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Improving adherence to care among "hard to reach" HIV-infected patients in Argentina

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Abstract

Many HIV-infected patients fail to achieve undetectable viral load and are not retained in care. This pilot study examined patients lost to care in public and private clinics in Buenos Aires, Argentina. The impact of patient and provider interventions was compared separately and collectively. In Phase 1, participants prescribed antiretrovirals (ARVs) and non-adherent to treatment in the prior 3 to 6 months (n = 60) were randomized to patient intervention or standard of care (SOC) and assessed over 12 months. In Phase 2, providers were trained in interviewing techniques and 60 additional patients were randomized to patient intervention or SOC condition. Averaged across patient intervention status, Phase 2 provider intervention patients reported the most improved adherence and viral suppression at 6 and 12 months. Adherence in "patient intervention only" improved at midpoint and returned to baseline at 12 months. Results suggest provider training sustained patient adherence and viral suppression among "hard to reach" patients.

Keywords

Provider intervention; adherence; engagement; HIV; Argentina

INTRODUCTION

Antiretroviral therapy (ART) enables HIV-infected patients to achieve and maintain viral suppression, thereby improving their health and lowering the probability of transmitting HIV to others (1). However, to receive the full benefits of antiretroviral therapy, HIV-infected patients must be highly adherent to ART regimens and engaged in regular, ongoing care (2,3). Globally, an average of 62% of adult patients report ≥90% adherence to highly active

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antiretroviral therapy (HAART), the level recommended to achieve and maintain viral suppression (4).

Treatment success is the shared responsibility of providers and patients, (5) and effective programs to enhance patient-provider interactions are needed to ensure long-term adherence (6). A large number of patient interventions to enhance patient adherence have been developed and tested, albeit most have achieved only limited success (7). Among the more effective strategies, the intervention's impact was typically brief and attenuated over time (8), suggesting that maintaining adherence may require a continuous rather than "single dose" intervention strategy. In contrast to patient interventions, few studies have successfully intervened with HIV providers to change providers' behavior toward the patient with the aim of influencing patient outcomes (9–11). This is surprising, as the quality of the patient-provider relationship has been shown to play an important role in adherence, (12) retention in care (13) and health outcomes (14).

Motivational interviewing is a patient-centered strategy utilizing techniques esigned to stimulate patient motivation and promote behavior change to achieve optimal health (15–17). Elements of MI have been utilized with HIV-infected individuals to reduce risk behavior and substance abuse and to enhance medication adherence (8,20–21). Using MI techniques, health care providers can often encourage patients with chronic conditions to recognize and overcome barriers to adherence to their medication regimen, reduce unhealthy habits, and to take other constructive actions on their own behalf (22–23). MI has also been used in Spanish-speaking populations for chronic conditions as a client–centered strategy (24–25).

Argentina was one of the first Latin American countries to guarantee HIV prevention, diagnosis and comprehensive care services to HIV-infected individuals, including provision of free antiretroviral drugs. This large scale distribution of ARVs removed cost and access as barriers to care for HIV-infected patients. The public health care system provides HIV health care to 70% of the general population, while 30% receive HIV health care through other types of health insurance. An estimated 110,000 individuals are HIV-infected in Argentina; 77,000 (70%) have been diagnosed and are aware of their infection and 60,000 (54%) are receiving antiretroviral treatment (26). Despite legislation providing universal access to care at no cost, over one-quarter of HIV-infected persons are neither engaged nor retained in care and only 36% have an undetectable viral load. Similarly a study in Brazil found 35% of HIV-infected patients to be non-adherent, with interventions targeting non-adherence still in development (27). Patients with uncontrolled HIV represent a significant public health problem due to both the increased likelihood of HIV transmission and poor health outcomes. These "hard to reach" patients are disengaged from treatment and characterized by repeated missed appointments and non-adherence to medical regimens, which typically renders ART ineffective and results in treatment failure.

As noted above, most adherence interventions have intervened with the patient rather than the provider, and there has been relatively few studies examining the relative efficacy of provider versus patient interventions. Additionally, many studies have neglected viral suppression as the biological goal of adherence interventions. We hypothesized that a

program that combined patient and provider interventions would have an additive effect, resulting in the greatest overall salutary effect on adherence and viral load. Using both adherence and viral load as key outcomes, this pilot study employed a full factorial design to examine individually and collectively the relative impact of patient and provider interventions to optimize the health outcomes of adherence and engagement in care among hard to reach non-adherent patients.

METHODS

Prior to the onset of study activities, ethical approval was obtained from the Institutional Review Board and Ethical Review Committees associated with the US and Argentina study sites, and informed consent was provided by each participant (both patients and providers).

Clinics and Participants

Study participants were HIV-infected men and women recruited from two sites, a public and private facility, providing HIV healthcare services in Greater Buenos Aires from October 2012 to October 2014. The private non-governmental organization serves ~3,500 patients living with HIV and the public clinic is located in a public hospital serving over 3,000 HIV-infected patients. The private clinic is an HIV ambulatory care center for patients with health insurance coverage, offering comprehensive treatment, including medical follow-up by 25 infectious disease (ID) staff physicians; 2–3 regular ambulatory visits with ID specialists per year, usually with the same physician, and computerized follow up and rescheduling for missed appointments and pharmacy refills. Psychological and social work support is offered, as well as adherence and peer support groups. The public clinic offers similar treatment and medical follow-up by ID specialists (12 ID physicians, 10 residents), and has similar rates of regular patient visits. In contrast to the private clinic, laboratory, pharmacy and clinical services for the public clinic, including psychologists, social workers, adherence counseling and support groups, are offered at a different venue. Public patients may not have the same physician at each visit, and missed appointments are rescheduled by patients, which may result in delayed prescriptions for pharmacy refills. A detailed examination of differences between sites has been previously published (28).

