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Predictors and outcomes of surgeons' referral of older breast cancer patients to medical oncologists

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Abstract

BACKGROUND—Older women are less likely than younger women to receive definitive care for a new diagnosis of breast cancer, but the reasons are not well understood. Although coordination of referral among specialists is an important component of quality of care, it has not been studied as a factor that contributes to observed age-related variations in breast cancer care.

METHODS—Treatment recommendations by 191 surgeons of 559 patients aged ≥65 years with Stage I to IIIa breast cancer provided patient-specific assessments of comorbidity and medical oncologist referral. Demographic, tumor, and treatment characteristics from medical records and telephone interviews were evaluated by statistical regression methods to identify factors associated with referral to a medical oncologist and to evaluate whether a referral resulted in discussion and prescription of tamoxifen.

RESULTS—Estrogen receptor protein negativity and higher tumor stage increased the likelihood of referral (odds ratio [OR] = 5.6, 95% confidence interval [CI] = 1.9-16.7, and OR = 4.2, 95% CI = 1.7-10.3, respectively), whereas a moderate to severely ill health status decreased the likelihood of referral (OR = 0.4, 95% CI = 0.2-0.9). Those referred were twice as likely to report having a discussion about tamoxifen (OR = 2.0, 95% CI = 1.06-3.7) and to have been prescribed tamoxifen (OR = 2.1, 95% CI = 0.99-4.3).

CONCLUSIONS—Referral to medical oncologists is associated with receipt of adjuvant tamoxifen therapy. The current study findings suggest that more consistent referral of older women to medical oncologists may enhance quality of discussion and participation in decisions concerning treatment options.

Keywords

breast cancer; physician referral; quality of care

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Effective treatment strategies for early stage breast cancer have been shown to enhance survival and quality of life.[1-4] A substantial literature has documented that older women are less likely to receive definitive care for a new diagnosis of breast cancer.[5-18] An additional body of literature has addressed factors that potentially underlie the observed age-dependent variations in breast cancer care. Previous investigations have evaluated the roles of patients' health status, [5][7][9][14-17] patients' and their families' preferences and support,[14][16][19][20] and aspects of patient-physician interactions[7][14][21][22] in explaining age-related treatment variations. When tumor characteristics are taken into account, comorbidity and functional status do not completely explain the tendency for older women to receive less than definitive treatment.[5][7][9][14-16]

Although coordination of referral among specialists is an important component of high quality care for breast cancer patients,[23] it has not been well studied as a factor contributing to the observed age-related variations in breast cancer care. Over a decade ago, Newcomb and Carbone documented that older women (aged ≥65 yrs) were less likely to receive consultation with medical or radiation oncologists than were their younger counterparts. Although older women were offered radiation and chemotherapy less often, there was no difference in offering hormonal therapy.[24] More recently in a single-site study, Bickell and colleagues documented a 16% underutilization of effective therapies in a sample of women with early stage disease cared for in a tertiary care referral hospital.[25] Key factors related to underuse were system failures and belief on the part of surgeons that adjuvant therapy was not indicated because its risks outweighed its benefits. In the latter instance, older age was the most common reason for omitting treatment (usually radiation therapy).[25] Studying only women ≥66 years of age diagnosed in 1995 and 1996 and identified in a Medicare dataset from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) reports, Keating et al. identified consultation with a medical oncologist as a key factor associated with receipt of definitive surgery.[26] In the current study, we extend Keating's observation to the setting of adjuvant tamoxifen therapy.

