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EPIDEMIOLOGY

Impact of pre-diagnosis depressive symptoms and health-related quality of life on treatment choice for ductal carcinoma in situ and stage I breast cancer in older women

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Abstract

Purpose To examine whether pre-diagnosis patient-reported health-related quality of life (HRQOL) and depressive symptoms are associated with local treatment for older women with ductal carcinoma in situ (DCIS) and stage I breast cancer (BC).

Methods Using the SEER-MHOS dataset, we identified women ≥ 65 years old with DCIS or stage I BC diagnosed 1998–2011 who completed surveys ≤ 24 months before diagnosis. Depressive symptoms were measured by major depressive disorder (MDD) risk and HRQOL was measured by Physical and Mental Component Summary scores (PCS and MCS, respectively) of the SF-36/VR-12. Associations with treatment choice (breast-conserving surgery [BCS] and radiation therapy [RT], BCS alone, mastectomy) were assessed with multivariable multinomial logistic regression, controlling for patient characteristics.

Results We identified 425 women with DCIS and 982 with stage I BC. Overall, 20.4% endorsed depressive symptoms placing them at risk for MDD pre-diagnosis; mean MCS and PCS scores were 52.3 (SD = 10.1) and 40.5 (SD = 11.5), respectively. Among women with DCIS, those at risk for MDD were more likely to receive BCS (adjusted odds ratio [AOR] 2.04, 95% CI 1.04–4.00, $p = 0.04$) or mastectomy (AOR 1.88, 95% CI 0.91–3.86, $p = 0.09$) compared to BCS + RT. For DCIS, MCS score was not associated with treatment; higher PCS score was associated with decreased likelihood of receiving mastectomy versus BCS + RT (AOR 0.71 per 10-point increase, 95% CI 0.54–0.95, $p = 0.02$). For BC, none of the measures were significantly associated with treatment.

Conclusion Older women at risk for MDD before DCIS diagnosis were less likely to receive RT after BCS, compared to BCS alone or mastectomy.

Keywords Quality of life · Depression · DCIS · Breast cancer · Local therapy

Introduction

Breast cancer (BC) is the most common malignancy diagnosed in women in the United States, where nearly 25% of cases are ductal carcinoma in situ (DCIS) [1–3]. Approximately half of BC diagnoses occur among women age 65 and older, a proportion that is projected to grow [4]. As such, optimizing healthcare quality and utilization among elderly women is of increasing societal importance.

The majority of women with DCIS and invasive BC are eligible for three local therapy options: mastectomy or breast-conserving therapy consisting of breast-conserving surgery (BCS) with or without radiation therapy (RT) [5, 6]. For women with DCIS treated with BCS, randomized trials have consistently demonstrated that postoperative RT reduces the risk of recurrence without impacting survival [7]. Likewise, for older women with stage I hormone

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receptor-positive invasive breast cancer receiving endocrine therapy, RT improves local–regional control without providing a survival benefit [8–11]. In the absence of an impact on survival, treatment decisions should be tailored to patient preferences for other outcomes such as risk of relapse, toxicity, and potential impact on health-related quality of life (HRQOL).

Depression is the most common affective disorder among women with BC. Major depressive disorder (MDD) is associated with negative impacts on quality of life and BC outcomes [12–20], and with reduced acceptance and adherence to adjuvant chemotherapy [21, 22]. Nevertheless, the effect of MDD on the clinical decision-making process remains poorly understood, particularly when considering potential effects of underlying depressive symptoms that predate the diagnosis of BC. Studies that have sought to describe and account for baseline HRQOL and comorbid mood disorders on BC treatment decisions have been limited by their need to define participants' baseline states retrospectively or at the time of diagnosis, when they may be most distressed.

We sought to examine whether prospectively assessed, pre-diagnosis patient-reported HRQOL and depressive symptoms are associated with local therapy decisions for DCIS and stage I BC among older women captured in the Surveillance, Epidemiology and End Results and Medicare Health Outcomes Survey (SEER-MHOS) linked dataset.

