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Patient, Hospital, and Surgeon Factors Associated with Breast Conservation Surgery

A Statewide Analysis in North Carolina

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Objective
The objective of this study was to determine the trend of breast conservation surgery (BCS) in North Carolina over a 6-year period and to identify patient, hospital, and surgeon factors associated with the use of BCS.

Summary Background Data
Despite evidence that BCS is an appropriate method of treatment for early-stage breast cancer, surgeons in the United States have been slow to adopt this treatment method.

Methods
Cases of primary breast cancer surgery in all 157 hospitals in the state from 1988 to 1993, inclusive (N = 20,760), were obtained from the State Medical Database Commission, Area Resource File, American Hospital Association and State Board of Medical Examiner's Databases. Multiple logistic regression was used to generate odds ratios (ORs) and 95% confidence intervals (CIs) to determine factors associated with BCS.

Results
The rate of BCS doubled from 7.3% in 1988 to 14.3% in 1993, with an overall rate of 10.2% (2117/20,760). Multiple logistic regression identified the following factors associated with BCS: patient age younger than 50 years of age (OR = 1.7, 95% CI = 1.4, 2.1), patient age 50 to 69 years of age (OR = 1.2, 95% CI = 1.1, 1.4), private insurance (OR = 1.2, 95% CI = 1.0, 1.4), hospital bed size 401+ (OR = 2.0, 95% CI = 1.6, 2.5), bed size 101 to 400 (OR = 1.7, 95% CI = 1.3, 2.1), and surgeon graduation from medical school since 1981 (OR = 1.6, 95% CI = 1.2, 2.0).

Conclusions
Rates of BCS in North Carolina are low. Least likely to have BCS were women older than 70 years of age, without private insurance, treated at small hospitals by older surgeons. To increase the use of BCS, widespread education of surgeons, other health care providers, policy makers, and the general public is warranted.

To meet the challenge of reducing costs and improving health outcomes, new approaches to medical care are being implemented throughout the United States. Changing physicians' practice can be a major undertaking that often requires intensive publicity and education to encourage the use of these new approaches.

Breast conservation surgery (BCS) for treatment of cancer of the breast has been shown to be an appropriate method of treatment for a large subset of women with stage I and II breast cancer.[1] However, surgeons in the United States have been slow to adopt this treatment method. Despite clinical evidence that women with early-stage breast cancer are equally well treated with BCS as with modified radical mastectomy, the rate of BCS remains low. Data from the National Cancer Database indicate that the overall rate of BCS in the United States in 1992 was 38%, and this rate has been shown to vary significantly in different regions of the country.[2-5]

In addition to regional variation, other factors have been shown to be associated with BCS. For example, hospital factors associated with BCS include university or teaching hospitals or both,[3,6,7] hospitals located in urban areas,[7] and large hospitals.[3,8] Patient factors associated with BCS include young age,[8-10] urban residence,[3,9] increased education or income or both,[9,10] and white race.[7,11]

The only statewide study that examines trends in the use of BCS and factors associated with BCS was done in Vermont by Foster et al.[6] This study found an increased use of BCS in the university hospital compared with the community hospitals in the state, but found no association between patient age and BCS. The authors concluded that variation in rates of BCS probably are associated with community and surgeon factors. Other studies have suggested that surgeon factors play an important role in the breast cancer treatment decision.[12-16] However, none of the national, regional, or state based studies have examined the association between surgeon factors and BCS. Identification of factors associated with BCS would be useful in targeting promotional and educational campaigns to increase acceptance and use of BCS among surgeons and the general public.

The purpose of this study was twofold: 1) to examine all hospital inpatient admissions for breast cancer in the state of North Carolina and determine the trend of BCS over a 6-year period and 2) to identify patient, hospital, and surgeon factors associated with the use of BCS.

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METHODS

This study used a retrospective cohort design that included all women admitted to the 157 nonfederal hospitals in North Carolina for breast cancer surgery from 1988 to 1993. We obtained data for the study from four data sets: 1) the North Carolina Medical Database Commission database, 2) the American Hospital Association database, 3) the North Carolina Board of Medical Examiner's database, and 4) the Area Resource File. We also used the North Carolina Central Cancer Registry to verify the number of breast cancer surgeries reported in the North Carolina Medical Database Commission database.

