Published in final edited form as:

Int J Psychiatry Med. 2012 ; 43(2): 105–117.

Feasibility of nurse-led antidepressant medication management of depression in an HIV clinic in Tanzania

Julie L. Adams, MD, MPH,

Department of Psychiatry and Behavioral Sciences, Duke University

Maria L. G. Almond, MD, MPH,

Department of Psychiatry, University of Michigan

Edward J. Ringo, MD, FMCPsych,

Department of Psychiatry, Mawenzi Regional Hospital

Wahida H. Shangali, MPH, and

Department of Community Health and Research, Mawenzi Regional Hospital

Kathleen J. Sikkema, PhD

Department of Psychology and Neuroscience, Duke University

Abstract

Objective—Sub-Saharan Africa has the highest HIV prevalence worldwide and depression is highly prevalent among those infected. The negative impact of depression on HIV outcomes highlights the need to identify and treat it in this population. A model for doing this in lower-resourced settings involves task-shifting depression treatment to primary care; however, HIV-infected individuals are often treated in a parallel HIV specialty setting. We adapted a model of task-shifting, measurement based care (MBC), for an HIV clinic setting and tested its feasibility in Tanzania. MBC involves measuring depressive symptoms at meaningful intervals and adjusting antidepressant medication treatment based on the measure of illness.

Method—Twenty adults presenting for care at an outpatient HIV clinic in Tanzania were enrolled and followed by a nurse care manager who measured depressive symptoms at baseline and every four weeks for 12 weeks. An algorithm-based decision-support tool was utilized by the care manager to recommend individualized antidepressant medication doses to participants' HIV providers at each visit.

Results—Retention was high and fidelity of the care manager to the MBC protocol was exceptional. Follow through of antidepressant prescription dosing recommendations by the prescriber was low. Limited availability of antidepressants was also noted. Despite challenges, baseline depression scores decreased over the 12- week period.

Conclusions—Overall, the model of algorithm-based nursing support of prescription decisions was feasible. Future studies should address implementation issues of medication supply and dosing. Further task-shifting to relatively more abundant and lower-skilled health workers, such as nurses' aides warrants examination.

Keywords

Depressive Disorder; HIV; Depressive Disorder/drug therapy; World Health; Feasibility Studies

INTRODUCTION

The impact of depression is growing worldwide, particularly in low and middle income countries [1, 2]. Available human resources for health are inadequate to address the need are inadequate in the developing world [1]. Models that shift the task of depression management from mental health to primary health care clinics have demonstrated effectiveness in addressing these issues [3]. Such models aim to logically redistribute tasks of disease management to relatively more abundant cadres of health workers, a process known as task-shifting. Task-shifting depression management relies on training lay and lower-skilled health workers to provide psychosocial interventions for the majority of depressed patients while referring refractory cases to less abundant, higher-skilled providers.

The profound need for depression treatment in HIV is two-fold. First, depression prevalence in sub-Saharan Africa is much greater among HIV-infected than in the general population, ranging from 14% in a cross-sectional survey of individuals seeking HIV treatment in South Africa [4] to 57% in a longitudinal study of Tanzanian women [5]. Second, depression negatively impacts HIV through decreased ARV adherence [6–9], higher viral loads [7, 10], lower CD4 counts [10–13], faster HIV disease progression [5, 14], and increased mortality [5, 11] compared to individuals without depression.

However, in areas of the world where HIV is highly prevalent, HIV programs have created a de facto primary care system that functions independently and in parallel to traditional primary care systems [ref]. As such, integrating depression management into the primary care system may not address the needs of those infected with HIV. For example, in Tanzania, receiving care in specialized HIV Care and Treatment Centres is necessary to obtain antiretroviral (ARV) medications. In addition, these clinics are often preferred by patients so as to avoid community-based primary care clinics where confidentiality of HIV diagnosis may not be guaranteed.

This system of HIV care provides an ideal platform from which to deliver depression care management since HIV clinics provide a medical home for this vulnerable population. Delivery of HIV care follows guideline-concordant algorithms based on measures of illness (e.g. CD4 counts, VL, incident infections, etc). A similar model that relies on the measurement of depressive illness to assist in the delivery of guideline-concordant antidepressant treatment would presumably be easily understood in such settings.

