Randomized Controlled Trial of Collaborative Care Management of Depression Among Low-Income Patients With Cancer

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ABSTRACT

Purpose

To determine the effectiveness of the Alleviating Depression Among Patients With Cancer (ADAPt-C) collaborative care management for major depression or dysthymia.

Patients and Methods

Study patients included 472 low-income, predominantly female Hispanic patients with cancer age ≥ 18 years with major depression (49%), dysthymia (5%), or both (46%). Patients were randomly assigned to intervention ($n = 242$) or enhanced usual care (EUC; $n = 230$). Intervention patients had access for up to 12 months to a depression clinical specialist (supervised by a psychiatrist) who offered education, structured psychotherapy, and maintenance/relapse prevention support. The psychiatrist prescribed antidepressant medications for patients preferring or assessed to require medication.

Results

At 12 months, 63% of intervention patients had a 50% or greater reduction in depressive symptoms from baseline as assessed by the Patient Health Questionnaire-9 (PHQ-9) depression scale compared with 50% of EUC patients (odds ratio [OR] = 1.98; 95% CI, 1.16 to 3.38; $P = .01$). Improvement was also found for 5-point decrease in PHQ-9 score among 72.2% of intervention patients compared with 59.7% of EUC patients (OR = 1.99; 95% CI, 1.14 to 3.50; $P = .02$). Intervention patients also experienced greater rates of depression treatment (72.3% v 10.4% of EUC patients; $P < .0001$) and significantly better quality-of-life outcomes, including social/family (adjusted mean difference between groups, 2.7; 95% CI, 1.22 to 4.17; $P < .001$), emotional (adjusted mean difference, 1.29; 95% CI, 0.26 to 2.22; $P = .01$), functional (adjusted mean difference, 1.34; 95% CI, 0.08 to 2.59; $P = .04$), and physical well-being (adjusted mean difference, 2.79; 95% CI, 0.49 to 5.1; $P = .02$).

Conclusion

ADAPt-C collaborative care is feasible and results in significant reduction in depressive symptoms, improvement in quality of life, and lower pain levels compared with EUC for patients with depressive disorders in a low-income, predominantly Hispanic population in public sector oncology clinics.

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INTRODUCTION

Depressive disorders affect up to 38% of patients with cancer,¹⁻³ worsen over the course of cancer treatment,⁴ persist long after cancer therapy,⁵ reoccur with the recurrence of cancer,⁶ and negatively affect quality of life.⁷⁻¹⁰ Unfortunately, clinicians and patients may perceive depression as an expected reaction to cancer; thus, depression is frequently under-recognized and undertreated in oncology practice.¹¹⁻²⁰ Two Institute of Medicine reports highlight failure to adequately address depression among cancer patients.^{21,22} Low-income and un-

insured patients with cancer have less access to mental health services.²³⁻²⁵ Unmet treatment preferences,^{26,27} economic stress, and practical barriers may impede access to depression care as well as contribute to depression.²⁸ However, there is also evidence that underserved populations benefit from quality of care improvement interventions.²⁹⁻³¹

A recent analytic review of antidepressant medication (AM) or psychotherapy trials with cancer patients found insufficient data to judge the efficacy of either AM or psychotherapy alone, underscoring a need for studies in which patients are selected on the basis of a diagnosis of major depression and

studies that monitor use of multiple therapies.³² We are aware of three preliminary studies of collaborative care among cancer patients; these include a subgroup analysis³³ from the Improving Mood-Promoting Access to Collaborative Treatment (IMPACT) trial,³⁴ a trial in Scotland,³⁵ and our pilot trial,³⁶ in which intervention patients had significantly better depression outcomes.

We enrolled 472 depressed patients with cancer from medical oncology clinics in a randomized trial of collaborative care with study recruitment and intervention protocols specifically adapted for low-income, minority patients. We hypothesized that intervention patients would experience significant reductions in depressive symptoms and improvement in quality of life.

