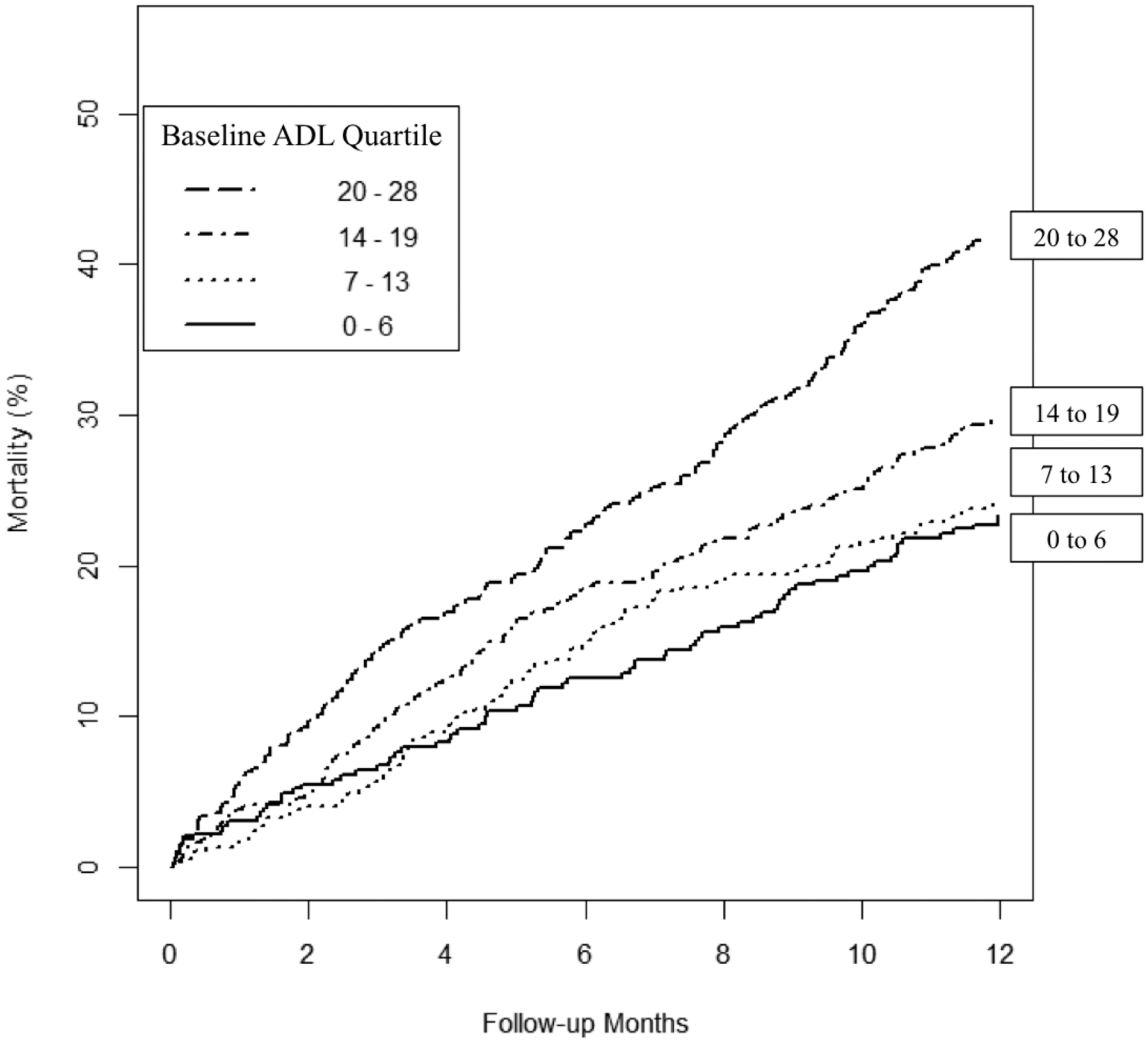
**Meaning:**

Surgical decision-making for nursing home residents with breast cancer should consider pre-operative function and cognitive impairment.