A measurement-based care (MBC) model of depression has demonstrated effectiveness in primary care clinics [15, 16] and feasibility in HIV clinics [17] in the U.S. The purpose of this study was to adapt this model in order to task-shift depression management to an HIV clinic in Tanzania. MBC involves measurement of depressive symptoms at meaningful intervals and reliance on physicians to utilize an algorithm to adjust antidepressant treatment based on the measure of illness [18]. However, given the relative paucity of physician-level providers, we further adapted the model to shift care management primarily to nurses and examined its feasibility in a single-condition study in a Tanzanian HIV Care and Treatment Centre (CTC).

METHODS

Setting

The study was conducted in an outpatient HIV Care and Treatment Centre (CTC) at a regional-level public hospital in the Northern Zone of Tanzania. The main clinic, where the study took place, and satellite clinics provide the majority of HIV care to the region's population. The daily clinic staff consists of 1 assistant medical officer, 3 clinical officers, 5

nurses, 3 nursing assistants, and 3 peer patients (HIV patients who provide peer counseling and education through a government sponsored program).

The clinics have a combined roster of approximately 2000 patients. On average, 100 patients are seen in clinic each day. Patients are almost exclusively self-pay, as only government employees in Tanzania have health insurance. Patients are dispensed 30-day supplies of anti-retroviral medications free-of-charge through ministry of health pharmacies.

HIV care is provided by physician extenders (assistant medical officer and clinical officers). ARV medications are prescribed according to Tanzanian Ministry of Health treatment algorithms which are based on World Health Organization staging of HIV illness (i.e. combined consideration of viral load and CD4 lymphocyte measurements, and presence of opportunistic infections).

Participants and Procedures

For this feasibility study, patients thought to be depressed by their HIV providers and interested in study participation were referred to the study nurse for further eligibility determination. A convenience sample of 20 participants was attained in one week. Inclusion criteria were 18 years old, score 10 on the Patient Health Questionnaire-9 item, and were capable of providing informed consent. Those who were acutely suicidal or had obvious psychiatric illness or history that would contraindicate enrollment or the use of antidepressant medication (e.g. Bipolar disorder, psychotic disorder) were excluded from the study and referred to the psychiatric clinic. Participants who were referred provided written informed consent prior to completing a baseline assessment. Ethical clearance was obtained from the lead U.S. investigator's home institution and the National Institutes of Health in the U.S., the local hospital's ethics committee and the Tanzanian National Institute of Medical Research in Tanzania.

Implementation and Intervention

Prior to the start of the study, a nurse and clinical officer were identified by the clinic director to conduct the research procedures. The nurse had a baccalaureate nursing degree and 15 years of clinical experience in HIV. The clinical officer had two years of practical training beyond her baccalaureate degree and 5 years of HIV clinical experience. These individuals completed research ethics training and in-service training to increase competency in the detection and management of depression in HIV illness. This included recognizing signs and symptoms of depression, principles of depression management, and management of emergent psychiatric issues. In addition, they were trained in the use study instruments and the guideline-concordant depression treatment algorithm (see figure 1).

Results of the baseline assessment, including relevant demographic and clinical data, were taken into account by the study nurse who consulted the adapted MBC treatment algorithm to determine an antidepressant medication and dose recommendation. The algorithm supported the use of Amitriptyline, the only antidepressant in stock at the hospital's pharmacy. Lower starting doses were recommended for participants on non-nucleoside reverse transcriptase inhibitors (NNRTIs) and protease inhibitors (PIs; see figure 1). Ritonavir is not widely used in Tanzania and dosing recommendations specific to it were not supported by the algorithm for purposes of simplicity. The maximum dose supported by the algorithm was 150mg or 200mg depending on ARV regimen. Dosing recommendations and relevant clinical data were presented by the study nurse to the study clinical officer who made the ultimate treatment choice in consultation with the participant.

