

Effects of Minimal Versus Intensive Intervention to Enhance Motivational Interviewing in HIV Care

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Abstract We conducted a randomized trial comparing the effect of two different levels of motivational interviewing training on clinician communication behaviors and patient experiences. We enrolled 12 HIV clinicians who attended a one-day MI workshop focusing on behavior change counseling skills. We then randomized clinicians to receive (or not) 3–5 rounds of personalized feedback from the MI trainer. We compared outcomes before and after the interventions and between the intervention groups. We tested time-by-study arm interactions to determine if one group improved more than the other. For all analyses, we used generalized estimating equations to account for clustering of patients within clinicians, with Gaussian or negative binomial distributions as appropriate. Patients of clinicians in both intervention groups rated their visits as more MI consistent (6.86 vs. 6.65, $p = 0.005$) and audio-recording analysis revealed that visits were more patient-centered (1.34 vs. 0.96, $p = 0.003$) with a more positive patient affect (22.36 vs. 20.84, $p < 0.001$) after versus before the intervention, without differences between intervention arms. Several specific clinician behaviors such as empathic statements, asking patient opinions and open-ended questions improved more in the workshop+feedback versus the workshop-only intervention arm. A few specific communication behaviors increased (total and complex

reflections) after versus before the intervention, without differences between intervention arms. The workshop alone was as effective as the workshop plus feedback in improving patient experiences and overall communication measures. Certain communication behaviors improved more with the more intensive intervention, but these additional benefits may not warrant the extra financial and logistical resources required.

Keywords Adherence · Patient-clinician communication · Motivational interviewing

Background

Twenty years into the era of highly active antiretroviral therapy (ART), medication adherence continues to be a barrier to effective treatment. Of the estimated 1.2 M persons in the US who are currently living with HIV, approximately 80% are prescribed treatment; of these, 22% are estimated to have detectable viral loads [1]. While resistance is part of the reason for detectable viral loads, research consistently shows that adherence is the most important predictor of the success of ART [2, 3]. Efforts to design patient-focused interventions to improve adherence with HIV ART have had limited, mostly short term success; and because they are often intensive, expensive, and focused on specific populations, even the successful interventions have not been widely disseminated [4]. Few interventions have focused on HIV clinicians, yet a recent study focused on primary care physicians who were trained in motivational interviewing found that trained physicians were more empathic and that empathy was associated with increased weight loss among overweight and obese patients [5]. Because it is HIV clinicians who see patients

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frequently and who start, stop, and change ART, small improvements in HIV clinician's skills leveraged over many patients could have a large overall effect.

Behavior change counseling, such as that focused on medication adherence, has therefore become an essential component of care, but many clinicians lack the skills to counsel patients effectively. Motivational Interviewing [6] is a client-centered, evidence-based behavior change consultation style that was originally developed in the 1980s to increase the effectiveness of treatment for alcohol and drug use disorders and has since been adopted in the fields of general and specialist medicine [7], criminal justice [8], and public health [9]. MI may be particularly helpful for clinicians providing HIV care, who not only counsel patients frequently on adherence, but on other issues such as safe sex and substance use treatment as well. There is some evidence that counselling with MI can improve medication adherence [10, 11].

As MI training programs for busy clinicians are developed, it is important to evaluate how to efficiently and effectively implement this training. There is a considerable body of research that has addressed this issue, across various groups of mental health, medical, and allied health professionals with consistent results [12, 13]. MI workshops, the classic method of MI training, yield positive changes in both the relational and technical components of MI. However, these effects erode within 4–6 months post-workshop unless followed by coaching, feedback, supervision, and other forms of continued skills development [14, 15]. A recent meta-analysis suggests that an average 4–6 booster sessions are needed to mitigate the post-workshop skill erosion [13]. However, many factors moderate the effectiveness of these post-workshop enhancements, including level of professional education of trainees, training cohort size, adherence rates, and training duration [16, 17].

The purpose of this research was to evaluate the differential effectiveness of a classic MI workshop versus an enhanced training model, among highly trained medical specialists. To better understand how to use MI in the care of persons with HIV, we conducted a pilot randomized trial comparing the effect of two different levels of MI training on clinician communication behaviors and patient experiences. We hypothesized that more intensive training would result in more significant communication behavior changes and better patient experience.

