VOLUME 30 · NUMBER 21 · JULY 20 2012

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

# Patient and Physician Decision Styles and Breast Cancer Chemotherapy Use in Older Women: Cancer and Leukemia Group B Protocol 369901

*Jeanne S. Mandelblatt, Leigh Anne Faul, George Luta, Solomon B. Makgoeng, Claudine Isaacs, Kathryn Taylor, Vanessa B. Sheppard, Michelle Tallarico, William T. Barry, and Harvey J. Cohen*

Jeanne S. Mandelblatt, Leigh Anne Faul, George Luta, Solomon B. Makgoeng, Claudine Isaacs, Kathryn Taylor, Vanessa B. Sheppard, and Michelle Tallarico, Georgetown University School of Medicine and Lombardi Comprehensive Cancer Center, Washington, DC; and William T. Barry and Harvey J. Cohen, Duke University Medical Center, Durham, NC.

Submitted October 26, 2011; accepted March 27, 2012; published online ahead of print at www.jco.org on May 21, 2012.

Written on Behalf of the Cancer and Leukemia Group B.

Supported by Grants No. CA77597 (C.I.), CA33601 (W.T.B.), and CA47577 (H.J.C.). The research for Cancer and Leukemia Group B (CALGB) 369901 was supported, in part, by grants from the National Cancer Institute, including U10 CA 84131 (J.S.M.), RO1 CA127617 (J.S.M.), KO5 CA096940 (J.S.M.); RO3 CA138077 (L.A.F.), U01 CA31946 to CALGB, and UO1 CA33601 to the CALGB Statistical Center, and American Cancer Society Grant No. MRSGT-06-132-01-CPPB (V.B.S.). Also supported by the Clinical and Molecular Epidemiology and Biostatistics and Bioinformatics Shared Resources at Lombardi Comprehensive Cancer Center under National Cancer Institute Grant No. P30CA51008, and by a grant from Amgen Pharmaceuticals to the CALGB Foundation to support patient accrual.

Authors' disclosures of potential conflicts of interest and author contributions are found at the end of this article.

Corresponding author: Jeanne Mandelblatt, MD, MPH, Lombardi Comprehensive Cancer Center, 3300 Whitehaven Blvd, Suite 4100, Washington, DC 20007; e-mail: mandelbj@georgetown.edu.



0732-183X/12/3021-2609/$20.00

DOI: 10.1200/JCO.2011.40.2909

## ABSTRACT

### Purpose
Physician and patient decision styles may influence breast cancer care for patients ≥ 65 years ("older") because there is uncertainty about chemotherapy benefits in this group. We evaluate associations between decision-making styles and actual treatment.

### Methods
Data were collected from women treated outside of clinical trials for newly diagnosed stage I to III breast cancer (83% response) from January 2004 through April 2011 in 75 cooperative group sites. Physicians completed a one-time mailed survey (91% response), and clinical data were abstracted from charts. Patient decision style was measured on a five-point scale. Oncologists' preference for prescribing chemotherapy was based on standardized vignettes. Regression and multiple imputation were used to assess associations between chemotherapy and other variables.

### Results
There were 1,174 women seen by 212 oncologists; 43% of women received chemotherapy. One-third of women preferred to make their own treatment decision. Patient and physician decision styles were independently associated with chemotherapy. Women who preferred less physician input had lower odds of chemotherapy than women who preferred more input (odds ratio [OR] = 0.79 per 1-point change; 95% CI, 0.65 to 0.97; $P = .02$) after considering covariates. Patients whose oncologists had a high chemotherapy preference had higher odds of receiving chemotherapy (OR = 2.65; 95% CI, 1.80 to 3.89; $P < .001$) than those who saw oncologists with a low preference.

### Conclusion
Physicians' and older patients' decision styles are each associated with breast cancer chemotherapy use. It will be important to re-evaluate the impact of decision styles when there is greater empirical evidence about the benefits and risks of chemotherapy in older patients.

*J Clin Oncol 30:2609-2614. © 2012 by American Society of Clinical Oncology*

## INTRODUCTION

Nearly 50% of the new cases and almost two thirds of the deaths from breast cancer occur in women ≥ 65 years of age.[1] There are marked variations in use of adjuvant chemotherapy among these women.[2-4] The reasons for this heterogeneity are multifaceted, including a paucity of trial data from this age group, high rates of coexistent illnesses, limitations in support for concrete needs during therapy, and risks for toxicity.[5-9] In our prior research, we found that 45% of older women were willing to undergo chemotherapy to gain ≤ 12 months in survival.[10] Women who rated provider communication more highly were also more likely to have chemotherapy when clinical indications were equivocal. These results suggest that in settings where decision making is complex and outcomes uncertain, factors such as patient and physician decision-making styles may be important in treatment choices.[10-14]

Most prior research on patient decision-making styles has focused on younger cancer populations.[15-19] In the limited research with older women, older age has been associated with a preference for allowing the doctor to make decisions.[20-26] However, in this time of increasing consumer orientation, it is possible that current cohorts of older women may prefer to be more actively involved in decision making. There are also little data on how physicians influence treatment patterns among older women,[27,28] but differences in their decision style, or preferences, could also affect chemotherapy use.[27,29-31]

In this study, we use cross-sectional data from a large cohort of newly diagnosed older patients with breast cancer and their oncologists to examine associations between patient and oncologist decision-making styles and chemotherapy use. The results are intended to inform interventions to enhance decision making for older patients with breast cancer.

