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Do depressed newly diagnosed cancer patients differentially benefit from nurse navigation?

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Abstract

Objective—To examine whether the effects of a nurse navigator intervention for cancer vary with baseline depressive symptoms.

Method—Participants were enrolled in a randomized controlled trial of a nurse navigation intervention for patients newly diagnosed with lung, breast or colorectal cancer (N=251). This exploratory analysis used linear regression models to estimate the effect of a nurse navigator intervention on patient experience of care. Models estimated differential effects by including interactions between randomization group and baseline depressive symptoms. Baseline scores on the 9-item Patient Health Questionnaire (PHQ) were categorized into 3 groups: no depression (PHQ=0-4, N=138), mild symptoms of depression (PHQ=5-9, N=76); and moderate to severe symptoms (PHQ= 10 or greater, N=34). Patient experience outcomes were measured by subscales of the Patient Assessment of Chronic Illness Care (PACIC) and subscales from an adaptation of the Picker Institute's patient experience survey at 4-month follow-up.

Results—With the exception of the PACIC subscale of delivery system/ practice design, interaction terms between randomization group and PHQ-9 scores were not statistically significant.

Conclusions—The intervention was broadly useful; we found it was equally beneficial for both depressed patients and patients who were not significantly depressed in the first four months post-diagnosis. However, because of the small sample size we cannot conclude with certainty that patients with depressive symptoms did not differentially benefit from the intervention.

Keywords

depression; cancer; oncology; navigation

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Background

People with medical illnesses are at higher risk for depression. Depression is a burdensome and destructive condition in and of itself. In the context of newly diagnosed cancer, significant depressive symptoms may impair patients' ability to cope with the illness, and to follow treatment and self-management regimens that may affect cancer outcomes. In general medical populations the prevalence of major depression is approximately 5-10%¹⁻³. Studies using conservative definitions of major depressive disorder show the rates range from 8% to 17% among patients with cancer^{4, 5}. On the other hand, elevated depressive symptoms have been reported to be as high as 32% among breast and colon cancer patients and 43% among lung cancer patients⁶. Health system interventions that reduce burden related to the coordination of care and provide psychosocial support may be particularly helpful in improving the care experience of cancer patients with depression.

We designed and evaluated a nurse navigation intervention for patients recently diagnosed with lung, breast or colorectal cancer⁷. The intervention was designed to address specific aspects of care: delays and poor coordination in the early phases of cancer care; lack of information and decision-making help regarding treatment options, and; lack of emotional and social support for patients. We did not find an effect of the intervention on quality of life, but we did find positive impact of the intervention on quality of patient-centered care as measured by the Patient Assessment of Chronic Illness Care (PACIC)⁸ and measures of the quality of patient care, most notably in the perception of psychosocial care⁹.

In trials of collaborative care interventions for depressed patients in primary care, major depression versus minor depression (i.e., greater depressive symptomology versus less) is a positive predictor of treatment response¹⁰⁻¹². There is also some evidence that more highly distressed cancer patients benefit more from psychosocial treatments than non-distressed patients¹³ (McCorkle et al, 2009). It is not known whether the same holds for health care system interventions such as nurse navigation that are not specifically targeted at patients with comorbid major depression.

In this exploratory analysis we examine whether the effects of the nurse navigator intervention varied by baseline depression symptoms. If the intervention was particularly effective for those with greater depressive symptomology, in environments with limited resources, this would have implications for targeting navigation interventions towards those patients with more distress.

Methods

Details of recruitment and methods for the randomized controlled trial are reported elsewhere and are outlined here in brief^{7, 9}. Participants were recruited from Group Health medical clinics in the greater Seattle area. Group Health is a non-profit healthcare organization that provides coverage and comprehensive care to over 600,000 Washington state residents. The two-group cluster randomized trial (with randomization of primary care physicians and their patient panels) was part of the NCI-funded Cancer Communication Research Center affiliated with the Cancer Research Network, a consortium of research

centers based in integrated care delivery systems ¹⁴. Adult patients (n=251) with newly diagnosed breast, colon or lung cancer were enrolled in the trial generally within two weeks of diagnosis. Intervention patients (n=131) had weekly contacts with a nurse navigator for 16 weeks. The nurses used the Distress Thermometers ¹⁵ to identify problems and monitor progress. For those patients reporting moderate to high levels of distress, the nurses assessed the sources of distress, and, using motivational and encouraging counseling, collaboratively developed plans to address problems. Patients who had high distress scores on the Distress Thermometers and were suspected to have been depressed were referred to their providers or to the Behavioral Health Service for assessment and treatment of major depressive episode. Nurses were not aware of PHQ-9 scores that were collected as part of the baseline research assessment. Participants randomized to enhanced usual care received tailored patient education materials but no navigator.