We used the North Carolina Medical Database Commission database as the main source of data for the study. The North Carolina Medical Database Commission was created by state legislative mandate in 1985 for the purpose of collecting data on the use, price, and quality of health care services provided in the state. The database includes inpatient admissions from all 157 acute care hospitals in the state from 1988 to 1993; this consists of approximately 850,000 individual patient discharge records per year. The database contains information on patient age, gender, diagnoses, procedures and services provided, charges, payer, and provider information. Although the database was designed originally to analyze billing information, it has been used successfully to address clinical research questions.[17-19] From the database, we identified the study population, their characteristics, and the type of breast cancer surgery performed. Because the database includes all inpatient admissions, patients with both primary and recurrent breast cancer are included in the study population.

One of the authors (R. R.) previously had matched patient data from the North Carolina Medical Database Commission with the other three data sets to provide information on hospital characteristics, surgeon characteristics, and patients' county of residence. Thus, we used the American Hospital Association database to obtain information on the hospitals, such as bed size, medical school affiliation, and residency program affiliation; the North Carolina Board of Medical Examiner's database to obtain information on the surgeons, such as age, gender, and year of graduation from medical school; and the Area Resource File to obtain information on the patients' county of residence.

To select the study population, we used the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) diagnostic codes listed in Table 1. We included all invasive female breast neoplasm diagnostic codes, including neoplasms of the connective tissue and soft parts of the breast and Paget's disease of the breast and nipple. The largest number of breast can-

Table 1. INTERNATIONAL CLASSIFICATION OF DISEASES (9th REVISION, CLINICAL MODIFICATION [ICD-9-CM]) DIAGNOSTIC CODES AND NUMBER OF CASES WITH EACH CODE

Malignant Neoplasm of Female Breast	ICD-9-CM Codes	No.*
Nipple and areola	174.0	802
Central portion	174.1	860
Upper-inner quadrant	174.2	1085
Lower-inner quadrant	174.3	536
Upper-outer quadrant	174.4	4588
Lower-outer quadrant	174.5	784
Axillary tail	174.6	200
Other specified sites of female breast	174.8	5478
Breast (female), unspecified	174.9	6631

* Number of cases do not add to total because cases may have multiple diagnostic codes.

cers localized to a specific site in the breast were those located in the upper, outer quadrant. We excluded neoplasms of the skin of the breast. We also excluded diagnostic code 233.0, which is carcinoma *in situ* of the breast, including both ductal and lobular carcinoma *in situ* but excluding Paget's disease.

To determine the type of breast cancer surgery performed, we used the ICD-9-CM procedure codes listed in Table 2. Codes for BCS included 85.20 through 85.23, and codes for mastectomy included 85.41 through 85.48. The numbers shown in the table do not add to the total number of cases because an individual could have more than one code. For example, the number of mastectomy codes was 1.2% greater than the total number of cases. The number of BCS codes was 58% greater than the total number of cases because women may have had a local breast excision before mastectomy. For this study, we selected mastectomy as the definitive procedure regardless of previous biopsies. The most frequent mastectomy procedure performed was code 85.43 (modified radical mastectomy).

The North Carolina Medical Database Commission database includes only inpatient admissions; thus, women who had breast cancer surgery on an outpatient basis were not included. Outpatient breast cancer surgery presumably is more likely to be BCS than mastectomy. Therefore, the reported rates of BCS from the North Carolina Medical Database Commission probably are underestimated. To determine the extent of this under-reporting, we examined data from the North Carolina Central Cancer Registry, which includes data on all cancers diagnosed in the state from 1990 to 1993. We compared the number of invasive cancers of the breast reported in the Central Cancer Registry with those reported in the Medical Database Commission database. The North Carolina Central Cancer Registry does not include information on the type of breast cancer surgery performed, and nonoperated cases also are included.

