

Effectiveness of Telephone-Based Therapy in the Management of Depression: A Systematic Review and Meta-Analysis

Tilahun Nigatu Haregu^{1*} Oyun Chimeddamba² and M Rakibul Islam²

¹African Population and Health Research Center, Kenya

²Department of Epidemiology & Preventive Medicine, Monash University, Australia

Article Information

Received date: May 13, 2015

Accepted date: Aug 04, 2015

Published date: Aug 26, 2015

*Corresponding author

Tilahun Nigatu Haregu, African Population and Health Research Center, P.O. Box 10787-00100, Nairobi, Kenya, Email: tharegu@aphrc.org

Distributed under Creative Commons CC-BY 4.0

Keywords Depression; Telephone-based therapy; Randomized controlled trials

Article DOI 10.36876/smjdr.1006

Abstract

Background: There are a couple of independent studies examining the effectiveness of telephone based therapy for the treatment of depression. However, up-to-date systematic reviews are lacking.

Objective: To evaluate the effectiveness of telephone-based therapy in the management of patients suffering from depression compared with the usual care.

Methods: A systematic review and meta-analysis of randomized controlled trials was conducted that compared telephone-based therapy with usual care for depression. We searched MEDLINE, EMBASE, PsycINFO, CINAHL, and CENTRAL (up to August 28, 2012) to identify eligible studies. The primary outcome was depression level at the end of the intervention. We pooled the mean depression level data from the studies using standardized mean difference using the random-effects model.

Results: A total of 11 studies met the inclusion criteria. Nine of these studies was considered for the pooled analysis. Comparison of depression levels in the immediate post-intervention period from the seven studies included in the pooled analysis was in favour of telephone-based therapy (standardized mean difference = -0.43; 95% CI: -0.74-0.12). In the remaining two studies, telephone-based therapy resulted in a statistically significant improvement in clinical outcomes and patient satisfaction. A longer duration of intervention and the presence of known medical comorbidity was positively associated with the effectiveness of telephone-based therapy. The overall effect was stable when studies with extreme characteristics were excluded. Intervention results were found to be sustained throughout the follow-up period.

Conclusion: Telephone-based therapy could be more effective than face-to face therapy in reducing the symptoms of depression. However, further research is required to establish the applicability and cost-effectiveness of telephone-based therapy for routine depression management in health systems.

Background

Depression is a common disease that affects more than 350 million people globally [1]. It causes greater functional disability than diabetes, chronic lung disease, hypertension, and back pain [2,3]. It is also associated with significant social impairment, as well as high direct and indirect health care costs [4].

The prevalence of depression varies across age, sex, regions, years and medical comorbidities. Studies in the United Kingdom reported a 10% community prevalence of depression, while in the United States the lifetime prevalence of depression was 25% in women and 12% in men [5,6]. On average, one in five women and one in eight men experience depression in their lifetime [7]. Studies have also revealed that the prevalence of depression in people with traumatic brain injuries ranges from 15.3% to 42% [8].

Although various psychotherapies in healthcare facilities are available for the effective treatment of depression, less than half of the people with depression receive the services they need [9]. This is mostly due to lack of resources, untrained health care professionals and social stigma [9]. Furthermore, in many countries, fewer than 10% of those affected by depression receive treatment. Attrition rates are also high due to access related barriers such as structural and time constraints, availability of services, transportation problems, and service costs [10,11]. Usual care, counselling in the treatment of depression is constrained by all these factors.

Cognitive-Behavioral Therapy (CBT) is a short-term psychological therapy that attempts to change dysfunctional patterns of thinking and non-adaptive behaviors in order to prevent the development of symptoms of depression or anxiety [12]. Most research on the effectiveness of CBT showed that it is effective in treating mild to moderate depression and a variety of anxiety disorders [12-15]. However, an insufficient number of trained therapists, both in primary and specialist mental

OPEN ACCESS

ISSN: 2573-3389

health care services, are found to be the key barrier to CBT [12]. On the other hand, with the advancement of telecommunication technology, Telephone-Based Therapy (TBT) has started to play a significant role in the management of numerous mental disorders [16,17]. Studies have demonstrated that TBT not only addresses the health problems of patients, but also reduces the rates of treatment attrition as compared to usual care interventions [17]. It usually includes a pre-determined number of telephone counselling sessions where each session starts with a brief structured assessment of depressive symptoms, medication use and adverse effects [18]. TBT is usually delivered by a qualified therapist who has adequate qualification and experience in outpatient psychotherapy of depression. The therapist may receive training from a psychologist and psychiatrist on various issues of depression counselling [18].