Symptoms of depression at baseline (shortly after cancer diagnosis, but prior to starting the intervention) were assessed using the nine-item Patient Health Questionnaire (PHQ), a self-report measure based on the American Psychiatric Association Diagnostic and Statistical Manual, Version IV (DSM-IV) criteria for major depression. The PHQ-9 assesses the nine major depressive symptoms with each item scored with a 0 to 3 Likert scale to provide both a dichotomous diagnosis of major depression and a severity score ranging from 0-27. Scores of 0-4 are considered to indicate no to minimal depression, 5-9 indicates mild depression severity (minor depression), and ten or above indicates moderate or greater depression severity and likely major depression ^{16, 17}. Participants who scored positive on the item assessing suicidal ideation were referred immediately to a clinical psychologist for clinical risk assessment. Three study participants did not complete the PHQ at baseline and were excluded from this analysis.

Care experience outcomes were measured at a four month follow-up telephone interview. The primary outcomes were based on three subscales of the Patient Assessment of Chronic Illness Care (PACIC) ⁸, also asked at baseline. The PACIC evaluates the extent to which care involves and activates patients, is well organized, and consistent with the patient's situation and values. Mentions of "chronic illness" in the original scale were replaced with "cancer" in all of the items on the patient activation, delivery system/practice design, and problem-solving subscales. In the randomized trial, the PACIC summary score and all three subscale scores were higher among nurse navigator patients than usual care patients at four months ⁹. Secondary patient-reported outcomes were based on selected subscales of the Picker Institute's patient experience measure adapted for cancer patients ¹⁸. Items were scored as indicating a problem in care if patients gave anything but the most optimal response. In the trial, nurse navigator patients were significantly less likely to report problems in coordination of care, psychosocial care and health information than usual care patients ⁹.

Both baseline and follow-up telephone interviews were conducted by trained staff who were masked as to patients' randomization group. Study procedures and materials were approved by the Group Health Institutional Review Board.

We described participant characteristics by randomization and depression groups and tested for significant differences in participant characteristics across baseline depression groups using Chi Square tests or the Fisher Exact test (when expected cell sizes were less than 5). We used linear regression models to describe the relationship between randomization group and baseline PHQ-9 score on patient experience measures (PACIC and Picker) at four months. We estimated the effect of randomization group by baseline PHQ-9 score on outcomes by creating an interaction term between randomization group and baseline PHQ-9 categories in our models. Models also adjusted for age and education, which differed between randomization groups. To account for nested clustering of patients within primary care providers, and longitudinal measurements within patients, we used generalized estimating equations (GEE) with an independence working correlation structure and a robust covariance adjustment¹⁹⁻²¹. Because we had relatively few patients per provider, we also adjusted for small cluster sizes²².

Results

Most participants had little to no depression at baseline. Overall 138 (55%) had no symptoms of depression (PHQ=0-4); 76 (31%) had mild symptoms of depression (PHQ=5-9); 34 (14%) had moderate to severe symptoms (PHQ-9= 10 or greater). In general, there were few differences in participant characteristics, including randomization group, across depression severity groups; the exceptions were differences in age, cancer site and comorbidity (Table 1). Participants with moderate to severe depression symptoms were younger, more likely to have colon cancer and had more medical comorbidities.

Table 2 shows the adjusted 4-month outcome scores stratified by baseline PHQ-9 scores and randomization group. Among those who had PHQ-9 scores of five or more, nurse navigation patients had generally higher PACIC scores than those in usual care. . The percentage of patients reporting problems in care increased with the severity of depressive symptoms. However, with the exception of the PACIC subscale of delivery system/ practice design (example item: “I was shown how what I did to take care of myself influenced my condition,”) interaction terms between randomization group and PHQ-9 scores were not statistically significant.