Methods

Study Design and Setting

We enrolled 12 HIV clinicians (8 physicians, 3 nurse practitioners, and 1 physician assistant) at a single, urban

academic medical center in a pilot study of an experimental trial of an educational intervention where they were randomized to one of two different levels (one-day workshop vs. one-day workshop plus ongoing feedback) to improve communication around behavioral change counseling. The clinical setting provides primary HIV care for ~3000 patients, and is located in a census tract with a median household income ~1.5 times the poverty level. All patients have a continuity provider whom they first meet at their initial visit, who subsequently provides longitudinal care over time.

Data Collection

An overview of the study design and data collection is presented in Fig. 1. All study procedures were approved by the Johns Hopkins Institutional Review Board. We first approached and enrolled a group of 12 HIV clinicians who provided longitudinal HIV primary care in the study site. All clinicians provided informed consent and completed a baseline and end-of-study questionnaire including questions about demographics, previous training, and self-reported attitudes and behaviors regarding behavior change counseling. After the study intervention, the clinicians were also asked to provide feedback on each component of the training.

To assess the counseling skills of both limited and full intervention clinicians, we attempted to enroll eight patients per clinician at baseline and eight patients per clinician at follow-up (6 months after the one-day workshop). Adult patients were eligible if (1) their primary clinician was participating in either of the study arms, (2) they were being seen for a routine follow-up appointment, and (3) they had a history of non-adherence to therapy as indicated by (a) any unsuppressed viral load within the past year or (b) a notation in medical record indicating non-adherence. All patients gave informed consent, and then a research assistant (RA) recorded the patient-clinician encounter. Following the encounter, the RA conducted a brief structured interview with each patient to assess their demographic characteristics, as well as their experience of clinician communication.

Study Intervention

All clinicians attended a one-day workshop in the fall of 2011 with an experienced MI trainer (GR), who is a member of the Motivational Interviewing Network of Trainers. The workshop was developed after conducting focus groups with patients and HIV clinicians regarding their experiences with medication adherence discussions within the context of the patient-clinician relationship [18]. We decided to make the workshop one full day and offsite,

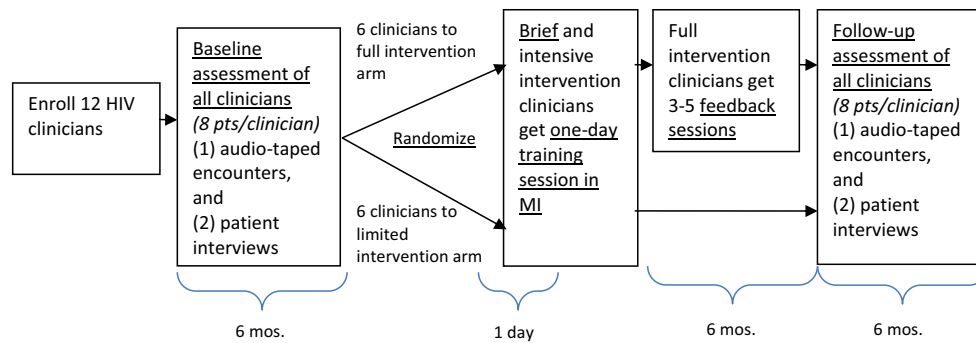


Fig. 1 Overview of study design

with the rationale that providers needed a complete break from their other duties in order to focus on the educational content, but that longer would not be feasible. Further, we had preliminary data from an earlier study [11] that a one-hour workshop was able to make small changes in clinician behaviors but we were looking for a bigger impact. We adapted standard MI training to focus on ARV medication adherence and other common behavior issues in HIV care. The content of the training was consistent with the principles of MI [6, 19] with seven modules delivered during the day: (1) Theoretical Considerations in MI, (2) Using MI Microskills, (3) Rolling with Resistance, (4) The Language of Change, (5) Readiness Scaling and Agenda, (6) Moving Towards Commitment, and (7) Integrated Practice. All modules featured demonstrations and practice exercises. At the time of the workshop, we used a random number generator to randomize clinicians to one of two study conditions (limited or full intervention). The limited intervention study arm did not receive any further training beyond the one-day workshop.