To determine patient, hospital, and surgeon factors associated with BCS, we constructed a multiple logistic regression model. The dichotomous dependent variable was BCS (yes *versus* no), and the independent variables were patient age, patient residence, patient insurance status, hospital bed size, and year of surgeon graduation from medical school. The analysis generated odds ratios and associated 95% confidence intervals in an attempt to identify factors associated with BCS.

Patient age was coded as two dummy variables. One dummy variable included patients younger than 50 years of age, and the other included patients 50 to 69 years of age. The comparison group was made up of patients 70 years of age and older. Patient residence was categorized as urban *versus* rural. Rural residence was defined in the Area Resource File as a county in which 60% or more of the population lives outside of the metropolitan area of the county. Patient insurance status was categorized as private insurance *versus* Medicaid, Medicare, and self-pay combined. The private insurance group included women with Blue Cross–Blue Shield, State Employees Health Plan, other commercial insurance, and participa-

Table 2. INTERNATIONAL CLASSIFICATION OF DISEASES (9th REVISION, CLINICAL MODIFICATION [ICD-9-CM]) PROCEDURE CODES AND NUMBER OF CASES WITH EACH CODE

	ICD-9-CM Codes	No.*
Breast-Conserving Surgery		
Excision or destruction of breast tissue, not otherwise specified	85.20	28
Local excision of lesion of breast including lumpectomy (excludes biopsy of breast)	85.21	2048
Resection of quadrant of breast	85.22	402
Subtotal mastectomy	85.23	870
Mastectomy		
Unilateral simple mastectomy	85.41	1202
Bilateral simple mastectomy	85.42	67
Unilateral extended simple mastectomy	85.43	16914
Bilateral extended simple mastectomy	85.44	203
Unilateral radical mastectomy	85.45	426
Bilateral radical mastectomy	85.46	20
Unilateral extended radical mastectomy	85.47	33
Bilateral extended radical mastectomy	85.48	6

* Number of cases do not add to total because cases may have multiple procedure codes.

tion in health maintenance organizations and other managed care plans.

Hospital bed size was coded as two dummy variables. One dummy variable included all hospitals with 401 or more beds, and the other dummy variable included all hospitals with 101 to 400 beds. The comparison group included hospitals with fewer than 100 beds. We did not use medical school affiliation or residency program affiliation in the model because both variables were correlated highly with hospital bed size. In fact, all 4 of the hospitals in North Carolina with medical school affiliations were in the 401+ bed size category, and most of the hospitals with residency program affiliations were in the 401+ bed size category.

Year of surgeon graduation from medical school was coded as two dummy variables. One dummy variable included all surgeons who graduated from medical school from 1981 to the present, and the other included those who graduated from 1961 to 1980. The comparison group included those who graduated in 1960 and before. We considered using surgeon age in the model, but age was correlated highly with year of graduation from medical school. Univariate analysis indicated that year of graduation from medical school was a better predictor of BCS than was surgeon age; therefore, we used year of graduation rather than surgeon age in the logistic regression model. We also considered using surgeon gender in the model, but the univariate analysis showed that surgeon gender was not significantly associated with BCS. Only 339 breast cancer surgeries over the 6-year study period were performed by female surgeons, and their rate of BCS was 10.3% compared with 15,740 breast cancer surgeries performed by male surgeons with a rate of 9.8% BCS. In approximately one fourth of all cases, missing information was a problem for the surgeon characteristic variables.

RESULTS

Data on inpatient admissions from the North Carolina Medical Database Commission indicate that the rate of BCS doubled from 7.3% in 1988 to 14.3% in 1993, with an overall rate of 10.2% (2117/20,760). Figure 1 shows a steady rise in the rate of BCS, with a fairly constant rate of inpatient breast cancer surgery in the state, except for an approximate 8% increase in the years 1990 and 1991. The gap between the number of inpatient breast cancer surgeries in the North Carolina Medical Database Commission and the number of breast cancers identified by the North Carolina Central Cancer Registry widened from 1990 to 1993. The increase may have been because of an increasing number of breast cancer surgeries done on an outpatient basis. If all of these outpatient surgeries are assumed to be BCS, then the actual rate of BCS is increasingly underestimated from 1990 to 1993 in the North Carolina Medical Database Commission database on inpatient admissions. There also is a certain proportion of stage III and IV disease that does not receive definitive breast cancer surgery. Therefore, the actual rate of BCS in North Carolina in 1993 is between 14.3% and 28.2%.