Several Randomized Controlled Trials (RCTs) have assessed the effectiveness of telephone-based treatments of depression in different settings. Three previous systematic reviews of such RCTs exist; though these reviews are limited in their scope [9,19,20]. The literature search in these reviews was conducted before May 2008. In addition, those

RCTs was also confounded by high variability in patient characteristics, scales of depression measurement, and context-specific nature of the treatment protocols. Consequently, the previous reviews concluded that there was insufficient evidence regarding the effectiveness of information and communication technology, although telephone-based interventions may benefit people with depression. Therefore, the aim of this systematic review was to produce an up-to-date synthesis of the results of RCTs that evaluated the effectiveness of TBT in the management of patients with depression as compared to usual care.

Materials and Methods

Study eligibility criteria

The eligibility criteria used in this study were the following:

Participants: People aged 18 years or older with a diagnosis of depression were included. Depression was diagnosed by a clinician according to Diagnostic and Statistical Manual (DSM) criteria or based on any of the commonly used depression measurement scales, including Hamilton Rating Scale for Depression (HRSD)

Table 1: The characteristics of the included studies.

First Author, Year	Sample size	Depression level for inclusion	Intervention group (n)	Control group (n)	Intervention/ Treatment	Duration of Intervention	No of Counselling Sessions	Depression Measurement Scale	Timing for Outcome assessment	Qualification of the Therapists
[58]	393	HSCL \geq 0.05	198	195	Structured CBT	12 months	8 core 2-4 booster	HSCL PHQ9 (12&18month)	6 week, 3, 6, 9, 12, 15, 18 months	Master level psychotherapists with 1 year experience
[55]	339	PHQ \geq 11; BDI \geq 14	145	146	CBT	12 months	12 (intensive) 9 (booster)	BDI	12 months	CBT trained nurses with psychiatry and primary care training
[54]	499	QIDS-SR>5	234	242	Telephone care management	12 months	Average 9 (SD=6.0) contacts	QIDS-SR	6 months; 18 months	Trained Masters level licensed clinicians
[62]	325	Ham-D \geq 16	163	162	Telephone administered CBT	18 weeks	18 sessions	Ham-D; PHQ-9	4, 9, 14, 18 weeks; 3, 6 months follow up	PhD level psychologists
[53]	118	BDI-II \geq 10	58	60	Telephone based CBT + employee assistance program	8 weeks	8 sessions	BDI-II	4 months; 8months(only for waitlist)	At least masters level psychologists, social workers and nurses
[56]	48	CES-D \geq 16	24	24	Telephone interpersonal counselling	6 weeks	6 sessions	CES-D	6 weeks and 1 month FU	MSc psychiatric mental health nurses
[17]	600	SCL \geq 0.5	172	176	Telephone psychotherapy; telephone care management	20 weeks	8 sessions(TPT)	HSCL scale; +PHQ9 at 3mo and 6mo	6 weeks, 3 months and 6 months after randomization	Psychotherapists with Masters degree and one year experience
[18]	32	POMS \geq 15	16	16	Telephone administered CBT	8 weeks	8 sessions	POMS	4 months FU	Doctoral and postdoctoral students in psychology
[59]	101	PHQ \geq 10	50	51	Culturally tailored CBT	8 weeks	8 sessions	SCL and PHQ9	6weeks, 3 months and 6 months after randomization	Masters of social work students and experienced therapists
[61]	54	Hamilton scale: 11-26	18	13	problem solving and stress management	6 weeks	6 sessions	Ham(baseline and end-line); BDI and Duke (at end-line)	6 weeks	Registered nurses with experience in family practice
[57]	126	Not available	85	86	Scheduled telephone intervention	9 months	7 sessions	BSI-D	1 year	Research care managers

HSCL: Hopkins Symptom Checklist; CBT: Cognitive Behavioural Therapy; PQH: Patient Health Questionnaire; BDI: Beck Depression Inventory; QIDS-SR: Quick Inventory of Depressive Symptomatology Self-Report; Ham-D: Hamilton Rating Scale for Depression; CES-D: The Center for Epidemiologic Studies Depression Scale; SCL: The Symptom Checklist; POMS: Profile of Mood States; BSI-D: Brief Symptom Inventory-Depression

[21], Beck's Depression Inventory (BDI) [22], and the Patient Health Questionnaire (PHQ-9) [23] checklists. The study settings were primary care facilities, mental health centers and psychiatric clinics.

Intervention: TBT of at least four sessions based on a treatment manual was considered as the intervention. Treatment duration was determined to be at least four sessions to ensure that the effect of the proposed treatment had sufficient time to be eventuated [24]. TBT was accompanied by a therapist manual and a patient workbook containing didactic materials, therapeutic concepts, in-session exercises, and written homework exercises for completion between sessions. The therapist/counsellor who delivered the intervention was either a primary care physician or a counsellor with adequate experience in outpatient psychotherapy of depression.