Discussion

Among a sample of patients recently diagnosed with breast, colon or lung cancer who were enrolled in a trial of nurse navigation, we found that almost a third had mild symptoms of depression and 14% had at least moderate symptoms of depression at early diagnosis. A recent multi-national meta-analysis of interview-based studies reported a prevalence of DSM-defined minor depression of 19% and DSM-defined major depression of 15% among cancer patients in oncological, hematological and palliative care settings⁴. The PHQ-9 self-report measure, though widely used in healthcare settings, does not provide a gold-standard DSM diagnosis of depression. Nevertheless, the 14% prevalence of moderate to severe depressive symptoms in our sample was only slightly lower than the prevalence of major depression reported in the meta-analysis. We found that 29% of patients with colorectal cancer in our sample had moderate to severe depressive symptoms, while only 12% of

patients with breast cancer had depressive symptoms in that range. Epidemiological studies in cancer show depression to be more common in women with breast cancer than in those with colon cancer²³. Sampling variability or an inadvertent sampling bias may have occurred during recruitment to explain this finding in our study. We explored whether participants with depressive symptoms in our trial benefitted differentially from the nurse navigator intervention than participants without depression because the intervention greatly emphasized emotional support, and because previous studies have found greater benefit of psychosocial interventions among more highly distressed patients. We did not find convincing evidence that this was the case. However, because of the modest percentage of patients in our study with moderate to severe depressive symptoms (PHQ-9 scores of 10 or above), we cannot conclude with certainty that patients with and without depressive symptoms benefit equally from a nurse navigation intervention. Further studies are warranted.

The nurse navigation intervention in our trial was delivered to all eligible and consenting patients newly diagnosed with cancer, whether or not they had depressive symptoms, and the primary outcomes of interest were measures of the quality of patient centered care. The nurse navigators helped newly diagnosed patients address barriers to high quality cancer care such as delay in and lack of coordination of care, patient information gaps and passivity, and inadequate attention to a broad range of psychosocial issues. However, this nurse navigation intervention did not specifically target depressive symptoms nor provide evidence-based psychotherapy and antidepressant medication support. Nurse navigators recognized the need for patients to be evaluated further and referred to providers who could evaluate and treat depression. In contrast, collaborative team-based depression care specifically targeted and implemented for cancer patients with comorbid major depression has been shown to improve depressive symptoms and perceived quality of depression care in the SMaRT trials.²⁴⁻²⁶ In order to improve depressive symptoms, it is likely important that oncology teams screen more specifically for depression and have structured treatment programs in place to treat and adjust until response or remission is achieved, as is the case with care for depression comorbid with other chronic conditions²⁷.

These results may not be generalizable to patients with other types of cancer, higher stage cancers, or even to other types of health care settings. It is possible that patients with more clinically significant depressive symptoms may not have enrolled in the trial, and that some sampling biases may have occurred as mentioned above. Nevertheless, this study adds to our understanding of who benefits from health system interventions by suggesting that a nurse navigation program is broadly useful, i.e., beneficial for depressed *and* for the majority of patients who are not significantly depressed in the first few weeks post-diagnosis. However until larger studies are conducted, systems may want to target patients with depression for navigation services because they report greater problems with their care experience.