Immediately following the workshop, the intensive intervention study arm received an additional 3–5 rounds of personalized one-on-one feedback from the MI trainer. The personalized feedback sessions were conducted as follows. First, our study team audio-recorded the clinician during a routine encounter with one of their patients, using the same criteria of nonadherence for enrollment that we used for the baseline and follow-up assessments. That recording was then transcribed. Both the audio and transcribed file were sent to the MI trainer who listened to the recording while reading the transcript and prepared written feedback. Written feedback consisted of some overall comments and a mark-up of the transcribed encounter indicating particular examples of MI adherent and non-adherent behaviors. Because the MI trainer focused on the emotional tone of the entire visit as well as behavior change dialogue, and because behavior change dialogue was variable across encounters, the MI feedback was broad yet focused on what the trainer felt the greatest areas of strength and improvements were. The MI trainer then sent

the written feedback and conducted a telephonic consultation with the clinician focused on each patient encounter. The time between encounter recording and feedback session was kept as short as possible, with 1–2 weeks representing the average amount of time. This was repeated 3–5 times per full intervention clinician over a period of 4 months. The mean number of sessions was 4.5 per clinician. All providers were paid for their participation in the one-day workshop but the intensive intervention arm was not paid further for the feedback sessions. Study data were collected and managed using REDCap (Research Electronic Data Capture) [20].

Study Measures

Clinician Self-Report

We measured clinicians' attitudes towards and use of MI counseling techniques at baseline and again after completion of the intervention. First we asked the clinicians to report their use of MI behaviors by indicating how often (on a 4-point scale from 'all of the time' to 'none of the time') they used a series of 14 MI consistent techniques (such as explore reasons for nonadherence, investigate if the patient believes the treatment will help, and acknowledge patient autonomy with respect to medication adherence) that we adapted from a previous study [21]. We asked the clinicians to report their attitude toward MI by indicating how useful (on a 5-point scale from 'very useful' to 'not at all useful') they thought the same 14 behaviors would be when discussing medication adherence with patients. We asked the clinicians to indicate their confidence to counsel patients (5-point scale 'not at all confident' to 'totally confident') on a series of behavior change topics (such as substance abuse, medication adherence, diet and exercise, etc.) and their attitude towards counseling on those same behavior change topics in terms of how convinced they are that it would make a difference (5-point scale 'not at all convinced' to 'totally convinced').

After the one-day training intervention, we asked the clinicians to report the extent to which the learning objectives were achieved (4 point scale; not achieved, partially achieved, largely achieved, and fully achieved) and also asked clinicians to rate the clarity and learning effectiveness for each of the seven modular components as well as the overall clarity and effectiveness for the day (5 point scale; poor, fair, good, very good, and excellent). After each personalized feedback session, we asked clinicians to give us feedback on how the session went and what could have gone better.

Patient Ratings

We asked patients to report basic demographic information and then administered the 6-item Healthcare Climate Questionnaires (short form) [22], which assesses patient perceptions of the degree to which the clinician adhered to the spirit of MI (e.g., My HIV provider listens to how I would like to do things) on a 7-point scale of strongly disagree to strongly agree. We calculated the mean of all six items on this measure ranging for an overall score that ranged between 0 and 7.

Audio-recorded Encounters

Audio-recordings were analyzed using three analysis systems: the Roter Interaction Analysis System (RIAS), the Motivational Interviewing Treatment Integrity (MITI), and the Client Language Assessment of Motivational Intent (CLAMI). The RIAS sorts each statement or complete thought made by either the patient or the clinician into 34 mutually exclusive and exhaustive categories, producing a detailed profile of the medical dialogue [23]. In addition to coding all patient and clinician behaviors, the RIAS codes the overall verbal tone of the clinician and patient along several dimensions [interest, responsiveness, friendliness, sympathy, and hurried (reverse coded)] which are added together to create a global affect scale for both the clinician and patient [24]. The RIAS is the most widely-used system for coding patient-physician communication, and it has demonstrated substantial reliability and predictive validity for a variety of patient outcomes, including comprehension and recall, appointment keeping, adherence to therapy and patient satisfaction [25–29]. For this study, we selected global and specific measures that were theoretically related to the MI training focus. We used global measures such as the patient-centeredness ratio (ratio of psychosocial and emotional talk to biomedical talk), the verbal dominance ratio (amount of provider talk divided by the amount of patient talk), the ratio of open to closed ended questions, and the patient and clinician global affect scores. We used specific measures such as the number of empathic

statements, approval, disagreements/disapproval, asking patient opinion, and asking patient permission. There were two RIAS coders who both had more than 6 years' experience using the RIAS system. They were blinded to the study hypothesis and to which audiorecordings were done with intervention and control clinicians. Intercoder reliability, calculated on a 10% random sample, ranged from 0.627 to 0.963 (doctor talk to patient) and 0.727–0.981 for patient talk to doctor).

