Patient Views and Correlates of Radiotherapy Omission in a Population-Based Sample of Older Women with Favorable Prognosis Breast Cancer

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Running head: Patient views on radiation omission

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Abstract

Background

Radiotherapy omission after lumpectomy is a reasonable option for many older women with favorable prognosis breast cancer. We sought to evaluate patient perspectives regarding decision-making about radiotherapy (RT).

Methods

Women age 65-79 with stage I and II breast cancer reported to the Georgia and Los Angeles County SEER registries were surveyed (response rate=70%) regarding radiotherapy decisions, the rationale for omitting RT, decision-making values, and understanding of recurrence risk. We also surveyed their corresponding surgeons (response rate=77%). We evaluated patient characteristics associated with omission of RT using multilevel, multivariable logistic regression, accounting for patient clustering within surgeons.

Results

Of 999 patients, 135 omitted RT (14%). Older age, lower grade, and estrogen receptor-positive disease were each strongly associated with omission of RT in multivariable analyses, whereas number of comorbidities was not. Non-English speakers were more likely to omit RT (adjusted OR 5.9, 95% CI 1.4-24.5).

The most commonly reported reasons for RT omission were that a physician advised the patient it was not needed (54% of patients who omitted RT) and patient choice (41%). Local recurrence

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risk was overestimated by all patients, by about 2-fold among those who omitted radiation and 8-fold among those who received radiotherapy. Distant disease recurrence risk was overestimated 3-fold on average.

Conclusions

To some extent, decisions about radiotherapy omission are appropriately influenced by age, grade, and estrogen receptor status, but do not appear to be optimally tailored according to competing comorbidities. Many women who are candidates for radiotherapy omission overestimate their risk of recurrence.

Condensed Abstract: (2 concise sentences)

Radiotherapy omission among older women with early stage breast cancer was appropriately associated with age, grade, and estrogen receptor status, but did not appear to be tailored according to comorbid disease. Despite their favorable prognosis, many older women with early stage breast cancer markedly overestimate the risk of local and distant recurrence.

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Introduction

There is growing concern about overtreatment in older women with early stage breast cancer because they are often more likely to die of competing comorbidities than breast cance.[1] Two trials (CALGB 9343 and PRIME II) have shown that among older women with stage I, estrogen receptor (ER)-positive invasive breast cancer that is treated with breast conserving surgery and endocrine therapy, adjuvant radiotherapy significantly reduces the incidence of local recurrence, but without an apparent influence on the rate of metastasis or breast cancer mortality.[2, 3] Guidelines now consider omission of RT after BCS as an acceptable treatment option for women age ≥70 with stage T1, clinically node negative, ER-positive breast cancer who receive endocrine therapy.[4]

Some have argued that all older women with characteristics similar to the eligibility requirements for CALGB 9343 and PRIME II should not receive radiotherapy, whether infirm or fit.[5] Others have advocated for a more individualized approach to decisions about RT that accounts for tumor characteristics, comorbidity, and patient preferences.[3] The lack of consensus regarding the treatment approach in this scenario is evident in several practice patterns studies that revealed only a modest decline in RT utilization after publication of CALGB 9343 results.[6-10] Our previous work evaluating clinician views on radiotherapy omission in this context found that many clinicians overestimate the benefits associated with radiotherapy and continue to consider RT omission to be substandard therapy.[11]The frequency with which older patients are offered treatment without RT is uncertain, and little is known about their understanding of the risks and benefits of this treatment approach.

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In this setting of evolving views on the treatment paradigm for older women with favorable prognosis breast cancer, we sought to evaluate patients' perspectives on the decision about radiotherapy omission as part of a survey that included a sizable sample of older women recently diagnosed with early stage breast cancer, as identified by the population-based Georgia and Los Angeles SEER registries. To our knowledge, this is the first study to evaluate patient views on radiotherapy omission. Our objectives were 1) to evaluate patient characteristics associated with radiotherapy omission; 2) explore patients' rationale for not receiving radiotherapy; and 3) assess patients' understanding of recurrence risk.

Methods

Patient Sample and Data Collection

The Individualized Cancer Care (iCanCare) Study is a large survey study of women with early-stage breast cancer between age 20-79 years who were reported to the population-based Surveillance, Epidemiology and End Results (SEER) registries of Los Angeles County, California and Georgia. Racial minorities were oversampled. Patients with tumors larger than 5cm or stage III to IV disease were excluded. From the iCanCare study, we selected women age ≥65 for the present analysis.

Between July 2013 and August 2015, we identified 7,303 women who were confirmed to be eligible for the study. Surveys were completed a median of 6.8 months (SD 3.2) after diagnosis, with a response rate of 69.6% (n = 5080). The analytic sample (n=999) for the present study

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consisted of patients age 65-79 with unilateral invasive breast cancer treated with breast

conserving surgery (online supplementary figure 1). Within this sample, 74% of patients had

stage I disease and 23% stage II (table 1). Given that we observed a non-negligible rate of

radiotherapy omission in stage II patients (12%), we also included stage II patients in

multivariable models of radiotherapy omission.

Surveys were mailed with a $20 cash incentive; a modified Dillman method was used to

improve the response rate.[12] Materials were mailed in English; Spanish-translated materials

were added for women with surnames that suggested Hispanic ethnicity.[13] Each SEER registry

provided SEER data that were stripped of identifiers and merged to survey data. This study was

approved by the University of Michigan Institutional Review Board, the University of Southern

California, Emory University, and the public health departments of Georgia and California.

Measures

We developed the questionnaire iteratively with input from survey design experts and cognitive

interviews with patients and clinicians to assess content validity, as described previously.[14]

The definitive surgical procedure was determined by asking patients to indicate the surgery that

was performed after biopsy, and whether additional surgeries were performed. As the primary

outcome measure, radiotherapy receipt was determined by asking patients, "Did you or are you

planning to have radiation therapy to treat your breast cancer?" as well as whether

radiotherapy (RT) was completed, ongoing, or planned. Information on endocrine therapy

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receipt was available for 62% of the analytic sample (n=619) who completed the survey module on endocrine therapy.

Patient preferences and values were assessed by asking, "When decisions were being made about your treatments, how important was it to you that your treatments…" followed by several prompts (detailed in figure 4), such as, "kept you from worrying about the cancer coming back," each rated on a 5 point Likert-type scale ranging from "not at all important" to "very important." Women who omitted radiotherapy were asked to indicate the reasons for their decision in a "mark all that apply" format. Responses were aggregated into higher (i.e. a lot, quite a bit, or somewhat) and lower (i.e. not at all or a little bit) categories for analysis.

We evaluated patient perceptions of recurrence risk by asking, "After receiving all the planned treatments, what do you think is the chance that your cancer will come back in the breast or the area around it within 10 years?" with instructions to write in a number from 0% to 100%. A similar question was asked about "the chance that your cancer will spread to other parts of your body within 10 years." We asked patients how often they had worried about their cancer coming back within the past month, with responses on a 5-point scale ranging from "almost never" to "almost always," dichotomizing those who reported "sometimes," "often," or "almost always" worrying from those reporting worrying "rarely" or "almost never." We asked how much doctors discussed the chance of cancer recurrence, ranging from "not at all" to "a lot" on a 5-point scale. Patients' decision control preferences were evaluated by asking if they

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"preferred to make [their] own decisions," with responses as "quite a bit of the time" or "all of

the time" dichotomized from "some of the time," "a little of the time," and "none of the time."

Additional covariates included patient-reported information on comorbidities, race/ethnicity

(white, black, Asian, Latina, other), education (no college vs at least some college), income

(<$20, $20-40, $40-60, $60-90, >$90, in thousands), insurance (private, Medicare, Medicaid,

other), marital status (married, divorced/separated, never married, widowed), and travel time

to the nearest radiation oncology facility (<15, 15-30, 31-60, >60 minutes). We asked patients

to indicate which language they primarily speak.