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References

1. Katon W, Schulberg H. Epidemiology of depression in primary care. *Gen Hosp Psychiatry*. 1992; 14:237–47. [PubMed: 1505745]
2. Wittchen HU, Kessler RC, Beesdo K, Krause P, Hofler M, Hoyer J. Generalized anxiety and depression in primary care: prevalence, recognition, and management. *J Clin Psychiatry*. 2002; 63(Suppl 8):24–34. [PubMed: 12044105]
3. Kessler RC, Berglund P, Demler O, Jin R, Koretz D, Merikangas KR, Rush AJ, Walters EE, Wang PS, National Comorbidity Survey R. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *JAMA*. 2003; 289:3095–105. [PubMed: 12813115]
4. Mitchell AJ, Chan M, Bhatti H, Halton M, Grassi L, Johansen C, Meader N. Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a meta-analysis of 94 interview-based studies. *Lancet Oncol*. 2011; 12:160–74. [PubMed: 21251875]
5. Krebber AM, Buffart LM, Kleijn G, Riepma IC, de Bree R, Leemans CR, Becker A, Brug J, van Straten A, Cuijpers P, Verdonck-de Leeuw IM. Prevalence of depression in cancer patients: a meta-analysis of diagnostic interviews and self-report instruments. *Psychooncology*. 2014; 23:121–30. [PubMed: 24105788]
6. Zabora J, BrintzenhofeSzoc K, Curbow B, Hooker C, Piantadosi S. The prevalence of psychological distress by cancer site. *Psychooncology*. 2001; 10:19–28. [PubMed: 11180574]
7. Horner K, Ludman EJ, McCorkle R, Canfield E, Flaherty L, Min J, Miyoshi J, Lapham B, Bowles EJ, Wagner EH. An oncology nurse navigator program designed to eliminate gaps in early cancer care. *Clin J Oncol Nurs*. 2013; 17:43–8. [PubMed: 23372095]
8. Glasgow RE, Wagner EH, Schaefer J, Mahoney LD, Reid RJ, Greene SM. Development and validation of the Patient Assessment of Chronic Illness Care (PACIC). *Med Care*. 2005; 43:436–44. [PubMed: 15838407]
9. Wagner EH, Ludman EJ, Aiello Bowles EJ, Penfold R, Reid RJ, Rutter CM, Chubak J, McCorkle R. Nurse navigators in early cancer care: a randomized, controlled trial. *J Clin Oncol*. 2014; 32:12–8. PMID: PMC3867643. [PubMed: 24276777]
10. Katon W, Von Korff M, Lin E, Walker E, Simon GE, Bush T, Robinson P, Russo J. Collaborative management to achieve treatment guidelines: impact on depression in primary care. *JAMA*. 1995; 273:1026–31. [PubMed: 7897786]
11. Katon W, Robinson P, Von Korff M, Lin E, Bush T, Ludman E, Simon G, Walker E. A multifaceted intervention to improve treatment of depression in primary care. *Arch Gen Psychiatry*. 1996; 53:924–32. [PubMed: 8857869]
12. Bush T, Rutter C, Simon G, Von Korff M, Katon WJ, Walker EA, Lin E, Ludman E. Who benefits from more structured depression treatment? *Int J Psychiatry Med*. 2004; 34:247–58. [PubMed: 15666959]
13. Schneider S, Moyer A, Knapp-Oliver S, Sohl S, Cannella D, Targhetta V. Pre-intervention distress moderates the efficacy of psychosocial treatment for cancer patients: a meta-analysis. *J Behav Med*. 2010; 33:1–14. PMID: PMC2813921. [PubMed: 19784868]
14. Wagner EH, Greene SM, Hart G, Field TS, Fletcher S, Geiger AM, Herrinton LJ, Hornbrook MC, Johnson CC, Mouchawar J, Rolnick SJ, Stevens VJ, Taplin SH, Tolsma D, Vogt TM. Building a research consortium of large health systems: the Cancer Research Network. *J Natl Cancer Inst Monogr*. 2005;3–11. [PubMed: 16287880]
15. Jacobsen PB, Donovan KA, Trask PC, Fleishman SB, Zabora J, Baker F, Holland JC. Screening for psychologic distress in ambulatory cancer patients. *Cancer*. 2005; 103:1494–502. [PubMed: 15726544]
16. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *JAMA*. 1999; 282:1737–44. [PubMed: 10568646]
17. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001; 16:606–13. PMID: PMC1495268. [PubMed: 11556941]

18. Malin JL, Ko C, Ayanian JZ, Harrington D, Nerenz DR, Kahn KL, Ganther-Urmie J, Catalano PJ, Zaslavsky AM, Wallace RB, Guadagnoli E, Arora NK, Roudier MD, Ganz PA. Understanding cancer patients' experience and outcomes: development and pilot study of the Cancer Care Outcomes Research and Surveillance patient survey. *Support Care Cancer*. 2006; 14:837–48. [PubMed: 16482448]
19. Zeger SL, Liang KY, Albert PS. Models for longitudinal data: a generalized estimating equation approach. *Biometrics*. 1988; 44:1049–60. [PubMed: 3233245]
20. Royall R. Model robust confidence intervals using maximum likelihood estimators. *Int Stat Rev*. 1986; 54:221–6.
21. White H. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica*. 1980; 48:817–38.
22. Mancl LA, DeRouen TA. A covariance estimator for GEE with improved small-sample properties. *Biometrics*. 2001; 57:126–34. [PubMed: 11252587]
23. Mehnert A, Brahler E, Faller H, Harter M, Keller M, Schulz H, Wegscheider K, Weis J, Boehncke A, Hund B, Reuter K, Richard M, Sehner S, Sommerfeldt S, Szalai C, Wittchen HU, Koch U. Four-week prevalence of mental disorders in patients with cancer across major tumor entities. *J Clin Oncol*. 2014; 32:3540–6. [PubMed: 25287821]
24. Sharpe M, Walker J, Holm Hansen C, Martin P, Symeonides S, Gourley C, Wall L, Weller D, Murray G, Team SMO- Integrated collaborative care for comorbid major depression in patients with cancer (SMaRT Oncology-2): a multicentre randomised controlled effectiveness trial. *Lancet*. 2014; 384:1099–108. [PubMed: 25175478]
25. Strong V, Waters R, Hibberd C, Murray G, Wall L, Walker J, McHugh G, Walker A, Sharpe M. Management of depression for people with cancer (SMaRT oncology 1): a randomised trial. *Lancet*. 2008; 372:40–8. [PubMed: 18603157]
26. Walker J, Hansen CH, Martin P, Symeonides S, Gourley C, Wall L, Weller D, Murray G, Sharpe M, Team SMO- Integrated collaborative care for major depression comorbid with a poor prognosis cancer (SMaRT Oncology-3): a multicentre randomised controlled trial in patients with lung cancer. *Lancet Oncol*. 2014; 15:1168–76. [PubMed: 25175097]
27. Katon WJ, Lin EH, Von Korff M, Ciechanowski P, Ludman EJ, Young B, Peterson D, Rutter CM, McGregor M, McCulloch D. Collaborative care for patients with depression and chronic illnesses. *N Engl J Med*. 2010; 363:2611–20. PMID: PMC3312811. [PubMed: 21190455]