The transcripts were also coded using an adaptation of the Motivational Interviewing Treatment Integrity (MITI) system Version 2.5 [30]. The MITI assigns global scales to the encounter capturing the relational component of MI, and also codes for specific provider behaviors, including some which are not specifically encouraged or discouraged in MI, such as giving information and asking questions; and behaviors which are classified as MI adherent or non-adherent. Examples of MI adherent behaviors are “asking permission before advising,” “emphasizing the client’s control,” “supporting the client” with statements of compassion or sympathy.” MI non-adherent behaviors are “advising without permission,” “confronting” the client by correcting, shaming, or other derogatory behaviors, and “directing” the client by giving mandates. The MITI also codes for reflections, which are a specific technique which is encouraged in MI; and distinguishes open and closed questions. The Client Level Assessment of Motivational Interviewing (CLAMI) codes client (or in this case patient) language as “moving in the direction of change” (change talk) or against (sustain talk).”Commitment language” goes beyond change talk in that it does not just concern motivation for change, but expresses agreement, intention or obligation to change. The CLAMI is the client language component of the Motivational Interviewing Skill Code [30].

However, most of the dialogue in typical medical visits does not consist of behavioral change counseling and cannot meaningfully be MITI/CLAMI coded. For example, physicians give instructions about proper use of medications or other self-care behaviors. This is an expected part of the physician’s role and it would be inappropriate to code it as MI non-adherent. On the other hand, if a patient already knows the proper way to follow a medication regimen, but is not doing so because of conflicting motivations, then behavioral counseling could occur and MITI coding would be appropriate.

Consequently, it was first necessary to identify what we called “episodes” of behavioral counseling within the visits. An episode is all of the talk about a particular health related behavior which consists of behavioral counseling and is MITI-codable. As these clinicians served as the patients’ primary care providers, these included many issues in addition to HIV adherence. We also applied the

MITI codes for simple and complex reflections to the entire visit. Reflections are a form of elicitation which can be applied to factual information or patients' feelings and wishes and are not limited to behavioral counseling.

Two research assistants who were experienced communication coders were trained to use the MITI and CLAMI by two of our investigators (GR and MBL). The research assistants were blinded to which transcripts were from the intervention providers, and blinded to study phase (pre vs. post training). Two coders were trained using tutorials provided by the developers of the MITI, with consultation from experienced MISC/MITI coders. They also consulted with co-author GR to resolve difficulties. After additional work with material drawn from other studies, and preliminarily establishing that they were converging on acceptable reliability, both coded two encounters. The MITI codable unit of analysis is the speaker turn. The kappa coefficient for agreement that a provider speaker turn constituted behavioral counseling, i.e. that it was MITI codable, was 0.93 for one visit and agreement was perfect ($\kappa = 1$) for the other. In sum, there were only five discrepant speaker turns out of a total of 217 in the two visits. In one visit, agreement on MI consistent (MICON) and MI inconsistent (MIIN) codes was 81.2%; in the other, agreement was 72.2%, counting only those episodes in which at least one MICON or MIIN episode occurred, by either coder.

Analyses

We used t test and Chi squared tests to compare participant characteristics and outcome measures before and after the interventions and between the two intervention groups. Because there were some differences despite randomization between intervention group clinicians (gender) and patients (gender and race), all subsequent analyses adjusted for these characteristics. To assess the effect of the intervention, we removed data from clinicians who did not participate in the intervention ($n = 1$) or remain at the clinic long enough to collect data in the post-intervention period ($n = 2$).

To assess whether one intervention was more effective than the other, we tested time-by-study arm interactions to determine whether one group changed more than the other. The time variable was dichotomous (pre vs. post) as was the study arm (brief vs. intensive). For the provider self-report of attitudes (4 or 5 point scales), patient ratings of provider visit (7-point scale), and global communication outcome measures (all continuous variables), we used linear regression analyses. For the particular communication behaviors (which are measured as utterance counts and not normally-distributed), we used negative binomial regression analyses. For all analyses, we used generalized

estimating equations to account for clustering of patients within clinicians, with Gaussian or negative binomial distributions as appropriate. For most outcomes (patient ratings and RIAS measures, which are calculated at the visit-level), we used patient-level data to increase the statistical power of our analysis while accounting for interclass correlations. For some outcomes (MITI and CLAMI measures, which were calculated for each episode of behavior change), we used behavior change episode level data. And finally, for a few more exploratory analyses, such as provider ratings, we used provider-level data. Data were analyzed by Stata 11.0. [31].