Comparison: Usual care (usual treatment) management of depression.

Outcome: The primary outcome was the depression score as measured by common depression measurement scales. If trials reported data for more than one depression scale, results from all the scales were considered. The common scales used were: (i) HRSD, (ii) Montgomery-Asberg Depression Rating Scale (MADRS [25], (iii) BDI, (iv) other. The primary outcome measurement time point was at completion of the intervention. Any outcome data reported during follow-up period were considered as secondary outcomes.

Study design: Only randomized controlled trials were included. Studies had to be described by the authors as randomized controlled trials.

Studies with the following characteristics were excluded: (i) studies targeting children (under the age of 18 years), (ii) studies with less than four sessions of telephone-based therapy; and (iii) studies with intervention that used additional information and communication technology (i.e. videoconference, the Internet, email and integrated computer-telephone system).

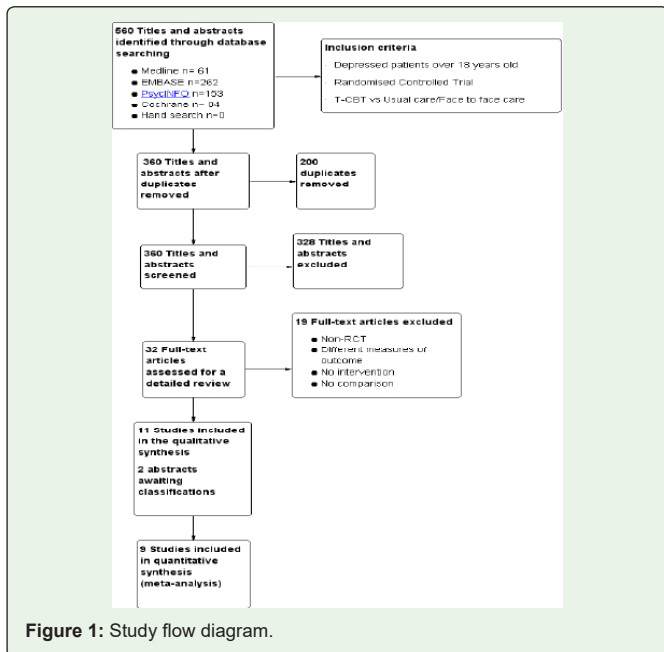


Figure 1: Study flow diagram.

Search strategy

We searched for eligible studies from the following electronic databases: Ovid MEDLINE, EMBASE, PsycINFO, CINAHL, and the Cochrane Central Register of Controlled Trials (CENTRAL) (from database inception to August 28, 2012). The search was limited by language of publication (English only). We also reviewed the reference lists of included RCTs and relevant systematic reviews [26-28] to identify any additional studies.

Study selection

After the database search, records were de-duplicated. Two authors (OC and TN) independently reviewed the titles and abstracts of the identified studies to assess their eligibility. For those articles not excluded from screening of titles and abstracts, the full text was retrieved, and two authors (OC and TN) independently assessed the full text using the eligibility criteria. Any discrepancies in the selection were resolved via discussion or, when necessary, adjudication by the third reviewer (MRI).

Data extraction and management

Two investigators (OC and TN) independently extracted data from the full texts of the selected studies using the data extracted checklist. Any discrepancies in the data extracted were resolved through discussion, before entering into the Revman 5.1 software. The data extracted included study characteristics, population profiles, details of the intervention, and details of comparison groups, outcomes, study design and risk of bias.

Data on sample size, depression level for inclusion, numbers of intervention and control groups, intervention or treatment type, duration of intervention, number of counselling sessions, depression measurement scale, timing for outcome assessment and qualification of the therapists were extracted (Table 1).

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Badger T 2005	+	?	?	?	+	+	?
Bombardier CH 2009	+	+	+	+	+	+	
Dwight-Johnson M 2011	+	?	?	?	+	+	
Furukawa TA 2012	+	+	+	?	+	+	
Kim SE 2011	+	+	+	?	+	+	
Ludman EJ 2007	+	?	?	+	+	+	
Lynch D 2004	+	?	?	?	+	+	
Mohr DC 2000	+	?	?	+	+	+	?
Mohr DC 2012	+	?	?	+	+	+	
Piette JD 2011	+	+	?	?	+	+	
Simon GE 2004	+	+	+	+	+	+	

Figure 2: Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

Assessment of risk of bias in included studies

The included studies were assessed for risk of bias using the Cochrane’s risk of bias assessment tool [29], that takes into account selection bias (random sequence generation and allocation concealment), performance bias (blinding of participants and personnel), detection bias (blinding of outcome assessment), attrition bias (incomplete outcome data), reporting bias (selective reporting) and other biases (any other bias not covered by the earlier forms of bias). Each domain was rated as ‘low risk’, ‘high risk’ or ‘unclear risk’. Discrepancies in risk of bias assessment were settled through discussion.