PATIENTS AND METHODS

The Los Angeles County and University of Southern California Medical Center provides oncology care to a low-income, predominantly Hispanic population. The study was approved by the University of Southern California-Health Sciences Institutional Review Board. Bilingual study recruiters identified potentially eligible patients by reviewing daily medical oncology clinic charts, assessing patient language preference, and obtaining brief verbal consent to be screened for depressive symptoms. All eligible patients provided written informed consent to study participation. The baseline interview was conducted before random assignment. Patients were assigned to intervention or enhanced usual care (EUC) via the recruiter providing the patient with a choice from five sealed envelopes that contained one sheet of paper indicating a study group randomly determined by computer algorithm. EUC patients received standard oncology care and were given patient/family depression and cancer educational pamphlets and a listing of center/community financial, social services, transportation, and childcare resources. The treating oncologist was informed of patients' depression status. Treating oncologists attended a depression treatment didactic session by the study psychiatrist at the beginning of the study and yearly thereafter. Oncologists were free to prescribe AMs or to refer patients for any usually available mental health treatment, and patients were free to seek care in the community.

Sample

Patients ≥ 90 days after cancer diagnosis and receiving acute or follow-up care in oncology clinics were eligible for the study if they were ≥ 18 years and had one of the two cardinal depression symptoms more than half of the days to nearly every day plus a Patient Health Questionnaire-9 (PHQ-9) depression scale score of ≥ 10 indicating major depression³⁷⁻³⁹ and/or two questions from the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition*⁴⁰ indicating dysthymia. Patients were excluded for the following reasons: acute suicidal ideation, advanced cancer or other condition that limited remaining life expectancy to less than 6 months, a score of 8 or greater on the Alcohol Use Disorders Identification Test alcohol assessment,⁴¹ recently used lithium/antipsychotic medication, a self-reported adaptation of the Karnofsky Performance Status Scale⁴² score of 2 or less on an 11-point scale representing severe functional impairment in cancer patients, and inability to speak English or Spanish (Fig 1).

Intervention

The Alleviating Depression Among Patients With Cancer (ADAPT-C) intervention adapted the IMPACT stepped care model,⁴³ including the following key evidence-based components: cancer depression clinical specialists (CDCS; bilingual social workers with master's degrees) provided psychotherapy; community services navigation by the CDCS or a patient navigator under CDCS direction; a psychiatrist who supervised the CDCS and prescribed AMs; a personalized treatment plan that included patient AM or problem-solving therapy (PST) preferences; a structured algorithm for stepped care management and protocol for PST; and CDCS telephone maintenance/relapse prevention and outcomes monitoring over 12 months. The algorithm (based on the IMPACT algorithm for depression in primary care, as well as National

Comprehensive Cancer Network⁴⁴ guidelines for the treatment of depression in cancer patients) was used to ensure that patients received care consistent with their clinical presentations.

The initial CDCS visit(s) included a semistructured psychiatric/psychosocial assessment; patient depression, psychotherapy, and antidepressant education; consideration of initial treatment choice; and provision of patient navigation assistance and included family members at patient request. Subsequent visits provided structured PST⁴⁵ and/or AM monitoring. A full-time CDCS could manage 35 to 40 patients in active/follow-up care. The psychiatrist held weekly telephone supervision to review the CDCS caseload focusing on new patients and those not improving as expected, provided in-person assessment, conducted in-person evaluation of patients who initially chose AM or did not respond to PST, and prescribed AM and additional psychotropic medications such as an anxiolytic agent or sedative-hypnotic, if clinically indicated. A clinical data tracking secure Web site facilitated CDCS and psychiatrist patient care management.

PST that is effective with primary care³³ and cancer patients^{34,46-48} uses behavioral activation components emphasizing patient assessment of personal contextual problems and building self-management skills.⁴⁹ Weekly sessions ranging from 6 to 12 weeks are highly structured.⁴⁹ Homework materials were linguistically and idiomatically adapted. Each CDCS received structured training in PST (and the study algorithms), and an independent expert conducted quality assurance structured assessments on five audiotaped patient sessions.³⁷ After acute treatment, patients received a treatment maintenance and relapse prevention program, including CDCS monthly telephone contacts up to 12 months after treatment initiation to monitor symptoms (with additional in-person visits if indicated), behavioral activation support for engaging in pleasant activities, and motivational support for ongoing use of PST skills and medication adherence.⁵⁰