Study participant candidates were identified by clinic record review or by medical personnel during clinical visits. Participants were identified as non-adherent patients new to ARVs if they were non-adherent to their first ARV regimen and met one of the following criteria: a) self-reported taking < 85% of medication at most recent medical consultation (self-report of one missed dose in the last week or 5 missed doses in the last month, n = 5), or b) one missed refill of their ARV medication in any month of the previous 6 months (n = 2). Patients were identified as existing patients, non-adherent to previously prescribed ARVs if they were non-adherent to a current ARV regimen, i.e.; prescribed medication > 12 months and met one of the following criteria: a) missed 3 pharmacy refills within previous 6 months (n = 65) or b) had no pharmacy refills for 3 consecutive months (n = 48).

Eligible participants were contacted by telephone or during clinic visits by study staff. The majority of private clinic patients were recruited by phone through record review. Most public clinic patients were referred by medical staff following a regular consultation.

Participants were enrolled and randomized to condition as follows: in Phase 1, participants were randomized to either the intervention (“patient active”) or SOC (“patient inactive”). Infectious diseases providers from the two sites were invited to participate in the study, and were enrolled. Following the completion of all assessment visits, all providers received training in the intervention (“provider active”). In Phase 2, the next patient participants were randomized to the intervention or and SOC and provider participants conducted the “provider active” condition. Four conditions were tested, 1) inactive patient/ inactive provider (“Standard of Care”), 2) activate patient/inactive provider (“patient active only”, 3) inactive patient/active provider (“provider active only”) and 4) active patient/active provider (“both patient and provider active”).

Assessments and Measures

After obtaining informed consent, study staff administered a written assessment consisting of demographic, psychosocial and adherence measures. Completion of the entire assessment of 237 items required ~1.5 hours. Individual items were clarified for participants as queries arose. Participants completed assessments at baseline, 3, 6 and 9 months post-intervention. All measures had either been previously translated into Spanish and were subsequently reviewed by the study team for local accuracy of meaning, or were translated and back-translated by the study team. Translated study materials, including all assessment and intervention materials, were pilot-tested with local focus groups of stakeholders, patients and providers.

The IMB Model (Information, Motivation and Behavioral Skills) served as the framework for the current study, and assessments were selected from within this model (29–30). The model theorizes that behavior, i.e.; adherence and engagement in care, is predicted by patient knowledge and motivation. As such, the underlying components of health behavior (adherence and health related-information, motivation, and behavioral skills) function together to promote adherence and engagement (29–30). Demographic information collected included age, education, employment status, income, marital/current partner status, and HIV-related information. Adherence to ART was assessed using a visual analogue scale for the last 4 weeks of adherence using a 0–100 rating of percent adherence to each prescribed medication. (31) A monthly adherence score was calculated by averaging across all medications. Viral load was assessed for all participants at study entry and at regularly scheduled provider visits. Participant self-efficacy, the belief that one’s treatment plan can be followed as prescribed, was assessed using a 12-item questionnaire, the HIV Treatment Adherence Self-Efficacy Scale, rating the participants’ perceived ability to engage in the target behavior on a 10 point scale (32) (Raykov’s reliability coefficient $\rho = .91$) (33). Motivation to participate in HIV care was measured using the LifeWindows Information Motivation Behavioral Skills ART Adherence Questionnaire, (34) in which participants rate 10 questions assessing motivation using a Likert scale (motivation subscale $\alpha = 0.70$) (34). Participants were assessed regarding their relationship with their health care provider(s) with two 5-item subscales addressing patients’ perceptions of provider communication and provider actions related to treatment (subscale α 0.71 and 0.86 in this sample). In this study, the total scores from the two subscales for perceptions of provider communication and provider actions related to treatment were used as indicators of the patient-provider

relationship and analyzed as continuous variables (35). HIV-specific health literacy was assessed using a knowledge measure adapted by the team for local accuracy that assessed participant knowledge regarding HIV, medication and viral load and CD4 tests (36). The scale score was the sum of 10 questions; items were scored 1 if correct and 0 if incorrect or "don't know". Finally, participants also completed the Beck Depression Inventory II (BDI), a scale of 21 items rating their current experience of symptoms of depression (α range for the total score = 0.83 to 0.96 in 118 studies) (37–38). As somatic symptoms of depression may reflect other symptoms of HIV, only the affective depression subscale of the BDI was analyzed.

Interventions

Patient—The patient intervention utilized a combination of strategies targeting health literacy, HIV, and medication and transmission information, and was adapted for use in Argentina (39). The intervention utilized an interactive group format to maximize the number of participants reached and the impact of provider and peer support. The intervention consisted of 4 1.5 hour sessions each held weekly over one month. Group leaders were trained and supervised by the study investigators. Sessions included information about HIV, and ART medications (e.g., effect of disease on the body, goals of medication, the importance of adherence and consequences of missed doses, medication side effects, positive coping strategies, misconceptions, myths/rumors about treatment or HIV) and were designed to stimulate discussion and motivation. Sessions encouraged communication with providers regarding treatment and medication regimens and recast the patient-provider relationship as a "therapeutic alliance." Group leaders encouraged members to collaboratively identify barriers and solutions to illness and treatment-related issues and to utilize coping strategies to enhance engagement and adherence. Central to the intervention were 1) clarifying the interface between adherence, medication, viral load and overall health, highlighting the importance of treatment and adherence in optimizing health; 2) strengthening the collaborative relationship between the patient and provider; and 3) enhancing motivation for engagement in care through social support.

Provider—The provider intervention, training and supervision has been described in previous literature (40). Training was conducted during a two session workshop over a period of one week. Providers were trained in using MI strategies, including active listening and summarizing, empowerment to evoke commitment and guiding patient communication. Additional skill training included using open-ended rather than closed questions, recognizing ambivalence towards change and evoking commitment from patients.