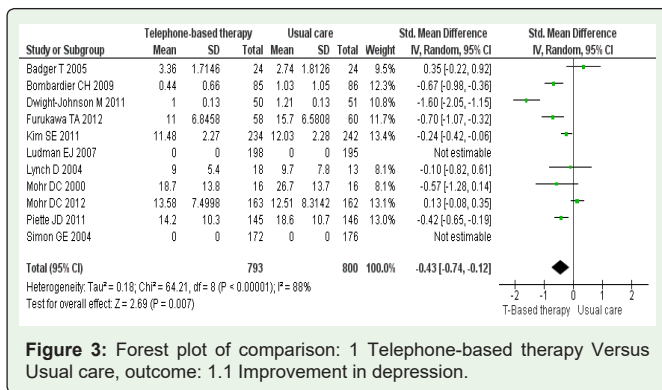


Figure 3: Forest plot of comparison: 1 Telephone-based therapy Versus Usual care, outcome: 1.1 Improvement in depression.

Statistical analysis

Depression scores were analyzed using the Standardized Mean Difference (SMD) with 95% confidence intervals (95% CIs). The SMD was preferred as the RCTs used different measurement scales of depression. End of intervention values, rather than change from baseline values, were included in the meta-analyses. We reported the proportion of participants with adverse events using narrative summaries. We adopted an intention-to-treat analysis approach where all participants who were randomized were analyzed. We conducted meta-analyses according to the guidance provided in the Cochrane Handbook for Systematic Reviews of Interventions [30]. We recognized high level of heterogeneity in the content of interventions, participants’ depression level at entry, duration of interventions and time points of outcome assessment in the included studies. For this reason, we used a random-effects meta-analysis model. Statistical heterogeneity among the studies was assessed using the I² statistic [31].

We performed two exploratory post-hoc sub-group analyses: (i) for duration of intervention of less than six months versus more than six months; and (ii) for RCTs including participants with a medical comorbidity versus without a medical comorbidity. We also carried out with sensitivity analyses based on extreme improvement as an outcome and sample size of less than 50 participants. We assessed publication bias using funnel plots [32].

Results

The total number of articles identified through the electronic search was 560. Of these, 200 duplicates were removed. Three hundred twenty eight articles were excluded after initial screening of titles and abstracts. A comprehensive review of full texts of the remaining 32 articles was then conducted. Nineteen studies [33-51] were excluded after the detailed

review of their full text. The major reasons for exclusion were the nature of the intervention and the measurement of outcomes. Eleven full text publications and 2 conference abstracts were considered eligible for inclusion. The two conference abstracts [52,53] did not report sufficient information that enables extraction of data and assessment of risk of bias. One study focused on sub-threshold depression [54] while another on Medicaid beneficiaries [55]. Therefore, 11 RCTs were included in the current review (Figure 1).

Characteristics of studies

The main characteristics of the included studies are shown in Table 1. The total number of participants included in all the included studies was 1593. Participants had different types and stages of depression. Four studies [18,56-58] included participants with known medical comorbidities, such as, diabetes, breast cancer, multiple sclerosis and brain injury while the rest of the studies included participants without knowing medical comorbidities. In one study, at least one study TBT and telephone care management were administrated in patients under antidepressant treatment [17]. Six studies used cognitive-behavioral orientation as they intervention approach while the other five studies used care management, interpersonal counselling, and psychotherapy, problem solving and scheduled telephone-based intervention approaches. A baseline depression level that was used for the inclusion of participants in the studies was measured using different scales across the studies. Four studies delivered interventions with duration of more than six months. In most of the studies, the duration of each telephone counselling session ranged from 30-50 minutes. On average, telephone counselling sessions were conducted on a weekly basis. All studies used structured manuals to guide the telephone-based intervention. Most of the studies audio taped their counselling sessions for quality check.

Risk of bias of included studies: The results of the risk of bias assessment are shown in risk of bias graph. All 11 studies have used an adequate random sequence generation, 5 studies used adequate allocation concealment, 1 study used blinding of both participants and personnel, 6 studies used blinding of outcome assessment, 9 studies had low risk of attrition bias and 7 studies had low risk of selective reporting (Figure 2).