The multiple logistic regression model identified patient, hospital, and surgeon factors associated with BCS (Table 3). Controlling for all other factors in the model, the patient factors associated with BCS included younger age and private health insurance. Women younger than 50 years of age were 1.7 times more likely to have BCS than those 70 years of age and older. Women 50 to 69 years of age were 1.2 times more likely to have BCS than those 70 years of age and older. Women who had private health insurance were 1.2 times more likely to have BCS than those who had Medicare, Medicaid, or who were self-pay. Women who lived in urban *versus* rural areas were not significantly more likely to have BCS when adjusted for other factors in the model.

In addition to patient factors, hospital size was associated with BCS. Controlling for all other factors in the model, women who were treated in hospitals with 401 or more beds (this includes all 4 medical schools in the state) were 2.0 times more likely to have BCS than those treated in hospitals with fewer than 100 beds. Also, women who were treated in hospitals with 101 to 400 beds were 1.7 times more likely to have BCS than those treated in hospitals with fewer than 100 beds.

Finally, the logistic regression model showed that the year of graduation from medical school was associated with BCS when adjusted for other factors in the model. Women whose surgeons graduated since 1981 were 1.6 times more likely to have BCS than those whose surgeons graduated before 1961.

DISCUSSION

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 shown the uneven adoption of such breast conserving surgery.[2-5] Foster et al.[6] published an overall BCS rate of 43% for the state of Vermont in 1989 to 1990 compared with 8.6% in the period from 1975 to 1984. The 1991 National Survey by the Commission on Cancer of the American College of Surgeons reported an overall rate of BCS of 25.4% in 1990 for 24,356 women.[20] A large study by Farrow et al.,[2] analyzing Surveillance, Epidemiology, and End Results program of the National Cancer Institute data, found that the rate of BCS in 1985 to 1986 varied from 19.6% in Iowa to 41.5% in Seattle. A Medicare study of 36,982 women in 1986 showed that

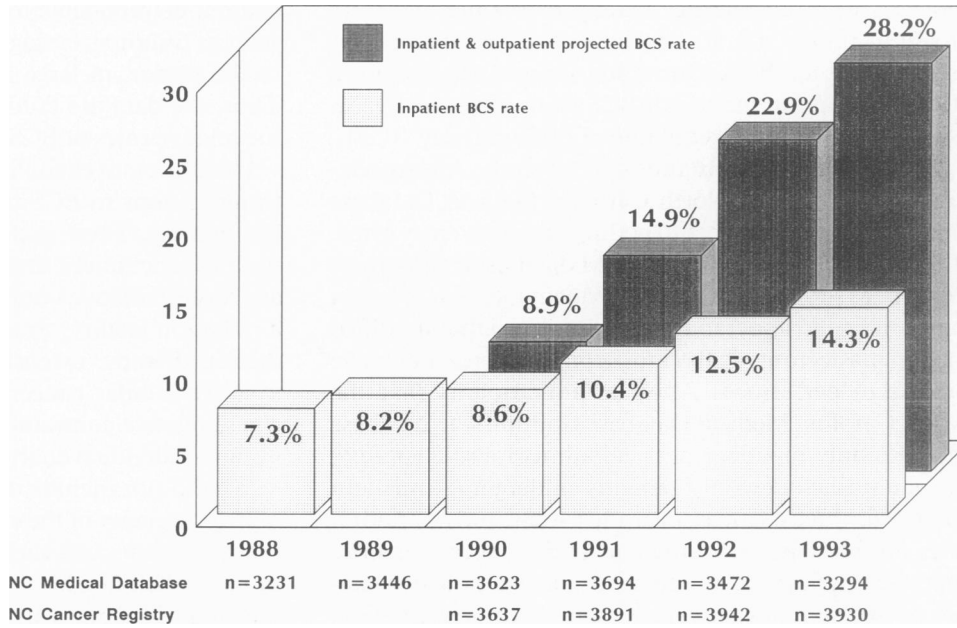

Figure 1. The North Carolina Medical Database Commission database includes all inpatient breast cancer surgeries in the state. The North Carolina Central Cancer Registry includes all newly identified breast cancer cases in the state, including all inpatient and outpatient procedures, as well as nonoperated cases.