## METHODS

This observational study was conducted at 75 hospitals/practices affiliated with the Cancer and Leukemia Group B (CALGB) cooperative group (Appendix, online only). The protocol met Health Insurance Portability and Accountability Act standards and was approved by CALGB and the institutional review boards at all sites. The original study[10] used an expected utility framework to assess how utilities for chemotherapy and communication affected treatment among women treated outside of clinical trials. In this article we use data on patient and physician decision styles to extend these results.

### Population

Women were registered to the study between January 1, 2004, and April 1, 2011; an earlier report[10] included women accrued through April 2010. Eligible participants were 65 years of age or older, newly diagnosed with invasive nonmetastatic breast cancer (tumors $\geq$ 1 cm), spoke English or Spanish, had sufficient cognitive function to complete interviews, and were within 20 weeks of their last definitive surgery; none were treated on clinical trials. A few exceptions were made to include women who were just over 20 weeks since their last procedure. Methods for the study have been described elsewhere.[10] Briefly, clinical research associates ascertained patients, confirmed eligibility, and, on physician approval, obtained patient consent for study registration. Patient registration was managed by the CALGB Statistical Center.

Among registered patients (n = 1,704), 6% (n = 98) were ineligible because of cognitive impairment[32,33] or other clinical characteristics (Fig 1). Among the remaining 1,606 eligible women, 83% (n = 1,329) completed baseline interviews. For this study we restrict analyses to women seen by a medical oncologist (94% of the sample); this resulted in the exclusion of 84 participants. We also excluded 71 women whose oncologists did not provide data, leaving 1,174 women. The 155 patients who were excluded did not differ from the group included in analyses on important covariates such as age and education, although the excluded group tended to have lower chemotherapy receipt compared with those included (25% *v* 43%, $P \leq .001$).

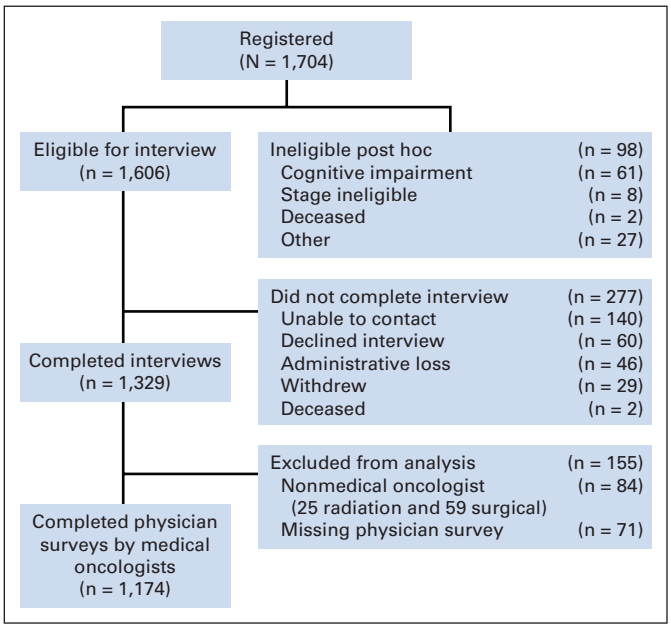


**Fig 1.** Sampling frame for older women with newly diagnosed breast cancer. A total of 1,174 women were included in the final data set for analysis. "Other" reasons for ineligibility included a previous cancer diagnosis, recurrent or metastatic breast cancer, development of another concurrent primary cancer, or being beyond 20 weeks of last definitive surgery (without an exception).

### Data Collection

Patient telephone interviews (averaging 45 minutes) were completed by centralized staff within an average of 4 weeks from registration. Ten percent of interviews were observed for quality assurance by the centralized project manager. Oncologists treating study participants (n = 305) were mailed a brief one-time survey of their background and practice styles at the time of enrollment of their first patient onto the study. If physicians did not respond, a second survey was mailed or faxed or they were contacted by telephone or in person. Physician survey completion rate was 91%; physician consent was implied by completion of the survey. From this group, 13 did not complete the hypothetical case scenarios portion of the survey and were excluded. Of the remaining 264, 52 did not have patients who were included in the final sample (eg, the registered patient refused interview or did not pass the cognitive screen), leaving 212 oncologists in the analysis. Medical records were abstracted by clinical research associates for information regarding tumor characteristics and treatment history.