A) Lumpectomy



B) Mastectomy



C) Axillary Lymph Node Dissection with Lumpectomy or Mastectomy

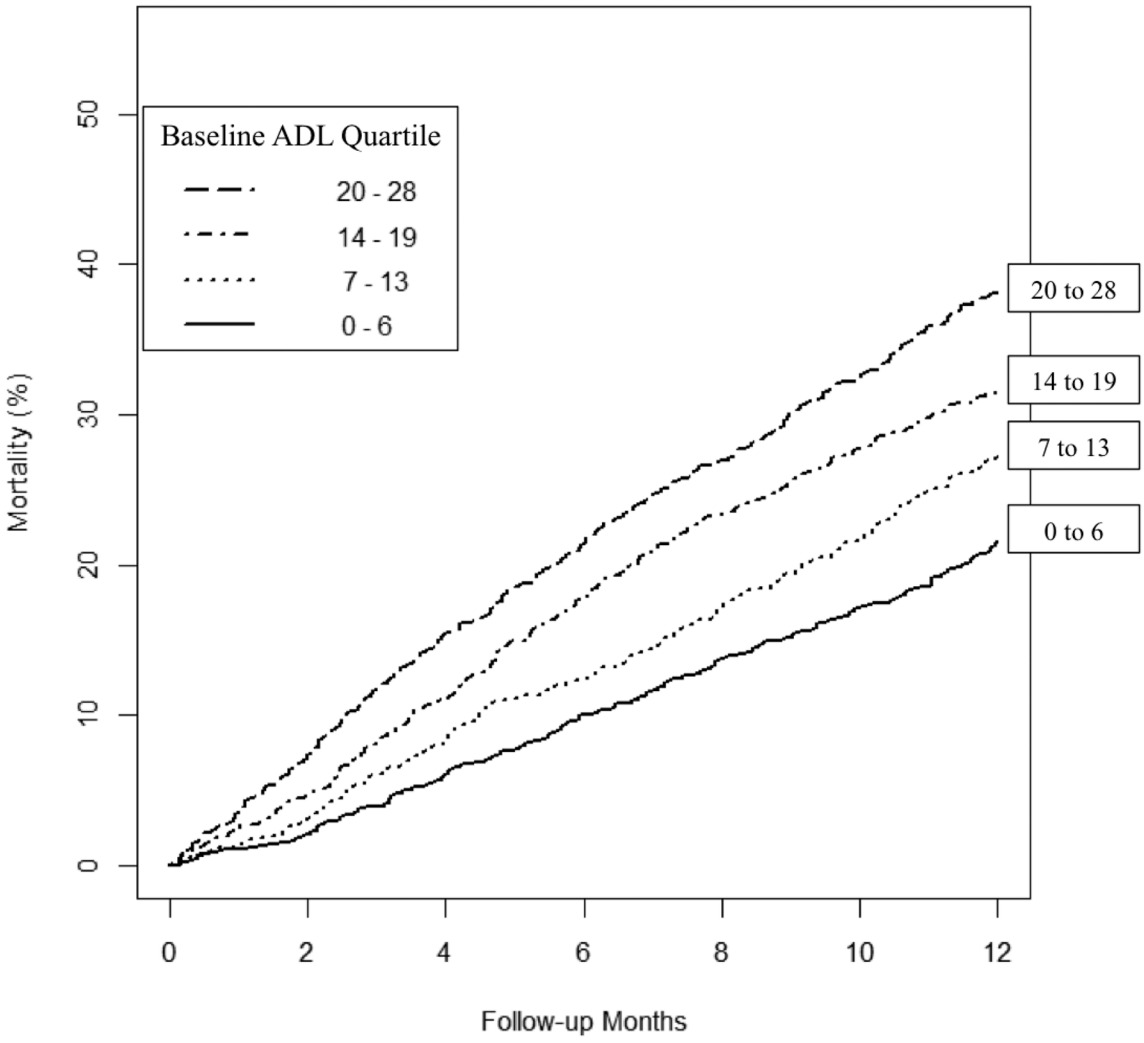



**Figure 1. Mortality Rates in Women Nursing Home Residents with Breast Cancer Surgery by Pre-operative Function**

The ADL performance in the Minimum Data Set for Nursing Home (MDS) includes information about mobility in 7 activities: mobility while in bed, transferring, ambulation, dressing, eating, toileting, and personal hygiene. Performance of each of these ADLs is rated using a scoring system of 0 to 4 points, ranging from 0, indicating independence, to 4, indicating total dependence. Possible total scores range from 0, for independence in all ADLs, to 28, indicating total dependence in all ADLs.