12.1% had BCS with a wide variation in different areas of the country.[3]

The widespread use of screening mammography in the United States has led to an increase in the detection of early breast cancer. This has been shown by Cady et al.,[21] who documented that the maximum diameter of the tu-

Table 3. ADJUSTED* ODDS OF HAVING BREAST-CONSERVING SURGERY (BCS) FOR VARIOUS PATIENT, HOSPITAL, AND SURGEON FACTORS: MULTIPLE LOGISTIC REGRESSION MODEL

Factors Associated with BCS	No.†	% BCS	Odds Ratios	95% Confidence Interval
Patient factors				
Age (yrs):				
70+	6388	7.3	1.0	
50–69	9377	10.1	1.2‡	1.1, 1.4
<50	4991	14.2	1.7‡	1.4, 2.1
Insurance:				
Medicaid/Medicare/self-pay	10758	8.1	1.0	
Private				
Residence:	10002	12.4	1.2‡	1.0, 1.4
Rural	9401	9.5	1.0	
Urban	11359	10.8	1.0	0.9, 1.1
Hospital factors				
≤ 100 beds	1525	4.9	1.0	
101–400 beds	11666	9.6	1.7‡	1.3, 2.1
401 + beds	6311	13.2	2.0‡	1.6, 2.5
Surgeon factors				
Graduated from medical school				
1960 and before	949	6.6	1.0	
1961–80	10006	9.3	1.2	0.9, 1.5
1981 and after	4820	11.7	1.6‡	1.2, 2.0

* Adjusted for all other variables in table.
† Numbers may not add to total due to missing values.
‡ Indicates statistical significance at $p \leq 0.05$.

mor has been decreasing steadily over time. This decrease in tumor size at detection should lead to an increased role for BCS. Our study found that, despite a steady increase in the use of BCS from 1988 to 1993 in North Carolina, the overall rate of BCS was only 10.2%.

There are several limitations of our study. All large databases, such as the North Carolina Medical Database Commission, are subject to coding and data entry error. It is reassuring that the ICD-9-CM diagnostic and procedure codes show that the most frequent location of breast cancer is in the upper, outer quadrant and that modified radical mastectomy is the most common breast ablative procedure performed. Another limitation is that the North Carolina Medical Database Commission database includes only inpatient hospital admissions. Therefore, our study includes only patients undergoing inpatient surgery for breast cancer over the 6-year study period. It does not include any outpatient breast cancer surgeries that were performed at either hospital outpatient facilities or free-standing surgery centers. Because outpatient procedures were not included, our reported rate of BCS probably is underestimated. Given these limitations, we were still able to identify trends and global factors.

Because of the lack of outpatient data, we compared the inpatient data from the North Carolina Medical Database Commission with that of the North Carolina Central Cancer Registry data on invasive breast cancer from 1990 to 1993. This registry contains data on all new breast cancers diagnosed in the state, and as can be seen in Figure 1, there is an increasing difference from 1990 to 1993 between the two databases. The Central Cancer Registry includes all stages of breast cancer, and, therefore, a certain proportion of patients with stage III and IV disease does not receive definitive breast surgery. Because the type of surgery for breast cancer treatment is not available in the Registry, we could not exclude those who did not receive breast surgery. Therefore, the actual rate of statewide BCS for both inpatient and outpatient procedures lies between the two ranges of the two databases. Nevertheless, the projected BCS rate of 28% for North Carolina still is below Foster's[6] rate of 43% and the National Cancer Database rate of 38%.[5]

The number of new breast cancer cases in the Central Cancer Registry increased by 254 from 1990 to 1991, reached a plateau in 1992, and actually decreased in 1993. This phenomenon may be because of the widespread use of mammography during the early 1990s that identified a large number of new early breast cancers. As suggested by Cady et al.,[21] this increased incidence of breast cancer during these years may be artifactual.