Data Collection

The PHQ-9 was used as both a screen and outcome measure because it provides a dichotomous diagnosis of major depression as well as a continuous severity score.^{38,51} measures a common concept of depression across racial and ethnic groups,⁵² has been used with cancer patients,⁵³ and was believed to be practically feasible and sustainable in real-world oncology clinics. In recent years, the PHQ-9 has emerged as a reliable depression screening tool in primary care, with a demonstrated ability to identify clinically important depression, to make accurate diagnoses of major depression, to track severity of depression over time, and to monitor significant improvement in response to therapy.⁵⁴⁻⁶¹ Health-related quality of life was assessed using the Functional Assessment of Cancer Therapy-General (FACT-G) scale (a 27-item questionnaire with Spanish translation^{62,63} and subscale scores for physical, functional, social, and emotional well-being, as well as satisfaction with the treatment relationship) and the Medical Outcomes Study 12-Item Short Form health survey (SF-12)⁶⁴ Physical and Mental Component Summary norm-based scores. The Brief Pain Inventory Short Form clinically significant cutoff score of ≥ 28 on a scale of 40 indicates severe pain.^{65,66}

Analyses

Baseline demographics, clinical characteristics, depression, and quality-of-life outcomes were compared between EUC and intervention groups by independent *t* test and analysis of variance for continuous variables and Pearson χ^2 test for categorical variables. The intent-to-treat analysis approach was adopted to evaluate intervention effects. To evaluate effects on depression, a 50% reduction of PHQ-9 score or a 5-point reduction was considered a clinically meaningful improvement in depressive symptoms.⁵⁹ Logistic regression models were conducted. To evaluate intervention effects on PHQ-9 score and quality-of-life outcomes, general linear mixed-effects models implemented in SAS Proc Mixed (SAS Institute Inc, Cary, NC) were fitted with longitudinal data from baseline to 6- and 12-month follow-ups.^{67,68} Unstructured covariance was specified in the mixed-effects model to account for within-patient correlations of repeated observations over time.⁶⁸ The fixed effects of time and intervention condition and their interactions were examined. Both logistic regression and linear mixed-effects models were adjusted for baseline depression severity, anxiety, and dysthymia; cancer stage, type, and

Fig 1. Alleviating Depression Among Patients With Cancer (ADAPT-C) CONSORT flowchart. (*) Declined included patients who declined further study participation or who were no longer living in the United States or receiving care at Los Angeles County and University of Southern California (LAC + USC) Medical Center. (†) Dying was defined as patients who were in hospice or in palliative care or whose life expectancy was less than 6 months. GYN, gynecologic; AM, antidepressant medication; PST, problem-solving treatment.

treatment status; sex; race; and years in the United States. All analyses were conducted using SAS software, version 9.1 (SAS Institute Inc).

In view of known barriers to participation in cancer trials and to depression treatment retention in low-income minority populations, efforts were made to facilitate recruitment and acceptance of the intervention and to minimize study attrition.⁶⁹ These efforts included the following: Spanish-speaking research staff and study and intervention materials in Spanish that were adapted for literacy and idiomatic content; telephone data collection and intervention option; evening and weekend telephone visits and scheduling depression treatment visits to coincide with oncology appointments; patient

navigation/case management intervention to address barriers to both cancer and depression treatment and need for community services; and attention to family member roles. Staff received self-administered brief training in cultural competency.⁷⁰ Blinded independent study interviewers and the clinical team made multiple attempts to reach patients. Study participants were reimbursed for time in completing outcome interviews and for transportation and copays for AM if indicated.

The rates of mortality and patients lost to follow-up were not significantly different between groups (Fig 1). By 12 months, total attrition had increased to 214 patients (45.3%), with 68 known patient deaths (14.4%),

three patients (0.6%) in hospice or palliative care, and 143 patients (30.3%) lost to follow-up (with 62 patients declining further study participation and 81 patients being unable to be located). In the attrition group versus the participant group, there were relatively more non-Hispanics (16.8% *v* 8.1%, respectively; *P* = .004), males (20.1% *v* 11.6%, respectively; *P* = .01), patients age $\geq$ 50 years (55.1% *v* 44.6%, respectively; *P* = .02), and patients receiving acute cancer treatment (57.5% *v* 47.3%, respectively; *P* = .03). Baseline depression and most quality-of-life outcomes were not significantly different between patients lost to the trial versus those who remained in the trial except that attrition patients had poorer baseline physical well-being scores (15.66 *v* 17.56, respectively; *P* = .001) and functional well-being scores (10.73 *v* 11.75, respectively; *P* = .03). In this article, we present results with all available data. In addition, we also conducted multiple imputations with the predictive model-based approach implemented in SOLAS software, version 3.2 (Statistical Solution Ltd, Saugus, MA, http://www.statsol.ie/html/solas/solas_resources.html). Five imputed data sets were generated, analysis of results across the five imputed data sets were aggregated by averaging, and SEs were adjusted to reflect both within- and between-imputation variability.^{71,72} Intervention effects on depression and quality-of-life outcomes analyzed with imputed data were consistent with the results analyzed with all available data.