Surgeon Sample and Data Collection

Patients were asked to identify their surgeons. From the patient analytic sample, 960 women

were linked to 311 treating surgeons, of whom 240 completed a surgeon-specific survey (77%).

A mean of 3 patients (IQR 1-4) were linked to each surgeon. Surgeons were asked about their

annual breast cancer patient volume, whether the practice included residents and fellows, and

number of years in practice. Surgeons were also asked, "How involved are you in the selection

of adjuvant radiation therapy approach in your post-lumpectomy patients?" with answers

ranging from "not at all involved" to "very involved" on a 5-point scale.

Statistical Analysis. We first calculated the proportion of women omitting radiotherapy overall

and by all demographic and treatment factors. Bivariate associations with radiotherapy

omission were evaluated using the Rao-Scott χ^2 test. Multivariable, multilevel logistic

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regression was used to explore the adjusted associations with radiotherapy omission, with

patients as the primary units of observation and the surgeon identifiers as the secondary units

(i.e. patients clustered within surgeon) [15]. Models were constructed beginning with patient-

level covariates, incorporating surgeon clustering, and finally adding surgeon-level covariates.

Area under the receiver-operator curve (AUC) was reported to measure the model's

discriminatory ability. All statistical analyses incorporated weights to account for the

differential probability of sample selection and survey nonresponse. Additionally, though

survey and SEER item nonresponse was low (<5%) for most covariates, we multiply imputed

missing items using sequential multiple imputation techniques[14, 16] to prevent potential bias

when using complete-case methods in the presence of missing data. P-values 5% or less were

considered significant throughout. All analyses were conducted using the SAS system version

9.4 (Cary, NC, USA).

Results

Radiotherapy Receipt

Table 1 and online supplementary table 1 show the distribution of patient and surgeon

characteristics. Overall, 14.4% of women in this sample of older women omitted radiotherapy

after breast conserving surgery, with 15.7% omission in the subset of patients with ER+, Stage I

disease. Among those who received radiotherapy, 48.1% received conventionally fractionated

whole breast RT, 26.6% received hypofractionated whole breast RT, 11% received accelerated

partial breast RT, 2.2% reported "other" or the duration was not specified, and 12.1% were

scheduled to receive RT but had not yet received it at the time of survey. On bivariate analysis, age, grade, ER status, SEER region, and income were associated with RT omission. Figure 1 shows the results of a multilevel logistic regression model that includes patient-level variables, SEER site, and surgeon identity. Older patient age, lower grade, and ER-positive disease were each strongly correlated with RT omission. Age 75-79 had a dominant effect, with an odds ratio of 14.4 (95% CI 5.6-37.1) when compared to age 65-69. The odds of non-English speakers omitting RT were greater when compared to English speakers (OR 5.9, 95% CI 1.4-24.5). It is noteworthy that patient comorbidities were not associated with RT omission on either bivariable or multivariable analysis (OR 1.3 for ≥2 vs 0 comorbidities, 95% CI: 0.6-2.9). Surgeon variables were not significantly associated with radiotherapy omission and were therefore not retained in the final model.

The multilevel model predicted RT omission well, with an AUC of 0.83 (95% CI 0.79-0.87). When analyzing clustering according to the surgeon identifier, the odds of a patient omitting radiotherapy would be predicted to increase approximately two-fold (OR 1.83, 95% CI 0.87-3.87) if she were to see a surgeon with a practice approach one standard deviation above the RT omission rate of an average surgeon (while adjusting for other model covariates). However, this trend for surgeon influence was not statistically significant. In a model restricted to the subgroup of patients with information on hormonal therapy, use of endocrine therapy was not significantly associated with radiotherapy omission, although there appeared to be a trend for women who omit radiotherapy to also omit endocrine therapy (OR 2.22, 95% CI 0.87-5.65; data not shown). In a model limited to patients with ER+, stage I disease, we again observed that

age, grade, and non-English speakers were significantly correlated with radiotherapy omission, without significant association with comorbidities, similar to the model derived from the larger analytic sample.

Risk Perception and Communication

In the subset of patients with ER+, Stage I disease, 33.1% of women overestimated their risk of local recurrence after all treatments were received as being >10% at 10 years. Among those who omitted RT, when asked to approximate their risk of local recurrence at 10 years, the mean estimate was 19% at 10 years (compared to the CALGB finding of 10%), and among women who received RT, the mean estimate was 17% (in contrast to CALGB 9343 finding of 2%; figure 2).[2] The risk of distant disease recurrence risk was similarly overestimated, with 46% of women approximating their risk of distant recurrence as being >5% at 10 years. The mean estimate of 10-year distant recurrence risk was 16.0% (compared to the CALGB finding of 5% both among those who received and omitted RT).[2] In this group of older women with favorable prognosis, approximately a quarter (26.9%) reported that within the last month, they had "sometimes," "often," or "almost always" worried about their cancer coming back, without significant differences for women who received or omitted RT.

Regarding communication with providers, 46.2% of patients in the overall sample reported that their physicians used numeric estimates to describe the risk of the cancer coming back. Approximately one-third (37.9%) reported that their doctors discussed the chance of the cancer coming back "not at all" or "a little bit." Although the majority of women (70.0%) reported that

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they preferred that their doctors tell them what to do for breast cancer treatment, women who

omitted radiotherapy were more likely to report that they preferred to make their own

decisions about breast cancer treatments than women who received RT (45.8% vs 35.7%,

p=0.03).

Patient Preferences and Values

Among women who omitted radiotherapy, the most commonly reported reasons were that a

physician told the patient it was not needed (53.8% of patients who omitted RT) and that the

decision was left to the patient and she chose to omit RT (40.9%, figure 3). Concerns about

placing an excessive burden on family and absence of discussion with a doctor about RT were

uncommon reasons for omitting RT (≤5%). Although 11.8% of patients reported "quite a bit" or

"a lot" of worry about current or future financial problems as a result of breast cancer and

treatments, <1% of women who omitted radiotherapy reported that cost motivated their

treatment decision.

When asked about considerations that were important in their decision-making, the most

commonly reported priorities were that the treatment kept them from worrying about the

cancer coming back (74.0%), had a low possibility of complications (73.9%), and allowed them

to continue caring for their home and family (73.6%, figure 4). Women who omitted

radiotherapy more commonly endorsed the importance of avoiding exposure to radiation (69%

vs 37%, p<0.001) and the need for fewer trips for treatment visits (49.2% vs 37.2%, p=0.008).

Discussion

In this large, contemporary survey of older women with early stage breast cancer, we observed that to a substantial extent, decisions about radiotherapy omission appear to be appropriately tailored based on older age, ER-positive disease, and lower grade tumor. However, the higher rate of RT omission in non-English speakers and the lack of association with comorbidity observed here are concerning. Incorporation of age and pathology findings into the decision to omit RT may be viewed as a starting point, but there remains a great need to further consider comorbidity status and remaining life expectancy to ensure that decisions about radiotherapy are appropriately individualized.[17]

We found that despite having an excellent prognosis, a sizeable proportion of older women with Stage I, ER+ breast cancer overestimate their risk of local recurrence, with an average two-fold overestimation in women who omitted RT and 8-fold overestimation in women who received RT. Nearly half of women perceived that their risk of distant recurrence was higher than has been reported in clinical trials, with an average 3-fold overestimation. This unrealistically pessimistic view of recurrence risk is reflected in the report from a quarter of women that they had frequently worried about cancer recurrence within the preceding month. Our observations are consistent with prior reports that notwithstanding a favorable prognosis, a large proportion of the most favorable subgroup in our sample of older women felt they were likely to develop a local or distant recurrence and die from breast cancer, resulting in psychological distress, frequent worry, and lower quality of life.[18, 19] Overestimation of recurrence risk may lead to a multiplicative overestimation of risk reduction from

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interventions,[20] resulting in overly generous attribution of benefits obtained from treatment. This might underlie the correlation that has been observed between worry about recurrence and receipt of radiotherapy in prior research.[21, 22] It is notable that one of the highest priorities that influenced decision-making for women in our study was that the treatment minimize the worry about cancer recurrence. Although radiotherapy undoubtedly does reduce the risk of local recurrence,[2, 3] our results indicate a need to more clearly communicate the favorable prognosis in this group, and to more directly address worry about recurrence and ensure that decisions are optimally informed.