Statistical Analyses

The primary analyses for this study were a series of generalized linear models depending on the distribution of the outcome variable. Mean percent adherence, patient-provider relationship, and psychosocial measures were all analyzed as continuous variables, and the proportion of virally suppressed participants was analyzed using logistic regression. Logistic regression was used as the outcome was the proportion of a binary outcome (virally suppressed or not virally suppressed), representing the number of participants that were virally suppressed at each time point.

The first two models examined adherence and viral suppression as outcomes and included a full-factorial combination of patient intervention status (active versus inactive), provider intervention status (active versus inactive), and time (baseline, 3, 6, and 9 months) as predictors of interest. The second two models examined adherence and viral suppression as outcomes and compared patient intervention status over time (active vs. inactive), averaged over provider intervention status. The final series of models examining adherence, viral suppression, and changes in patient-provider relationship and psychosocial measures, compared provider intervention status over time averaged over patient intervention status. All models controlled for differences between the public and private clinics, adherence to HIV provider visits at each timepoint and self-efficacy. Finally, models included an unstructured covariance matrix of timepoints in order to account for repeated measurements on individuals.

In order to evaluate the primary study hypothesis, that a program that combined patient and provider interventions would have the greatest overall salutary effect on adherence and viral load, mean levels of outcome variables were compared between the patient + provider active condition and all other conditions at each timepoint. In order to evaluate the other hypotheses, the patient active and provider active conditions were compared to the patient and provider inactive conditions, respectively, at each timepoint. All analyses were conducted using SAS v.9.3.

RESULTS

Among public clinic patients contacted (n = 116), those not enrolled (n =56) were due to not meeting the study criteria or being unreachable by phone (30%), scheduling conflicts (25%), transferring to a new insurance system (20%), re-engagement in care since clinic visit with new treatment regimen (10%), personal reasons (10%) or other reason (5%). Of the private clinic patients contacted (n = 300), 240 declined to participate (n = 240) due to conflict with employment (50%), lack of interest (30%), or skepticism regarding the proposed intervention (20%).

Demographic Characteristics

Overall 120 patient participants were enrolled into four conditions: patient + provider active (PA/PRA; n = 30), patient active/provider inactive (PA/PRI; n = 31), patient inactive/provider active (PI/PRA; n = 30), and patient + provider inactive (PI/PRI, n = 29). On average, participants were 40 ± 9 years of age and 51% were male. Half had a high school degree or higher education (n = 61, 52%), approximately two thirds were employed (63%, n = 76), and the mean monthly income was ~4500 Argentine Pesos (approximately $550). Most were unmarried (n = 72, 60%) but 62% had a partner. On average, participants had been living with HIV for 11.3 ± 6.1 years and had been prescribed ART for an average of 9.8 ± 5.8 years. Of those who had a partner, two thirds (n = 48) reported that their partner was HIV-uninfected or that they did not know their partner's HIV status. About half of the study participants were prescribed 2 or 3 NRTIs + 1 PI (n = 61), 36% were prescribed 2 NRTIs + 1 NNRTI, and the remaining patients were prescribed other regimens that included various combinations of several drug classes, selected according the past ART history and

genotype results. Twelve Infectious Disease providers were enrolled; 6 private clinic providers and 6 public clinic providers.

Demographic and HIV-related characteristics were compared between study conditions, and a difference in monthly income was found (see table I). However, as income data was not available for all participants and did not significantly impact outcomes in multivariable models, it was not retained in the primary analyses. See table I for participant demographics and comparisons between conditions.

Comparisons of Patient and Provider Interventions

In the first set of analyses, mean percent adherence and the proportion of participants with an undetectable viral load were compared between the patient + provider active condition and all other conditions at each timepoint. Estimates of adherence and viral suppression and *p* values from comparisons are presented in table II. Adherence was lowest among the patient + provider active condition at baseline compared to patient + provider inactive ($p = .042$), patient inactive/provider active ($p = .018$), and patient + provider inactive ($p = .002$). In addition, the proportion of virally suppressed participants tended to increase over time in all conditions, with the highest increase at 9 month follow-up seen in the patient inactive/ provider active condition (.88), compared to patient + provider active (.48), patient active + provider inactive (.48), and patient + provider inactive (.35), $p = .018$.

Comparisons of Patient Intervention Status, Averaging over Provider Intervention Status

The second set of analyses compared participants randomized to receive the patient intervention [patient active (PA) vs. patient inactive (PI)], averaging over levels of the provider intervention. Mean adherence at each timepoint and the proportions of virally suppressed participants are presented in table III. Adherence was lower among participants in the PA condition at baseline and increased at 3 months, such that there was no difference between conditions. There also was no difference in adherence between conditions at 6 months; however, adherence among participants in the PA condition declined at 9 months, such that it was significantly lower than those in the PI condition (72.29 vs 83.77, $p = .048$). No differences in the proportions of participants with an undetectable viral load between patient conditions were noted at baseline ($p = .473$), 3 months ($p = .635$), 6 months ($p = .341$), or 9 months ($p = .326$).

Comparisons of Provider Intervention Status, Averaging over Patient Intervention Status

The third set of analyses compared participants seeing providers who had received the provider intervention [provider active (PRA)] to those who saw control providers [provider inactive (PRI)], averaging over levels of the patient intervention. The results of these analyses are presented in figure 1. In contrast to the comparisons between patient intervention status, the provider intervention showed a consistent and positive effect on both adherence and viral load. Mean adherence among participants in the PRA condition was lower than adherence in the PRI condition at baseline. However, adherence increased consistently in the PRA condition over time, such that there was no difference at 3 months and at 6 and 9 months, adherence was significantly higher in the PRA condition as compared PRI. As can be seen in figure 1, viral load analyses showed a similar pattern to adherence

analyses. The proportion of virally suppressed participants was not significantly different between conditions at baseline and 3 months; however, there was a non-significant trend at 6 months, and a significantly higher proportion of virally suppressed participants in the PRA condition compared to the PRI condition at 9 months follow-up (.68 vs .44, p = .036).