Methods

SEER-MHOS dataset

The SEER-MHOS database links clinical data from the Surveillance, Epidemiology and End Results (SEER) program of cancer registries with HRQOL data from the Medicare Health Outcomes Survey (MHOS) to provide detailed information about Medicare beneficiaries diagnosed with cancer [23]. The SEER program currently collects data from population-based cancer registries covering approximately 30 percent of the United States population [24]. Since 1998, the MHOS, which includes self-reported socioeconomic, demographic, comorbidity, health and functional status information, has been administered annually to randomly selected Medicare managed care beneficiaries [23]. Selected participants who remain in the same managed care plan receive follow-up surveys every 2 years [23]. Response rates range from 52.7 to 73.3% for baseline surveys and from 71.9 to 87% for follow-up surveys. The SEER-MHOS dataset includes 13,480 beneficiaries with BC diagnosed between 1998 and 2011. This study was determined to be exempt from review by the Dana-Farber/Harvard Cancer Center Institutional Review Board.

Cohort assembly

Included participants were women of age 65 years and older with pathologically confirmed primary DCIS (AJCC Stage 0) or stage I BC diagnosed between 1998 and 2011 who underwent definitive surgical treatment with either BCS or mastectomy, and completed the MHOS within 24 months prior to diagnosis (Fig. 1). We chose this time point to correspond to the frequency of survey administration to maximize the number of patients, but minimize the number that had completed the survey more than once. Individual participants contributed MHOS responses from only a single time point within 24 months prior to the diagnosis date recorded in SEER; if participants completed multiple surveys within this timeframe, then the survey completed closest to diagnosis was used. Participants were excluded if they had a prior cancer diagnosis including BC, or had mastectomy followed by RT. Because SEER does not provide chemotherapy data, we excluded women with ER-negative disease

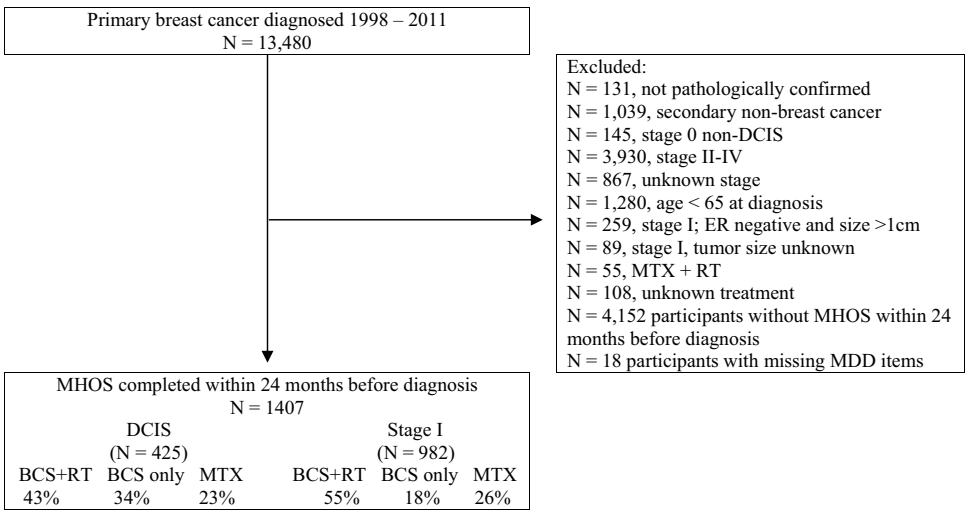

Fig. 1 Flow diagram of cohort selection. *DCIS* ductal carcinoma in situ, *BCS* breast-conserving surgery, *RT* radiation therapy, *MTX* mastectomy, *MDD* major depressive disorder

and tumor size greater than 1 cm, who are more likely to receive chemotherapy.