Results

Clinician and Patient Characteristics

Table 1 displays patient and clinician characteristics. Clinicians ($N = 12$) had a mean age of 45 years. The majority were female (75%), white (75%) and half were physicians (50%). Only two clinicians (17%) reported previous exposure to MI training. There were no differences between physicians in the limited and full intervention study groups in terms of age, race, previous MI training or professional training, but the full intervention group had significantly more female clinicians.

Patients ($N = 142$) had a mean age of 49 years, and about half were female (48%). Most were African American (89%) and had graduated high school (63%). A minority were employed (21%). There were no differences between the limited and full intervention study arm patients in race, education or employment, but patients of clinicians in the full versus limited intervention study arm were younger and more likely to be female.

Clinician Response to the Training Intervention

Eleven of the 12 clinicians were able to attend the one-day training intervention (one became ill on that day). Of the 11 clinicians, 6 reported that the training clarity and learning effectiveness was excellent, 4 very good, and 1 good. In terms of meeting the learning objectives, 6 reported that all of the 7 objectives were largely or fully achieved and 4 reported that one or more of the more objectives was only partially achieved.

Clinicians in the intensive intervention group provided open-ended responses after all of their personalized feedback sessions. There were no negative comments. Themes that emerged were appreciation for the written feedback, appreciation for the trainer's insights and conversation, statements that the transcript was easy to review, and a

Table 1 Provider and patient characteristics

Providers	Total sample N = 12	Full intervention N = 6	Limited intervention N = 6	P = value ^a
Age, mean (SD)	45 (11.3)	42 (9.8)	48 (12.7)	0.383
Gender, n (%) female	9 (75%)	6 (100%)	3 (50%)	0.046
Race, n (%) white	9 (75%)	5 (83%)	4 (67%)	0.211
Previous MI training, n (%)	2 (17%)	1 (17%)	1 (17%)	1.000
Profession, n (%) physicians	6 (50%)	3 (50%)	3 (50%)	1.000
Patients	Total sample N = 142	Full intervention N = 80	Limited intervention N = 62	P = value ^a
Age, mean (SD)	49 (8.6)	49 (8.1)	51 (7.8)	0.041
Gender, n (%) female	68 (48%)	48 (60%)	20 (32%)	0.002
Race, n (%) African American	125 (88%)	72 (90%)	53 (85%)	0.293
Education, n (%) high school graduates	89 (63%)	55 (69%)	34 (55%)	0.089
Employment, n (%) working	30 (21%)	20 (25%)	10 (16%)	0.119

^a Obtained using t-tests or Chi squared tests

desire to improve and get the next round of feedback. Representative comments are shown in the text box.

Text box. Representative clinician comments regarding personalized feedback

“Got great feedback on strategies to use on next encounter with patient using the motivational interviewing method. I had to review at night at bedtime. Extremely helpful. Appropriate time spent. So far great. I got the transcript in advance to review with the comments. I got appropriate reminders. I was able to get in touch with all parties in advance to the review time. So far everything is working well now that I reviewed the patient interview and I got the comments from Gary. I think I can apply some to the motivational interviewing principles at the appropriate time. I am going to review the interviews and comments again.” (provider 2).

“I was very satisfied with the feedback session. It was useful and interesting to me. It was not difficult to review the transcript. I did not review the audio. The review was helpful and gave me a few specific skills to work on for my next challenging patient encounter. Just hope I can get a few more sessions soon.” (provider 4).

“I think the feedback session went well! It was very informative and helpful. I took lots of notes so hopefully it will reflect in my next recordings. Reviewing the transcripts and audio was not time intrusive for me at all, again I found it very informative (though I still don’t like listening to my own voice). The feedback session itself, I think lasted about 30–45 min. I think the process has been fairly efficient so far.” (provider 12).