We studied a cohort of older women with newly diagnosed early stage breast cancer to identify factors associated with surgeons' referral to medical oncologists and to determine whether or not a referral to a medical oncologist increased the proportion who received appropriate care with respect to adjuvant tamoxifen therapy. Referral to a medical oncologist and discussion of systemic therapy treatment options are recognized as important process indicators of quality breast cancer care,[27] and tamoxifen was explicitly recommended for older women - both node positive and moderate to high risk node negative - by the 1992 St. Gallen Conference on Adjuvant Therapy of Primary Breast Cancer.[28]

METHODS

Study Population

We conducted a prospective cohort study of women ≥65 years of age diagnosed with early stage breast cancer. Our enrollment and data collection procedures have been described elsewhere.[29] Briefly, we identified women with a new diagnosis of early-stage breast cancer (Stage I and a tumor diameter of ≥1 cm, Stage II, or Stage IIIa) at hospitals in Rhode Island, North Carolina, Minnesota, and Los Angeles, California, between December 1, 1996 and September 30, 1999. With their physician's permission, we invited patients 65 years of age or older, with no previous breast cancer and no concurrent second primary tumor, to complete 3 telephone interviews and to allow review of their medical records. We excluded women who were 1) non-English speaking, 2) not competent for interview, 3) without satisfactory hearing, or 4) not enrolled within 5 months of the date of their breast cancer surgery.

Data Collection

Enrolled patients completed 35- to 50-minute telephone interviews at 3, 6, and 15 months after their definitive breast cancer surgery. From these interviews, we collected data on demographics, health status (comorbid conditions and physical and emotional function), primary and systemic adjuvant therapies, and treatment decisions. At least 3 months after surgery, medical record reviewers collected data from medical records on tumor characteristics, including TNM staging and hormone-receptor status, comorbidity, and treatments received.

The patients' surgeons were asked to complete a baseline questionnaire to provide information on their sociodemographic (age, gender, race, and marital status), professional (specialty and year of graduation from medical school), and practice characteristics (number of breast cancer patients cared for each year, size of primary hospital, and affiliation with a medical school). Key missing data were obtained from the American Medical Association Database.[30] In addition, each physician completed a patient-specific treatment recommendation form that provided an assessment of the patient's health at the time of presentation, rating of the importance of various factors that influenced the physician's decisions concerning prescription of tamoxifen, and whether or not the patient was referred to a medical oncologist. For the current study, all patients whose surgeons completed patient-specific recommendation forms and provided information on patient referral to medical oncologists were included.

Dependent Variables

1. Surgeon's Referral of the Patient to a Medical Oncologist: Women whose surgeons referred them to medical oncologists were compared with women whose surgeons did not refer them.
2. Physician Discussion of Adjuvant Tamoxifen: Women who reported by their 6-month interview that they had had a discussion about tamoxifen therapy with their physicians were compared with women who reported not having a discussion.
3. Prescription of Adjuvant Tamoxifen: Women who reported by their 6-month interview that they had been prescribed tamoxifen were compared with women who had not been so prescribed.

Independent Variables

Patient characteristics—We classified study site based on site of patient enrollment (Rhode Island, Minnesota, North Carolina, and Los Angeles, CA), and grouped patient age into 3 categories: 65-70 years, 70-79 years, and ≥80 years. Because of the small number of minority women participants, race/ethnicity was classified as White or non-White. Education was considered as less than a complete high school education, high school graduation, or more than a high school education. Surgeons' assessments of patients' health status were grouped as not ill, mildly ill, and moderate to severely ill. Our measure of physical function was the Physical Function Index, PFI-10, (scaled from 0-100, with higher scores reflecting better function) from the Medical Outcomes Study (MOS) 36-item short form (SF), known as the MOS SF-36.[31] Similarly, our measure of emotional function was the Mental Health Index, MHI-5, (scaled from 0-100), also from the MOS SF-36.[31]

Tumor characteristics—Tumors were staged according to the TNM classification[32] and grouped as Stage I or II/IIIa. Estrogen receptor protein (ERP) status was categorized as negative or positive/indeterminate.

Data Analysis

We compared the sociodemographic and cancer characteristics of patients who were referred to a medical oncologist with those who were not. We used Student's *t* test for comparison of continuous variables and Pearson chi-square test for comparison of categorical variables across two referral groups.