SEER-MHOS measures

Predictor variables

Individuals were categorized as having depressive symptoms if they were positive for major depressive disorder (MDD) according to an algorithm of MHOS responses derived from the Diagnostic Interview Schedule [25, 26]. Participants were determined to be at risk for MDD if they met one of the two criteria: (1) answered 'yes' to the question 'in the past year, have you had 2 weeks or more during which you felt sad, blue or depressed; or when you lost interest or pleasure in things that you usually cared about or enjoyed?' or (2) answered 'yes' to both 'in the past year, have you felt depressed or sad much of the time?' and to 'have you ever had 2 years or more in your life when you felt depressed or sad most days, even if you felt okay sometimes?' and also responded at least 'some of the time' to the question 'how much of the time during the past 4 weeks have you felt downhearted and blue?'. Utility of this algorithm in identifying individuals at high risk for MDD has been previously demonstrated [25, 26].

HRQOL was measured using the Physical Component Summary (PCS) and Mental Component Summary (MCS) scores from the Medical Outcomes Study Short-Form 36 Health Status Survey (SF-36) [27] until 2005, and the Veterans Rand-12 (VR-12) [28] after 2005. PCS and MCS data from the SF-36 and VR-12 have been re-scored to be equivalent, and imputed scores are available within the dataset. Higher scores reflect better HRQOL, with differences of 5 points and greater established as clinically meaningful [29].

All three predictor variables were extracted from MHOS completed within 24 months prior to diagnosis.

Statistical analysis

Analyses were conducted separately for participants with DCIS and for those with stage I BC. MDD risk was analyzed as a dichotomous variable (yes/no). PCS and MCS scores were analyzed as continuous variables, with odds ratios (OR) presented per 10-point increase, corresponding to one standard deviation increase. Associations between patient characteristics and MDD risk were examined using Fisher's exact test, while analysis of variance was used to assess associations between patient characteristics and mean MCS or PCS scores.

Univariate and multivariable multinomial logistic regression were used to assess associations between individual predictors of interest (MDD risk, PCS, and MCS) and treatment received. The multivariable models adjusted for all pre-specified covariates (Table 1) regardless of statistical significance on univariate analyses. Statistical analyses were conducted using Stata software (version 13.1; Stata, College Station, TX).

Results

Participant characteristics

We identified 425 women with DCIS and 982 with stage I BC who completed the MHOS within 24 months prior to their diagnosis date between 1998 and 2011 (Table 1). The median age at diagnosis was 74 years (range 65–93). Most participants reported having at least two comorbid conditions (DCIS 67%; stage I BC 70%).

Among those with DCIS, 43% were treated with BCS and RT, 34% with BCS only, and 23% with mastectomy. For women with stage I BC, treatment consisted of BCS and RT for 55%, BCS only for 18%, and mastectomy for 26%.

Association between pre-diagnosis MDD risk, MCS and PCS scores, and treatment received for DCIS

Among older women with DCIS, 20% ($n=83$) were at risk for MDD in the 24 months preceding diagnosis based on self-reported symptoms. MDD risk was significantly associated with self-reported race and ethnicity, income, and number of comorbidities (Supplemental Table 1). Of DCIS participants at risk for MDD, 39% ($n=32$) received BCS only, 30% ($n=25$) received BCS and RT, and 31% ($n=26$) received mastectomy (Fig. 2). In contrast, among those not at risk for MDD, the most frequent treatment was BCS and RT (46%, $n=159$), followed by BCS only (33%, $n=112$) and mastectomy (21%, $n=71$; Fig. 2). Pre-diagnosis MDD risk was associated with significantly increased odds of receiving BCS only (82% increased odds of BCS only versus BCS and RT, and 133% increased odds of mastectomy versus BCS and RT; Table 2). After adjusting for the pre-specified covariates, older women at risk for MDD remained more likely to receive BCS only (OR 2.04, 95% confidence interval [CI] 1.04–4.00, $p=0.04$) and mastectomy (OR 1.88, 0.91–3.86, $p=0.09$) compared to BCS and RT, although the latter comparison was no longer statistically significant (Fig. 3).