### Measures

Actual chemotherapy receipt (yes/no) was our outcome, including use of neoadjuvant treatment. Use of chemotherapy was determined from the records. The two primary predictors of interest for this analysis were the patient decision-making style and the oncologist's preference to use chemotherapy. Patient decision-making style was measured using one item developed by Llewellyn-Thomas et al[34] with five responses ranging from "The doctor should make all the decisions using all that's known about the treatments," to "The doctor and I should make the decisions together on an equal basis," to "I should make all the decisions using all I know or learn about the treatments."

Oncologists' preference to prescribe chemotherapy to older women was based on responses to hypothetical case scenarios. The scenarios were drafted by clinicians to represent situations in which adjuvant chemotherapy might be considered according to professional guidelines,[35] but there was no one right answer. The concept underlying the scenarios was that in so-called toss-up situations, oncologists with strong leanings in either direction would choose the treatment most consistent with their individual decision style.[27]

The four scenarios depicted older women with nonmetastatic breast cancer and selected clinical characteristics (eg, estrogen receptor and node status), followed by questions about the treatment the physician would select for each woman (Data Supplement). Based on the distribution of responses, we defined a high preference for chemotherapy as a choice of chemotherapy in three or four of the scenarios; a low preference was defined as selecting chemotherapy in none, one, or two of the scenarios. Results were similar if we used the scores as an ordinal scale but we retained the categorical variable for ease of interpretation.

We considered several covariates that might affect the relationships between decision styles and chemotherapy, including communication, attitudes, and clinical and demographic factors. Patient–physician communication was measured using a seven-item scale developed by Makoul et al.[36] The scale includes statements such as "The doctor fully explained the risks of the treatment recommended" (Cronbach's $\alpha$ = .7 in our sample). Higher scores indicate more positive perceived patient–physician communication.

To evaluate patients' attitudes toward chemotherapy, a 4-point Likert-scaled response to the following two statements was used: "The adverse effects are worse than the disease" and "You are less likely to have the cancer come back if you have chemotherapy."

Pathologic tumor size was considered in three categories: less than 2 cm, 2 to less than 3 cm, and $\geq$ 3 cm.[10] Nodal status was defined as positive versus negative. Estrogen receptor results were reported as positive versus negative on the basis of institutional standards. We used the Physical Component Summary of the Medical Outcomes Study Short Form–12 to represent health status.[37] Finally, we included the demographic characteristics of the patient (age,

  

race, marital status, and education level) and oncologist (sex and time since graduation). Factors related to setting of care were also included as covariates, such as health maintenance organization (HMO; yes/no), National Cancer Institute–designated comprehensive cancer center status (yes/no), and region.

### Statistical Analysis

We evaluated the associations between chemotherapy use and study variables using *t* tests and $\chi^2$ tests. Next we used multiple imputation methods to impute values for missing data; most variables were only missing up to 5% of values, and only two variables had 15% to 16% missing values. The R package "MI" (R Foundation, University of Auckland, Auckland, New Zealand) was used to generate 10 imputed data sets.[38] We used logistic regression to model chemotherapy use. We started with models that included patient and clinical variables. We then examined models that added either patient or physician decision styles. Next we examined a full model with both patient and physician styles. In each model, the initial inclusion of variables was based on the statistical significance (at $P = .05$ level) of bivariate associations with chemotherapy; those that were not significant in the multivariable models were subsequently removed. However, factors having face validity (eg, age, region) were retained even if not significant. The estimates from the logistic regression models corresponding to the 10 imputed data sets were combined according to the method of Rubin.[39,40] We also used logistic regression models with generalized estimation equations to account for the potential clustering of chemotherapy use by physician. Because the results were similar, we report the results from the logistic models. The predictive ability of the models was assessed using the c statistic; values greater than 90% show outstanding discrimination. All analyses were performed using SAS 9.2 (SAS Institute, Cary, NC) and R 2.13.0.

## RESULTS

The mean patient age in this older breast cancer cohort was 73 years (standard deviation = 6; range, 65 to 99): 43% received chemotherapy, including 3% who had neoadjuvant treatment. Overall, 30% of women preferred to make their chemotherapy decisions alone or primarily alone with some input from the physician, and 41% stated that they preferred equally shared decision making (Table 1).

The oncologists cared for an average of six participating patients, but 28% cared for just one patient. They practiced in a mix of community and cancer center settings, and 86 (41%) of 212 were women. Among these oncologists, 67% had a high preference to prescribe chemotherapy to hypothetical patients. Overall, at the patient level, 63% of the patients were cared for by an oncologist with a high chemotherapy preference, and 43% were seen by a female oncologist.

Using sequential regression models, we examined how patient and physician decision-making styles affected chemotherapy (Table 2). In the first model, we see that younger age and markers of poor prognosis (eg, estrogen receptor status) were associated with higher chemotherapy use. Also, women who reported more communication with their physicians were more likely to receive chemotherapy than those who reported less communication.