To evaluate factors associated with a surgeon's referral to a medical oncologist and to statistically account for clustering by physician, a multivariable logistic regression model was fitted using Generalized Estimating Equations (GEE) in SAS software.[33] We accounted for physician clustering because approximately half of our surgeons treated more than one patient who participated in our study. This model included enrollment site, age, health status, tumor stage, ERP status, definitive surgery type, and physical function as independent predictors to estimate the odds of a referral in the target group relative to the reference group. Enrollment site, age, health status, and tumor size were entered into the model as dummy variables (reference categories are shown in the tables). The respective odds ratios represent the odds of the surgeon referring a patient in the target category to a medical oncologist, relative to the reference category, adjusted for the other variables.

To evaluate whether or not a referral to a medical oncologist was associated with having a discussion with a physician (surgeon or medical oncologist) about adjuvant tamoxifen therapy and receiving a prescription, two separate logistic regression models were fitted with tamoxifen discussion and tamoxifen prescription as dependent variables. The sample was restricted to those with ERP-positive and ERP-indeterminate tumors, because tamoxifen is not indicated for ERP negative tumors.[2][3] The referral variable was the main independent variable of interest, controlling for age, health status, physical function, stage, and enrollment site. The respective odds ratios represent the odds of having a discussion or a prescription if the patient was referred relative to not referred.

RESULTS

We enrolled 865 women into the inception cohort. Analyses for this study were restricted to the 559 patients with a completed surgeon's treatment recommendation form (TRF) that included a known status of referral to a medical oncologist.

Of 559 patients, all had medical record review and 447 patients (79%) had completed baseline interviews at 3 months after definitive surgery. Physician baseline questionnaires were completed by 98% of the 191 participating surgeons. Demographic and professional characteristics of the participating surgeons are shown in Table 1. The majority were men, White, married, and general surgeons. About half cared for 20 or fewer breast cancer patients each year. Thirty-nine percent of surgeons had only 1 patient participating in the study, and nearly 90% of surgeons had ≤5 patients participating.

Approximately 75% of patients were referred by their surgeons to medical oncologists. Compared with those not referred, breast cancer patients who were referred were younger and healthier; had better physical function, higher tumor stage and ERP negative tumors; and had received a mastectomy and chemotherapy (Table 2). Patients' enrollment site, race, education, emotional health, and receipt of radiation therapy were not related to referral. In the multivariable regression model (Table 3), ERP negativity and high tumor stage were strongly associated with referral to a medical oncologist, after statistically adjusting for enrollment site, age, health status, physical function, tumor size, and type of definitive surgery (Odds Ratio (OR) = 5.6, 95% Confidence Interval (CI) = 1.9-16.7 for ERP-negative relative to ERP-positive or indeterminate tumors, and OR = 1.8, 95% CI = 1.1-3.0 for tumor Stage II/IIIa relative to tumor Stage I). Conversely, health status was negatively associated, with moderate to severely

ill patients being referred half as often as those not ill (OR = 0.4, 95% CI = 0.2-0.9 for moderately to severely ill compared with not ill).

Among those whose tumors were ERP-positive or indeterminate, there was a twofold increase in the likelihood of having a discussion of tamoxifen if the patient was referred (Table 4), after adjusting enrollment site, age, health status, stage, and physical function (OR = 2.0, 95% CI = 1.06-3.7). Similarly, those referred to a medical oncologist were twice as likely to receive a prescription for tamoxifen (OR = 2.1, 95% CI = 0.99-4.3).

DISCUSSION

In this cohort of older breast cancer patients, 79% were referred by their surgeons to medical oncologists. This proportion is slightly lower that the 88% reported for a younger cohort,[34] and very similar to the 80% targeted as a quality indication for women ≤65 years of age.[23] Adjusted for patient and treatment characteristics, ERP negativity and high tumor stage were the two factors most strongly associated with referral to a medical oncologist. These relations are not suprising, because these factors are indications for chemotherapy in older women.[2] [3] Conversely, poor health status, as evaluated by the surgeon, was associated with a decreased likelihood of referral.