After baseline, study visits took place at weeks 4, 8 and 12. At each visit, the study nurse measured the PHQ-9 and reviewed relevant clinical data including ARV prescription and

adherence to both ARVs and antidepressants. These data were again utilized to determine from the treatment algorithm what dosing recommendations were indicated—maintain medication and dose, increase dose, change medication, or refer (see figure 1). The results of the PHQ-9, adherence, side effects and recommended management steps were communicated to the clinical officer who made all treatment decisions. Optional visits at weeks 2, 6 and 10 were offered as needed to monitor for emergence of troubling side effects or to manage crises (e.g. emergent suicidal thoughts). The treatment algorithm indicated referral to psychiatric care for participants who had not remitted (PHQ-9<5) by week 12 or for those who experienced clinically significant worsening of their depressive symptoms.

The study team met weekly with a psychiatrist to review the course of every participant. This supervision included reviewing PHQ-9 scores since baseline, antiretroviral regimen, baseline and incident side effects, algorithm-based recommendations since baseline, antidepressant prescription history since baseline, and any other relevant clinical data. The psychiatrist assessed the appropriateness of the treatment course and made recommendations for adjustment to the study nurse and clinical officer.

Study Measures

Patient Health Questionnaire-9 Item (PHQ-9)—The PHQ-9 is a nine-item measure of depression based on the Diagnostic and Statistical Manual criteria for diagnosis of major depressive disorder [19]. Each item asks how often over the previous 2 weeks the respondent has been bothered by each of the 9 symptom criterion of major depressive disorder (0-not at all to 3-every day). A Swahili version has demonstrated construct validity and test-retest reliability in an HIV population in Kenya [20]. No diagnostic validation has been conducted in sub-Saharan Africa, therefore, a Western-validated cut-off score of 10 was used to define a positive screen, a definition that has demonstrated high sensitivity and specificity [21]. The instrument also has utility in monitoring change in depressive symptoms [22] and has been used to track symptoms previously [23].

Antidepressant and antiretroviral therapy adherence measure—We modified the Adult AIDS Clinical Trials Group adherence measure to include antidepressant medications. This is a self-report measure in which respondents identify their regimen from a comprehensive list of antiretroviral and antidepressant medications. Each medication is assessed in turn. The numbers of pills per dose and doses per day that are prescribed are recorded then the numbers actually taken. The timing of the last missed dose is ascertained and three visual analog scales indicate from 0–100% how many of those prescribed were taken, how many were missed completely, and how many were taken late in the last month [24].

Analysis

Stata version 10 was used for all analysis. Frequencies, means, and standard deviations were calculated for demographic variables. Mean PHQ-9 scores and standard deviations were calculated for each time point at which they were measured (weeks 0, 4, 8, and 12). Individual items on the PHQ-9 were also averaged and reported with standard deviations for each time point. Simple mean differences were calculated for total and individual item PHQ-9 scores and paired sample t-tests were used to compare baseline and week 12 PHQ-9 total and individual items scores.

RESULTS

Twenty-one individuals were referred by HIV providers and provided informed consent. Twenty were found to have a PHQ-9 ≥ 10 and meet other eligibility criteria. There were 14 (70%) women and 6 (30%) men. Additional demographic data are presented in table 1.

Retention was 95% (n=19) at week 4, 90% (n=18) at week 8, and 85% (n=17) at week 12. This corresponded to a study visit completion rate of 93% (74 study visits attended of 80 indicated). One participant moved outside the clinic's catchment area and the other two were lost to follow up.

Algorithm fidelity was determined by correct identification of algorithm-indicated antidepressant dose by the nurse, communication of the indicated dose to the clinical officer, and subsequent prescription of the indicated dose by the clinical officer. The study nurse correctly identified all algorithm-indicated antidepressant recommendations (n=74, 100%) and communicated all to the study clinical officer. Determination of subsequent prescription was made in concert between the nurse and clinical officer. The supply of Amitriptyline was disrupted when the pharmacy ran out of the medication at week 8 and could not recuperate supplies until week 10. As a result, the clinical officer either suspended prescription or kept the dose artificially low to ensure ongoing availability for all participants. Thus, algorithm fidelity was ultimately low with only 19 (95%) participants having received a single dose increase by week 12, and no participant received a dose higher than 50mg. All participants reported 100% adherence to antidepressants prescribed at each time-point; however, a two-week shortage of medications meant that during one 4-week interval only two weeks' worth of medication was taken by participants.