Changes in psychosocial measures

In order to explore patient-level measures that may have changed after interacting with a provider who received the intervention, changes in provider relationship and psychosocial variables from baseline to follow-up at 9 months were examined. Comparisons were made between participants seeing an active provider (PRA) and those seeing a control provider (PRI), averaged over patient intervention conditions. The results are presented in table IV. Although there were no differences at baseline, patients in the PRA condition reported greater satisfaction with their provider relationship at 9 months follow-up as compared to those in the PRI condition ($p = .009$). In addition, although satisfaction with provider actions related to treatment was higher in the PRI group at baseline ($p = .012$), there was an increase in the PRA group over time, such that satisfaction with actions related to treatment was higher in the PRA group at follow-up ($p = .022$). Changes in psychosocial variables are also presented in table IV; a reduction in depression over time was noted among participants in the PRI condition at follow-up ($p = .026$). No other differences were noted.

DISCUSSION

This pilot study utilized a full factorial design to examine the individual and combined impact of patient and provider interventions to optimize adherence and health outcomes among non-adherent HIV-infected patients disengaged from treatment. Contrary to our hypothesis, the combined impact of the patient and provider interventions (PA/PRA) did not have the greatest overall effect on adherence and viral load. Adherence initially rose most dramatically among the PA/PRA group, but the increase tapered off over time, while a more consistent but subtle increase was noted among the provider intervention-only (PI/PRA) group. When averaging over patient intervention levels, the salutary impact of the provider intervention was sustained across the duration of the study, resulting in an increase in adherence and viral load suppression.

In contrast, when averaged over provider intervention levels, the patient intervention resulted in only a temporary increase in adherence. To our knowledge, this is the first intervention for providers targeting adherence to achieve a sustained impact on both adherence and viral load. In contrast with previous studies, this pilot study also found sustained improvement in patient-provider communication following intervention as well as improved patient adherence, viral load and retention in care (9–11,41–44). Although comments on adherence-related topics were found to increase in earlier studies, almost no dialogue was problem-solving in nature rather, adherence directives were primarily expressed in an authoritative manner (9). The provider communication techniques utilized in the current study encouraged a collaborative patient-centered approach to enhance patient motivation and commitment to agreed upon treatment goals for optimal health. Additionally, while this study and others suggest that both patients and providers could benefit from adherence training, this study

identified as more efficacious an intervention to improve provider adherence counseling techniques (9,12,14).

The pattern of patient self-reported adherence was supported by patient viral load, and an increase in viral suppression was noted in the combined intervention (PA/PRA) group at 6 months, followed by a decline between 6 and 9 months. In contrast, the proportion of participants who achieved an undetectable viral load rose consistently among provider intervention-only (PI/PRA) participants. A small change in adherence that was not maintained was noted in the patient activation-only (PA/PRI) group, and adherence was highly variable in the control (PI/PRI) group. The failure of the patient intervention arm to achieve a lasting adherence and viral load benefit may reflect the requirement for participants to attend the clinic for sessions in addition to regularly occurring visits. As such, the patient intervention proposes to increase visits to enhance clinic attendance, in contrast with the provider intervention, which incorporates the intervention into the regularly occurring visits (7,8). Results support the need for a continuous rather than “single dose” intervention strategy, making providers an ideal vehicle for intervention. Additionally, careful examination of viral load data indicated that the adherence self-report in the PI/PRI group at 9 months was likely self-inflated. Despite the large increase in self-reported adherence, the proportion of participants with an undetectable viral load decreased at that time point. Previous studies have noted both inflated as well as accurate self-report (45, 46). As a result, viral load assessment was used as the most reliable measure of medication adherence (47).

The provider intervention was associated with enhanced satisfaction with the patient-provider relationship and increased perception of the provider as an active participant in the relationship at both healthcare sites. Results expand on previous studies, in which the use of a patient-centered approach to healthcare, i.e., treating each patient as a unique, autonomous individual, has been associated with fewer missed appointments, increased retention in care, enhanced medication adherence and undetectable viral load (48, 49). This patient-centered relationship also may have contributed to positive attitudes towards treatment (50). Previous studies have also suggested that the patient’s decision to engage in treatment and tolerate the frustrations associated with HIV care may stimulate motivation to improve treatment adherence and thereby achieve undetectable viral load (51). Collaborative providers utilizing strategies that are “engaging, validating and partnering” rather than “paternalistic” may enhance adherence and sustained engagement in care by emphasizing the potential benefit of treatment adherence on health outcomes (9). Study outcomes highlight the value of motivational strategies for providers working with challenging patients in clinical settings.

Not all patients may require the same clinical intervention to re-engage in care. Though this study recruited only challenging non-adherent patients, many participants self-reported restarting ARVS following contact by a study recruiter. For some, contact, enrollment and assessment may have increased adherence, acting as a medical reminder and a facilitator of re-engagement. Results suggest the importance of ongoing healthcare visits to maintain adherence and engagement in challenging or disengaged patients. Additionally, it is important to note that for some, while adherence at study entry may appear high, viral loads

provide confirmation of pre-existing and ongoing non-adherence and non-persistence in making and attending missed appointments among participants.

