

# Treating Early-Stage Breast Cancer: Hospital Characteristics Associated with Breast-Conserving Surgery

## ABSTRACT

Despite growing acceptance of the fact that women with early-stage breast cancer have similar outcomes with lumpectomy plus radiation as with mastectomy, many studies have revealed the uneven adoption of such breast-conserving surgery. Discharge data from the Hospital Cost and Utilization Project, representing multiple payers, locations, and hospital types, demonstrate increasing trends in breast-conserving surgery as a proportion of breast cancer surgeries from 1981 to 1987. Women with axillary node involvement were less likely to have a lumpectomy, even though consensus recommendations do not preclude this form of treatment when local metastases are present. Non-White race, urban hospital location, and hospital teaching were associated with an increased likelihood of having breast-conserving surgery. (*Am J Public Health*. 1995;85:1432-1434)

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### Introduction

The development of radiation therapies and chemotherapies brought into question the need for extensive surgical excision for early-stage breast cancer. Clinical trials comparing total mastectomy with segmental mastectomy plus radiation demonstrated similar survival outcomes.<sup>1</sup> By 1990, a National Institutes of Health Consensus Development Conference recommended breast-conserving surgery as the appropriate method of primary therapy for most women with stage 1 or 2 breast cancer.<sup>2</sup> But despite the growing belief in this approach for most women at this stage of disease, studies suggest that breast-conserving surgery continues to be underused<sup>3,4</sup> and that wide geographic variations in its use exist.<sup>5-7</sup> The adoption of breast-conserving approaches appeared to slow in the late 1980s and even declined in some areas.<sup>3,8,9</sup>

Several explanations are offered for this slow and varied adoption: uneven diffusion of recommendations,<sup>4-6,10</sup> lack of access to specialized cancer services,<sup>4,6,9,11</sup> rejection of clinical trial results in community practice,<sup>3,9,12</sup> and varied patient and physician preferences.<sup>3,5,9,10</sup> Interestingly, most of these explanations relate to nonclinical factors whereas consensus recommendations are based primarily on clinical factors. The purpose of this study is to examine trends in surgical treatment for early-stage breast cancer from 1981 to 1987 in a national sample of hospitals, focusing on the influence of characteristics of the hospital where the surgical treatment was received.

### Methods

Data from the Hospital Cost and Utilization Project were used in this investigation.<sup>13</sup> These data were derived from a national sample of more than 500 hospitals drawn from the universe of nonfederal, short-term, general hospitals in the United States with more than 30 beds. Discharges with a principal diagno-

sis of breast cancer, categorized as early-stage with *Disease Staging Clinical Criteria*,<sup>14</sup> and having a nondiagnostic surgical breast procedure were the basis for this investigation. An enlarged or malignant axillary lymph node was considered as evidence of local metastasis. Very early breast cancers (carcinomas in situ) were excluded since surgical therapy may not have been warranted. This resulted in a sample size of 87 449 discharges.

Age categories were constructed to serve as a crude proxy for menopausal status. An adaption of the Charlson Comorbidity Index<sup>15</sup> was used to measure comorbidities. A patient was identified as having a comorbidity if she had any of the following diseases coded in her diagnoses vector: myocardial infarction, congestive heart failure, peripheral vascular disease, cerebrovascular disease, dementia, chronic pulmonary disease, rheumatologic disease, peptic ulcer disease, liver disease, diabetes, hemi- or paraplegia, renal disease, malignancy (other than breast), or acquired immunodeficiency syndrome. Data from the American Hospital Association's *Annual Survey of Hospitals*<sup>16</sup> and the American Medical Association's *Directory of Residency Training Programs*<sup>17</sup> were used to assign each hospital to one of four categories of teaching intensity. Hospitals were additionally categorized as urban if they were located in an area designated as a metropolitan statistical area by the Office of Management and Budget. The independent influence of hospital characteristics on the likelihood of having breast-

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*Note.* The views expressed here are the authors' and do not necessarily reflect those of the Agency for Health Care Policy and Research or the US Department of Health and Human Services.

**TABLE 1—Study Hospitals' Total Percentage of Breast Cancer Surgery, by Year**

	1981 (n = 11 286)	1982 (n = 11 632)	1983 (n = 11 998)	1984 (n = 12 645)	1985 (n = 13 004)	1986 (n = 13 222)	1987 (n = 13 662)	EAPC <sup>a</sup> (95% CI)
Radical mastectomy	8.7	6.7	5.8	4.6	3.2	2.5	2.3	-20.8 (-22.97, -18.63)
Modified radical mastectomy	74.6	76.4	78.2	78.4	75.9	75.9	77.0	0.2 (-0.53, 0.88)
Simple mastectomy	6.9	6.6	5.6	5.1	5.5	6.0	6.2	-2.0 (-5.72, 1.95)
Breast-conserving surgery	9.9	10.2	10.4	12.0	15.4	15.7	14.5	9.0 (5.37, 12.82)

Source. Data are from the Hospital Cost and Utilization Project, Center for Intramural Research, Agency for Health Care Policy and Research.

<sup>a</sup>EAPC = estimated annual percentage change; CI = confidence interval. The EAPC is derived by fitting a regression line to the natural logarithm of the procedure rate, using calendar year as the independent variable. A negative EAPC indicates that the rate of the procedure is declining over time; a positive EAPC indicates that the rate is increasing.

conserving surgery was estimated by using logistic regression.