Another limitation of the study is that it includes all women who were treated for breast cancer, rather than just those who were clinically eligible for BCS. However, all of the studies cited above present crude BCS rates because it is impossible to identify BCS eligibility criteria, such as tumor size, staging, or other pathologic features of the tumor, in large national or statewide databases. Thus, the data are crude and give an overall picture of the relative rates of BCS *versus* mastectomy.

In addition to eligibility criteria, there are definite contraindications to BCS that large studies such as this do not address. These include previous radiation therapy, multicentric cancer, and collagen vascular disease. There are several relative contraindications such as the lack of a radiation facility, strong patient preference against radiation therapy, extensive intraductal component, and invasive lobular cancer, especially in a young patient. These relative contraindications are difficult to identify, even in individual chart reviews.

We did not include ductal carcinoma *in situ* because of heterogeneity of the entity, difficulties with pathologic interpretation, and varied mastectomy rates.[22] In addition, the ICD-9-CM code does not distinguish between ductal and lobular cancer *in situ*. If noninvasive breast cancer were included, the annual incidence of BCS undoubtedly would increase, but many of these patients would be treated at outpatient facilities and would not be included in the data source for this study.

The seminal feature of the study was to identify factors associated with the use of BCS. We identified that older patients, those without private insurance, and those women treated at small hospitals were associated with low rates of BCS. These findings are consistent with those of other studies in the literature.[5,7–10,23] Breast cancer surgery may not be offered as readily to elderly women compared with younger women because cosmesis may be thought to be less of a concern to elderly women.[24] Breast cancer surgery may not be offered as readily to women without private insurance because of the added cost of radiation therapy that is often borne by the patient. Also, BCS may be offered less often in small hospitals that are not affiliated with medical centers, where they may not have access to tumor board conferences or randomized clinical trials that promote BCS[25] or access to a radiation oncology facility. Unfortunately, the data sources used in this study did not allow us to assess access to a radiation oncology facility. North Carolina has a limited number of such facilities, which may have had an impact on the rate of BCS.

The data sources used in this study also did not include information on income or race. Other studies have showed higher rates of BCS in women with higher incomes than those with low incomes.[5,9,10] Other studies also have reported higher rates of BCS in white women than in nonwhite women.[7,11]

This study did not find that women residing in urban areas had higher rates of BCS compared to those women from rural counties. Other studies have indicated high

rates of BCS in urban counties.[3,5,7,9,10] The difference may be because of different classifications of urban *versus* rural in these studies compared to those of North Carolina. In addition, most of the large hospitals that are university affiliated and that have a higher rate of BCS are almost always located in urban locations. Therefore, the multivariate model, which included hospital size, may have obscured the effect of urban residence.

This study also found that year of surgeon graduation from medical school was related to BCS. In another study, we identified that the decision-making process for early-stage breast cancer is very much surgeon driven with a high degree of patient compliance.[12] In a study by Tarbox et al.,[16] surgeons reported that in T1 breast cancer, they present the choice to patients with a bias toward mastectomy because many of the surgeons believe that BCS and mastectomy do not have equivalent survival rates. Even surgeons who reportedly believed that each type of surgery has equal survival rates were found to unknowingly influence patients to choose modified radical mastectomy with a subtly biased presentation. These surgeon biases affect patient attitudes and practices. Wei et al.[26] surveyed 300 women and found that there was a prevailing fear of radiation therapy and cancer recurrence that led women to favor mastectomy over BCS. Tate et al.,[27] in a study in Kentucky, stated that the most frequent patient reasons for a mastectomy were the fear and inconvenience of radiation therapy and a perception that survival would be decreased if they did not have a mastectomy.