Effects of interventions

Overall intervention effect: Nine studies reported a mean level of depression as depression scores at the completion of treatment. The other two studies reported a proportion of patients who had improved depression rather than a mean depression level in individual patients at the end of the intervention. Comparison of depression levels in the immediate post-intervention period from the nine studies included in the pooled analysis was in favor of TBT. The pooled SMD was -0.43 (95% CI: -0.74, -0.12) (Figure 3). This was found to be statistically significant (p= 0.007). However, the heterogeneity among the studies as estimated by the I² statistic was substantial (88%). The two studies that were not included in the pooled analysis [17,59] have reported that TBT had resulted in a statistically significant improvement in clinical outcomes and patient satisfaction as compared to usual care.

Sub-group analysis: Comparison of the effectiveness of TBT between studies with duration of intervention less than six months and more than six months showed that TBT was not better than usual

care in those seven studies with treatment duration of less than six months (SMD=-0.42; 95% CI:-1.03, 0.19). In the two studies with an intervention duration of more than six months, TBT was significantly better in reducing depression as compared to usual care. A telephone-based intervention was significantly better than usual care in those studies having participants with known medical comorbidity. However, the TBT was not significantly better as compared to usual care for those studies having participants without knowing medical comorbidity.

Sensitivity analysis: To evaluate the effect of withholding a study in which “highest improvement” was reported with TBT, we excluded one study (60) from the pooled analysis. The overall effect was still statistically significant when this study was excluded (SMD=-0.29; 95% CI: -0.54-.04; P=0.02). Similarly, exclusion of three studies with a sample size of less than 50 participants in the treatment arm [18,61,62] improved the overall effectiveness of TBT (SMD=-0.55; 95% CI: -0.92-0.18). This was not significantly different from the overall effect of the nine studies included in the pooled analysis.

Secondary outcome during the follow up period

Four studies [17,59,60,63] had depression measurements in the post-treatment follow up period. In the study by Ludman EJ, the results obtained at 12 months (post-treatment) were maintained for 18 months (follow up). In this study, there were booster sessions during the follow up period. In the study by Mohr DC (2012), the depression levels were significantly lower in the TBT group than in the usual care group. In the fourth study that involved follow up [60], inconsistent results were found. In this study, there was no statistically significant difference of mean SCL depression score at 6 months follow up period between the intervention and control group. However, the PHQ-9 mean depression score at 6 month follow up was significantly lower in the intervention group.

Discussion

Our meta-analysis found a statistically significant effect of TBT in reducing depression levels as compared to usual care. However, the statistical heterogeneity was substantial.

In subgroup analyses, we found that TBT in studies having more than fifty participants, more than six months of duration of intervention and participants with known medical comorbidities (e.g. Multiple sclerosis, breast cancer, traumatic brain injuries) had a significant effect in reducing depression. TBT had no significant benefit over usual care when subgroup analysis was conducted by a type of randomization (individual randomization versus block randomization).

The findings regarding the effect of TBT are not applicable to people aged less than 18 years, as we have explicitly excluded such trials from the review. Therefore, the results of this review would only be interpreted for the adult population. This review indicated that TBT is important in reducing depression. These findings are consistent with the findings from other reviews. Mohr DC found that telephone-administered psychotherapy can produce significant reductions in depressive symptoms [26]. This study also found that TBT reduces the attrition rates as well as depressive symptoms in the analyses of pre-treatment to post-treatment change, which were not investigated in this review.

Telephone-based interventions, as an accessible and convenient method of health service delivery to manage depression, can be applied to communities and primary health care facilities in settings where the infrastructure is available [64]. All the studies included in this review have used the structured approach with clear outlines of materials on cognitive behavioral component, telephone, interpersonal counselling, psychotherapy, problem solving and stress management covered in each session of the TBT followed by therapist manual and a patient workbook. This should be carefully considered in applying TBT in other contexts. The content of telephone interventions should be adapted depending on type of medical disorders that depressive patients suffer. It is highly recommended that therapists or telephone counselors delivering telephone interventions should be experienced in outpatient psychotherapy of depression and CBT. TBT could be a readily applicable intervention to improve the quality of care for depression. If the conditions necessary for telephone-based interventions was created, TBT could help patients and primary care providers in maximizing treatment choices.

There were some limitations associated with this study. First, there was a significant level of heterogeneity among the studies and this need to be considered in the interpretation of the findings of this review. Second, subgroup analysis by study settings (primary care setting vs. psychiatric settings) was not possible due to the limited number of studies. Third, comparison of the effectiveness of TBT in the two treatment groups (with specific psychological treatment and with nonspecific treatment) was not conducted as the number of the studies is not sufficient for this analysis. Finally, this study focused on whether TBT is more effective than usual care or not. Further studies are needed to explore why TBT is more effective and the different factors that have contributed to its effectiveness.