RESULTS

Sample Characteristics

Patient baseline demographic, clinical, and quality-of-life characteristics are listed in Table 1. Patients were predominantly Latino, foreign born, in the United States for 10 years or more, and had not completed high school. Nearly 72% of patients had unstaged or stage I or II cancer, and nearly 50% of patients had comorbid medical conditions. Representation of cancer type was consistent with study site 2006 cancer census data contributing to high representation of women (consistent with national data finding significantly higher rates of depression among women and significantly higher study participation refusal by men; 33.6% of men *v* 13.5% of women, *P* < .0001).

Intervention Implementation

Over the course of 12 months, only 24 EUC patients (10.4%) received depression treatment (13 received AM, four received psychotherapy, and seven received both), whereas 72.3% of intervention patients received depression treatment (odds ratio [OR] = 30.88; *P* < .0001). Patients reported receiving guideline starting dosage, with one patient reporting an increased dosage at 12 months. Seven patients reported having seen a psychiatrist, and of these, four patients also saw a psychologist; five patients saw only a psychologist, and 15 patients saw a social worker. Implementation in the intervention group is summarized in Figure 2. Of 37 intervention patients who received neither PST nor AM at 6 months, 15 received PST (four were also prescribed AM) by 12 months. The CDCS and/or patient navigator made multiple attempts to locate and invite patients to participate up to 1 year after enrollment and to provide/offer patient navigation supportive services, including an offer of in-hospital or telephone depression care to patients with worsening clinical course or hospitalization. Patients self-reported greater satisfaction with PST compared with AM (satisfied to extremely satisfied with PST: 84.4% of 77 respondents at 6 months and 92.3% of 52 respondents at 12 months; and satisfied to extremely satisfied with AM: 40.5% of 37 respondents at 6 months and 42.3% of 26 respondents at 12 months). We estimate the mean

cost of the ADAPt-C services to be \$524 per intervention patient over 12 months, including costs for the CDCS and patient navigation services, telephone and in-person supervision, evaluation and prescription by the study psychiatrist, and educational brochures and relaxation tapes.

Depression Outcomes

Intervention effects on 50% reduction of PHQ-9 scores were evaluated at the 6- and 12-month follow-ups (Table 2). Intervention patients had significantly higher rates of treatment response (at least 50% reduction in the PHQ-9 score from baseline) than EUC patients at 12 months. The percentage of patients with 50% PHQ-9 reduction was 63% in intervention group and 50% in EUC group, with a significant adjusted OR of 1.92 (95% CI, 1.14 to 3.26), indicating 92% greater odds of reaching a 50% reduction among patients in the intervention group than in the EUC group. A significantly greater proportion of patients in the intervention group (72.2%) than in the EUC group (59.7%) achieved a 5-point decrease in PHQ-9 scores at 12 months (adjusted OR = 1.99; 95% CI, 1.14 to 3.50; *P* = .02). Comparison of the mean PHQ-9 scores between EUC and intervention groups indicated a positive improvement trend with average PHQ-9 scores of 7.34 in the intervention group and 8.14 in the EUC group at 6 months and 6.4 in the intervention group and 7.14 in the EUC group at 12 months. Change in mean PHQ-9 scores across time between groups was borderline significant (*P* = .06). There were no significant interaction effects between study groups and race, baseline cancer site, cancer stage, or severity of depression on depression outcome improvement.

Maintenance of remission and relapse status among 129 intervention patients who completed both the 6- and 12-month interviews found that 50% received PST, 37% received PST and AM, 0.8% received AM alone, and 12% refused treatment or were nonadherent. Of the 114 treated patients, 80 (70%) responded to treatment and no longer had major depression at 6 months. At 12 months, 16 of these patients (14%) had experienced a relapse, 19 (17%) had responded to treatment, and 15 (13%) had not responded to treatment. We are unaware of any attempted or completed suicides in either the intervention or EUC group.