In the second model, we see that patient decision-making style (as a 5-point ordinal factor) was associated with chemotherapy after considering covariates. Women who preferred to make their decisions with less physician input were significantly less likely to have had chemotherapy than women who preferred more input (the odds of chemotherapy decreased by 21% for each 1-point change on the decision-making scale, 95% CI, 0.65 to 0.97; $P = .02$), controlling for covariates. Decision-making style did not account for the relationship between physician–patient communication and chemotherapy, because the estimated odds were virtually unchanged after consideration of the other variables (Table 2, model 2 *v* model 1). Of note, women who preferred to make their own decisions were also more likely to rate their communication more highly than women who relied on physicians for decision making (data not shown).

**Table 1.** Characteristics of Newly Diagnosed Older Patients With Breast Cancer (n = 1,174)

| Characteristic | No. | % |
|---|---|---|
| Age, years | | |
| Mean | 73 | |
| SD | 6 | |
| Race | | |
| White | 1,041 | 89 |
| Marital status | | |
| Missing/unknown | 8 | 1 |
| Unmarried | 520 | 44 |
| Married | 646 | 55 |
| Education | | |
| Missing/unknown | 32 | 3 |
| ≤ 12 years | 495 | 42 |
| > 12 years | 647 | 55 |
| Patient decision-making style | | |
| Missing/unknown | 38 | 3 |
| The doctor should make the decisions using all that's known regarding treatments | 61 | 5 |
| The doctor should make the decisions but strongly consider my opinion | 236 | 20 |
| The doctor and I should make the decisions together on an equal basis | 486 | 41 |
| I should make the decisions, but consider the doctor's opinion | 313 | 27 |
| I should make the decisions using all I know or learn about the treatments | 40 | 3 |
| You are less likely to have the cancer come back if you have chemotherapy* | | |
| Missing/unknown | 172 | 15 |
| Not at all | 180 | 15 |
| Very little | 79 | 7 |
| Somewhat | 301 | 26 |
| Very much | 442 | 38 |
| Side effects of chemotherapy are worse than the disease* | | |
| Missing/unknown | 190 | 16 |
| Not at all | 392 | 33 |
| Very little | 155 | 13 |
| Somewhat | 270 | 23 |
| Very much | 167 | 14 |
| Type of physician seen—preference for recommending chemotherapy | | |
| Low | 437 | 37 |
| High | 737 | 63 |
| Oncologist sex | | |
| Male | 668 | 57 |
| Female | 506 | 43 |
| Years since oncologist's medical school graduation | | |
| < 15 | 311 | 26 |
| 15-24 | 443 | 38 |
| 25+ | 420 | 36 |
| Practice setting (all CALGB cooperative group sites or affiliates) | | |
| Comprehensive cancer center | 333 | 28 |
| Community cancer centers and practices | 841 | 72 |
| Patients who received chemotherapy† | 505 | 43 |

Abbreviations: CALGB, Cancer and Leukemia Group B; SD, standard deviation.
*Responses indicate level of agreement with statement.
†Among those who received chemotherapy, 3% had neoadjuvant treatment.

**Table 2.** Adjusted Odds of Chemotherapy Receipt Among Older Patients With Breast Cancer, Associated With Patient and Physician Decision Styles