The mean pre-diagnosis MCS score among all older women with DCIS was 52.7 (standard deviation [SD] = 9.7). MCS score was significantly associated with self-reported race and ethnicity, education, income, proxy survey completion, and number of comorbidities (Supplemental Table 1). When stratified by type of treatment received, participants with DCIS treated with BCS and RT had a mean MCS score of 53.5 (SD = 9.4), those treated with BCS only had a mean

Table 1 Participant characteristics

Characteristics	Group, no. (%)	
	DCIS	Stage I breast cancer
No. of participants	425	982
Age at diagnosis		
65–69	101 (24)	190 (19)
70–74	133 (31)	309 (31)
75–79	106 (25)	244 (25)
≥ 80	85 (20)	239 (24)
Race and ethnicity		
White	292 (69)	771 (79)
Asian or Pacific Islander	40 (9)	75 (8)
Black	46 (11)	66 (7)
Hispanic	34 (8)	55 (6)
Other/unknown	13 (3)	15 (2)
Smoking status		
No	296 (70)	709 (72)
Yes	35 (8)	75 (8)
Unknown	94 (22)	198 (20)
Marital status		
Married	197 (46)	462 (47)
Not married	219 (52)	495 (50)
Unknown	9 (2)	25 (3)
Education		
Less than high school	90 (21)	209 (21)
High school graduate	276 (65)	596 (61)
College graduate	53 (12)	156 (16)
Unknown	6 (1)	21 (2)
Income		
< $20,000	145 (34)	305 (31)
$20,000–39,000	101 (24)	255 (26)
$40,000–79,999	62 (15)	161 (16)
≥ $80,000	16 (4)	46 (5)
Unknown	101 (24)	215 (22)
Proxy completed survey		
No	381 (90)	884 (90)
Yes	17 (4)	43 (4)
Unknown	27 (6)	55 (6)
Number of comorbidities		
0–1	141 (33)	293 (30)
2	92 (22)	230 (23)
≥ 3	192 (45)	459 (47)
Geographic region		
Northeast	74 (17)	127 (13)
South	80 (19)	160 (16)
Midwest	32 (8)	99 (10)
West	239 (56)	596 (61)
Year of diagnosis		
1998–2002	138 (32)	345 (35)
2003–2007	94 (22)	247 (25)
2008–2011	193 (45)	390 (40)
Hormone receptor status		
ER or PR positive	181 (43)	862 (88)
ER and PR negative	41 (10)	44 (4)
Unknown	203 (48)	76 (8)
Grade		
Well differentiated	48 (11)	347 (35)
Moderately differentiated	141 (33)	439 (45)
Poorly differentiated/undifferentiated	161 (38)	135 (14)
Unknown	75 (18)	61 (6)
Tumor size[a]		
≤ 2 cm	266 (63)	982 (100)
> 2–4 cm	35 (8)	–
> 4 cm	15 (4)	–
Unknown	109 (26)	–

DCIS ductal carcinoma in situ

[a]All Stage I breast cancer patients had tumor size ≤ 1 cm in order to restrict inclusion to individuals least likely to receive chemotherapy

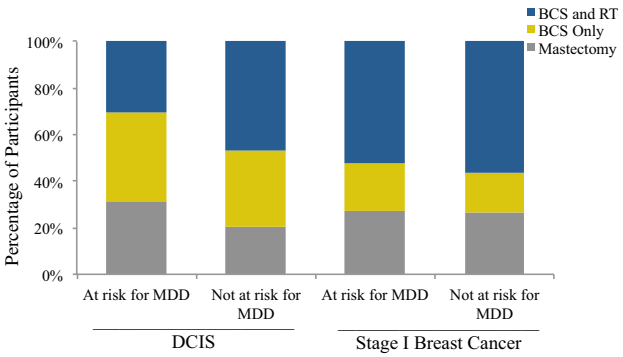

Fig. 2 Distribution of treatment received for participants with DCIS and Stage I breast cancer among those at risk for MDD (DCIS, $n = 83$; Stage I, $n = 204$) versus those not at risk for MDD (DCIS, $n = 342$; Stage I, $n = 778$) within 24 months prior to diagnosis. *DCIS* ductal carcinoma in situ, *BCS* breast-conserving surgery, *RT* radiation therapy, *MDD* major depressive disorder risk