The mean (SD) baseline PHQ-9 score for the sample was 19.85 (2.87). Average scores among 17 completers significantly decreased from 19.76 (3.01) at baseline to 8.12 (1.83) at week 12 ($t=19.62$, $df=16$, $p<0.001$). Total and individual items scores at baseline and weeks 4, 8, and 12 are presented in table 2. Each item decreased significantly ($p<0.05$) over the course of the intervention.

DISCUSSION

This study tested the feasibility of an innovative model of task-shifting depression treatment in an HIV clinic in Tanzania. The model utilized nurse management and an antidepressant decision support algorithm to assist the prescriber. Model feasibility was supported by various points of evidence. Recruitment through clinician referral readily produced twenty participants demonstrating high positive predictive value (95%) of clinician impression. The eagerness of staff to receive assistance managing depression also speaks to the acceptability of the approach. Participant retention was high suggesting the model was acceptable to them as well. Further evidence of feasibility was the high fidelity to the algorithm by the nurse in identifying and communicating the appropriate antidepressant dose recommendation to the prescriber. Adherence to prescribed antidepressants was high indicating that pharmaceutical interventions for depression are acceptable. The participant retention rates may, in part, be due to the fact that study visits corresponded to routine clinic visits, intentionally spaced at 1-month intervals to maximize ARV adherence and prescription refill. For patients attending HIV clinic less often, one might expect lower retention. The decrease in depressive symptoms in the sample suggests early evidence of effectiveness of the intervention, though these results must be interpreted cautiously given that the sample was not powered to detect a change and the study was non-experimental in nature.

The two main obstacles to feasibility of the model hinged on medication dosing and supply. First, the study clinical officer was apparently hesitant to increase the dose as indicated by

the algorithm. Though routinely prescribed by clinicians in the CTC as a sleep aid, none of the clinical officers had ever prescribed Amitriptyline at doses above 50mg and only rarely for depression. It is unclear whether use of an antidepressant with fewer side effects or interactions with ARVs would have addressed this issue. The clinician had no previous prescribing experience with any other antidepressant and as such may have also hesitated to push doses in any other medication.

The second obstacle to feasibility was the disrupted supply. The study period represented the highest prescribing rate for Amitriptyline in the head pharmacist's memory. In order to continue supplying 20 individuals with monthly prescriptions, additional shipments from the Tanzanian Ministry of Health were required. As such, the clinical officer was further encouraged by external mechanisms to maintain lower doses than was indicated by the algorithm. Providing medications to participants through the study would have avoided this obstacle, but would not have allowed assessment of feasibility in this low resource setting. The ultimate aim of the clinic is to sustainably implement a feasible treatment model independent of research, and provision of medications through study resources was not deemed by clinic staff to further that goal. However, given the disruption in supply experienced during this rather small feasibility study, reliable pharmaceutical supplies are a demonstrable obstacle to independently sustained treatment in this clinic. Pharmaceutical distribution and use patterns should be examined in future research to assess implementation readiness.

Despite low prescribed doses and disrupted antidepressant supplies, depression response to medication was seen in all participants who completed the study. This could be understood in various ways. It is possible that adequate antidepressant dosing is lower in this cohort than those previously studied. In a Tanzanian cohort, Clomipramine, another antidepressant in the same class as Amitriptyline, was found to be equally effective at 75mg as the conventional "adequate" dose of 125mg [25]. Further research into what constitutes an adequate antidepressant dose in Tanzanians is warranted. Another possible contributor to improvement was the personal interactions with clinicians around issues of depression. Despite no increased frequency of clinic visits, the increased attention to depressive situations may have been therapeutic in itself. These data must be interpreted cautiously, however, given the lack of control group in the current study. Future studies might compare task-shifted medication management to psychosocial support interventions to determine the relative contribution of identifying and discussing depression to a medication treatment model.

The study had several limitations. The small sample size and lack of a control arm limits any conclusions about effectiveness of the model. The lack of systematic screening to identify participants could have created a bias for self-selection of highly motivated participants and thus an over-estimation of acceptability and feasibility. The use of a specifically selected and motivated study nurse and clinical officer rather than using all staff to provide the intervention could also impact our assessment of how easily the algorithm can be implemented in this setting. The use of a study nurse as opposed to a member of a lower-skilled health care worker does not address sustainability from the human resources for health perspective. Ideally, health care workers in relatively abundant supply, as opposed to further tasking an under-supplied cadre such as nurses, would be trained to provide decision support to prescribers. The current study did not assess feasibility of such task-shifting.