Patient Ratings of Clinicians

Patient ratings of clinicians are shown in Table 2. Patients in both intervention arms rated their encounters as more MI consistent ($p = 0.009$) after versus before the training but without difference between intervention groups ($p = 0.151$).

Analysis of Audio-Recorded Visits

Results of the audiorecorded analysis are shown in Tables 2 and 3. There were several communication outcome measures that improved equally in both intervention study arms: visits were overall more patient-centered ($p < 0.000$), with a more positive patient affect ($p < 0.001$), after versus before the intervention. Analyses revealed an increase in reflective statements ($p = 0.23$), an increase in complex reflective statements ($p = 0.22$) and a decrease in disapproving statements ($p < 0.001$) after compared to before the intervention, without differences by intervention groups.

Several clinician behaviors improved to a greater extent in the full versus limited intervention arm. An increase in open (relative to closed) questions, empathic statements, asking patient opinion and asking patient permission all increased significantly for the full intervention group, but not for the limited intervention group.

Table 2 Patient ratings and global communication measures pre- and post- limited and full training interventions

	Both (full and limited interventions combined)			Full intervention			Limited intervention			Effect of full versus limited intervention β (p-value) ^a
	Mean pre	Mean post	β^a p-value	Mean pre	Mean post	β^a p-value	Mean pre	Mean post	β^a p-value	
Patient ratings ^b										
Healthcare visit climate	6.59	6.86	0.28 (0.009)	6.72	6.85	0.14 (0.032)	6.41	6.86	0.47 (0.059)	−0.28 (.151)
Global communication measures ^c										
Patient-centeredness ratio	0.92	1.34	0.45 (<0.000)	1.00	1.42	0.46 (0.014)	0.82	1.23	0.44 (0.001)	0.01 (0.963)
Verbal dominance ratio	1.23	1.17	−0.05 (0.687)	1.09	1.17	0.08 (0.584)	1.41	1.16	−0.23 (0.344)	0.31(0.225)
Open/closed question ratio	0.43	0.56	0.13 (0.012)	0.45	0.67	0.21 (0.007)	0.41	0.44	0.03 (0.171)	0.18 (0.016)
Provider global affect score	11.44	12.07	0.59 (0.217)	11.67	12.55	0.92 (0.212)	11.14	11.47	0.19 (0.728)	0.76 (0.390)
Patient global affect score	20.65	22.36	1.62 (<0.001)	21.05	22.45	1.36 (0.009)	20.10	22.25	1.97 (<0.000)	−0.60 (0.337)
Visit length in minutes	29.36	29.78	−0.29 (0.852)	30.15	30.00	−0.64 (0.792)	28.29	29.51	0.16 (0.912)	−0.26 (0.932)

^a Linear regression models used generalized estimating equations to account for clustering of patients within providers and adjusted for provider gender, patient gender, and patient race

^b Measured using the Healthcare Visit Climate Instrument

^c Measured using the Roter Interaction Analysis System

Audio-Recorded Analyses of Behavior Change Counseling Episodes

There were 681 behavior change episodes within the 168 visits, and there were no significant differences in MI adherent and non-adherent behaviors after versus before the intervention or between intervention arms (Table 4). As shown in Table 4, patients of clinicians of the limited intervention study group changed more in terms of commitment talk after vs. before the intervention when compared to the difference in commitment talk made by patients of clinicians in the full intervention arm ($p = 0.042$).

Discussion

In this pilot study, the workshop alone was as effective as the workshop plus feedback communication skills training intervention in improving patient experiences, the overall patient-centeredness of the encounters, and the emotional tone displayed by the patient during the visit. Certain communication behaviors improved to a greater extent with the intensive intervention, but whether these

additional improvements are substantial enough to warrant the extra financial and logistical resources required is unclear. To determine this, further studies should examine whether these findings are reproducible, and larger studies are needed with longer follow-up to explore whether more intense training yields greater improvements in patient adherence.