Quality-of-Life Outcomes

Comparing changes across time between groups found significantly greater improvement among intervention patients over time in FACT-G emotional and social well-being and mental components of SF-12 (*P* < .01). Comparisons of adjusted mean scores between patient groups (Table 3) found that, at 6 months, intervention patients had significantly higher scores on FACT-G physical functioning and functional well-being and the SF-12 mental component. At 12 months, intervention patients had significantly better social/family (adjusted mean difference between scores, 2.7; 95% CI, 1.22 to 4.17; *P* < .001), emotional (adjusted mean difference, 1.29; 95% CI, 0.26 to 2.32; *P* = .01), and functional well-being scores (adjusted mean difference, 1.34; 95% CI, 0.108 to 2.59; *P* = .04) and SF-12 physical component scores (adjusted mean difference, 2.79; 95% CI, 0.49 to 5.1; *P* = .02). Borderline significant pain reduction was also found (adjusted mean difference, -2.72; 95% CI, -5.44 to 0.01; *P* = .05). There were no significant interaction effects between study groups and race, baseline cancer site, cancer stage, or severity of depression on quality-of-life outcomes.

Table 1. Patient Demographic, Clinical, and Quality-of-Life Characteristics at Baseline

Characteristic	All Patients (N = 472)		Enhanced Usual Care Patients (n = 230)		Intervention Patients (n = 242)		Group Test <i>P</i>
	No.	%	No.	%	No.	%	
Female	399	84.5	197	85.7	202	83.5	.51
Age ≥ 50 years	233	49.4	116	50.4	117	48.3	.65
Hispanic	415	87.9	196	85.2	219	90.5	.08
Foreign born	413	87.5	194	84.3	219	90.5	.04
In United States for > 10 years	352	74.6	180	78.3	172	71.1	.07
Unmarried	300	63.6	145	63.0	155	64.0	.82
< 12-year education	300	63.6	146	63.5	154	63.6	.97
Cancer site							.96
Female gynecologic	201	42.6	94	40.9	107	44.2	
Breast	103	21.8	52	22.6	51	21.1	
Digestive system: colon/rectum	29	6.1	14	6.1	15	6.2	
Other digestive system*	26	5.5	13	5.7	13	5.4	
Other*	113	23.9	57	24.8	56	23.1	
Cancer stage							.95
Stage 0, I, II, or unstaged	340	72.0	166	72.2	174	71.9	
Stage III, IV, or recurrent	132	28.0	64	27.8	68	28.1	
Treatment phase							.49
Prior to treatment	52	11.0	29	12.6	23	9.5	
Acute treatment	193	40.9	95	41.3	98	40.5	
Follow-up care	227	48.1	106	46.1	121	50.0	
Depressive status							.18
Major depression	232	49.2	123	53.5	109	45.0	
Dysthymia	24	5.1	10	4.3	14	5.8	
Major depression and dysthymia	216	45.8	97	42.2	119	49.2	
PHQ-9 score (total possible points = 27)							.19
Mean	13.09		12.87		13.30		
SD	3.48		3.44		3.51		
Moderate to severe depression: PHQ-9 score of ≥ 15	139	29.4	65	28.3	74	30.6	.58
Previous diagnosis of major depression	61	12.9	33	14.3	28	11.6	.37
BSI anxiety score of ≥ 14 (total possible points = 24)	39	8.3	19	8.3	20	8.3	.99
Taking medication for depression or anxiety	51	10.8	28	12.2	23	9.5	.35
Receiving counseling for depression or anxiety	36	7.6	16	7.0	20	8.3	.59
Attending a cancer support group	22	4.7	11	4.8	11	4.5	.90
Comorbid medical condition†	235	49.8	112	48.7	123	50.8	.64
Brief pain inventory pain score (total possible points = 40)							.99
Mean	11.63		11.63		11.63		
SD	11.58		11.83		11.37		
Karnofsky performance status scale (total possible points = 10)							.62
Mean	6.11		6.07		6.14		
SD	1.76		1.78		1.74		
FACT-G (higher = better)							
Physical well-being							.50
Mean	16.70		16.51		16.88		
SD	5.93		5.87		5.99		
Social/family well-being‡							.08
Mean	13.89		14.40		13.42		
SD	6.13		5.73		6.46		
Emotional well-being							< .01
Mean	12.93		13.58		12.31		
SD	4.21		4.39		3.94		
Functional well-being							.87
Mean	11.29		11.32		11.25		
SD	5.07		4.85		5.28		
SF-12 (higher = better)§							
Physical component summary							.08
Mean	36.69		35.95		37.39		
SD	8.94		8.53		9.27		
Mental component summary							.01
Mean	32.78		33.85		31.77		
SD	9.20		9.14		9.16		