MCS score of 52.6 (SD = 9.8), and those treated with mastectomy had a mean MCS score of 51.3 (SD = 10.1). There were no significant associations between pre-diagnosis MCS score and type of treatment received for DCIS (Table 2; Fig. 3).

The mean pre-diagnosis PCS score for all participants with DCIS was 41.0 (SD = 11.4). PCS score was significantly associated with education, income, number of comorbidities, and tumor grade (Supplemental Table 1). When stratified by type of treatment received, the mean PCS score

Table 2 Associations between pre-diagnosis MDD risk, MCS and PCS scores, and treatment received

Stage	Multinomial outcome	Pre-diagnosis predictor	Unadjusted			Adjusted[b]		
			OR	95% CI	*p*	OR	95% CI	*p*
DCIS, Stage 0 ($n=425$)	BCS only versus BCS and RT	At risk for MDD	1.82	1.02, 3.23	0.04	2.04	1.04, 4.00	0.04
		SF-12 MCS[a]	0.90	0.72, 1.13	0.37	0.98	0.74, 1.30	0.89
		SF-12 PCS[a]	0.83	0.68, 1.02	0.07	0.85	0.66, 1.10	0.22
	Mastectomy versus BCS and RT	At risk for MDD	2.33	1.26, 4.31	0.007	1.88	0.91, 3.86	0.09
		SF-12 MCS[a]	0.79	0.62, 1.02	0.07	0.91	0.67, 1.23	0.53
		SF-12 PCS[a]	0.66	0.53, 0.83	< 0.001	0.71	0.54, 0.95	0.02
Stage I ($n=982$)	BCS only *v*. BCS and RT	At risk for MDD	1.25	0.83, 1.87	0.28	1.29	0.82, 2.04	0.27
		SF-12 MCS[a]	0.92	0.78, 1.09	0.34	0.98	0.81, 1.18	0.80
		SF-12 PCS[a]	0.79	0.68, 0.91	0.001	0.84	0.70, 1.00	0.06
	Mastectomy versus BCS and RT	At risk for MDD	1.09	0.76, 1.57	0.63	1.03	0.69, 1.53	0.89
		SF-12 MCS[a]	0.91	0.79, 1.05	0.19	0.93	0.79, 1.09	0.35
		SF-12 PCS[a]	0.93	0.81, 1.06	0.25	1.00	0.85, 1.16	0.96

Separate multinomial logistic regression models were fit for each predictor of interest

MDD major depressive disorder, *MCS* mental component summary, *PCS* physical component summary, *DCIS* ductal carcinoma in situ, *RT* radiation therapy, *BCS* breast-conserving surgery

[a]Per 10-point increase in MCS or PCS scores, corresponding with one standard deviation increase; higher MCS and PCS scores reflect better HRQOL

[b]Adjusted for age at diagnosis, race and ethnicity, smoking status, marital status, education, income, survey completed by proxy, number of comorbidities, geographic region, year of diagnosis, hormone receptor status, and grade. For DCIS patients, the models also adjusted for tumor size. Tumor size was not included in the model for patients with stage I disease because all had tumor size ≤ 1 cm by study design