The effects of patient overestimation of recurrence risk may well relate to physician overestimation that has been demonstrated in other work. In a nationwide survey, 19% of radiation oncologists and 32% of surgeons overestimated the 10-year risk of local recurrence.[11] The reluctance of many surgeons and radiation oncologists to consider radiotherapy omission to be a reasonable option in select older women is particularly problematic given the findings of the current study demonstrating that the most common reason given by women for the decision to omit radiotherapy was advice from a doctor that radiotherapy was not needed. Furthermore, most women (70%) preferred that their doctors tell them what to do regarding their breast cancer treatment. Therefore, physicians' attitudes and approaches to communication may be particularly important to ensure that patients do indeed consider all options and their risks and benefits. Many potential mechanisms have been considered as possible drivers of physicians' poor communication practices in this setting, including lack of up-to-date knowledge of clinical trial results,[23] heuristics like risk aversion and anticipatory regret

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that may motivate physicians and patients alike to embrace overly aggressive treatments,[24] lack of training in effective risk communication skills,[25] and financial incentives that reimburse the delivery of care rather than its omission.[7] Our data suggest a compelling need to evaluate the relative roles of these underlying drivers further in order to develop appropriately targeted interventions that encourage clinicians to improve communication in this regard. We find it striking that one-third of women reported minimal discussions with their providers about the risk of recurrence, which is absolutely essential for a patient to understand the relative impact of interventions like radiotherapy.

Our data suggest that surgeons, who are the first breast cancer clinicians to outline a plan of care, may play an important role in decisions regarding radiotherapy omission. Although we did not detect a statistically significant impact of the surgeon on the likelihood of radiotherapy omission, this may be due to the sample size and distribution of patients across surgeons within our sample. We did, however, observe a notable trend, and others have shown that among women with short life expectancy, the probability of receiving RT varies substantially across primary surgeons.[26]

We also found that non-English speakers were significantly more likely to omit radiotherapy, even after adjustment for race, income, employment and education. This finding may reflect barriers to high quality decision-making in a vulnerable population. Numerous reports describe non-English speakers as a vulnerable population, particularly Latinas with low acculturation.[27-30] Latina women who are less acculturated have previously been found to have greater desire for

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information, lower satisfaction with breast cancer decision-making,[30] and perceived

powerlessness in medical encounters,[31] highlighting a need for greater attention to support

these patients and identify potential barriers.[32] Although disparities are often viewed in the

context of undertreatment of an aggressive cancer, with vulnerability related to known risk

factors such as lower education or minority race, it is interesting to note that vulnerability to

overtreatment may be an entirely distinct concept that primarily affects classically privileged

populations, as has been observed with trends in contralateral prophylactic mastectomy.[33, 34]

The association between language barrier and RT omission is worthy of further exploration in

future studies.

We observed a trend for patients who omit radiotherapy to also omit endocrine therapy. This is

a particularly concerning finding that merits further evaluation, as receipt of endocrine therapy

is known to have a substantial impact in reducing local recurrence[35] and is believed to be a key

factor in leading to the acceptable rates of local failure observed in trials like CALGB 9343 as

compared to historical studies where endocrine therapy was not required.[36, 37] Endocrine

therapy non-adherence and discontinuation are known to be an issue for nearly half of women

with breast cancer in general,[38] and if women who omit radiotherapy are even more likely to

omit endocrine therapy, rates of recurrence may be higher than expected.

Aspects of the study merit comment. Strengths include a contemporary, diverse, population-

based sample with a high response rate and specific measures of patients' clinical decision

making. Multiple imputation and weighting were used to account for potential bias related to

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missing data, and to ensure that the results were representative of the overall population.

Limitations include data obtained from 2 large SEER regions (Georgia and Los Angeles County),

which might not reflect the entire US population. The number of patients who omitted

radiotherapy is small. Patient responses are necessarily retrospective and may be subject to

recall bias. Finally, our study evaluated patients' views of radiotherapy omission, but did not

explore views about omitting endocrine therapy rather than radiotherapy.[39] Nonetheless, our

study offers a novel and clinically relevant view of decision-making in older women with

favorable prognosis breast cancer.

In conclusion, our findings indicate several targets for interventions to improve the quality of

older women's decision-making in the context of radiotherapy after lumpectomy. First,

although decisions about radiotherapy omission are influenced by some clinical factors,

interventions are necessary to ensure that decisions reflect not only considerations of age and

tumor characteristics but also patients' health status and remaining life expectancy. Second,

communication must improve, as patients cannot share in the making of preference-

concordant decisions when they are not optimally informed about key facts such as recurrence

risk and report that their providers had little discussion with them regarding this. Ultimately, we

believe that a combination of physician-facing and patient-facing interventions are necessary,

as it appears that both patients and physicians play important roles in the predominant

intervention bias that has resulted in overtreatment of many older women with early stage

breast cancer.[7] Our results demonstrate that most older women with breast cancer care about

avoiding complications and about avoiding worry about recurrence. Therefore, decision aids

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that present risk information in understandable formats, such as pictographs,[40] constitute

particularly promising avenues for the improvement of decision quality in practice. Clear

information and communication is critical, both for the subset of older patients with favorable

risk disease in whom radiotherapy omission is a reasonable and guideline-concordant option if

it accords with individual preferences, and also for the subset with more aggressive or

advanced tumors, for whom radiotherapy remains a fundamental component of cure.

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References

1. Walter LC, Schonberg MA. Screening mammography in older women: a review. Jama 2014;311(13): 1336-47.

2. Hughes KS, Schnaper LA, Bellon JR, et al. Lumpectomy plus tamoxifen with or without irradiation in women age 70 years or older with early breast cancer: long-term follow-up of CALGB 9343. J Clin Oncol 2013;31(19): 2382-7.

3. Kunkler IH, Williams LJ, Jack WJ, Cameron DA, Dixon JM. Breast-conserving surgery with or without irradiation in women aged 65 years or older with early breast cancer (PRIME II): a randomised controlled trial. Lancet Oncol 2015;16(3): 266-73.

4. National Comprehensive Cancer Network. Breast Cancer. Available from URL: https://www.nccn.org/professionals/physician_gls/pdf/breast.pdf [accessed December 12, 2017.

5. Hughes KS, Schnaper LA. Can older women with early breast cancer avoid radiation? Lancet Oncol 2015;16(3): 235-7.

6. McCormick B, Ottesen RA, Hughes ME, et al. Impact of guideline changes on use or omission of radiation in the elderly with early breast cancer: practice patterns at National Comprehensive Cancer Network institutions. J Am Coll Surg 2014;219(4): 796-802.

7. Soulos PR, Yu JB, Roberts KB, et al. Assessing the impact of a cooperative group trial on breast cancer care in the medicare population. J Clin Oncol 2012;30(14): 1601-7.

8. Shirvani SM, Jiang J, Likhacheva A, et al. Trends in Local Therapy Utilization and Cost for Early-Stage Breast Cancer in Older Women: Implications for Payment and Policy Reform. Int J Radiat Oncol Biol Phys 2016;95(2): 605-16.

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9. Shen X, Anne PR, Keith SW, et al. Radiation therapy use and outcomes among older women with ER-positive and ER-negative stage I breast cancer. Am J Clin Oncol 2014;37(3): 241-7.

10. Rhieu BH, Rajagopalan MS, Sukumvanich P, et al. Patterns of care for omission of radiation therapy for elderly women with early-stage breast cancer receiving hormonal therapy. Pract Radiat Oncol 2015;5(4): e267-73.