Conclusion

The findings of this review support that telephone-based therapy could be more effective than face-to face therapy in reducing the symptoms of depression and improving access to care. However, there is a large level of heterogeneity that could possibly affect this conclusion. Therefore, more research is required to establish the applicability and cost-effectiveness of telephone-based therapy for routine depression management in healthcare systems.

Acknowledgement

We thank Matthew Page, Sheila Cyril, Janice Whetton and Megan D’Souza for their professional advice and support in the design and conduct of this study.

References

1. World Health Organization. Fact sheet on depression. WHO, Geneva, 2012. Accessed on 25 Jan, 2013.
2. Andrews G, Titov N. Depression is very disabling. *Lancet*. 2007; 370: 808-809.
3. Panzarino PJ Jr. The costs of depression: direct and indirect; treatment versus nontreatment. *J Clin Psychiatry*. 1998; 59 Suppl 20: 11-14.
4. Wang PS, Simon G, Kessler RC. The economic burden of depression and the cost-effectiveness of treatment. *Int J Methods Psychiatr Res*. 2003; 12: 22-33.
5. Singleton N, Bumpstead R, O'Brien M, Lee A, Meltzer H. Psychiatric morbidity among adults living in private households, 2000. *Int Rev Psychiatry*. 2003; 15: 65-73.