## Results

The rate of breast cancer surgery by type for the study period is reported in Table 1, along with the estimated annual percentage change, a measure that summarizes the nature of the trend from 1981 to 1987. The rate of radical mastectomies decreased by nearly 21% per year. Modified radical mastectomies, which represent approximately three fourths of the procedures, remained relatively constant, as did simple mastectomies. In contrast, the rate of breast-conserving surgeries increased by 9% per year.

Logistic regression was used to model the influence of hospital characteristics on the use of breast-conserving surgery while controlling for patient and hospital characteristics (Table 2). The results indicate that women 50 to 64 years old were 23% less likely to have breast-conserving surgery than women less than 50 years old. Women with local metastasis had less than half the likelihood of having breast-conserving surgery as women with no evidence of metastasis. The presence of a comorbid condition demonstrated no independent effect.

Among the nonclinical characteristics examined, discharges for which the expected payer was "self" were 22% less likely to have breast-conserving surgery than those for which the expected payer was private. Non-White women were 24% more likely to have such surgery than White women. Discharges from hospitals located in urban areas were 43% more likely to have such surgery than those

**TABLE 2—The Likelihood of Receiving Breast-Conserving Surgery, by Patient and Hospital Characteristics**

	No.	Adjusted Odds Ratio <sup>a</sup>	95% Confidence Interval
Age, y			
< 50	18 546	1.00	
50-64	41 367	0.77	0.73, 0.81
65+	27 489	0.93	0.86, 1.00
Evidence of local metastasis			
None	66 500	1.00	
Local	20 949	0.44	0.42, 0.47
Comorbidity			
None	77 689	1.00	
One or more	9 760	1.00	0.94, 1.07
Expected payer			
Private, including BlueCross BlueShield	40 240	1.00	
Medicare, Medicaid, other government	38 901	0.91	0.51, 1.63
Self or unknown	8 308	0.78	0.68, 0.89
Race			
White	73 369	1.00	
Non-White	7 932	1.24	1.17, 1.31
Hospital location			
Rural	75 600	1.00	
Urban	11 849	1.43	1.33, 1.55
Hospital bed size			
≥ 250	62 101	1.00	
100-249	17 108	0.95	0.89, 1.01
< 100	8 240	0.90	0.83, 0.98
Hospital teaching			
Academic medical center	4 934	1.00	
Major teaching	34 352	0.73	0.67, 0.80
Minor teaching	10 006	0.65	0.59, 0.72
No teaching	38 157	0.73	0.67, 0.80
Hospital region			
Northeast	7 776	1.00	
Northcentral	20 824	0.96	0.91, 1.02
South	26 707	1.01	0.96, 1.06
West	16 772	0.92	0.87, 0.98

Note. Frequencies may not add to totals because of missing values.

Source. Data are from the Hospital Cost and Utilization Project, Center for Intramural Research, Agency for Health Care Policy and Research.

<sup>a</sup>Adjusted for all variables included in the model.

from rural hospitals, while discharges from hospitals with fewer than 100 beds were 10% less likely to have such surgery than discharges from hospitals with at least 250 beds. Hospital teaching status demonstrated a significant independent effect: discharges from hospitals with no teaching program were 27% less likely to have breast-conserving surgery as those from an academic medical center. Discharges from hospitals with minor teaching programs were 65% as likely to have breast-conserving surgery as discharges from academic medical centers. Interestingly, there was little difference in the likelihood of having this surgery across regions once patient and hospital characteristics were controlled.

## Discussion

It is difficult to compare surgical rates among studies because different sampling procedures, definitions, and databases are used. However, the overall trends in surgical treatment for early-stage breast cancer in these data are similar to those reported in the literature, although the actual proportions of breast-conserving surgeries reported here are lower. Considering that some breast-conserving surgery was probably done on an ambulatory basis, a bias against identifying all such surgeries exists in these data. This may also account for some of the decline in this kind of surgery observed in the last year of the study, although Surveillance, Epidemiology and End Results data report a similar decline.<sup>8</sup> It is also possible that our method for identifying discharges with early-stage breast cancer did not result in a sample that is comparable to that defined by clinical staging. Clinical staging is based on actual tumor size, evidence of nodal disease, and presence of metastasis, all of which are not definitively coded in discharge abstract data. Consequently, coding errors of omission on discharge abstracts may have misclassified some discharges as early-stage cancer when they were actually later-stage cancers and not candidates for breast-conserving surgery.

A major limitation of this and other studies examining the use of breast-conserving surgery is that patient and physician preferences are not considered.

Although studies indicate that mastectomy and breast-conserving surgery plus radiation have equivalent clinical outcomes, treatment decisions are complex and often take into consideration multiple factors. Physicians and patients may choose a more extensive surgery where the intellectual appeal of "getting all of the tumor" prevails. Given that the breast-conserving approach requires daily radiation therapy for 6 weeks, compliance may be difficult for working women and for older women with functional limitations. On the other hand, breast conservation may be very important for some women, particularly when reconstruction options are limited.

Despite these limitations, this study provides trends in breast cancer surgery for a large sample of diverse hospitals. It demonstrates the independent influence of clinical and nonclinical factors on the choice of breast-conserving surgery. The finding that a woman treated in a rural hospital is less than half as likely to have breast-conserving surgery as one treated in an urban hospital is commonly attributed to a slower diffusion of new technologies and innovations in these areas. However, the choice of a mastectomy procedure rather than a lumpectomy plus daily radiation may be reasonable, particularly when the ability to comply with radiation therapy is limited. □

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