Conclusions

The lack of an affordable selection of antidepressants in Tanzania, as in many low and middle income countries [1] complicates depression management in HIV. Further, the exhaustion in supply of those antidepressants that are available speaks to the need for

ministries of health to anticipate the rising burden of depression globally and adjust pharmaceutical purchasing and distribution practices to address growing treatment needs. The potential for relatively low effective doses of antidepressants in Tanzanians must be further explored to accurately plan for population needs. Demands on the HIV healthcare work force should also be examined to identify the ideal cohort to drive task-shifted depression treatment. While this study feasibly shifted this task to a nurse, even this cadre of health professional is in relatively short supply [26] and nurses' aides or lay health workers should be considered. Shifting antidepressant medication decision support to even lower-skilled workers, in the way certain psychosocial interventions have been elsewhere [3], should be studied as a way to further logically distribute the work burden to those cadres of health workers in relatively greater supply than health professionals. Finding a sustainable human resource base to drive depression management in HIV clinics in Tanzania, may prove invaluable for treating a population so highly vulnerable to depression and its effects.

Acknowledgments

The research was supported by a grant through the Duke Center for AIDS Research funded through the National Institute of Allergy and Infectious Disease (PI: Weinhold; 2P30AI064518-06).

The team would like to acknowledge the invaluable assistance of Vera Mushi and Eunice Mmbando as well as the clinical staff of the Mawenzi Regional Hospital HIV Care and Treatment Centre, Moshi, Tanzania.

References

1. WHO. Switzerland: World Health Organization; 2005. Mental Health Atlas.
2. Switzerland: World Health Organization; 2008. The global burden of disease: 2004 update.
3. Patel V, Weiss HA, Chowdhary N, Naik S, Pednekar S, Chatterjee S, De Silva MJ, Bhat B, Araya R, King M, Simon G, Verdelli H, Kirkwood BR. Effectiveness of an intervention led by lay health counsellors for depressive and anxiety disorders in primary care in Goa, India (MANAS): a cluster randomised controlled trial. *Lancet*. 2010; 376:2086–2095. [PubMed: 21159375]
4. Myer L, Smit J, Roux LL, Parker S, Stein DJ, Seedat S. Common mental disorders among HIV-infected individuals in South Africa: prevalence, predictors, and validation of brief psychiatric rating scales. *AIDS Patient Care STDS*. 2008; 22:147–158. [PubMed: 18260806]
5. Antelman G, Kaaya S, Wei R, Mbwambo J, Msamanga GI, Fawzi WW, Fawzi MC. Depressive symptoms increase risk of HIV disease progression and mortality among women in Tanzania. *Journal of Acquired Immune Deficiency Syndrome*. 2007; 44:470–477.
6. Gordillo V, del Amo J, Soriano V, Gonzalez-Lahoz J. Sociodemographic and psychological variables influencing adherence to antiretroviral therapy. *AIDS*. 1999; 13:1763–1769. [PubMed: 10509579]
7. Horberg MA, Silverberg MJ, Hurley LB, Towner WJ, Klein DB, Bersoff-Matcha S, Weinberg WG, Antoniskis D, Mogyeros M, Dodge WT, Dobrinich R, Quesenberry CP, Kovach DA. Effects of depression and selective serotonin reuptake inhibitor use on adherence to highly active antiretroviral therapy and on clinical outcomes in HIV-infected patients. *Journal of Acquired Immune Deficiency Syndrome*. 2008; 47:384–390.
8. Mugavero M, Ostermann J, Whetten K, Leserman J, Swartz M, Stangl D, Thielman N. Barriers to antiretroviral adherence: the importance of depression, abuse, and other traumatic events. *AIDS Patient Care STDS*. 2006; 20:418–428. [PubMed: 16789855]
9. Amberbir A, Woldemichael K, Getachew S, Girma B, Deribe K. Predictors of adherence to antiretroviral therapy among HIV-infected persons: a prospective study in Southwest Ethiopia. *BMC Public Health*. 2008; 8:265. [PubMed: 18667066]
10. Ironson G, O'Cleirigh C, Fletcher MA, Laurenceau JP, Balbin E, Klimas N, Schneiderman N, Solomon G. Psychosocial factors predict CD4 and viral load change in men and women with human immunodeficiency virus in the era of highly active antiretroviral treatment. *Psychosomatic Medicine*. 2005; 67:1013–1021. [PubMed: 16314608]