There are limitations to our study findings. Firstly, as noted, this pilot study was limited by its small sample size that restricts some analyses. For example, although neither knowledge nor motivation increased and neither appeared to underlie the improvement in adherence and viral load, the small sample size precludes drawing conclusions regarding their role in adherence or viral load. Additionally, in contrast to previous studies, depression did not appear to impact adherence, though this is likely also the result of the small subset of patients with elevated rates of depression (52). In both cases, future intervention studies should utilize larger samples to address the impact of depression, knowledge and motivation on adherence and health outcomes. Secondly, participants were recruited based on disengagement and non-adherence to HIV treatment and care. Thus, adherence to medication may also be less variable in this population, which may have reduced the likelihood of discovering characteristics associated with adherence. Thirdly, the rate of study candidates declining to participate was high in both clinics, though this may reflect the characteristics of the target group of disengaged patients. This high rate of declining may also limit the generalizability of study findings.

CONCLUSION

This study examined the impact of combinations of patient and provider interventions on adherence and viral load among hard to reach, challenging patients in Buenos Aires, Argentina. Contrary to our hypothesis that a combined intervention would be most effective; based on our full-factorial design, a provider intervention was the most successful in achieving a sustained increase in patient re-engagement in care, adherence and viral suppression. These provocative findings support an expanded, appropriately powered clinical trial to determine whether patient-centered, provider-based interventions can strengthen adherence, encourage re-engagement in care and optimize health outcomes in a larger, more representative sample of challenging HIV-infected patients.

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References

1. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med. 2011; 365:493–505. [PubMed: 21767103]
2. Gardener EM, McLees MP, Steiner JF, del Rio C, Burman WJ. The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. Clin Infect Dis. 2011; 52(6):793–800. [PubMed: 21367734]
3. Mugavero MJ, Amico KR, Westfall AO, et al. Early retention in HIV care and viral load suppression: implications for a test and treat approach to HIV prevention. J Acquir Immune Defic Syndr. 2012; 59:86–93. [PubMed: 21937921]
4. Ortego C, Huedo-Medina TB, Llorca J, et al. Adherence to highly active antiretroviral therapy (HARRT): A meta-analysis. AIDS Behav. 2011; 15:1381–1396. [PubMed: 21468660]

5. Burns CW, Vermund SH. Rethinking prevention of HIV type 1 infection. ClinJOU Infect Dis. 2010; 51(6):725–731.
6. Thrun M, Cook PF, Bradley-Springer LA, et al. Improved prevention counseling by HIV care providers in a multisite, clinic-based intervention: Positive STEPs. AIDS Educ Prev. 2009; 21:55–66. [PubMed: 19243231]
7. Mathes T, Pieper D, Antoine SL, Eikermann M. Adherence-enhancing interventions for highly active antiretroviral therapy in HIV-infected patients - a systematic review. HIV Med. 2013; 14(10): 583–595. [PubMed: 23773654]
8. Parsons JT, Golub SA, Rosof E, Holder C. Motivational interviewing and cognitive-behavioral intervention to improve HIV medication adherence among hazardous drinkers: A randomized controlled trial. J Acquir Immune Defic Syndr. 2007; 46:443–450. [PubMed: 18077833]
9. Wilson LB, Laws MB, Safren SA, et al. Provider-focused intervention increases adherence-related dialogue but does not improve antiretroviral therapy adherence in persons with HIV. J Acquir Immune Defic Syndr. 2010; 53(3):338–347. [PubMed: 20048680]
10. Marquez C, Mitchell SJ, Hare CB, John M, Klausner JD. Methamphetamine use, sexual activity, patient-provider communication, and medication adherence among HIV-infected patients in care, San Francisco 2004–2006. AIDS Care. 2009; 21(5):575–582. [PubMed: 19444665]
11. Metsch LR, Brewer T, del Rio C, et al. Hospitalized HIV-Infected patients in the era of highly-active antiretroviral therapy. Am J Public Health. 2009; 99:1045–1049. [PubMed: 19372520]
12. Grodensky CA, Golin CE, Boland MS, et al. Translating concern into action: HIV care providers' views on counseling patients about HIV prevention in the clinical setting. AIDS Behav. 2008; 12(3):404–411. [PubMed: 17577658]
13. Johnson MO, Neilands TB, Dilworth SE, et al. The role of self-efficacy in HIV treatment adherence: validation of the HIV Treatment Adherence Self-Efficacy Scale (HIV-ASES). J Beh Med. 2007; 30(5):359–370.
14. Beach MC, Saha S, Korthuis PT, et al. Differences in patient provider communication for Hispanic compared to non-Hispanic White patients in HIV care. J Gen Intern Med. 2010; 25(7):682–687. [PubMed: 20238204]
15. Miller, WR.; Rollnick, S. Motivational interviewing: Preparing people for change. 2. New York, NY: Guilford Press; 1983.
16. Miller WR, Mount KA. A small study of training in motivational interviewing: Does one workshop change clinician and client behavior? Behavioural and Cognitive Psychotherapy. 2001; 29:457–471.
17. Miller, WR.; Rollnick, S. Motivational Interviewing: Helping People Change. New York, NY: Guildford Press; 2013.
18. Parsons JT, Rosof E, Punzalan JC, Maria LD. Integration of motivational interviewing and cognitive behavioral therapy to improve HIV medication adherence and reduce substance use among HIV positive men and women: Results of a pilot project. AIDS Patient Care STDs. 2005; 19(1):31–39. [PubMed: 15665633]
19. Lavoie, K.; Moullec, G.; Blais, L., et al. The efficacy of brief motivational interviewing to improve medication adherence in poorly controlled nonadherent asthmatics: results from a randomized controlled pilot stury. Program and abstracts of the Chest Annual Meeting; Honolulu. 2011. p. Abstract 4
20. Hill S, Kavookjian J. Motivational interviewing as a behavioral intervention to increase HAART adherence in patients who are HIV-positive: A systematic review of the literature. AIDS Care. 2012; 24:583–592. [PubMed: 22292452]
21. Konkle-Parker DJ, Erlen JA, Dubbert PM, May W. Pilot testing of an HIV medication adherence intervention in a public clinic in the Deep South. Journal of the American Academy of Nurse Practitioners. 2012; 24(8):488–498. [PubMed: 22845032]
22. Colby S, Monti P, Olearytevyaw T, et al. Brief motivational intervention for adolescent smokers in medical settings. Addict Behav. 2015; 30(5):865–874. [PubMed: 15893085]
23. Ogedegbe G, Chaplin W, Schoenthaler A, et al. A practice-based trial of motivational interviewing and adherence in hypertensive African Americans. Am J Hypertens. 2008; 21(10):1137–1143. [PubMed: 18654123]