11. Shumway DA, Griffith KA, Sabel MS, et al. Surgeon and Radiation Oncologist Views on Omission of Adjuvant Radiotherapy for Older Women with Early-Stage Breast Cancer. Ann Surg Oncol 2017.

12. Dillman DA, Smyth JD, Christian LM. Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method. Wiley Publishing, 2008.

13. Hamilton AS, Hofer TP, Hawley ST, et al. Latinas and breast cancer outcomes: population-based sampling, ethnic identity, and acculturation assessment. Cancer Epidemiol Biomarkers Prev 2009;18(7): 2022-9.

14. Jagsi R, Griffith KA, Kurian AW, et al. Concerns about cancer risk and experiences with genetic testing in a diverse population of patients with breast cancer. J Clin Oncol 2015;33(14): 1584-91.

15. Anders Skrondal SR-H. Generalized Latent Variable Modeling: Multilevel, Longitudinal, and Structural Equation Models. Chapman & Hall/CRC Interdisciplinary Statistics, 2004.

16. Rubin DB. Multiple Imputation for Nonresponse in Surveys. Hoboken, NY: John Wiley & Sons, 1987.

17. Spratt DE, Jagsi R. Breast and Prostate Cancer: Lessons to Be Shared. Int J Radiat Oncol Biol Phys 2017;98(2): 263-68.

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18. Rakovitch E, Franssen E, Kim J, et al. A comparison of risk perception and psychological morbidity in women with ductal carcinoma in situ and early invasive breast cancer. Breast Cancer Res Treat 2003;77(3): 285-93.

19. Hawley ST, Janz NK, Griffith KA, et al. Recurrence risk perception and quality of life following treatment of breast cancer. Breast Cancer Res Treat 2017;161(3): 557-65.

20. Black WC, Nease RF, Jr., Tosteson AN. Perceptions of breast cancer risk and screening effectiveness in women younger than 50 years of age. J Natl Cancer Inst 1995;87(10): 720-31.

21. Tewari A, Chagpar AB. Worry about breast cancer recurrence: a population-based analysis. Am Surg 2014;80(7): 640-5.

22. Simard S, Thewes B, Humphris G, et al. Fear of cancer recurrence in adult cancer survivors: a systematic review of quantitative studies. J Cancer Surviv 2013;7(3): 300-22.

23. Shumway DA, Griffith KA, Sabel MS, et al. Surgeon and Radiation Oncologist Views on Omission of Adjuvant Radiotherapy for Older Women with Early-Stage Breast Cancer. Ann Surg Oncol 2017;24(12): 3518-26.

24. Katz SJ, Morrow M. The challenge of individualizing treatments for patients with breast cancer. JAMA 2012;307(13): 1379-80.

25. Zikmund-Fisher BJ, Janz NK, Hawley ST, Griffith KA, Sabolch A, Jagsi R. Communication of Recurrence Risk Estimates to Patients Diagnosed With Breast Cancer. JAMA Oncol 2016.

26. Feinstein AJ, Soulos PR, Long JB, et al. Variation in receipt of radiation therapy after breast-conserving surgery: assessing the impact of physicians and geographic regions. Med Care 2013;51(4): 330-8.

27. Janz NK, Mujahid MS, Hawley ST, Hamilton AS, Katz SJ. Racial/ethnic differences in quality of life and fear of recurrence after diagnosis of breast cancer. Journal of Clinical Oncology 2008;26(15_suppl): 9526-26.

28. Janz NK, Mujahid MS, Hawley ST, et al. Racial/ethnic differences in quality of life after diagnosis of breast cancer. J Cancer Surviv 2009;3(4): 212-22.

29. Hawley ST, Janz NK, Hamilton A, et al. Latina patient perspectives about informed treatment decision making for breast cancer. Patient Educ Couns 2008;73(2): 363-70.

30. Alderman AK, Hawley ST, Janz NK, et al. Racial and ethnic disparities in the use of postmastectomy breast reconstruction: results from a population- based study. J Clin Oncol 2009;27(32): 5325-30.

31. Garrett PW, Dickson HG, Whelan AK, Roberto F. What do non-English-speaking patients value in acute care? Cultural competency from the patient's perspective: a qualitative study. Ethn Health 2008;13(5): 479-96.

32. Janz NK, Mujahid MS, Hawley ST, Griggs JJ, Hamilton AS, Katz SJ. Racial/Ethnic Differences in Adequacy of Information and Support for Women with Breast Cancer. Cancer 2008;113(5): 1058-67.

33. Hawley ST, Jagsi R, Morrow M, et al. Social and Clinical Determinants of Contralateral Prophylactic Mastectomy. JAMA Surg 2014;149(6): 582-9.

34. Yao K, Stewart AK, Winchester DJ, Winchester DP. Trends in contralateral prophylactic mastectomy for unilateral cancer: a report from the National Cancer Data Base, 1998-2007. Ann Surg Oncol 2010;17(10): 2554-62.

35. Fisher B, Bryant J, Dignam JJ, et al. Tamoxifen, radiation therapy, or both for prevention of ipsilateral breast tumor recurrence after lumpectomy in women with invasive breast cancers of one centimeter or less. J Clin Oncol 2002;20(20): 4141-9.

36. Lim M, Bellon JR, Gelman R, et al. A prospective study of conservative surgery without radiation therapy in select patients with Stage I breast cancer. Int J Radiat Oncol Biol Phys 2006;65(4): 1149-54.

37. Holli K, Hietanen P, Saaristo R, Huhtala H, Hakama M, Joensuu H. Radiotherapy after segmental resection of breast cancer with favorable prognostic features: 12-year follow-up results of a randomized trial. J Clin Oncol 2009;27(6): 927-32.

38. Hershman DL, Kushi LH, Shao T, et al. Early discontinuation and nonadherence to adjuvant hormonal therapy in a cohort of 8,769 early-stage breast cancer patients. J Clin Oncol 2010;28(27): 4120-8.

39. Walker GA, Kaidar-Person O, Kuten A, Morgan DA. Radiotherapy as sole adjuvant treatment for older patients with low-risk breast cancer. Breast 2012;21(5): 629-34.

40. Zikmund-Fisher BJ, Witteman HO, Dickson M, et al. Blocks, ovals, or people? Icon type affects risk perceptions and recall of pictographs. Med Decis Making 2014;34(4): 443-53.

Figure Legends

Figure 1: Odds ratios from a model estimating radiotherapy omission. Odds ratios from a multilevel logistic regression model estimating radiotherapy omission. The model was adjusted for race, income, education, insurance, marital status, BMI, and SEER site. The odds ratio for the surgeon effect represents the amount by which a patient's odds of radiotherapy omission are multiplied if they see a surgeon associated with a rate of radiotherapy omission that is one standard deviation above the average surgeon.

Figure 2: Patient-reported estimates of 10-year risk of local recurrence in patients aged 65-79 with stage I, estrogen receptor positive invasive breast cancer compared to CALGB 9343 results.

Figure 3. Patient reported reasons for omission of radiotherapy. Responses are not mutually exclusive.

Figure 4. Patient reported considerations that influenced decisions about breast cancer treatment.

Online supplementary figure 1: Flow diagram of development of analytic sample.