Abbreviations: PHQ-9, Patient Health Questionnaire-9; SD, standard deviation; BSI, Brief Symptom Inventory; FACT-G, Functional Assessment of Cancer Therapy-General; SF-12, Short Form 12-Item Health Survey.

*Other digestive system sites include liver, sigmoid, stomach, esophagus, gallbladder, anus, and pancreas. Other cancer sites include lymphatic system, blood and bone marrow, lung, male genital, urinary, skin, oral cavity/pharynx, brain, and thyroid.

†Hypertension, diabetes, arthritis, stroke, or heart or kidney disease.

‡Two enhanced usual care patients did not respond to these questions.

§One enhanced usual care patient and one intervention patient did not respond to these questions.

Fig 2. Treatment implementation. CDCS, cancer depression clinical specialists; AM, antidepressant medication; PST, problem-solving therapy; SD, standard deviation.

DISCUSSION

To our knowledge, this is the first large-scale trial of collaborative care for predominantly female patients with cancer who met depression diagnostic criteria.³² Study results are responsive to recent calls for improving receipt of depression care among cancer patients^{21,22} and indicate, in conjunction with other recent studies, that quality of care improvement strategies are effective among low-income and minority populations.²⁹⁻³¹ Findings suggest that a collaborative care model adapted for low-income, minority patients results in significant reductions in depressive symptoms and improvements in quality of life, particularly among women without advanced cancers. Improvement in the intervention group is

likely attributable to increased access to and choice of treatment, as well as patient navigation services and attention to accessibility within the medical center and via telephone.

Noteworthy is the high rate of patients who indicated a strong preference for PST over AM, a preference consistent with previous studies.^{33,73} In this trial, the better outcomes of PST alone or in combination with AM raise important questions for future studies about patient treatment adherence, the long-term effects of psychotherapy versus medication or combined care models, and the cost of care, particularly within clinics serving low-income patients.

Not all patients improved, and significant improvement required up to 1 year. An important consideration may be that cancer-related symptoms, including pain, progressive disease over time, and the economic stresses²⁸ associated with the study population, may have

Table 2. Comparison of PHQ-9 Outcomes Between Groups

Outcome	EUC Patients		Intervention Patients		OR: Intervention v EUC	95% CI	P
	No.	%	No.	%			
50% PHQ-9 reduction							
6-month follow-up	63	41.4	82	49.4	1.26	0.79 to 2.02	.33
12-month follow-up	57	50.0	91	63.2	1.98	1.16 to 3.38	.01
5-point PHQ-9 reduction							
6-month follow-up	76	50.0	102	61.5	1.45	0.90 to 2.33	.13
12-month follow-up	68	59.7	104	72.2	1.99	1.14 to 3.50	.02

NOTE. Existing gold standard instruments, like the Hamilton Rating Scale for Depression or the Depression Module of the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition*, which are more time consuming and require administration by specially trained interviewers, were considered by oncology staff to be less likely to be implemented in busy clinic practice. In contrast, the PHQ-9 takes only minutes to administer as a screen, has been shown to be an effective practical tool to monitor and gauge treatment response over time, and has been widely used in patients with medical illness and within the general health care system.

Abbreviations: PHQ-9, Patient Health Questionnaire-9; EUC, enhanced usual care; OR, odds ratio.