Table 1

Characteristics of participants by baseline PHQ score and randomization group

Characteristic	Baseline PHQ score					
	0-4		5-9		10+ p-value	
Age (mean, sd)	66.4 (10.7)	61 (12.7)	0.007	61.3 (11.9)	60.6 (10.8)	57.5 (13.7)
Gender						
Male	8 (11.4)	7 (10.3)	0.831	6 (18.2)	2 (14.3)	2 (10.0)
Female	62 (88.6)	61 (89.7)		27 (81.8)	12 (85.7)	18 (90.0)
Race *			0.512			1.0
Caucasian	61 (88.4)	56 (82.4)		29 (87.9)	9 (64.3)	14 (70.0)
African American	1 (14)	3 (4.4)		0	2 (14.3)	2 (10.0)
Asian	1 (14)	4 (5.9)		2 (6.1)	2 (14.3)	2 (10.0)
American Indian/Alaska Native	2 (2.9)	3 (4.4)		2 (6.1)	1 (7.1)	2 (10.0)
Native Hawaiian/Other Pacific Islander	1 (14)	0		0	0	0
Other	3 (4.3)	2 (2.9)		0	0	0
Hispanic **	4 (5.7)	3 (4.4)	1.0	1 (3.0)	0	0
Cancer site			0.573			0.714
Breast	54 (77.1)	56 (82.4)		22 (66.7)	10 (71.4)	13 (65.0)
Colorectal	9 (12.9)	5 (7.4)		4 (12.1)	4 (28.6)	5 (25.0)
Lung	7 (10.0)	7 (10.3)		7 (21.2)	0	2 (10.0)
Cancer stage (AJCC)			0.965			0.099
0	11 (15.7)	9 (13.2)		2 (6.3)	4 (28.6)	0
I	28 (40.0)	28 (41.2)		15 (46.9)	4 (28.6)	6 (30.0)
II	21 (30.0)	19 (27.9)		10 (31.3)	4 (28.6)	6 (30.0)
III	8 (11.4)	10 (14.7)		3 (9.4)	2 (14.3)	7 (35.0)
IV	2 (2.9)	2 (2.9)		2 (6.3)	0	1 (5.0)
Marital status			0.331			0.376
Married	40 (57.1)	46 (67.6)		25 (75.8)	8 (57.1)	9 (45.0)