6. American Psychiatric Association. APA Practice Guidelines. Washington DC: American Psychiatric Association. 2000.
7. Kessler RC, Zhao S, Blazer DG, Swartz M. Prevalence, correlates, and course of minor depression and major depression in the National Comorbidity Survey. *J Affect Disord.* 1997; 45: 19-30.
8. Menzel JC. Depression in the elderly after traumatic brain injury: A systematic review. *Brain Injury.* 2008; 22: 375-380.
9. Spek V, Cuijpers P, Nyklicek I, Riper H, Keyzer J, Pop V. Internet-based cognitive behaviour therapy for symptoms of depression and anxiety: a meta-analysis. *Psychol Med.* 2007; 37: 319-328.
10. Mohr DC, Ho J, Duffecy J, Baron KG, Lehman KA, Jin L, et al. Perceived barriers to psychological treatments and their relationship to depression. *J Clin Psychol.* 2010; 66: 394-409.
11. Mohr DC, Ho J, Duffecy J, Reifler D, Sokol L, Burns MN, et al. Effect of telephone-administered vs face-to-face cognitive behavioral therapy on adherence to therapy and depression outcomes among primary care patients: a randomized trial. *JAMA.* 2012; 307: 2278-2285.
12. Hoifodt RS, Strom C, Kolstrup N, Eisemann M, Waterloo K. Effectiveness of cognitive behavioral therapy in primary health care: a review. *Fam Pract.* 2011; 28: 489-504.
13. Williams C, Wilson P, Morrison J, McMahon A, Walker A, Allan L, et al. Guided self-help cognitive behavioral therapy for depression in primary care: a randomized controlled trial. *PLoS One.* 2013; 8: e52735.
14. Churchill R, Hunot V, Corney R, Knapp M, McGuire H, Tylee A, et al. A systematic review of controlled trials of the effectiveness and cost-effectiveness of brief psychological treatments for depression. *Health Technol Assess.* 2001; 5: 1-173.
15. Butler AC, Chapman JE, Forman EM, Beck AT. The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clin Psychol Rev.* 2006; 26: 17-31.
16. Rollman BL, Belnap BH, Mazumdar S, Houck PR, Zhu F, Gardner W, et al. A randomized trial to improve the quality of treatment for panic and generalized anxiety disorders in primary care. *Arch Gen Psychiatry.* 2005; 62: 1332-1341.
17. Simon GE, Ludman EJ, Tutty S, Operskalski B, Von Korff M. Telephone psychotherapy and telephone care management for primary care patients starting antidepressant treatment: a randomized controlled trial. *JAMA.* 2004; 292: 935-942.
18. Mohr DC, Likosky W, Bertagnolli A, Goodkin DE, Van Der Wende J, Dwyer P, et al. Telephone-administered cognitive-behavioral therapy for the treatment of depressive symptoms in multiple sclerosis. *J Consult Clin Psychol.* 2000; 68: 356-361.
19. Mohr DC, Vella L, Hart S, Heckman T, Simon G. The Effect of Telephone-Administered Psychotherapy on Symptoms of Depression and Attrition: A Meta-Analysis. *Clinical psychology: a publication of the Division of Clinical Psychology of the American Psychological Association.* 2008; 15: 243-253.
20. Andersson G, Cuijpers P. Internet-based and other computerized psychological treatments for adult depression: a meta-analysis. *Cogn Behav Ther.* 2009; 38: 196-205.
21. Hamilton M. A rating scale for depression. *J Neurol Neurosurg Psychiatry.* 1960; 23: 56-62.
22. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry.* 1961; 4: 561-571.
23. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001; 16: 606-613.
24. Peck A. Changing the face of standard nursing practice through telehealth and telenursing. *Nurs Adm Q.* 2005; 29: 339-343.
25. Montgomery SA, Asberg M. A new depression scale designed to be sensitive to change. *Br J Psychiatry.* 1979; 134: 382-389.
26. Leach LS, Christensen H. A systematic review of telephone-based interventions for mental disorders. *J Telemed Telecare.* 2006; 12: 122-129.
27. García-Lizana F, Muñoz-Mayorga I. Telemedicine for depression: a systematic review. *Perspect Psychiatr Care.* 2010; 46: 119-126.
28. Higgins JP, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomized trials. *BMJ.* 2011; 343: d5928.
29. Higgins JPT, Green S. *Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [Updated March 2011].* The Cochrane Collaboration. 2011.
30. Higgins JP, Thompson SG. Quantifying heterogeneity in a meta-analysis. *Stat Med.* 2002; 21: 1539-1558.
31. Sterne JA, Sutton AJ, Ioannidis JP, Terrin N, Jones DR, Lau J, et al. Recommendations for examining and interpreting funnel plot asymmetry in meta-analyses of randomized controlled trials. *BMJ.* 2011; 343: d4002.
32. Adler DA, Bungay KM, Wilson IB, Pei Y, Supran S, Peckham E, et al. The impact of a pharmacist intervention on 6-month outcomes in depressed primary care patients. *Gen Hosp Psychiatry.* 2004; 26: 199-209.
33. Badger T, Segrin C, Dorros SM, Meek P, Lopez AM. Depression and anxiety in women with breast cancer and their partners. *Nurs Res.* 2007; 56: 44-53.
34. Bambauer KZ, Aupont O, Stone PH, Locke SE, Mullan MG, Colagiovanni J, et al. The effect of a telephone counseling intervention on self-rated health of cardiac patients. *Psychosom Med.* 2005; 67: 539-545.
35. Bowland L, Cockburn J, Cawson J, Anderson HC, Moorehead S, Kenny M. Counseling interventions to address the psychological consequences of screening mammography: A randomized trial. *Patient Education and Counseling.* 2003; 49: 189-198.
36. Brenes GA, Miller ME, Williamson JD, McCall WV, Knudson M, Stanley MA. A randomized controlled trial of telephone-delivered cognitive-behavioral therapy for late-life anxiety disorders. *American Journal of Geriatric Psychiatry.* 2012; 20: 707-716.
37. Datto CJ, Thompson R, Horowitz D, Disbot M, Oslin DW. The pilot study of a telephone disease management program for depression. *Gen Hosp Psychiatry.* 2003; 25: 169-177.
38. Dietrich AJ. The telephone as a new weapon in the battle against depression. *Eff Clin Pract.* 2000; 3: 191-193.
39. Dorstyn D, Mathias J, Denson L, Robertson M. Effectiveness of telephone counseling in managing psychological outcomes after spinal cord injury: a preliminary study. *Arch Phys Med Rehabil.* 2012; 93: 2100-2108.
40. Gellis ZD, Bruce ML. Problem solving therapy for subthreshold depression in home health care patients with cardiovascular disease. *Am J Geriatr Psychiatry.* 2010; 18: 464-474.
41. Graves KD, Wenzel L, Schwartz MD, Luta G, Wileyto P, Narod S, et al. Randomized controlled trial of a psychosocial telephone counseling intervention in BRCA1 and BRCA2 mutation carriers. *Cancer Epidemiology, Biomarkers and Prevention.* 2010; 19: 648-654.
42. Ludman EJ, Simon GE, Grothaus LC, Luce C, Markley DK, Schaefer J. A pilot study of telephone care management and structured disease self-management groups for chronic depression. *Psychiatr Serv.* 2007; 58: 1065-1072.
43. Lynch DJ, Tamburrino MB, Nagel R. Telephone counseling for patients with minor depression: preliminary findings in a family practice setting. *J Fam Pract.* 1997; 44: 293-298.
44. Marcus AC, Garrett KM, Cella D, Wenzel L, Brady MJ, Fairclough D, et al. Can telephone counseling post-treatment improve psychosocial outcomes among early stage breast cancer survivors? *Psycho-Oncology.* 2010; 19: 923-932.
45. Mohr DC, Hart SL, Julian L, Catledge C, Honos-Webb L, Vella L, et al. Telephone-administered psychotherapy for depression. *Arch Gen Psychiatry.* 2005; 62: 1007-1014.