11. Ickovics JR, Hamburger ME, Vlahov D, Schoenbaum EE, Schuman P, Boland RJ, Moore J. Mortality, CD4 cell count decline, and depressive symptoms among HIV-seropositive women: longitudinal analysis from the HIV Epidemiology Research Study. *Journal of the American Medical Association*. 2001; 285:1466–1474. [PubMed: 11255423]
12. Leserman J, Petitto JM, Perkins DO, Folds JD, Golden RN, Evans DL. Severe stress, depressive symptoms, and changes in lymphocyte subsets in human immunodeficiency virus-infected men. A 2-year follow-up study. *Archives of General Psychiatry*. 1997; 54:279–285.
13. Kaharuza FM, Bunnell R, Moss S, Purcell DW, Bikaako-Kajura W, Wamai N, Downing R, Solberg P, Coutinho A, Mermin J. Depression and CD4 cell count among persons with HIV infection in Uganda. *AIDS Behavior*. 2006; 10(4 Suppl):S105–S111. [PubMed: 16802195]
14. Leserman J, Jackson ED, Petitto JM, Golden RN, Silva SG, Perkins DO, Cai J, Folds JD, Evans DL. Progression to AIDS: the effects of stress, depressive symptoms, and social support. *Psychosomatic Medicine*. 1999; 61:397–406. [PubMed: 10367622]
15. Trivedi MH, Rush AJ, Crismon ML, Kashner TM, Toprac MG, Carmody TJ, Key T, Biggs MM, Shores-Wilson K, Witte B, Suppes T, Miller AL, Altshuler KZ, Shon SP. Clinical results for patients with major depressive disorder in the Texas Medication Algorithm Project. *Archives of General Psychiatry*. 2004; 61:669–680. [PubMed: 15237079]
16. Trivedi MH, Rush AJ, Wisniewski SR, Nierenberg AA, Warden D, Ritz L, Norquist G, Howland RH, Lebowitz B, McGrath PJ, Shores-Wilson K, Biggs MM, Balasubramani GK, Fava M. Evaluation of outcomes with citalopram for depression using measurement-based care in STAR*D: implications for clinical practice. *American Journal of Psychiatry*. 2006; 163:28–40. [PubMed: 16390886]
17. Adams J, Pollard R, Sikkema K. Feasibility of integrated depression care in an HIV clinic. *Psychiatric Services*. 2011; 62:804. [PubMed: 21724798]
18. Rush AJ, Fava M, Wisniewski SR, Lavori PW, Trivedi MH, Sackeim HA, Thase ME, Nierenberg AA, Quitkin FM, Kashner TM, Kupfer DJ, Rosenbaum JF, Alpert J, Stewart JW, McGrath PJ, Biggs MM, Shores-Wilson K, Lebowitz BD, Ritz L, Niederhede G. Sequenced treatment alternatives to relieve depression (STAR*D): rationale and design. *Controlled Clinical Trials*. 2004; 25:119–142. [PubMed: 15061154]
19. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*. 2001; 16:606–613. [PubMed: 11556941]
20. Monahan PO, Shacham E, Reece M, Kroenke K, Ong'or WO, Omollo O, Yebei VN, Ojwang C. Validity/reliability of PHQ-9 and PHQ-2 depression scales among adults living with HIV/AIDS in western Kenya. *Journal of General Internal Medicine*. 2009; 24:189–197. [PubMed: 19031037]
21. Gilbody S, Richards D, Brealey S, Hewitt C. Screening for depression in medical settings with the Patient Health Questionnaire (PHQ): a diagnostic metaanalysis. *Journal of General Internal Medicine*. 2007; 22:1596–1602. [PubMed: 17874169]
22. McMillan D, Gilbody S, Richards D. Defining successful treatment outcome in depression using the PHQ-9: A comparison of methods. *Journal of Affective Disorders*. 2010; 127:122–129. [PubMed: 20569992]
23. Landis SE, Gaynes BN, Morrissey JP, Vinson N, Ellis AR, Domino ME. Generalist care managers for the treatment of depressed medicaid patients in North Carolina: a pilot study. *BMC Family Practice*. 2007; 8:7. [PubMed: 17338822]
24. Chesney MA, Ickovics JR, Chambers DB, Gifford AL, Neidig J, Zwickl B, Wu AW. Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: the AACTG adherence instruments. Patient Care Committee & Adherence Working Group of the Outcomes Committee of the Adult AIDS Clinical Trials Group (AACTG). *AIDS Care*. 2000; 12:255–266. [PubMed: 10928201]
25. Kilonzo GP, Kaaya SF, Rweikiza JK, Kassam M, Moshi G. Determination of appropriate clomipramine dosage among depressed African outpatients in Dar es Salaam, Tanzania. *Central African Journal of Medicine*. 1994; 40:178–182. [PubMed: 7812991]
26. Kurowski C, Wyss K, Abdulla S, Mills A. Scaling up priority health interventions in Tanzania: the human resources challenge. *Health Policy Plan*. 2007; 22:113–127. [PubMed: 17485419]