| Variable | Model 1 | | | Model 2 (add patient decision-making style) | | | Model 3 (add oncologist propensity) | | | Model 4 (add patient decision-making style and oncologist propensity) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OR | 95% CI | *P* | OR | 95% CI | *P* | OR | 95% CI | *P* | OR | 95% CI | *P* |
| Patient demographics | | | | | | | | | | | | |
| Age (per 5-year increment) | 0.52 | 0.44 to 0.62 | < .001 | 0.51 | 0.43 to 0.61 | < .001 | 0.51 | 0.43 to 0.60 | < .001 | 0.50 | 0.42 to 0.60 | < .001 |
| Education ≤ 12 years *v* >12 years | 1.70 | 1.18 to 2.43 | .004 | 1.68 | 1.17 to 2.41 | .0052 | 1.56 | 1.08 to 2.26 | .0176 | 1.54 | 1.07 to 2.24 | .0218 |
| Patient–physician factors | | | | | | | | | | | | |
| Physical function (per 5 of 100 pts) | 1.15 | 1.02 to 1.31 | .0256 | 1.16 | 1.02 to 1.31 | .0208 | 1.17 | 1.03 to 1.33 | .0181 | 1.17 | 1.03 to 1.33 | .0155 |
| Belief in recurrence (per 1 of 4 pts) | 2.07 | 1.72 to 2.50 | < .001 | 2.06 | 1.71 to 2.48 | < .001 | 2.02 | 1.67 to 2.44 | < .001 | 2.00 | 1.65 to 2.42 | < .001 |
| Belief in side effects (per 1 of 4 pts) | 0.57 | 0.48 to 0.68 | < .001 | 0.58 | 0.49 to 0.69 | < .001 | 0.57 | 0.48 to 0.68 | < .001 | 0.58 | 0.48 to 0.69 | < .001 |
| Patient–physician communication (per 5 of 42 pts) | 1.33 | 1.11 to 1.60 | .0025 | 1.37 | 1.14 to 1.65 | .0011 | 1.33 | 1.10 to 1.60 | .0033 | 1.37 | 1.13 to 1.66 | .0014 |
| Patient decision making (per 1 of 5 pts) | | | | 0.79 | 0.65 to 0.96 | .0204 | | | | 0.79 | 0.65 to 0.97 | .0234 |
| Clinical factors | | | | | | | | | | | | |
| Tumor < 2 cm *v* > 3 cm | 0.28 | 0.17 to 0.46 | < .001 | 0.27 | 0.16 to 0.46 | < .001 | 0.26 | 0.15 to 0.43 | < .001 | 0.25 | 0.15 to 0.43 | < .001 |
| Tumor 2-2.9 cm *v* > 3 cm | 0.65 | 0.37 to 1.13 | .1225 | 0.65 | 0.37 to 1.14 | .1361 | 0.63 | 0.36 to 1.10 | .1035 | 0.64 | 0.36 to 1.12 | .1157 |
| Node negative *v* positive | 0.09 | 0.06 to 0.14 | < .001 | 0.09 | 0.06 to 0.14 | < .001 | 0.09 | 0.06 to 0.13 | < .001 | 0.09 | 0.06 to 0.13 | < .001 |
| ER negative *v* positive | 13.27 | 7.75 to 22.72 | < .001 | 13.87 | 8.07 to 23.83 | < .001 | 14.64 | 8.38 to 25.59 | < .001 | 15.35 | 8.75 to 26.93 | < .001 |
| Oncologist characteristics | | | | | | | | | | | | |
| Physician preference, high *v* low | | | | | | | 2.65 | 1.81 to 3.89 | < .001 | 2.65 | 1.80 to 3.89 | < .001 |
| Female *v* male | 1.16 | 0.79 to 1.69 | .4524 | 1.16 | 0.79 to 1.69 | .4546 | 1.12 | 0.76 to 1.64 | .5653 | 1.12 | 0.76 to 1.64 | .5594 |
| Physician years since graduation (ref. 25+) | | | | | | | | | | | | |
| < 15 | 1.67 | 1.04 to 2.67 | .0327 | 1.70 | 1.06 to 2.73 | .0276 | 1.55 | 0.96 to 2.50 | .0709 | 1.58 | 0.98 to 2.56 | .0597 |
| 15-24 | 1.31 | 0.85 to 2.00 | .2194 | 1.27 | 0.83 to 1.95 | .2763 | 1.38 | 0.89 to 2.12 | .1479 | 1.34 | 0.87 to 2.07 | .1897 |
| NCI-designated cancer center *v* community center | 1.24 | 0.82 to 1.88 | .3005 | 1.24 | 0.82 to 1.88 | .3086 | 1.03 | 0.67 to 1.59 | .8763 | 1.03 | 0.67 to 1.59 | .8918 |
| Managed care *v* not | 1.01 | 0.64 to 1.60 | .9692 | 1.04 | 0.65 to 1.66 | .8744 | 1.10 | 0.68 to 1.77 | .6943 | 1.14 | 0.70 to 1.84 | .6002 |
| C Statistic (min-max) | 0.91-0.92 | | | 0.91-0.92 | | | 0.91-0.92 | | | 0.91-0.92 | | |

NOTE. All models control for region.
Abbreviations: ER, estrogen receptor; max, maximum; min, minimum; NCI, National Cancer Institute; OR, odds ratio; pts, points; ref., referent group.

When oncologists' preference to prescribe chemotherapy was considered (Table 2, model 3), estimates were unaffected, and seeing an oncologist with a high preference significantly increased the odds of receiving chemotherapy compared with women seeing an oncologist with a low preference.

In the final model (Table 2, model 4), the impact of the oncologist preference did not change or explain the relationship between patient decision style and chemotherapy, with both being independently associated with chemotherapy. The odds of receiving chemotherapy among women who saw an oncologist with a high preference to recommend chemotherapy were 2.65 times higher (95% CI, 1.80 to 3.89; $P < .001$) than the odds of receiving chemotherapy among women who were seen by oncologists with a low preference. There was no interaction between patient and physician decision styles in relation to chemotherapy use (not shown).

Oncologist sex, setting of care (cancer center *v* community hospital), and the structure of care (HMO *v* non-HMO) were not associated with chemotherapy use in any model. Women cared for by the youngest oncologists tended to be more likely to receive chemotherapy than women seeing the oldest physicians, although this trend was not significant (odds ratio = 1.58; 95% CI, 0.98 to 2.56, $P = .06$).

## DISCUSSION

This study fills important gaps in our understanding of how patient and physician decision making affect the complex process of chemotherapy decisions in older women with breast cancer. We found that older women preferred to make their own decisions about treatment or to use shared input and that preference for less physician input lowered the odds of receiving chemotherapy compared with women who preferred to rely on the physician to a greater extent. Our results also demonstrate that patients cared for by oncologists with a high preference to prescribe chemotherapy had higher odds of receiving chemotherapy than women seeing oncologists with a low preference. Patient and oncologist decision styles were independently related to chemotherapy and were not affected by patient–physician communication.