Although the referral rate was high in this population, we observed consequences of nonreferral. Sugeons' referral of older women with ERP-positive or indeterminate tumors to medical oncologists increased the likelihood of both discussion and receipt of adjuvant tamoxifen therapy, even when taking age, health status, physical function, and stage into account. In an earlier study, we identified the number of times treatment options were discussed as a factor associated with the receipt of guideline primary tumor therapy.[35] Confronted with the news of potentially life-threatening illness followed by the need of a series of complicated decisions about treatment, many breast cancer patients opt out of deciding among treatment options, and some opt out of conventional medical care entirely.[36]

Hearing about options through the lenses of different oncologic specialists, complete with reinforcing and contrasting observations and communication styles, is likely to enhance patients' understanding and promote their ability to engage in making informed decisions. Although most breast cancer patients desire a collaborative role in making treatment decisions, [26][37][38] fewer than half achieve their desired role.[26][39][40] Patients who achieve their desired role are more likely to 1) adhere to prescribed treatments,[41][42] 2) receive definitive breast cancer therapy,[43] 3) be satisfied with their care,[43][44] and 4) have superior health outcomes.[41][42]

In addition to having an important role to play in deciding treatment, medical oncologists' ongoing involvement in care has the potential of maximizing adherence to therapy and ensuring regular monitoring for adverse effects.[45] Older women are also at risk for receiving less than guideline surveillance for recurrent or second primary tumors.[46] Regular visits to medical oncologists may promote more optimal surveillance for tumor recurrence, particularly during the first 5 years of follow-up - when tamoxifen is indicated and when the risk of recurrence is highest.[3][47]

Although our findings are provocative and complement those of Keating and colleagues,[26] they must be considered in light of our study's two most important limitations. First, physician characteristics related to referral could not be examined directly because it was impossible to classify surgeons into mutually exclusive groups of referred or nonreferred status. This is due to the fact that the majority of participating surgeons had multiple patients participating in our study. To address this issue, we evaluated surgeon characteristics at the patient-specific level by fitting multivariate regression models with referral as a dependent variable, clustering on

number of patients participating in this study. These models included as adjustment covariates patient's age, health status, physical function, tumor size, ERP negativity, lymph node positivity, and type of definitive surgery. Surgeons were more likely to refer if they were general surgeons, not affiliated with medical schools, saw < 10 breast cancer patients annually, and practiced in hospitals with < 200 beds. Surgeons' gender, race, and marital status were not associated with referral.

The second important limitation arises because we restricted the cohort for the current study to those patients whose surgeons completed patient-specific treatment recommendation forms with information on whether or not the patient had been referred to a medical oncologist. Exclusion from analyses of those with missing data on referral might have biased the results if absence of information is related to referral. When we compared those included versus those excluded based on absence of referral status, we found no significant differences in the proportions of those receiving tamoxifen discussion or recommendation.

In light of age-dependent variations in care and growing evidence that these variations are associated with variations in outcomes - namely, that those receiving less than standard therapy suffer from increased rates of recurrence and mortality,[48-50] our findings suggest that more consistent referral of older women to medical oncologists may enhance the quality of discussions and decisions concerning treatment options - both primary tumor therapy and adjuvant therapy.

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Table 1

Characteristics of 191 Participating Surgeons

Characteristic	***n*(%)**
Gender	
Male	157(85)
Female	27(15)
Race	
White	147(90)
African American	2(1)
Other (Asian, Hispanic)	14(9)
Martial Status	
Married	150 (93)
Other	34 (7)
Specialty	
General surgery	158 (87)
Surgical oncology	21 (11)
Other (vascular surgery, gynecology)	3 (2)
Affiliated with medical school	55 (34)
Annual number breast cancer patients seen	
≤ 10	32 (21)
11-20	44 (28)
21-50	58 (37)
< 50	22 (14)
Number of patients in study	
1	74 (39)
2-5	92 (48)
6-15	25 (13)

Table 2

Patient and Tumor Characteristics Associated with Surgeon Referral to Medical Oncologists