Table 1: Patient Characteristics

	No. (N=999)	Weighted %	% Omitting RT*	$P^{\dagger}$
Age				
65-69	410	40.2	5.4	<0.0001
70-74	337	34.1	16	
75-79	252	25.7	26	
SEER Stage				0.5404
1	749	73.5	14.3	
2	218	23.2	12.2	
Not reported	32	3.2	28.2	
ER status				0.0164
Positive	857	85.5	15.3	
Negative	111	11.5	5.2	
Not reported	31	3.0	20.2	
SEER Grade				0.0029
1	346	34.8	18.1	
2	430	43.4	14.4	
3	187	18.2	6.1	
Not reported	36	3.7	17.8	
Comorbidities				0.2995
0	482	49.5	13.6	
1	315	30.3	12.8	
2+	190	18.9	17.8	
Not reported	12	1.3	21.8	
Receipt of endocrine therapy[‡]				0.2222
Yes	449	71.1	13.6	
No	170	26.8	17.7	
Not reported	15	2.1	18.5	
Site				0.0113
Georgia	522	49.3	11.2	
Los Angeles County	477	50.7	17.2	
Primarily speak language other than English				0.1279
Yes	896	90.9	13.5	
No	89	7.8	20.4	
Not reported	14	1.3	30.4	
Race				0.3019
White	631	67.5	14.9	
Black	160	13.9	10.3	
Latina	136	11.3	14.9	
Asian	52	5.2	10.9	

Other, unknown, or missing	20	2.1	26.6	
Income				0.0265
<20K	163	15.3	15.3	
20K - <40K	183	17.6	9.6	
40K - <60K	136	13.4	15.5	
60K - <90K	134	14.4	10.4	
90K+	147	16.8	11.4	
Don't know/not reported	236	22.6	21	
Education				0.5094
At least some college	614	63.4	13.8	
No college	365	34.8	15.4	
Not reported	20	1.8	8.6	
Type of insurance				0.1035
Medicaid	104	9.9	15.3	
Medicare	641	66.1	14.5	
Private	121	12.2	6	
Other	7	0.6	14.7	
Not reported	126	11.2	20.9	
Marital status				0.5347
Married/partnered	523	53.3	13.5	
Not partnered	457	44.8	15	
Not reported	19	1.9	20.5	
BMI				0.1281
Underweight (<18.5)	8	0.7	33.5	
Normal weight (18.5-25)	262	27.8	17.4	
Overweight (>25-30)	323	32.7	12.5	
Obese >30	371	35.7	12.7	
Not reported	35	3.2	18.4	
Bra cup size				0.5723
A/B	289	29.0	15.9	
C	322	32.1	14.7	
D	197	19.7	13.3	
DD+	156	15.8	11	
Not reported	35	3.4	17.1	
Distance to nearest radiation oncology clinic[‡]				0.5430
≤30 minutes	350		11.3	

>30 minutes	126		11.3	
Not reported	34		54.8	
*Percent omitting RT calculated within the weighted sample †*P* values for differences in the proportion of RT omission; the 'not reported' category (if present) was excluded from the calculation. ‡Not all patients were asked to provide this information due to differences in survey versions				

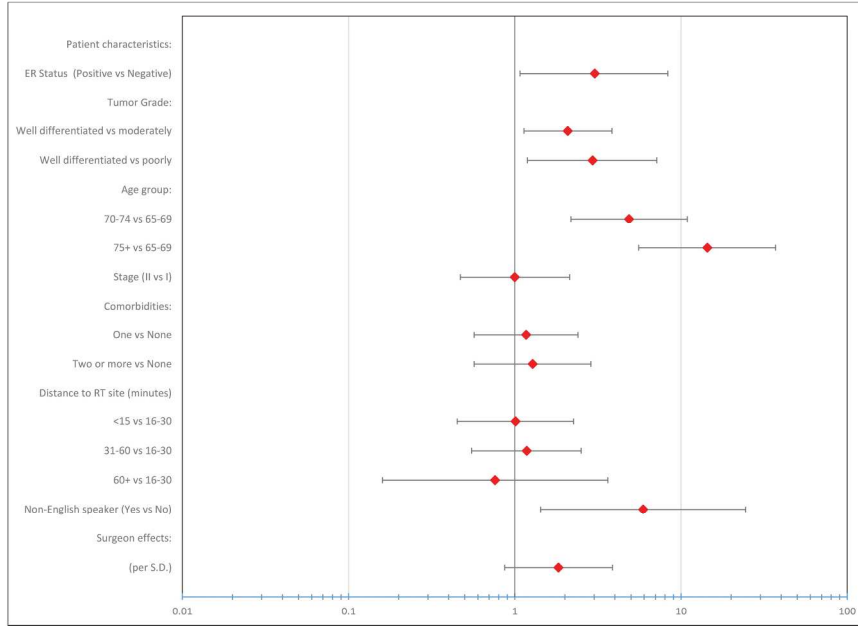Figure 1: Odds ratios from a model estimating radiotherapy omission. Odds ratios from a multilevel logistic regression model estimating radiotherapy omission. The model was adjusted for race, income, education, insurance, marital status, BMI, and SEER site. The odds ratio for the surgeon effect represents the amount by which a patient's odds of radiotherapy omission are multiplied if they see a surgeon associated with a rate of radiotherapy omission that is one standard deviation above the average surgeon.

215x166mm (300 x 300 DPI)
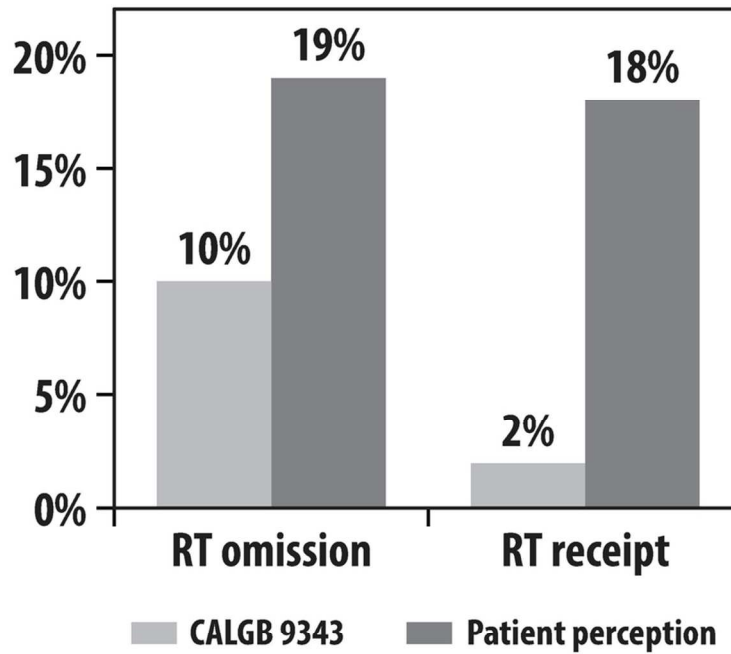
Figure 2: Patient-reported estimates of 10-year risk of local recurrence in patients aged 65-79 with stage I, estrogen receptor positive invasive breast cancer compared to CALGB 9343 results.

96x82mm (300 x 300 DPI)
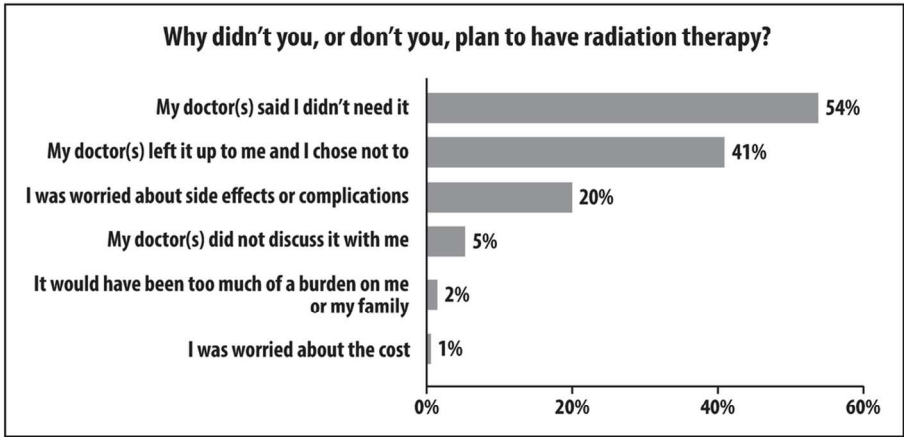
Why didn't you, or don't you, plan to have radiation therapy?