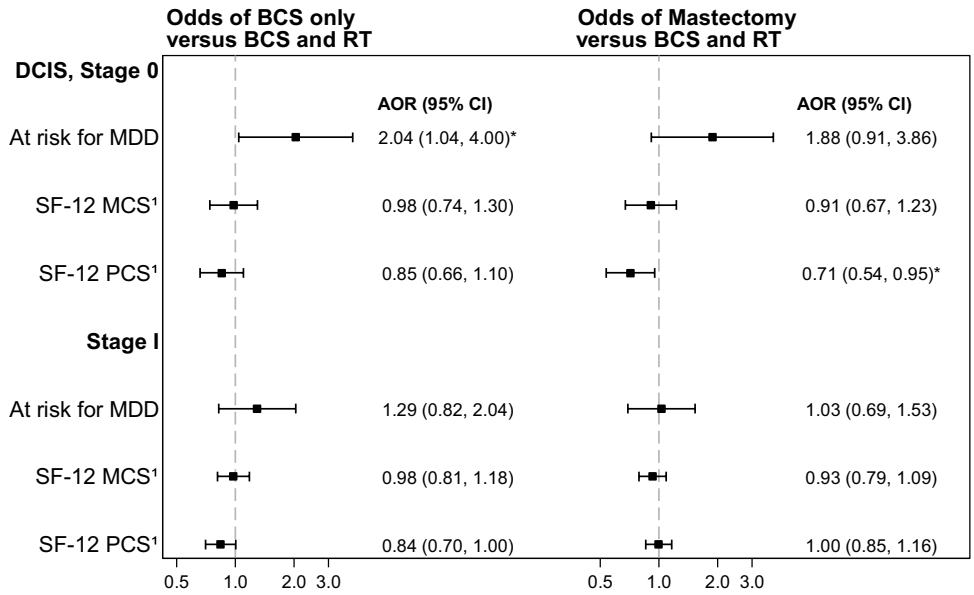

Fig. 3 Multivariable multinomial logistic regression for associations between pre-diagnosis MDD risk, MCS, PCS, and treatment received for DCIS ($N=425$) and Stage I ($N=982$) breast cancer. Separate models were fit for each predictor of interest. The squares represent odds ratios adjusted for pre-specified covariates of age at diagnosis, number of comorbidities, year of diagnosis, hormone receptor status, grade, and tumor size (DCIS only; tumor size was not included in the model for patients with stage I disease because all had tumor size ≤ 1 cm by study design). 95% confidence intervals are represented by the error bars. *DCIS* ductal carcinoma in situ, *BCS* breast-conserving surgery, *RT* radiation therapy *MDD* major depressive disorder risk, *AOR* adjusted odds ratio. *$p<0.05$. [1]Per 10-point increase in MCS or PCS, corresponding with a standard deviation increase; higher MCS and PCS scores reflect better HRQOL

was 42.9 (SD = 11.2) among older women treated with BCS and RT, 40.7 (SD = 11.4) for those undergoing BCS only, and 37.6 (SD = 11.1) for those undergoing mastectomy. We observed that higher PCS score was associated with significantly decreased likelihood of receiving mastectomy versus BCS and RT (adjusted OR 0.71 per 10-point increase in PCS score, 95% CI 0.54–0.95, $p = 0.02$; Table 2; Fig. 3).

Association between pre-diagnosis MDD risk, MCS and PCS scores, and treatment received for stage I BC

Among older women with stage I BC, 21% (n = 204) were at risk for MDD within 24 months before diagnosis. MDD risk was significantly associated with self-reported race and ethnicity, marital status, education, income, proxy survey completion, and number of comorbidities (Supplemental Table 2). Of those at risk for MDD, 52% ($n = 107$) received BCS and RT, 21% ($n = 42$) received BCS only, and 27% ($n = 55$) were treated with mastectomy (Fig. 2). Among participants not at risk for MDD, 56% ($n = 436$) received BCS and RT, 18% ($n = 137$) received BCS only, and 26% ($n = 205$) were treated with mastectomy (Fig. 2). We observed no significant associations between pre-diagnosis MDD risk and type of treatment received (Table 2; Fig. 3).