Most of the older women in our sample preferred an active role in their treatment decisions. In contrast, in a study by Elkin et al,[41] 52% of older patients with cancer preferred a passive role. However, in that study, preference for decisional roles was assessed in patients with advanced disease. It is possible that those patients

  

may have felt that they had more limited treatment choices compared with our participants who were being treated for nonmetastatic disease. Indeed, in a study by Keating et al,[42] patients with advanced cancers were more likely to defer to their physicians in making treatment decisions than patients with earlier stage disease.

Women who preferred to make their own chemotherapy decisions were less likely to receive chemotherapy than women who stated that they rely more on physicians for input. It is possible that women whose physicians did not recommend chemotherapy or who decided not to receive it rationalized the treatment decision post hoc by saying that they were making the decision on their own. Alternatively, because women who prefer to make their own decisions reported the highest level of communication with their providers, it is possible that they were making informed judgments about the balance of risks and benefits. This result is consistent with data from other settings that demonstrate that when benefits are uncertain, patient control has a greater role in decisions than in situations where evidence is strong.[42]

Given the complexity of chemotherapy decision making in older patients with breast cancer and the paucity of evidence about benefits in this age group, it was not surprising that the oncologists' decision style also influenced care. It is our assumption that oncologist styles are related to perceptions about the benefits of adjuvant therapy.[43,44] In other research, physicians have rated small survival benefits (eg, 6% to 10% gain in 10-year survival) as sufficient to recommend chemotherapy, but most of these studies focused on younger women.[43] It will be interesting in future work to link propensities with provider ratings of benefit in older women.

Clinical factors had the highest magnitude of association with chemotherapy use, as seen in our prior work with an earlier subset of this cohort.[10] Patient education was also associated with chemotherapy, but did not explain the associations of decision style with chemotherapy.

There are some caveats that should be considered in evaluating our results. We measured patient decision style using a single item that may not capture all aspects of decision-making style. We were unable to observe actual decision making. It is possible that there were differences between patients' preferred and actual decision roles or between their self-reported style and actual behavior.[17,19,45]

We measured oncologist styles using hypothetical scenarios. Ideally, we would have had information on their recommendations for each patient. Also, physicians practicing in institutions affiliated with a cancer cooperative group may be influenced by the clinical trial culture and have more positive attitudes toward chemotherapy than providers in general practice. Because most of the physicians were aware of the study, their responses to the preference scenarios may have been affected by social desirability biases—giving the perceived correct answer. These biases should not have changed associations with treatment. Our measure of preference is based on one-time responses to a small number of scenarios. It would have been of interest to reassess responses at another point in time to evaluate test–retest reliability. Other potential methods of evaluating physicians' treatment preferences include direct observation of encounters, peer assessment,[46] detailed chart review, or analysis of claims data.[47] Collection of these data is generally time-consuming, and each data set would need to be adjusted for confounding variables, such as patient age and tumor characteristics.[47] On balance, we decide to use a short instrument focused on clinical factors to minimize respondent burden and maximize response rates. Another potential limitation is that we did not have data on recurrence risk testing or human epidermal growth factor receptor 2 status. However, the distribution of use of these new diagnostic tests should have been random with respect to the inherent decision styles of our patients and their providers. It will be important to build on our results and explore these issues in future, theoretically guided decision research.

Overall, our results indicate that the majority of older women with breast cancer prefer to take an active role in their treatment and that oncologist decision styles are independently associated with patterns of care. Interventions that enhance patients' skills in communicating their decision styles and preferences and/or physician training in preference elicitation[48,49] may lead to greater patient-centered cancer care. However, optimal decision making may remain an elusive goal for this age group without clear empirical evidence about the benefits and risks of adjuvant chemotherapy. New clinical trials that focus on the growing older population could provide the evidence necessary for informed patient and physician decision making.

## AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

*Although all authors completed the disclosure declaration, the following author(s) and/or an author's immediate family member(s) indicated a financial or other interest that is relevant to the subject matter under consideration in this article. Certain relationships marked with a "U" are those for which no compensation was received; those relationships marked with a "C" were compensated. For a detailed description of the disclosure categories, or for more information about ASCO's conflict of interest policy, please refer to the Author Disclosure Declaration and the Disclosures of Potential Conflicts of Interest section in Information for Contributors.*

**Employment or Leadership Position:** None **Consultant or Advisory Role:** None **Stock Ownership:** None **Honoraria:** Claudine Isaacs, AstraZeneca, Genentech **Research Funding:** None **Expert Testimony:** None **Other Remuneration:** None