Figure 3. Patient reported reasons for omission of radiotherapy. Responses are not mutually exclusive.

106x59mm (300 x 300 DPI)
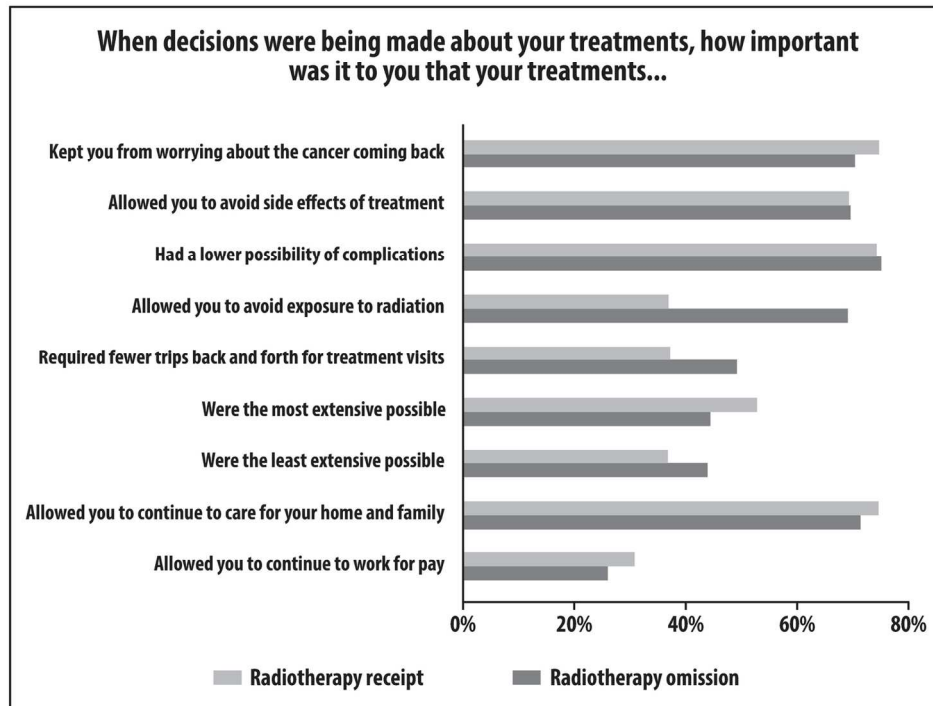
Figure 4. Patient reported considerations that influenced decisions about breast cancer treatment.

141x109mm (300 x 300 DPI)

Online supplementary table 1: Physician Characteristics

	No.* (N = 240)	Weighted %
Years in practice		
0-10 yrs	46	19.2
11-20	71	29.6
≥21 yrs	118	49.2
Missing	5	2.1
Site		
Georgia	120	50.0
LA	120	50.0
Work with residents and/or fellows	67	27.9
Yes	169	70.4
No	4	1.7
Missing		
Breast cancer volume within last 12 months		
≤50	142	59.2
>50	88	36.7
Missing	10	4.1
Surgeon involvement in RT decisions		
Not at all or slightly	93	38.8
Somewhat	46	19.2
Moderately or very	94	39.2
Missing	7	2.9
*Number of surgeons who were linked to a patient in table 1 and completed a survey.		

7,810 patients identified with breast cancer

507 considered ineligible

7,303 surveys sent to eligible patients

2,223 non-respondents

5,080 eligible patients completed a survey

3,240 younger (<65)

1,840 older (≥ 65)

841 excluded in total:
108 bilateral disease†
600 mastectomy†
308 DCIS†
12 Without RT information†
† Not mutually exclusive

999 analytic sample:
948 with Surgeon ID
784 with Surgeon Survey

254x190mm (96 x 96 DPI)

A12. Please tell us whether you have ever been <u>told by a doctor</u> that you had any of the following health conditions:

Yes	No	
○	○	a. Chronic bronchitis or emphysema
○	○	b. Heart disease, such as coronary artery disease or congestive heart failure
○	○	c. Diabetes
○	○	d. Blood clots in the legs or the lung
○	○	e. Connective tissue disease, such as lupus or scleroderma
○	○	f. Stroke
○	○	g. Depression
○	○	h) High cholesterol
○	○	i) High blood pressure or hypertension

C1. **Before your surgery,** did you consult with any of these providers about your treatment decisions?

Yes	No	
○	○	a) Radiation oncologist (a doctor who specializes in radiation treatment)
○	○	b) Medical oncologist (a doctor who specializes in chemotherapy)
○	○	c) Plastic surgeon (a doctor who performs breast reconstruction)
○	○	d) Primary care provider (a doctor, physician assistant, or nurse practitioner who sees you for common problems or standard checkups)
○	○	e) Genetic counselor (someone who reviews your family history and explains the purpose and results of genetic tests)
○	○	f) Navigator (often a nurse, someone who helps you with your treatment schedule, test results, or who gives you and your family information about breast cancer)

Surgery

C2. What was the <u>first</u> surgery that you had to remove your breast cancer <u>after</u> the biopsy test?

○ I did not have any surgery after the biopsy   ⟶

○ I had a <u>mastectomy</u> (removal of the entire breast) ⟶

                                                Please go to C3 at the top of the next page

○ I had a <u>lumpectomy</u> (removal of the cancer and some surrounding tissue)

    ⟶ a. Did you have a <u>second lumpectomy</u> to remove more breast tissue from the <u>same breast</u>?

        ○ Yes – I had another lumpectomy to remove more breast tissue from the same breast

        ○ No – I only had one lumpectomy

    b. Did you have a mastectomy <u>later</u>, on the same breast?

        ○ Yes – I had a mastectomy <u>after</u> my lumpectomy

        ○ No – I did not have a mastectomy

    c. <u>How strongly</u> did your doctor recommend that you have a mastectomy after your initial lumpectomy?

○	○	○	○	○
Very strongly	Strongly	Moderately	Weakly	Not at all

    d. How strongly did <u>you request</u> to have a mastectomy after your initial lumpectomy?

○	○	○	○	○
Very strongly	Strongly	Moderately	Weakly	Not at all

Please continue to C3 on the next page

1

C3. What kind of mastectomy did you have?

- ○   I did not have a mastectomy

- ○   Mastectomy only – no reconstruction

- ○   Mastectomy with reconstruction and I kept my own nipple, called a nipple sparing
       or nipple saving mastectomy

- ○   Mastectomy with reconstruction and my original nipple was removed

C4. What type of breast reconstruction did you have?

- ○   I have not had any breast reconstruction surgery

- ○   A DIEP flap, TRAM flap, or latissimus dorsi flap (uses your own tissue from the abdomen or back)

- ○   An implant (silicone or saline)

- ○   Other (please explain): _

C5. Did you have a mastectomy on **both breasts**?

○	○
Yes	No

| **Go to C6 below** | → | **Please go to C7 at the top of the next page** |

C6. How important were the following factors in your decision to have a mastectomy on **both breasts**?

	Not at all important	A little important	Somewhat important	Quite important	Very important
a. My age	○	○	○	○	○
b. Having a family history of breast cancer	○	○	○	○	○
c. Wanting both breasts to match after reconstruction	○	○	○	○	○

Please continue to C7 on the next page

2

Radiation Therapy

Please answer the following questions even if you did not have radiation therapy

C8. **At the time of your breast cancer diagnosis,** how much time did it or would it have taken you to get from your home to the nearest radiation treatment facility?

○ Less than 15 minutes   ○ 31 to 60 minutes

○ 15 to 30 minutes   ○ More than 60 minutes   ○ I don't know

C9. Did any doctor tell you that radiation treatment…

	Yes	No	Don't remember
a. Usually involves daily trips to an outpatient facility	○	○	○
b. Can be completed in 3-4 weeks or less	○	○	○

C14. <u>Did you</u> or <u>are you going to</u> have radiation therapy to treat your breast cancer?