The mean pre-diagnosis MCS score for all participants with stage I BC was 52.1 (SD = 10.2). MCS score was significantly associated with race and ethnicity, marital status, education, income, proxy survey completion, and number of comorbidities (Supplemental Table 2). When stratified by type of treatment received, the mean pre-diagnosis MCS score was 52.6 (SD = 9.6) for participants treated with BCS and RT, 51.7 (SD = 11.4) for those treated with BCS only, and 51.6 (SD = 10.6) for those who underwent mastectomy. Similar to participants with DCIS, we observed no significant associations between pre-diagnosis MCS and treatment received for stage I BC (Table 2; Fig. 3).

The mean pre-diagnosis PCS score for all participants with stage I BC was 40.2 (SD = 11.5). PCS score was significantly associated with age, marital status, education, income, proxy survey completion, number of comorbidities, and geographic region (Supplemental Table 2). When stratified by type of treatment received, the mean PCS score was 41.1 (SD = 11.5) for participants who underwent BCS and RT, 37.9 (SD = 12.0) for those treated with BCS only, and 40.1 (SD = 11.5) for those treated with mastectomy. For older women with stage I BC, higher PCS scores were associated with decreased odds of receiving BCS only versus BCS and RT (unadjusted OR 0.79 per 10-point increase in PCS, 95% CI 0.68–0.91); however, after adjustment, the association did not meet conventional levels of statistical significance (adjusted OR = 0.84 per 10-point increase in PCS, 95% CI 0.70–1.00, $p = 0.06$; Table 2; Fig. 3).

Discussion

Our results reveal that older women at risk for depression based on self-reported symptoms within 24 months preceding DCIS diagnosis were less likely to receive BCS and RT versus BCS only or mastectomy, compared to older women not at risk for MDD. This relationship remained significant after adjusting for sociodemographic and tumor characteristics. Conversely, among older women with favorable stage I invasive BC, for whom the three local therapy options are likewise expected to offer comparable survival outcomes, treatment choice was not significantly associated with pre-diagnosis depressive symptoms. This study is unique in its ability to examine the relationship between treatment and patient-reported depressive symptoms or HRQOL assessed *prior* to patients' awareness of a breast neoplasm diagnosis.

Women with newly diagnosed BC face a series of complex local therapy decisions, which are ideally both informed and value-concordant [30]. As such, there has been considerable interest in identifying predictors of decisional preference and in developing decisional aids to improve individualized care [31–34]. Prior studies have demonstrated associations between local treatment preference and patient age, family history of BC, level of concern regarding breast loss, and concern for local recurrence [35–38]. The importance of the counseling process and medical culture on treatment decisions has also been highlighted, with demonstrated associations between local therapy and patient perceptions regarding their surgeon's preference, terminology used (for DCIS), geographic location, and the surgeon's BC volume and academic affiliation [36–39].

Although depression is associated with greater BC mortality, higher complication rates, reduced adherence, and increased health care cost, the impact of pre-existing depression on the treatment decision-making process itself is not well understood [40–43]. The observed prevalence of pre-diagnosis depressive symptoms in our cohort was consistent with that reported for major and non-major depression among older Americans [40, 44–49]. Important challenges exist in studying the effects of depression on treatment preference among older women, including the diagnostic challenge for general practitioners in differentiating depression from other psychological, cognitive, or social problems in the elderly [50, 51]. Additionally, an individual's gender, culture and ethnic background may influence differential expressions of depression and further complicate diagnosis [52–54]. As such, patient-reported depressive symptoms, as assessed in the present study, could represent a more sensitive measure of clinically relevant mood disturbances not detected by practitioners or not meeting criteria for a diagnosis of major depression.