**Table 1.**

Baseline Characteristics of Women Nursing Home Residents ≥67 Years undergoing Breast Cancer Surgery[a]

| | No. (%) | | | |
|---|---|---|---|---|
| **Characteristics** | **Total Cohort (N=5969)** | **Lumpectomy (N=666)** | **Mastectomy (N=1642)** | **Axillary Lymph Node Dissection with Lumpectomy or Mastectomy (N=3661)** |
| **Age (y)** | | | | |
| 67 to <75 | 980 (16.4) | 90 (13.5) | 221 (13.5) | 669 (18.3) |
| 75 to <85 | 2593 (43.4) | 260 (39.0) | 626 (38.1) | 1707 (46.6) |
| ≥85 | 2396 (40.1) | 316 (47.4) | 795 (48.4) | 1285 (35.1) |
| Mean ± SD | 82.3 ± 7.3 | 83.2 ± 7.3 | 83.7 ± 7.5 | 81.5 ± 7.1 |
| **Race** | | | | |
| White | 4960 (83.1) | 526 (79.0) | 1393 (84.8) | 3041 (83.1) |
| Black | 845 (14.2) | 123 (18.5) | 205 (12.5) | 517 (14.1) |
| Other | 164 (2.7) | 17 (2.6) | 44 (2.7) | 103 (2.8) |
| **Elective Admission** | 4473 (74.9) | 278 (41.7) | 1283 (78.1) | 2912 (79.5) |
| **Baseline ADL quartile**[b] | | | | |
| 0 to 6 | 1310 (21.9) | 106 (15.9) | 332 (20.2) | 872 (23.8) |
| 7 to 13 | 1375 (23.0) | 157 (23.6) | 383 (23.3) | 835 (22.8) |
| 14 to 19 | 1759 (29.5) | 201 (30.2) | 482 (29.4) | 1076 (29.4) |
| 20 to 28 | 1525 (25.5) | 202 (30.3) | 445 (27.1) | 878 (24.0) |
| Mean ± SD | 13.9 ± 7.8 | 15.1 ± 7.7 | 14.3 ± 7.9 | 13.5 ± 7.8 |
| **Functional decline before surgery**[c] | 962 (16.1) | 133 (20.0) | 257 (15.7) | 572 (15.6) |
| **Comorbidity** | | | | |
| Cognitive impairment | 3396 (56.9) | 383 (57.5) | 975 (59.4) | 2038 (55.7) |
| Myocardial infarction | 720 (12.1) | 98 (14.7) | 192 (11.7) | 430 (11.7) |
| Heart failure | 1324 (22.2) | 180 (27.0) | 351 (21.4) | 793 (21.7) |
| Cerebrovascular disease | 1315 (22.0) | 143 (21.5) | 340 (20.7) | 832 (22.7) |
| Chronic pulmonary disease | 1055 (17.7) | 140 (21.0) | 276 (16.8) | 639 (17.5) |
| Rheumatologic disease | 1608 (26.9) | 188 (28.2) | 453 (27.6) | 967 (26.4) |
| Diabetes mellitus | 2175 (36.4) | 264 (39.6) | 526 (32.0) | 1385 (37.8) |
| Charlson score, mean [SD][d] | 1.8 [1.7] | 2.0[1.7] | 1.8[1.6] | 1.9[1.7] |
| **Number of hospital admissions 12 months before surgery:** | | | | |
| 0 | 2477 (41.5) | 138 (20.7) | 740 (45.1) | 1599 (43.7) |
| 1 | 836 (14.0) | 175 (26.3) | 207 (12.6) | 454 (12.4) |
| 2 | 895 (15.0) | 86 (12.9) | 241 (14.7) | 568 (15.5) |
| ≥3 | 1761 (29.5) | 267 (40.1) | 454 (27.6) | 1040 (28.4) |
| Mean[SD] | 1.9 [2.5] | 2.6 [2.6] | 1.8 [2.3] | 1.9 [2.5] |

Abbreviation: ADLs, activities of daily living.

[a]This table presents the characteristics for the total cohort of women nursing home residents 67 years and older who underwent a breast cancer surgery in 2003–2012 and 3 subgroups of this cohort: “Women who underwent a Lumpectomy”, “Women who underwent a Mastectomy”, and “Women who underwent a Lumpectomy or Mastectomy with Axillary Lymph Node Dissection” (ALND). Differences between the lumpectomy, mastectomy, and ALND were significant ($p<0.05$) for all characteristics except for certain comorbidities, specifically “myocardial infarction”, “cerebrovascular disease”, or “rheumatologic disease”.

[b]The ADL performance in the Minimum Data Set for Nursing Home (MDS) includes information about mobility in 7 activities: mobility while in bed, transferring, ambulation, dressing, eating, toileting, and personal hygiene. Performance of each of these ADLs is rated using a scoring system of 0 to 4 points, ranging from 0, indicating independence, to 4, indicating total dependence. Possible total scores range from 0, for independence in all ADLs, to 28, indicating total dependence in all ADLs.

[c]Residents were classified as having Functional decline before surgery if they had a 2-point or greater MDS-ADL score increase in the 3 months before their surgical admission.

[d]Range of Charlson scores: 0–15