Table 3. Comparison of Depression and Quality-of-Life Outcomes Between Groups

Outcome	EUC Patients		Intervention Patients		Adjusted Mean Difference: Intervention v EUC	95% CI	P
	Adjusted Mean Score	SE	Adjusted Mean Score	SE			
PHQ-9 score							
Baseline	12.79	0.29	13.17	0.29	0.37	−0.37 to 1.12	.33
6-month follow-up	8.14	0.34	7.34	0.34	−0.8	−1.7 to 0.11	.08
12-month follow-up	7.14	0.39	6.4	0.36	−0.74	−1.74 to −0.27	.15
Physical well-being							
Baseline	16.8	0.39	17.13	0.39	0.33	−0.67 to 1.32	.52
6-month follow-up	19.29	0.46	20.82	0.45	1.54	0.35 to 2.72	.01
12-month follow-up	20.13	0.51	21.35	0.48	1.22	−0.08 to 2.53	.07
Social/family well-being							
Baseline	14.4	0.45	13.73	0.45	−0.68	−1.82 to 0.47	.25
6-month follow-up	14.81	0.52	14.97	0.51	0.15	−1.19 to 1.5	.82
12-month follow-up	14.69	0.58	17.38	0.54	2.7	1.22 to 4.17	< .001
Emotional well-being							
Baseline	13.64	0.3	12.47	0.3	−1.16	−1.93 to −0.4	< .01
6-month follow-up	15.46	0.35	15.96	0.35	0.5	−0.42 to 1.43	.29
12-month follow-up	16.3	0.4	17.59	0.37	1.29	0.26 to 2.32	.01
Functional well-being							
Baseline	11.37	0.37	11.27	0.37	−0.11	−1.06 to 0.84	.83
6-month follow-up	12.45	0.44	13.65	0.43	1.2	0.06 to 2.34	.04
12-month follow-up	12.97	0.49	14.31	0.46	1.34	0.08 to 2.59	.04
SF-12 physical							
Baseline	36.28	0.69	37.59	0.69	1.3	−0.46 to 3.07	.15
6-month follow-up	38.87	0.81	40.18	0.8	1.31	−0.79 to 3.41	.22
12-month follow-up	38.68	0.91	41.48	0.84	2.79	0.49 to 5.1	.02
SF-12 mental							
Baseline	33.97	0.71	32.15	0.71	−1.82	−3.64 to 0.01	.05
6-month follow-up	41.74	0.84	44.49	0.83	2.75	0.54 to 4.96	.01
12-month follow-up	43.46	0.96	45.65	0.88	2.19	−0.26 to 4.63	.08
Pain							
Baseline	11.35	0.81	11.66	0.81	0.32	−1.75 to 2.38	.76
6-month follow-up	11.65	0.95	9.79	0.94	−1.86	−4.33 to 0.61	.14
12-month follow-up	11.55	1.07	8.83	0.99	−2.72	−5.44 to 0.01	.05

NOTE. Mixed-effects linear regression and logistic regression were adjusted for sex, race, years in United States, dysthymia, baseline depression severity, baseline anxiety, cancer stage, cancer type, and treatment status. No. of total participants varied across waves and outcomes: baseline, $n = 470$ – 472 ; 6 months, $n = 317$ – 318 ; 12 months, $n = 258$.

Abbreviations: EUC, enhanced usual care; PHQ-9, Patient Health Questionnaire-9; SF-12, Short Form 12-Item Health Survey.

contributed to ongoing depressive symptoms. The relatively high rate of improvement in the EUC group may have resulted from enhancements, particularly routine screening, notification of oncologists, and information about site and community psychosocial supportive services.

The rates of death and patients lost to follow-up were high but were not significantly different between the intervention and EUC groups. Moreover, comparison of patients who did and did not remain in the trial found no significant difference in baseline depression severity or quality-of-life outcomes. Known death (we are unable to confirm deaths that may have occurred in other countries), palliative care, and attrition rates were high but were consistent with our previous studies. Perhaps advancing illness influenced patients to leave the area (ie, baseline differences between attrition and nonattrition groups found that patients lost to the trial had poorer baseline physical and functional status).

The ADAPT-C collaborative care model seems to be feasible and significantly more effective than screening and modest care enhancements for depression in a low-income, predominantly

Hispanic population in public sector oncology clinics with the potential to reduce disparities in receipt of mental health care among low-income and minority patients. Information on long-term treatment response will be reported in a subsequent article on 18- and 24-month outcomes. There is a need for future multisite collaborative care trials with representation from different racial/ethnic groups and economic strata. There is also need for the implementation of practice guidelines for treating depression in cancer patients.^{21,22,74}

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The author(s) indicated no potential conflicts of interest.

AUTHOR CONTRIBUTIONS

Conception and design: Kathleen Ell, Brenda Quon, Megan Dwight-Johnson

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