## AUTHOR CONTRIBUTIONS

**Conception and design:** Jeanne S. Mandelblatt, Leigh Anne Faul, Harvey J. Cohen

**Collection and assembly of data:** Jeanne S. Mandelblatt, Claudine Isaacs, Michelle Tallarico, William T. Barry

**Data analysis and interpretation:** Jeanne S. Mandelblatt, Leigh Anne Faul, George Luta, Solomon B. Makgoeng, Kathryn Taylor, Vanessa B. Sheppard, Harvey J. Cohen

**Manuscript writing:** All authors

**Final approval of manuscript:** All authors

## REFERENCES


1. Altekruse SF, Kosary CL, Krapcho M, et al: SEER Cancer Statistics Review, 1975-2007. Bethesda, MD, National Cancer Institute. http://seer.cancer.gov/csr/1975-2007

2. Cyr A, Gillanders WE, Aft RL, et al: Breast cancer in elderly women (≥ 80 years): Variation in standard of care? J Surg Oncol 1:201-206, 2010

3. Du XL, Key CR, Osborne C, et al: Discrepancy between consensus recommendations and actual community use of adjuvant chemotherapy in women with breast cancer. Ann Intern Med 138:90-97, 2003

4. Enger SM, Thwin SS, Buist DS, et al: Breast cancer treatment of older women in integrated health care settings. J Clin Oncol 24:4377-4383, 2006

5. Lewis JH, Kilgore ML, Goldman DP, et al: Participation of patients 65 years of age or older in cancer clinical trials. J Clin Oncol 21:1383-1389, 2003

**6.** Harlan LC, Klabunde CN, Ambs AH, et al: Comorbidities, therapy, and newly diagnosed conditions for women with early stage breast cancer. J Cancer Surviv 3:89-98, 2009

**7.** Early Breast Cancer Trialists' Collaborative Group (EBCTCG): Effects of chemotherapy and hormonal therapy for early breast cancer on recurrence and 15-year survival: An overview of the randomised trials. Lancet 365:1687-1717, 2005

**8.** Silliman RA, Troyan SL, Guadagnoli E, et al: The impact of age, marital status and physician-patient interactions on the care of older women with breast carcinoma. Cancer 80:1326-1334, 1997

**9.** Hurria A, Brogan K, Panageas KS, et al: Patterns of toxicity in older patients with breast cancer receiving adjuvant chemotherapy. Breast Cancer Res Treat 92:151-156, 2005

**10.** Mandelblatt JS, Sheppard VB, Hurria A, et al: Breast cancer adjuvant chemotherapy decisions in older women: The role of patient preference and interactions with physicians. J Clin Oncol 28:3146-3153, 2010

**11.** Mandelblatt JS, Hadley J, Kerner JF, et al: Patterns of breast carcinoma treatment in older women: Patient preference and clinical and physical influences. Cancer 89:561-573, 2000

**12.** Katz SJ, Hawley ST, Abrahamse P, et al: Does it matter where you go for breast surgery? Attending surgeon's influence on variation in receipt of mastectomy for breast cancer. Med Care 48:892-899, 2010

**13.** O'Brien MA, Ellis PM, Whelan TJ, et al: Physician-related facilitators and barriers to patient involvement in treatment decision making in early stage breast cancer: Perspectives of physicians and patients. Health Expect [epub ahead of print on September 16, 2011]

**14.** Hurria A, Wong FL, Villaluna D, et al: Role of age and health in treatment recommendations for older adults with breast cancer: The perspective of oncologists and primary care providers. J Clin Oncol 26:5386-5392, 2008

**15.** Caldon LJ, Walters SJ, Reed MW: Changing trends in the decision-making preferences of women with early breast cancer. Br J Surg 95:312-318, 2008

**16.** Vogel BA, Bengel J, Helmes AW: Information and decision making: Patients' needs and experiences in the course of breast cancer treatment. Patient Educ Couns 71:79-85, 2008

**17.** Hawley ST, Lantz PM, Janz NK, et al: Factors associated with patient involvement in surgical treatment decision making for breast cancer. Patient Educ Couns 65:387-395, 2007

**18.** Hack TF, Degner LF, Watson P, et al: Do patients benefit from participating in medical decision making? Longitudinal follow-up of women with breast cancer. Psychooncology 15:9-19, 2006

**19.** Keating NL, Guadagnoli E, Landrum MB, et al: Treatment decision making in early-stage breast cancer: Should surgeons match patients desired level of involvement? J Clin Oncol 20:1473-1479, 2002

**20.** Janz NK, Mujahid M, Lantz PM, et al: Population-based study of the relationship of treatment and sociodemographics on quality of life for early stage breast cancer. Qual Life Res 14:1467-1479, 2005

**21.** Petrisek AC, Laliberte LL, Allen SM, et al: The treatment decision-making process: Age differences in a sample of women recently diagnosed with nonrecurrent, early-stage breast cancer. Gerontologist 37:598-608, 1997

**22.** Degner LF, Kristjanson LJ, Bowman D, et al: Information needs and decisional preferences in women with breast cancer. JAMA 277:1485-1492, 1997