46. Neugebauer R, Kline J, Markowitz JC, Bleiberg KL, Baxi L, Rosing MA, et al. Pilot randomized controlled trial of interpersonal counseling for subsyndromal depression following miscarriage. *Journal of Clinical Psychiatry*. 2006; 67: 1299-1304.
47. Osgood-Hynes DJ, Greist JH, Marks IM, Baer L, Heneman SW, Wenzel KW, et al. Self-administered psychotherapy for depression using a telephone-accessed computer system plus booklets: An open U.S.-U.K. Study. *Journal of Clinical Psychiatry*. 1998; 59: 358-365.
48. Tutty S, Spangler DL, Poppleton LE, Ludman EJ, Simon GE. Evaluating the effectiveness of cognitive-behavioral teletherapy in depressed adults. *Behav Ther*. 2010; 41: 229-236.
49. Van den Berg N, Grabe HJ, Freyberger HJ, Hoffmann W. A telephone- and text-message based telemedical care concept for patients with mental health disorders--study protocol for a randomized, controlled study design. *BMC psychiatry*. 2011; 11: 30.
50. Wang PS, Simon GE, Avorn J, Azocar F, Ludman EJ, McCulloch J, et al. Telephone screening, outreach, and care management for depressed workers and impact on clinical and work productivity outcomes: A randomized controlled trial. *Journal of the American Medical Association*. 2007; 298: 1401-1411.
51. Temkin NR, Fann JR, Bombardier CH. Telephone and in-person cognitive behavioral therapy for depression after traumatic brain injury. *Journal of Neurotrauma*. 2012; 29: A96-A97.
52. Piette J, Duffy S, Torres T, Vogel M, Himle J, Richardson C, et al. 12-month outcomes from a randomized trial of telephone cognitive behavioral therapy for depressed patients with type 2 diabetes. *J Gen Intern Med*. 2010; 25: S205.
53. Furukawa TA, Horikoshi M, Kawakami N, Kadota M, Sasaki M, Sekiya Y, et al. Telephone cognitive-behavioral therapy for subthreshold depression and presenteeism in work place: a randomized controlled trial. *PLoS One*. 2012; 7: e35330.
54. Kim SE, Le Blanc AJ, Michalopoulos C, Azocar F, Ludman EJ, Butler DM, et al. Does telephone care management help Medicaid beneficiaries with depression? *Am J Manag Care*. 2011; 17: e375-382.
55. Piette JD, Richardson C, Himle J, Duffy S, Torres T, Vogel M, et al. A randomized trial of telephonic counseling plus walking for depressed diabetes patients. *Med Care*. 2011; 49: 641-648.
56. Badger T, Segrin C, Meek P, Lopez AM, Bonham E, Sieger A. Telephone interpersonal counseling with women with breast cancer: symptom management and quality of life. *Oncol Nurs Forum*. 2005; 32: 273-279.
57. Bombardier CH, Bell KR, Temkin NR, Fann JR, Hoffman J, Dikmen S. The efficacy of a scheduled telephone intervention for ameliorating depressive symptoms during the first year after traumatic brain injury. *Journal of Head Trauma Rehabilitation*. 2009; 24: 230-238.
58. Ludman EJ, Simon GE, Tutty S, Von Korff M. A randomized trial of telephone psychotherapy and pharmacotherapy for depression: continuation and durability of effects. *J Consult Clin Psychol*. 2007; 75: 257-266.
59. Dwight-Johnson M, Aisenberg E, Golinelli D, Hong S, O'Brien M, Ludman E. Telephone-based cognitive-behavioral therapy for Latino patients living in rural areas: A randomized pilot study. *Psychiatric Services*. 2011; 62: 936-942.
60. Badger T, Segrin C, Meek P, Lopez AM, Bonham E, Sieger A. Telephone interpersonal counseling with women with breast cancer: symptom management and quality of life. *Oncol Nurs Forum*. 2005; 32: 273-279.
61. Lynch D, Tamburrino M, Nagel R, Smith MK. Telephone-based treatment for family practice patients with mild depression. *Psychol Rep*. 2004; 94: 785-792.
62. Mohr DC, Ho J, Duffecy J, Reifler D, Sokol L, Burns MN, et al. Effect of telephone-administered vs face-to-face cognitive behavioral therapy on adherence to therapy and depression outcomes among primary care patients: a randomized trial. *JAMA*. 2012; 307: 2278-2285.
63. Bischoff R, Hollist C, Smith C, Flack P. Addressing the mental health needs of the rural underserved: findings from a multiple case study of a behavioral telehealth project. *Contemporary Family Therapy*. 2004; 26: 179-198.