○   ○   ○   ○
Yes – I am finished   Yes – I am still having   Yes – I plan to have radiation   No
with radiation therapy   radiation therapy   therapy but haven't started yet

Please go to C14a

Please go to C15 below

C14a. Why didn't you, or don't you, plan to have radiation therapy?
Please mark ALL that apply.

○ My doctor(s) did not discuss it with me

○ My doctor(s) said I didn't need it

○ My doctor(s) left it up to me and I chose not to

○ I was worried about side effects or complications

○ I was worried about the cost

○ It would have been too much of a burden on me or my family

○ Other (please explain): _
_ _

Please go to C18 on the next page

C15. How many total weeks of radiation treatments are planned?

○	○	○	○
1 week	2-4 weeks	5 weeks	6 or more weeks

C16. How was, or will, your radiation treatment be given? **Please mark <u>ALL</u> that apply.**

○	○	○	○
Using beams from outside my body	Using a balloon placed inside my breast	Using needles placed into my breast	I don't know how my radiation treatment was, or will be, given

C17. Which of the following areas were, or will be, treated with radiation? **Please mark <u>ALL</u> that apply.**

○	○	○	○
My whole breast	Only the part of the breast where my tumor was	The chest wall, after my mastectomy	The lymph node areas

<u>Hormonal Therapy</u>

C20. Hormonal therapy helps block estrogen from getting to cancer cells that may remain in the body. Hormonal therapy is sometimes called "anti-estrogen therapy" or "endocrine therapy." Examples include **tamoxifen**, **anastrozole** or Arimidex, **letrozole** or Femara, and **exemestane** or Aromasin.

<u>Have you</u> or <u>are you going to be</u> taking any of these medications? **Please mark <u>ONE</u>.**

○   Yes, I currently take one of these medications

○   Yes, I plan to take one of these medications in the future but haven't started yet

○   Yes, I took one of these medications before but no longer take it

○   No, I am not taking any of these medications right now and I am unsure whether or not I   should start

○   No, I have no plans to take any of these medications

4

Section D: Decision Making

D1. **In general,** please tell us how often you have these thoughts and feelings when you make decisions.

	Never	Rarely	Sometimes	Often	Always
a. I worry about making a bad decision	○	○	○	○	○
b. I struggle to decide what the right decision is	○	○	○	○	○
c. I get angry at myself when I have made a bad decision	○	○	○	○	○
d. I worry a lot about the outcomes of my decisions	○	○	○	○	○

D2. When making decisions about **how to treat my breast cancer**…

	Not at all	A little	Somewhat	Quite a bit	A lot
a. I weighed the pros and cons of all the treatment options	○	○	○	○	○
b. I feel like I really thought through all the issues important to the treatment decisions	○	○	○	○	○
c. I talked with others – family or friends – before making treatment decisions	○	○	○	○	○
d. I talked with other breast cancer patients before making treatment decisions	○	○	○	○	○
e. I spent time thinking about all of the treatment options	○	○	○	○	○

D3. When making decisions about **how to treat my breast cancer**…

	Not at all	A little bit	Somewhat	Quite a bit	Very much
a. I would like to have had more information	○	○	○	○	○
b. I would like to have participated more	○	○	○	○	○
c. I am satisfied with the amount of time I had	○	○	○	○	○
d. I am satisfied with the amount of involvement I had from family and friends	○	○	○	○	○

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D4. **When decisions were being made about your treatments**, how <u>important</u> was it to you
that your treatments…

	Not at all important	A little important	Somewhat important	Quite important	Very important
a. Reduced the need for more surgery	○	○	○	○	○
b. Allowed you to avoid side effects of treatment	○	○	○	○	○
c. Allowed you to avoid exposure to radiation	○	○	○	○	○
d. Required fewer trips back and forth for treatment visits	○	○	○	○	○
e. Did not make you feel bad about your body	○	○	○	○	○
f. Kept you from worrying about the cancer coming back	○	○	○	○	○
g. Allowed you to feel feminine	○	○	○	○	○
h. Were the most extensive possible	○	○	○	○	○
i. Were the least extensive possible	○	○	○	○	○
j. Allowed you to keep your original breast	○	○	○	○	○
k. Were what your partner/family wanted you to do	○	○	○	○	○
l. Were what your doctor wanted you to do	○	○	○	○	○
m. Were the same treatments that other women you know have received	○	○	○	○	○
n. Were the newest, most advanced treatments available	○	○	○	○	○
o. Had the shortest recovery time	○	○	○	○	○
p. Gave you peace of mind	○	○	○	○	○
q. Allowed you to avoid having follow-up mammograms	○	○	○	○	○
r. Did not require you to spend a lot of your own money	○	○	○	○	○
s. Had a lower possibility of complications	○	○	○	○	○
t. Allowed you to continue to care for your home and family	○	○	○	○	○
u. Allowed you to continue to work for pay	○	○	○	○	○

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D5. At the time that decisions were being made about your treatments, how much do you feel that your preferences were considered?

○	○	○	○	○
Not at all	Slightly	Moderately	Very much	Completely

Section E: How You Feel About Your Decisions

Please tell us how you feel about the decisions that were made for your breast cancer treatment. If your doctor did not offer you the test or treatment that is listed, please mark N/A for "Not applicable."

E1. Please rate the **amount of information** you had when the following decisions were made:

	Not enough		Just right		Too much	N/A
e. Whether or not to have radiation therapy	○	○	○	○	○	○

E2. I received enough information about the following topics:

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
d. The risk of my breast cancer coming back	○	○			

E3. How **satisfied** are you with the decision about…

	Not at all satisfied	A little satisfied	Somewhat satisfied	Quite satisfied	Totally satisfied	N/A
e. Whether or not to have radiation therapy	○	○	○	○	○	○

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Section H: Communicating with Your Doctors

	None of the time	A little of the time	Some of the time	Quite a bit of the time	All of the time
H1. When it came to getting treatment for breast cancer, I preferred to be told what to do	○	○	○	○	○
H2. When it came to getting treatment for breast cancer, I wanted <u>my doctor</u> to tell me what to do	○	○	○	○	○
H3. I preferred to make my <u>own</u> decisions about my treatments for breast cancer	○	○	○	○	○

Section I: Your Thoughts and Feelings

The questions below are important to help us better understand how women like you feel towards the end of treatment and the beginning of the recovery period. Please answer these questions the best way you can.

I1. For the question below, please <u>write in a number from 0% to 100%</u> where…

> 0% = you think there is absolutely no chance that your breast cancer will come back in the breast or the area around it in the next 10 years, and

> 100% = you think it is absolutely certain that your breast cancer will come back in the breast or the area around it in the next 10 years

After receiving all the planned treatments, what do you think is the chance that your cancer will come back <u>in the breast or the area around it</u> within 10 years?

_____ % (0 to 100)

I2. After receiving all of the planned treatments, do you consider the chance of your cancer coming back <u>in the breast or the area around it</u> to be:

○	○	○	○	○
Very low	Low	Moderate	High	Very high

I3. Next, we would like to ask you for your opinion on the chances of your cancer <u>spreading to other parts of your body</u>. For the question below, please <u>write in a number from 0% to 100%</u> where…

> 0% = you think there is absolutely no chance that your breast cancer will spread to other parts of your body in the next 10 years, and

> 100% = you think it is absolutely certain that your breast cancer will spread to other parts of your body in the next 10 years

After receiving all the planned treatments, what do you think is the chance that your cancer will <u>spread to other parts of your body</u> within 10 years?

_____ % (0 to 100)

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I3a. Why did you pick this number?

_____

_____

_____

I4. After receiving all the planned treatments, do you consider the chance of your cancer <u>spreading to other parts of your body</u> to be:

○	○	○	○	○
Very low	Low	Moderate	High	Very high

I5. How much did your doctors discuss with you the chance of your cancer coming back?