24. Freixa N. La entrevista con el enfermo alcohólico. (The interview with the alcoholic patient). Estrategias Motivacionales. 2000; 59:1383–1384.
25. García Pérez AM, Prados Torres D, Sánchez de la Cuesta F. Cumplimiento terapéutico en pacientes con hipertensión arterial y diabetes mellitus tipo 2. (Therapeutic compliance in patients with arterial hypertension and type 2 diabetes mellitus). SEMERGEN: Medicina de Familia. 2004; 30:55–59.
26. Ministerio de Salud de la Nación. (National Department of Health). Dirección de Sida y ETS, Ministerio de Salud de la Nación. Año XVII. 2014. Boletín N° 31 sobre el VIH-SIDA en la Argentina. (Publication 31 on HIV/AIDS in Argentina).
27. Fiuza MLT, Moura Lopes E, Oliveira Alexandre H, et al. Adherence to antiretroviral treatment: Comprehensive care based on the care model for chronic conditions. Esc Anna Nery. 2013; 17(4): 740–748.
28. Jones DL, Cook R, Cecchini D, et al. Examining adherence among challenging patients in public and private HIV care in Argentina. AIDS Behav. 2015 Mar 18.
29. Fisher JD, Fisher WA, Amico KR, Harman JJ. An information-motivation-behavioral skills model of adherence to antiretroviral therapy. Health Psychol. 2006; 25:462–473. [PubMed: 16846321]
30. Fisher JD, Amico KR, Fisher WA, Harman JJ. The information-motivation-behavioral skills model of antiretroviral adherence and its applications. Curr HIV/AIDS Rep. 2008; 5(4):193–203. [PubMed: 18838059]
31. Walsh JC, Mandalia S, Gazzard BG. Responses to a 1 month self-report on adherence to antiretroviral therapy are consistent with electronic data and virological treatment outcome. AIDS. 2002; 16(2):269–277. [PubMed: 11807312]
32. Johnson MO, Neilands TB, Dilworth SE, et al. The role of self-efficacy in HIV treatment adherence: validation of the HIV Treatment Adherence Self-Efficacy Scale (HIV-ASES). J Behav Med. 2007; 30(5):359–70. [PubMed: 17588200]
33. Raykov T. Estimation of composite reliability for congeneric measures. Applied Psychological Measurement. 1997; 21(2):173–184.
34. The LifeWindows Project Team. The LifeWindows Information Motivation Behavioral Skills ART Adherence Questionnaire (LW-IMB-AAQ). Center for Health, Intervention, and Prevention. University of Connecticut; 2006.
35. Ekstrand ML, Chandy S, Heylen E, Steward W, Singh G. Developing useful highly active antiretroviral therapy adherence measures for India: the Prerana study. J Acquir Immune Defic Syndr. 2010; 53(3):415–416. [PubMed: 20190588]
36. Jones D, Cook R, Rodriguez A, Waldrop-Valverde D. Personal HIV knowledge, appointment adherence and HIV outcomes. AIDS Behav. 2013; 17(1):242–249. [PubMed: 23143751]
37. Beck, AT.; Steer, RA.; Brown, GK. Manual for Beck Depression Inventory-II. Psychological Corporation; San Antonio, TX: 1996.
38. Wang YP, Gorenstein C. Psychometric properties of the Beck Depression Inventory-II: a comprehensive review. Rev Bras Psiquiatr. 2013; 35(4):416–431. [PubMed: 24402217]
39. Jones DL, McPherson-Baker S, Lydston D, et al. Efficacy of a group medication adherence intervention among HIV positive women: The SMART/EST Women's Project. AIDS Behav. 2007; 11:79–86. [PubMed: 17028992]
40. Bofill L, Weiss S, Jones D, et al. Patient-provider perceptions on engagement in HIV care in Argentina. AIDS Care. 2014; 26:602–607. [PubMed: 24138788]
41. Jolly B, Scott J, Sanford S. Simplification of emergency department discharge instructions improves patient comprehension. Ann Emerg Med. 1995; 26:443–446. [PubMed: 7574126]
42. Davis TC, Michielutte R, Askov EN, Williams MV, Weiss BD. Practical assessment of adult literacy in health care. Health Educ Behav. 1998; 25(5):613–624. [PubMed: 9768381]
43. Beach MC, Keruly J, Moore RD. Is the quality of the patient-provider relationship associated with better adherence and health outcomes for patients with HIV? JGIM. 2005; 21:661–665. [PubMed: 16808754]
44. Van Servellen G, Lombardi E. Supportive relationships and medication adherence in HIV-infected, low-income Latinos. Western Journal of Nursing Research. 2005; 27:1023–1039. [PubMed: 16275696]

45. Liu H, Wenger NS, Miller LG, et al. A practical method to calibrate self-reported adherence to antiretroviral therapy. J Acquir Immune Defic Syndr. 2006; 43:S104–S112. [PubMed: 17133192]

46. Simoni JM1, Huh D, Wang Y, et al. The validity of self-reported medication adherence as an outcome in clinical trials of adherence-promotion interventions: Findings from the MACH14 study. AIDS Behav. 2014; 18(12):2285–90. [PubMed: 25280447]

47. Simoni JM, Amico RK, Pearson CR, Malow R. Strategies for promoting adherence to antiretroviral therapy: A review of the literature. Curr Infect Dis Rep. 2008; 10:515–521. [PubMed: 18945394]