Characteristic	Baseline PHQ score					
	0-4		5-9		10+ p-value	
	Control N=70 (%)	NN N=68 (%)	p- value	Control N=33 (%)	NN N=43 (%)	p- value
Living with partner	7 (10.0)	7 (10.3)		1 (3.0)	4 (9.3)	1 (7.1)
Widowed	8 (11.4)	4 (5.9)		2 (6.1)	4 (9.3)	1 (7.1)
Divorced/separated	10 (14.3)	4 (5.9)		3 (9.1)	9 (20.9)	4 (28.6)
Never married/single	5 (7.1)	7 (10.3)		2 (6.1)	4 (9.3)	0
Education **			0.002			0.955
<High school	3 (4.3)	0		0	1 (2.3)	0
HS grad or GED	16 (22.9)	6 (8.8)		5 (15.2)	4 (9.3)	2 (14.3)
Some college	22 (31.4)	19 (27.9)		11 (33.3)	9 (20.9)	6 (42.9)
College grad	12 (17.1)	30 (44.1)		8 (24.2)	20 (46.5)	4 (28.6)
Postgrad degree	17 (24.3)	13 (19.1)		9 (27.3)	9 (20.9)	2 (14.3)
# Of people living with patient			0.301			0.969
0	14 (20.0)	9 (13.2)		4 (12.1)	14 (32.6)	3 (21.4)
1	35 (50.0)	35 (51.5)		18 (54.5)	20 (46.5)	8 (57.1)
2	13 (18.6)	12 (17.6)		4 (12.1)	2 (4.7)	2 (14.3)
3	7 (10.0)	5 (7.4)		3 (9.1)	5 (11.6)	0
4	1 (1.4)	6 (8.8)		4 (12.1)	2 (4.7)	1 (7.1)
Varies	0	1 (1.5)		0	0	1 (5.0)
Charlson comorbidity score			0.538			0.240
0	47 (71.2)	49 (81.7)		21 (70.0)	30 (71.4)	8 (66.7)
1	5 (7.6)	4 (6.7)		4 (13.3)	9 (21.4)	1 (8.3)
2	7 (10.6)	4 (6.7)		4 (13.3)	3 (7.1)	2 (16.7)
3+	7 (10.6)	3 (5.0)		1 (3.3)	0	1 (8.3)
unknown	4	8		3	1	2
						4

* Primary race reported

*** 1 person responded "don't know."

Table 2

Adjusted 4-month outcome scores stratified by baseline PHQ-9 scores and randomization group

4-month outcome	PHQ 0-4		PHQ 5-9		PHQ 10+	
	Control (n=70)	NN (n=68)	Control (n=33)	NN (n=43)	Control (n=14)	NN (n=20)
	Adjusted score (95% CI)	Adjusted score (95% CI)	Adjusted score (95% CI)	Adjusted score (95% CI)	Adjusted score (95% CI)	Adjusted score (95% CI)
PACIC **						
Overall	3.9 (3.7, 4.2)	4.0 (3.8, 4.2)	3.3 (2.7, 3.9)	3.9 (3.6, 4.1)	3.3 (2.7, 3.9)	4.0 (3.6, 4.4)
Patient activation	3.9 (3.6, 4.2)	4.1 (3.8, 4.3)	3.3 (2.8, 3.8)	3.9 (3.6, 4.2)	3.6 (3.0, 4.3)	4.1 (3.5, 4.6)
Delivery system *	4.1 (3.9, 4.3)	3.9 (3.8, 4.1)	3.4 (2.9, 3.8)	3.9 (3.6, 4.2)	3.0 (2.4, 3.7)	4.0 (3.6, 4.5)
Problem solving	3.8 (3.5, 4.1)	3.9 (3.6, 4.2)	3.0 (2.6, 3.5)	3.8 (3.5, 4.1)	3.2 (2.5, 4.0)	3.9 (3.5, 4.2)
PICKER						
Coordination of care	16.1 (11.0, 21.2)	8.7 (5.2, 12.2)	22.7 (12.4, 33.1)	18.8 (11.7, 26.0)	37.4 (17.9, 57.0)	22.2 (9.6, 34.9)
Confidence in providers	3.6 (-0.6, 7.9)	2.3 (-1.3, 5.9)	13.1 (1.3, 24.8)	11.8 (3.2, 20.4)	13.9 (0.7, 27.2)	5.8 (
Treatment information	16.3 (9.8, 22.8)	14.0 (11.2, 36.6)	25.5 (15.0, 36.1)	23.3 (15.1, 31.5)	23.9 (11.2, 36.6)	19.6 (6.8, 32.5)
Health information	40.3 (34.0, 46.7)	32.5 (25.7, 39.4)	70.0 (59.6, 80.3)	48.1 (38.4, 57.8)	63.9 (48.8, 78.9)	52.3 (35.0, 69.7)
Access to cancer care	7.4 (3.3, 11.5)	4.2 (0.8, 7.6)	8.0 (2.3, 13.7)	7.3 (2.1, 12.5)	4.9 (-1.4, 11.2)	9.4 (-1.9, 20.7)
Psychosocial care	21.8 (15.0, 28.6)	14.2 (9.2, 19.2)	33.9 (23.7, 44.0)	25.0 (17.3, 32.8)	37.5 (23.8, 51.1)	12.0 (3.7, 20.2)

* Interaction term between randomization group and PHQ9 scores statistically significant

** On the PACIC, higher scores represent more favorable outcomes; on the PICKER, higher scores represent greater problems in care