Given equivalent survival rates between BCS and mastectomy[1] and superior techniques of modern radiation therapy, it is paramount that we promote these facts to our peers to alter the prevailing surgical mind-set. Physician–patient communication is of critical importance when a breast cancer diagnosis is made because the emotionally overwhelmed patient must be educated about her disease and available treatments so she can be an informed participant in decisions about her care.[28] Specific surgeons' behaviors that may facilitate patient acceptance include expressing empathy, allowing sufficient time for patients to absorb the cancer diagnosis, providing information, and engaging the patient in treatment decision making.[12,28]

There is no doubt that BCS, when accompanied by radiation therapy, leads to increased cost to the health care system. It is uncertain what the role of managed care will have in influencing the decision-making process between BCS and mastectomy in patients eligible for BCS. However, with the increasingly small size of new breast cancers that are being detected by mammography, we should not abandon BCS or deny this procedure to women purely on the basis of cost.

Exciting new technology, such as outpatient sentinel lymphadenectomy that identifies women who may avoid axillary node dissection if the sentinel node is confirmed to be pathologically negative, makes BCS even more attractive.[29] This currently is being performed in the research setting, and if proved to be accurate in prognosticating axillary nodal status, sentinel lymphadenectomy will play an important role in the treatment of breast cancer.

In conclusion, surgery remains the primary treatment method for breast cancer. Surgery provides the clinical team with material for diagnosis, prognostication, and assistance in clinical decision making. The choice of the surgical procedure and its performance should be handled by surgeons knowledgeable and interested in the field to obtain the best possible functional and cosmetic results. Correct decision making requires a knowledgeable and committed patient and physician. The rate of BCS appears low in North Carolina compared with that of other published studies. In North Carolina, the women least likely to have BCS were older than 70 years of age, without private insurance, and treated at small hospitals by surgeons who graduated from medical school before 1961. If we are to increase the use of BCS in North Carolina and other regions of the country where rates are low, we should promote widespread education of surgeons, other health care professionals, policy makers, and the general public.

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Discussion

DR. KIRBY I. BLAND (Providence, Rhode Island): As we have seen in this presentation, the rate of breast conservation surgery in the State of North Carolina is quite low. Identified in this study were the findings that women who were least likely to have breast conservation measures were those over age 70, those without private insurance, and those treated at small hospitals by surgeons who graduated from medical school before 1961. As indicated, these findings are consistent with other studies and, as you would expect, older individuals are the least likely to have breast conservation surgery offered to them.

Dr. Kotwall's previous work has shown that the decision-making process for early breast cancer is very much driven by the surgeons in their discussion with management. For instance, compliance with breast conservation surgery is maximum when information is provided by the surgeon to the patient regarding recurrence, overall survival, cosmesis, and outcome; the patient who is informed is much more likely to accept the technique. So the implication that can be drawn from this study and others is that older surgeons have not modified their practice methods to encourage utilization of breast conservation surgery for eligible patients.

So my first question: Have the regional North Carolina surgeons been unwilling to accept outcome data for disease-free survival in breast conservation surgery? Or has there been a lack of familiarity with the techniques and the application of multimodal therapies for these patients, particularly by surgeons who graduated before 1961? Can you give us an estimate of the number of outpatient breast conservation procedures in University of North Carolina affiliated institutions? Further, are the number of breast conservation procedures increasing as a consequence of the influence of the managed-care environment?

The most recent report of the Commission on Cancer of the American College of Surgeons from the National Cancer Data Base in 1995 suggested there have been trends for Stage 0 (*in situ*) as well as Stage I disease; approximately 54% of these patients currently accept breast conservation procedures. As you would expect for Stage II disease, the recommendations for and the acceptance rate is less; approximately 32% of patients accept breast-conserving surgery with Stage II disease. So there clearly are trends to use it in that regard for earlier patients.

Further, the Commission has noted that there is greater utilization in breast conservation surgery in National Cancer Institute designated centers and teaching hospitals, 33% compared with community hospitals, which was 28%, a 5% differential.

With the pressures of managed care and the health maintenance organization environment to decrease inpatient hospital costs, one would expect these breast conservation procedures will have an increasing utilization in our environment, particularly with health-care shift to the outpatient setting. However, the necessity of irradiation to these patients for invasive Stage I and Stage II disease might offset this cost savings. Radiation therapy, for instance, in the New England area is approximately $8,000 to $14,000 cost per patient. And I suspect for the surgeons in this audience, it is very similar in your area, as well as throughout the United States and Canada.