Furthermore, considerations regarding timing of measurement for depression or HRQOL in relation to diagnosis impose additional complexity. Measures of depressive symptoms and HRQOL obtained close to the time of BC or DCIS diagnosis may reflect acute distress, which could have a different impact on treatment preference than chronic hardship. Because access to patients prior to the time of diagnosis is inherently limited in the setting of convenience sampling study designs, data addressing the impact of pre-diagnosis depression and HRQOL on treatment decisions are limited. One available study examined effects of pre-diagnosis depression on BC treatment among older women diagnosed between 1993 and 1996 using claims data [41]. Goodwin and colleagues found that women with a diagnosis of depression coded prior to their BC diagnosis were less likely to receive definitive therapy [41]. The effect of pre-existing depression on treatment according to stage (DCIS versus invasive breast cancer) was not reported [41]. Furthermore, definitive initial therapy was defined as receipt of either mastectomy or BCS and RT within 4 months from diagnosis, with BCS alone considered to be suboptimal treatment even for DCIS and favorable stage I disease [41]. Our study extends these findings by demonstrating an association between pre-diagnosis depression and decreased odds of receiving BCS and RT compared to surgery alone (BCS only or mastectomy) among older women with DCIS.

There are several mechanisms by which depression may influence local therapy choice. Depression may impact cognition, affecting decisional preferences and interpretation of risks and benefits [55–58]. Depressive symptoms may also be associated with limitations in social support or other patient-specific factors mediating preferences. Alternatively, recognizing depressive symptoms in patients may influence the way physicians present treatment options by mediating interpretations of patient values, likelihood of adherence, and treatment tolerability [59, 60].

Interestingly, the association between pre-diagnosis depression and reduced likelihood of receiving BCS and RT was observed only for older women with DCIS, and not stage I BC. This may reflect greater clinical equipoise towards BCS and RT versus BCS only as treatment options for DCIS, as highlighted by the more comparable use of each approach among participants with DCIS compared to stage I BC. Furthermore, our cohort includes patients diagnosed before the initial publication of the Cancer and Leukemia Group B (CALGB) C9343 trial and inclusion of RT omission as an option for older women undergoing BCS within the National Comprehensive Cancer Network BC guidelines [61, 62]. Nevertheless, use of BCS only among this population has been slow to disseminate into clinical care [63–65]. Consequently, the lack of influence of pre-diagnosis depression on treatment for stage I BC may have been mediated by reduced perception and presentation of the three treatment options as comparable alternatives. Our study has several limitations. First, the analysis assumes cohort participants were candidates for all three therapeutic options. We were not able to control for unmeasured factors that impact optimal candidacy for breast-conserving surgery, including presence of multicentric disease or diffuse calcifications, inadequate margins, or expected cosmesis (breast relative to tumor size) [66]. Furthermore, although the C9343 results are generalizable only to women with stage I BC prescribed tamoxifen following BCS, endocrine therapy use is not recorded in SEER-MHOS [8]. Finally, the SF-36 and VR-12 are generic instruments that may not be sufficiently sensitive to detect more subtle, but meaningful variations in baseline mental or physical functioning that could influence treatment preferences. This may, at least in part, explain why association between treatment choice and the depressive symptom metric used in this study did not translate into significant associations with pre-diagnosis MCS score.

In conclusion, depressive symptoms reported by older women within 2 years prior to DCIS diagnosis are associated with local therapy decisions. More research is needed to further explore potential mechanisms by which depression may influence DCIS treatment decisions, and whether these decisions have implications for long-term psychological health and satisfaction with treatment outcomes. This knowledge may, in turn, provide opportunity to develop strategies for enhancing supportive resources and physician communication during counseling, with the goal of improving quality of care and of reducing disparities in breast cancer outcomes among individuals with mental illness.

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Compliance with ethical standards

Conflict of interest None of the authors have any conflict of interest related to the subject matter presented.

Ethical approval This survey study was approved by the Dana-Farber/Harvard Cancer Center (DFCI/HCC) IRB (Protocol #12–420). This article does not contain any studies with animals.

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