**23.** Wallberg B, Michelson H, Nystedt M, et al: Information needs and preferences for participation in treatment decisions among Swedish breast cancer patients. Acta Oncol 39:467-476, 2000

**24.** Sandison AJ, Gold DM, Wright P: Breast conservation or mastectomy: Treatment choice of women aged 70 years and older. Br J Surg 83:994-996, 1996

**25.** Maly RC, Umezawa Y, Leake B, et al: Determinants of participation in treatment decision-making by older breast cancer patients. Breast Cancer Res Treat 85:201-209, 2004

**26.** Beisecker AE: Aging and the desire for information and input in medical decisions: Patient consumerism in medical encounters. Gerontologist 28: 330-335, 1988

**27.** Mandelblatt JS, Berg CD, Meropol NJ, et al: Measuring and predicting surgeons' practice styles for breast cancer treatment in older women. Med Care 39:228-242, 2001

**28.** Hawley ST, Hofer TP, Janz NK, et al: Correlates of between-surgeon variation in breast cancer treatments. Med Care 44:609-616, 2006

**29.** Silliman RA, Guadagnoli E, Weitberg AB, et al: Age as a predictor of diagnostic and initial treatment intensity in newly diagnosed breast cancer patients. J Gerontol 44:M46-M50, 1989

**30.** Liberati A, Apolone G, Nicolucci A, et al: The role of attitudes, beliefs, and personal characteristics of Italian physicians in the surgical treatment of early breast cancer. Am J Public Health 81:38-42, 1991

**31.** Liberati A, Patterson WB, Biener L, et al: Determinants of physician's preferences for alternative treatments in early breast cancer. Tumori 73: 601-609, 1987

**32.** Davis PB, Morris JC, Grant E: Brief screening tests versus clinical staging in senile dementia of the Alzheimer type. J Am Geriatr Soc 38:129-135, 1990

**33.** Kawas C, Karagiozis H, Resau L, et al: Reliability of the Blessed Telephone Information-Memory-Concentration Test. J Geriatr Psychiatry Neurol 8:238-242, 1995

**34.** Llewellyn-Thomas HA, McGreal MJ, Thiel EC, et al: Patients' willingness to enter clinical trials: Measuring the association with perceived benefit and preference for decision participation. Soc Sci Med 32:35-42, 1991

**35.** National Comprehensive Cancer Network: NCCN Clinical Practice guidelines in oncology v. 2.2008. http://www.nccn.org/professionals/physician_gls/ f_guidelines.asp

**36.** Makoul G, Krupat E, Chang CH: Measuring patient views of physician communication skills: Development and testing of the Communication Assessment Tool. Patient Educ Couns 67:333-342, 2007

**37.** Ware J Jr, Kosinski M, Keller SD: A 12-Item Short-Form Health Survey: Construction of scales and preliminary tests of reliability and validity. Med Care 34:220-233, 1996

**38.** Gelman A, Hill J, Su YS, et al: MI-Missing data imputation and model checking, R packing version 0.09-14. http://CRAN.R-project.org/package=mi

**39.** Little R, Rubin D: Statistical Analysis With Missing Data. New York, NY, John Wiley, 1987

**40.** Rubin D: Imputation for Nonresponse in Surveys. New York, NY, John Wiley, 1987

**41.** Elkin EB, Kim SH, Casper ES, et al: Desire for information and involvement in treatment decisions: Elderly cancer patients' preferences and their physicians' perceptions. J Clin Oncol 25:5275-5280, 2007

**42.** Keating NL, Beth Landrum M, Arora NK, et al: Cancer patients' roles in treatment decisions: Do characteristics of the decision influence roles? J Clin Oncol 28:4364-4370, 2010

**43.** Stiggelbout AM, de Haes JC, van de Velde CJ: Adjuvant chemotherapy in node negative breast cancer: Patterns of use and oncologists' preferences. Ann Oncol 11:631-633, 2000

**44.** Malik SM: The impact of aging on chemotherapy. Clin Lung Cancer 5:243-244, 2004

**45.** Tariman JD, Berry DL, Cochrane B, et al: Preferred and actual participation roles during health care decision making in persons with cancer: A systematic review. Ann Oncol 21:1145-1151, 2010

**46.** Ramsey PG, Wenrich MD, Carline JD, et al: Use of peer ratings to evaluate physician performance. JAMA 269:1655-1660, 1993

**47.** Roos NP, Flowerdew G, Wajda A, et al: Variations in physicians' hospitalization practices: A population-based study in Manitoba, Canada. Am J Public Health 76:45-51, 1986

**48.** Mosconi P, Meyerowitz BE, Liberati MC, et al: Disclosure of breast cancer diagnosis: Patient and physician reports—GIVIO (Interdisciplinary Group for Cancer Care Evaluation, Italy). Ann Oncol 2:273-280, 1991

**49.** Legare F, Ratte S, Stacey D, et al: Interventions for improving the adoption of shared decision making by healthcare professionals. Cochrane Database Syst Rev CD006732, 2010

  