○	○	○	○	○
Not at all	A little bit	Somewhat	Quite a bit	A lot

I6. When your doctors discussed the chance of your cancer coming back, did they use…

○	○	○	○
Only words (For example, "small chance")	Only numbers (For example, "8% chance")	Both words and numbers	My doctors did not discuss the risk with me

I7. Compared to other women with similar breast cancer and treatment, how likely do you think it is that your breast cancer will come back?

○	○	○	○	○
Much less likely	Less likely	About the same	More likely	Much more likely

I8. **In the past month,** how often have you worried about your cancer coming back?

○	○	○	○	○
Almost never	Rarely	Sometimes	Often	Almost always

I9. **During the past month,** how often has <u>worrying about your cancer coming back</u>…

	Almost never	Rarely	Sometimes	Often	Almost always
a. Made you feel upset?	○	○	○	○	○

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b. Made it difficult for you to carry out your usual daily activities at home or at work?   ○   ○   ○   ○   ○

c. Made you feel distant from family and friends?   ○   ○   ○   ○   ○

I10. When you see your cancer doctors for follow-up care, how often do they ask if you are worried about your breast cancer coming back?

○	○	○	○	○
Almost never	Rarely	Sometimes	Often	Almost always

Section K: Home and Work

K15. How much do you worry about current or future financial problems as a result of your breast cancer and treatments?

○	○	○	○	○
Not at all	A little	Somewhat	Quite a bit	A lot

Section L: Language and Other Preferences

L1. What language do you <u>primarily</u> speak? **Please mark ONE.**

○ English   ○ Mandarin   ○ Cantonese   ○ Korean

○ Spanish   ○ Vietnamese   ○ Japanese   ○ Other (please explain): _ _ _ _ _ _ _ _ _

L2. In general, what language(s) do you <u>read and speak</u>?

○	○	○	○	○
Only English	English better than any other language	Both equally	Another language better than English	Only another language

L3. What language do you usually <u>speak at home</u>?

○	○	○	○	○
Only English	More English than any other language	Both equally	Another language more than English	Only another language

L4. In what language do you usually <u>think</u>?

○	○	○	○	○
Only English	More English than any other language	Both equally	Another language more than English	Only another language

L5. What language do you usually <u>speak with your friends</u>?

○	○	○	○	○
Only English	More English than	Both equally	Another language	Only another

10

any other language   more than English   language

Section M: A Few More Questions

M1. Today's date is: _____ / _____ / _____
                                            month   day   year

M2. About how tall are you?   _____feet _____inches   *or*   _____meters

M3. **At the time of your breast cancer diagnosis,** about how much did you weigh?

_____pounds   *or*   _____kilograms

M4. **Before your breast surgery,** what was your bra cup size?

○ A   ○ D

○ B   ○ DD

○ C   ○ Other (please explain): _ _ _ _ _ _ _ _ _ _

M5. **In the 12 months before your diagnosis with breast cancer,** what was your experience with your menstrual periods?

○ I had no menstrual periods in the 12 months before my breast cancer diagnosis

○ I had regular (or the usual timing of) menstrual periods in the 12 months before my breast cancer diagnosis

○ I had a change in the timing of menstrual periods in the 12 months before my breast cancer diagnosis

M6. **In the 12 months before your breast cancer diagnosis,** did you experience hot flashes or night sweats at any time – even once?

○   ○
Yes   No

M7. What is your birth date?   _____ / _____ / _____
                                                    month   day   year

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M8. **When you were diagnosed with breast cancer,** what was your marital status?

◯ Married   ◯ Living with partner

◯ Divorced   ◯ Widowed

◯ Separated   ◯ Never married

M9. What is the highest level of education you have completed?

◯ No high school   ◯ Some college or technical school

◯ Some high school   ◯ College graduate (Bachelor's degree)

◯ High school graduate or G.E.D.   ◯ Graduate degree or higher

M10. Are you of Hispanic, Latino, or Spanish origin?

◯ Yes, Mexican, Mexican-American, or Chicano

◯ Yes, Puerto Rican

◯ Yes, Cuban

◯ Yes, another Hispanic, Latino, or Spanish origin (please explain): _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

◯ No

M11. Are you of Jewish descent?

◯	◯	◯
Yes	No	Don't know

M12. For how many years have you lived in the United States? _____ years

M13. In what country were you born?   _

◯ Don't know

M14. In what country was your mother born?   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

◯ Don't know

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M15. In what country was your father born? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

◯ Don't know

M16. Which of the following best describes your race? **Please mark <u>ALL</u> that apply**.

◯ White   ◯ Chinese

◯ Black or African-American   ◯ Filipino

◯ American Indian or Alaska Native   ◯ Japanese

◯ Native Hawaiian or other Pacific Islander   ◯ Korean

◯ Asian Indian   ◯ Vietnamese

◯ Other Asian (please explain): _

◯ Other Race (please explain): _

Section N: Your Doctors

N1. We want to learn from doctors about better ways to communicate with patients and their families about treatment decisions. The information you provide below will help us contact the doctors who treat patients with breast cancer. The doctors may be surveyed about their treatment practices. Importantly, your answers will <u>never be shared</u> with any doctors and your personal information including your name will <u>never be used</u> in any communication.

a. **Surgeon** who performed your <u>first</u> lumpectomy or mastectomy:

Doctor's last name: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _   First name: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Name of hospital or clinic: _

City: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

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Cancer

Section A: About You and Your Practice

A1. At how many hospitals do you see patients?

    ○ 1   ○ 2   ○ 3 or more

A2. Does your primary practice have…

	Yes	No
a. Residents and/or fellows	○	○
b. Cancer care navigators for newly-diagnosed breast cancer patients to help them with treatment decision making	○	○

A3. **In the past 12 months,** approximately what percentage (%) of your <u>new</u> patients were…

    a. _____%   Breast cancer (including DCIS) patients

    b. _____%   Other (non-breast) oncology patients

    c. _____%   Patients without cancer

    100 %   **Total for the past 12 months**

A4. **In the past 12 months,** how many <u>new</u> patients who were diagnosed with <u>breast cancer</u> have you seen? (Please include patients who came to you for a second opinion.)

    ○ None   ○ 11 – 20   ○ 51 – 100

    ○ 1 – 10   ○ 21 – 50   ○ More than 100

A5. **In the past 12 months,** approximately what percent of your newly diagnosed breast cancer patients did you discuss in a multidisciplinary meeting (e.g., a tumor board) to get input on the treatment plan?

    ○ 0%   ○ 10 – 25%   ○ More than 50%

    ○ 1 – 9%   ○ 26 – 50%

Section I: Radiation Therapy

I3. How involved are you in the selection of adjuvant radiation therapy approach in your post-lumpectomy patients?

○	○	○	○	○
Not at all involved	Slightly involved	Somewhat involved	Moderately involved	Very involved

Section L: A Few More Questions

L1. How many years have you been in practice since completing your residency or fellowship training?

_____ years

L2. Please PRINT the name of the
location where you practice the most: _____

L3. How old are you? _____ years

L4. What is your gender?

◯	◯
Male	Female

L5. Which of the following best describes your race? **Please mark ALL that apply.**

◯ White

◯ Black or African-American

◯ American Indian or Alaska Native

◯ Native Hawaiian or other Pacific Islander

◯ Asian Indian

◯ Other Asian (please explain): _

◯ Other Race (please explain): _

◯ Chinese

◯ Filipino

◯ Japanese

◯ Korean

◯ Vietnamese

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M3. Which **radiation oncologists** do you interact with <u>the most</u> when you are uncertain about the **management of your newly diagnosed patients with breast cancer?** Please **PRINT** the first and last names of up to 2 radiation oncologist whom you would approach <u>to get advice</u>.

<u>Do you share patients via a tumor board?</u>

<u>Name</u>	<u>Hospital / Institution / Practice</u>	Yes	No
_____	_____	○	○
_____	_____	○	○

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