Figure 1.

Schematic of antidepressant (AD) treatment algorithm

*Antiretroviral (ARV), **Nucleoside reverse transcriptase inhibitor, [†]Nonnucleoside reverse transcriptase inhibitor, [‡]Protease inhibitor, not Ritonavir.

Table 1

Demographic characteristics of participants

Characteristic	N (%) or Mean (SD)
Gender	
Female	14 (70)
Male	6 (30)
Marital status	
Single	2 (10)
Married	7 (35)
Divorced	8 (40)
Widowed	3 (15)
Educational attainment	
No school	3 (15)
Primary education	15 (75)
Secondary education	2 (10)
Household composition	
Total in household	5.9 (2.0)
Adults in household	3.2 (1.5)
Monthly Household income	
<20,000 Tanzanian shillings (TSh; <\$13US)	6 (30) 9 (45)
20,000–49,000 TSh (\$13-23US)	5 (25)
50,000 TSh (\$23)	
Household assets	
Radios	17 (75)
Indoor plumbing	10 (50)
Flush toilet	10 (50)
Bicycle	7 (35)
Television	6 (30)

Table 2

Individual PHQ-9 item analysis for participants who completed the intervention

Item	Mean (SD)				Mean change [*]	p-value
	Baseline	Week 4	Week 8	Week 12		
Anhedonia	2.95 (0.87)	1.29 (0.99)	1.75 (0.93)	0.76 (0.66)	-1.89	<0.001
Depressed mood	2.71 (0.77)	1.53 (0.80)	1.56 (0.72)	0.82 (0.81)	-1.88	<0.001
Sleep	2.64 (0.79)	1.88 (0.78)	1.81 (0.91)	1.12 (0.78)	-1.58	<0.001
Low energy	2.76 (0.56)	1.94 (0.82)	2.00 (0.89)	1.41 (0.71)	-1.29	<0.001
Appetite	2.18 (0.95)	2.18 (1.07)	1.50 (0.97)	0.88 (0.78)	-1.42	<0.001
Feeling like a failure	2.47 (1.01)	1.71 (0.92)	1.50 (0.89)	1.06 (0.90)	-1.39	<0.001
Poor concentration	1.94 (1.09)	1.59 (1.00)	1.69 (0.87)	1.00 (0.35)	-0.90	0.005
Psychomotor	1.71 (1.05)	1.59 (1.00)	1.00 (0.81)	1.00 (0.61)	-0.70	0.03
Suicidal thoughts	0.76 (1.03)	0.29 (0.47)	0.25 (0.45)	0.06 (0.24)	-0.69	0.01
Total	19.76 (3.01)	14.00 (2.81)	13.06 (2.86)	8.12 (1.83)	-11.73	<0.001

^{*} Baseline to week 12