	Referred to oncologist (79%) *n* 439 *n* (%)	=	**Not referred to oncologist (21%) *n* 120 *n* (%)**	=	**Test of homogeneity *P* value**
Enrollment site					
Rhode Island	162 (37)		52 (43)		
North Carolina	117 (27)		20 (17)		
Minnesota	114 (26)		31 (26)		
Los Angeles, CA	46 (10)		17 (14)		0.11
Age in yrs					
65-69	119 (27)		13 (11)		
70-79	234 (53)		65 (54)		
≥ 80	86 (20)		42 (35)		<0.0001
Race					
White	327 (93)		89 (95)		
Non-White	26 (7)		5 (5)		0.84
Education					
< 12 yrs	73 (21)		20 (21)		
12 yrs	127 (36)		39 (42)		
≥ 13 yrs	153 (43)		34 (37)		0.46
Health status					
Not ill	322 (77)		72 (65)		
Mildly ill	64 (15)		18 (16)		
Moderately to severely ill	31 (8)		20 (18)		0.002
Physical function: mean and standard deviation	79.9, SD: 24.5		69.0 (31.3)		0.002
Mental health function: mean and standard deviation	80.4, SD: 18.6		77.4 (18.1)		0.18
Stage					
I	196 (45)		74 (62)		
II/IIIa	242 (55)		46 (38)		0.001
Estrogen receptor protein					
Positive or indeterminate	358 (83)		112 (96)		
negative	74 (17)		5 (4)		0.0004
Definitive surgery					
Mastectomy	237 (55)		48 (41)		
Breast conserving surgery	194 (45)		70 (59)		0.006
Therapy					
Received radiation therapy	177 (51)		39 (42)		0.13
Received chemotherapy	80 (23)		0 (0)		<0.0001
Tamoxifen discussion	289 (82)		67 (71)		0.02
Tamoxifen prescription	278 (79)		68 (72)		0.18

Table 3

Patient and Tumor Characteristics Associated with Surgeon Referral to Medical Oncologists

Characteristics	OR (95% CI)
Age in yrs	
65-69	Reference
70-79	0.8 (0.4-1.4)
≥80	0.6 (0.3-1.4)
Health status	
Not ill	Reference
Mildly ill	0.7 (0.4-1.4)
Moderately to severely ill	0.4 (0.2-0.9)
Physical function	1.01 (1.0-1.02)
Stage	
I	Reference
II/IIIa	1.8 (1.1-3.0)
ERP	
Positive/indeterminate	Reference
Negative	5.6 (1.9-17)
Surgery	
BCS	Reference
Mastectomy	1.2 (0.7-1.9)

OR: odds ratio; CI: confidence interval; ERP: estrogen receptor protein; BCS: breast conserving surgery.

Table 4

Association between Surgeon Referral to Medical Oncologist and Report of Tamoxifen Discussion or Receipt of Tamoxifen Prescription, adjusted for Enrollment Site

Characteristic	OR[a] (95% CI)	OR[b] (95% CI)
Referral		
Not referred	Reference	Reference
Referred	2.0 (1.1-3.7)	2.1 (0.99-4.3)
Age in yrs		
65-69	Reference	Reference
70-79	0.7 (0.3-1.6)	1.6 (0.8-3.3)
≥80	0.6 (0.2-1.7)	1.1 (0.5-2.6)
Health status		
Not ill	Reference	Reference
Mildly ill	0.7 (0.3-1.7)	1.1 (0.5-2.8)
Moderately to severely ill	1.0 (0.3-3.4)	1.5 (0.5-4.5)
Physical function	1.0 (0.99-1.01)	1.0 (0.99-1.01)
Stage		
I	Reference	Reference
II/IIIa	1.3 (0.8-2.2)	1.6 (0.9-3.0)

OR: odds ratio; CI: confidence interval.

[a] Report of tamoxifen discussion (OR).

[b] Receipt of tamoxifen prescription