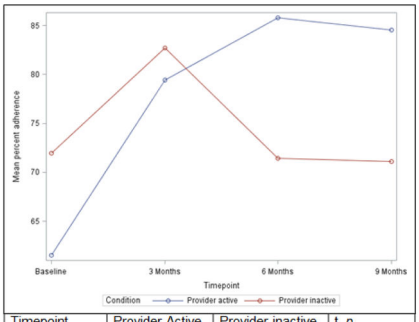
48. Beach MC, Keruly J, Moore RD. Is the quality of the patient-provider relationship associated with better adherence and health outcomes for patients with HIV? J Gen Intern Med. 2006; 21(6):661–665. [PubMed: 16808754]

49. Saha S, Jacobs EA, Moore RD, Beach MC. Trust in physicians and racial disparities in HIV care. AIDS Patient Care STDS. 2010; 24(7):415–420. [PubMed: 20578909]

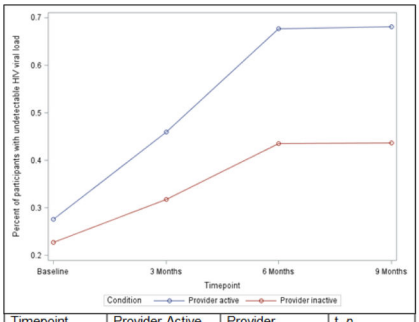
50. González JS, Penedo FJ, Antoni MH, Durán RE, Fernández MI. Social support, positive states of mind, and HIV treatment adherence in men and women living with HIV/AIDS. Health Psychol. 2004; 23:413–418. [PubMed: 15264978]

51. Piña Lopez JA, Gonzalez MT. Un modelo psicológico de adhesión en personas VIH+: Modelamiento con ecuaciones estructurales. (A psychological model among HIV+ persons: Structural equation modeling). Revista Iberoamericana de Psicología y Salud. 2010; 1(2):185–206.

52. Gonzalez JS, Batchelder AW, Psaros C, Safren SA. Depression and HIV/AIDS treatment nonadherence: A review and meta-analysis. J Acquir Immune Defic Syndr. 2011; 58(2):181–187. [PubMed: 21857529]



Timepoint	Provider Active (n = 60) mean(standard error)	Provider inactive (n = 60)	t, *p*
Baseline	**61.53(3.5)**	**71.96(3.9)**	**2.02, .046**
3 Months	79.44(4.0)	82.68(6.3)	0.41, .686
6 Months	**85.80(4.6)**	**71.45(5.1)**	**2.12, .037**
9 Months	**84.57(4.0)**	**71.12(4.4)**	**2.36, .021**



Timepoint	Provider Active (n = 60) proportion(standard error)	Provider inactive (n = 60)	t, *p*
Baseline	.28(.06)	.23(.06)	0.56, .575
3 Months	.46(.10)	.32(.09)	1.12, .264
6 Months	.68(.09)	.44(.10)	1.81, .073
9 Months	**.68(.08)**	**.44(.08)**	**2.13, .036**

Figure 1.

Comparisons of mean percent adherence and viral suppression over time between Provider active and Provider inactive conditions, averaged over patient intervention status.

Note: Estimates were adjusted for repeated measurements, baseline self-efficacy, and the differences between the public and private clinics and adherence to HIV provider visits at each timepoint; statistically significant comparisons are noted in **Bold**

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Table I

Demographics and HIV-related characteristics of N = 120 COPA participants

Characteristic	All Mean(sd) N(%)	Patient Active/ Provider Active (n = 30)	Patient Active/ Provider Inactive (n = 31)	Patient Inactive/ Provider Active (n = 30)	Patient Inactive/ Provider Inactive (n = 29)	F[a], *p* Chi- square ,*p*
Gender						3.35, .341
Male	61(51%)	11(37%)	18(58%)	16(53%)	16(55%)	
Female	59(49%)	19(63%)	13(42%)	14(47%)	13(45%)	
Age	40.0(8.6)	39.7(8.6)	38.6(7.2)	41.6(9.9)	39.9(8.7)	0.64, .589
Education level						3.27, .352
High school or greater	61(52%)	12(40%)	19(63%)	15(52%)	15(52%)	
Did not finish high school	57(48%)	18(60%)	11(37%)	14(48%)	14(48%)	
Employment status (n = 118)						0.44, .932
Employed	76(63%)	19(63%)	20(65%)	20(67%)	17(59%)	
Unemployed	44(37%)	11(37%)	11(35%)	10(33%)	12(41%)	
Monthly income in Argentine Pesos (n = 106) (ARS) 1USD = ~100 ARS	**4472 ARS(3238)**	**3687 ARS (2091)**	**3983 ARS (3011)**	**6068 ARS (4357)**	**3568 ARS (2645)**	**3.53, .018**
Marital status						4.01, .675
Married	24(20%)	5(17%)	9(29%)	5(17%)	5(17%)	
Not married	72(60%)	20(66%)	18(58%)	18(60%)	16(55%)	
Other (e.g., divorced, widowed)	24(20%)	5(17%)	4(13%)	7(23%)	8(28%)	
Years since HIV diagnosis (n = 115)	11.3(6.1)	10.7(6.4)	11.3(6.1)	10.4(6.0)	13.0(5.9)	0.96, .413
Years since ART initiation (n = 109)	9.8(5.8)	9.2(5.9)	9.8(5.5)	9.8(5.7)	10.5(6.5)	0.21, .892
Has a current partner						0.46, .927
Yes	74(62%)	13(43%)	11(35%)	11(37%)	11(38%)	
No	46(38%)	17(57%)	20(65%)	19(63%)	18(62%)	
Partner HIV status (n = 74 with a current partner)						0.99, .803

Characteristic	All Mean(sd) N(%)	Patient Active/ Provider Active (n = 30)	Patient Active/ Provider Inactive (n = 31)	Patient Inactive/ Provider Active (n = 30)	Patient Inactive/ Provider Inactive (n = 29)	F[a], *p* Chi- square ,*p*
Positive	26(35%)	5 (29%)	6(30%)	8(41%)	7(39%)	
Negative/Unknown	48(65%)	12(71%)	14(70%)	11(58%)	11(61%)	
ART Regimen (n = 118 with data available)						Fisher' s exact test *p* = . 857
NRTIs + PI	61(52%)	16(55%)	16(52%)	16(55%)	13(45%)	
NRTIs + NNRTI	43(36%)	8(28%)	12(38%)	10(34%)	13(45%)	
Other[b]	14(12%)	5(17%)	3(10%)	3(10%)	3(10%)	

[a]F statistic and *p*-value refer to an ANOVA test for any difference of means

[b]Other ART regimens included combinations of several families including NRTI, NNRTI, PI, integrase inhibitors (raltegravir), fusion inhibitor (T-20), or CCR5 inhibitor (maraviroc) selected according the past ART history and the genotypic results

Note: **Bold** indicates a statistically significant difference between clinics.

Note: N varies due to instances of missing data on questionnaire items.

Table II

Adjusted mean percent adherence and proportions of viral supression over time for a full-factorial combination of patient and provider intervention conditions.

Timepoint	Patient + Provider active(n = 30) mean(standard error)	Patient active/Provider inactive (n = 31)	p^a	Patient inactive/Provider active (n = 30)	p^b	Patient + Provider inactive (n = 29)	p^c
Mean percent adherence							
Baseline	53.3(5.0)	67.9(5.2)	.042	70.2(4.9)	.018	75.9(5.5)	.002
3 Months	80.8(6.0)	82.5(8.1)	.874	78.3(5.4)	.754	83.0(8.1)	.834
6 Months	85.4(6.3)	77.3(7.0)	.392	86.5(6.6)	.898	65.6(7.3)	.043
9 Months	82.0(5.6)	63.0(5.6)	.454	87.8(5.4)	.015	81.4(6.5)	.946
Proportion of participants with undetectable viral load							
Baseline	.27(.09)	.28(.10)	.933	.28(.09)	.971	.18(.08)	.404
3 Months	.45(.13)	.29(.10)	.342	.49(.14)	.837	.38(.14)	.725
6 Months	.61(.13)	.40(.12)	.251	.75(.11)	.388	.51(.15)	.606
9 Months	.48(.12)	.48(.11)	.996	.88(.07)	.018	.35(.11)	.422

[a] *p* values are from *t* tests of adjusted adherence between the Patient + Provider active condition and the Patient active/Provider inactive condition at each timepoint

[b] *p* values are from *t* tests of adjusted adherence between the Patient + Provider active condition and the Patient inactive/Provider active condition at each timepoint

[c] *p* values are from *t* tests of adjusted adherence between the Patient + Provider active condition and the Patient + Provider inactive condition at each timepoint

Note: Estimates were adjusted for repeated measurements, baseline self-efficacy, and the differences between the public and private clinics and adherence to HIV provider visits at each timepoint

Table III

Comparisons of mean percent adherence and viral suppression over time between Patient active and Patient inactive conditions, averaged over provider intervention status.

Timepoint	Patient Active (n = 61) mean(standard error)	Patient inactive (n = 59)	t, *p*
Mean percent adherence			
Baseline	**60.61(3.7)**	**73.29(3.7)**	**2.47, .015**
3 Months	81.51(4.7)	80.58(4.7)	0.15, .880
6 Months	80.67(4.7)	76.44(4.9)	0.63, .528
9 Months	**72.29(4.1)**	**83.77(4.3)**	**2.01, .048**
Proportion of participants with undetectable viral load			
Baseline	.28(.07)	.22(.06)	0.72, .473
3 Months	.36(.09)	.42(.10)	0.48, .635
6 Months	.50(.10)	.63(.10)	0.96, .341
9 Months	.51(.08)	.63(.08)	0.99, .326

Note: Estimates were adjusted for repeated measurements, baseline self-efficacy, and the differences between the public and private clinics and adherence to HIV provider visits at each timepoint; statistically significant comparisons are noted in **Bold**

Table IV

Changes in provider relationship and psychosocial variables from baseline to 9 month follow-up

Variable	Provider Active (n = 60) mean(standard error)	Provider inactive (n = 60)	t, *p*
Satisfaction with provider relationship			
Baseline	11.8(0.5)	12.3(0.5)	0.69, .489
Follow-up	**14.2(0.4)**	**12.6(0.5)**	**2.67, .009**
Provider actions related to treatment			
Baseline	**8.5(0.6)**	**10.6(0.6)**	**2.57, .012**
Follow-up	**11.3(0.5)**	**9.5(0.6)**	**2.32, .022**
Self-efficacy			
Baseline	85.5(3.9)	93.0(4.3)	1.30, .195
Follow-up	105.2(3.8)	99.8(4.3)	1.03, .305
HIV-related knowledge			
Baseline	7.2(0.2)	7.5(0.2)	1.06, .291
Follow-up	7.7(0.2)	7.6(0.2)	0.73, .468
Motivation for adherence			
Baseline	33.6(0.8)	34.8(0.9)	0.96, .340
Follow-up	35.4(1.1)	36.0(1.2)	0.37, .714
Affective depression			
Baseline	4.4(0.6)	4.2(0.7)	0.26, .795
Follow-up	**3.3(0.6)**	**1.4(0.6)**	**2.26, .026**

Note: Estimates were adjusted for repeated measurements, the differences between the public and private clinics, and adherence to HIV provider visits at each timepoint; statistically significant comparisons are noted in **Bold**