Considerable attention has been paid to the development of effective methods of training practitioners in MI [32, 33] and of evaluating practitioner competence and establish fidelity to the model [34], in research and clinical settings. Although it has clearly been established that post-workshop enhancements increase the durability of gains associated with MI training workshops [35], these enhancements vary with respect to the incremental gain [36]. There are two possible explanations of the lack of incremental gain in the feedback and coaching condition in this study. First, the dose and timeframe of individualized coaching may have been too small. There is evidence that post-workshop feedback sessions with 5–12 contact hours or greater spanning 6 or more months have the greatest impact above and beyond an initial training workshop [36]. Second, the feedback sessions may have been too broad in focus, addressing behavioral attributes of all 4 of the MI processes

Table 3 Particular communication measures used across entire visit pre- and post- limited and full training interventions

	Both (full and limited interventions combined)			Full intervention			Limited intervention			Effect of full versus limited intervention β (p-value) ^a
	Mean pre	Mean post	IRR ^a p-value	Mean pre	Mean post	IRR ^a p-value	Mean pre	Mean post	IRR ^a p-value	
Empathic statements ^b	0.29	0.58	2.23 (<0.000)	0.36	0.88	2.90 (<0.001)	0.21	0.22	0.74 (0.611)	3.30 (0.019)
Approval ^b	6.72	5.44	0.87 (0.266)	7.00	5.88	0.92 (0.640)	6.34	4.91	0.83 (0.437)	1.09 (0.713)
Disagree/disapproval ^b	4.57	1.47	0.33 (<0.001)	4.36	1.15	0.28 (<0.001)	4.86	1.88	0.36 (0.004)	0.75 (0.466)
Asks patient opinion ^b	3.00	3.90	1.23 (0.347)	2.69	4.75	1.75 (<0.001)	3.38	2.84	0.70 (0.191)	2.37 (0.003)
Asks patient permission ^b	0.22	0.47	2.17 (0.026)	0.18	0.58	3.46 (0.006)	0.28	0.34	1.08 (0.591)	2.89 (0.020)
Total Reflections ^c	4.78	5.74	1.39 (0.023)	5.59	7.00	1.64 (0.007)	3.64	4.16	1.10 (0.605)	1.53 (0.099)
Complex reflections ^c	1.45	2.57	1.90 (0.002)	1.72	3.03	2.02 (0.017)	1.07	2.00	1.71 (0.033)	1.19 (0.644)

^a Negative binomial regression models used generalized estimating equations to account for clustering of patients within providers and adjusted for provider gender, patient gender, patient race, and visit length

^b Measured using the Roter Interaction Analysis System

^c Measured using modified MITI

Table 4 MI-consistent and inconsistent provider behaviors and patient behaviors used during behavior change counseling portion of visits only pre- and post- limited and full training interventions

	Both (full and limited interventions combined)			Full intervention			Limited intervention			Effect of full versus limited intervention β (p-value)
	Pre	Post	β^a p-value	Pre	Post	β^a p-value	Pre	Post	β^a p-value	
Provider behaviors ^b										
MI-adherent utterances	0.57	0.79	0.22 (0.084)	0.39	0.56	0.17 (0.367)	0.75	1.02	0.27 (0.135)	-0.10 (0.703)
MI-nonadherent utterances	2.01	1.97	-0.04 (0.898)	0.62	0.71	0.09 (0.800)	3.40	3.23	-0.17 (0.747)	0.26 (0.687)
Patient behaviors ^b										
Change talk	1.83	2.38	0.55 (0.073)	1.67	1.83	0.16 (0.693)	1.98	2.92	0.94 (0.043)	-0.78 (0.203)
Commitment talk	0.41	0.49	0.08 (0.379)	0.38	0.26	-0.12 (0.306)	0.44	0.72	0.28 (0.071)	-0.40 (0.042)

^a Negative binomial regression models used generalized estimating equations to account for multilevel clustering of counseling episodes within patient visits and patients within providers; also adjusted for provider gender, patient gender, and patient age

^b Measured using the modified MITI/CLAMI

[6]. A more focused feedback process, limited to components of the physician consultations most amenable to MI would likely have yielded greater incremental gain given the relatively limited nature of the feedback intervention.

Another interesting finding from our study was the fact that the differences we saw in communication behaviors after versus before the training intervention were seen globally across the entire visit rather than focused strictly on the episodes of behavior change counseling. MI is comprised of both a relational and a technical component [37]. The relational component, which provides the patient-centered, motivationally informed foundation of MI, is

defined by the constructs of empathy, evocation, and empowerment. The evidence base regarding the relational component of MI is well developed, with multiple published reports showing a correlation between practitioner behavior and patient involvement in treatment [38, 39] and subsequent behavior change [39, 40]. Our training intervention seemed most effective at altering the relational component of MI, with more patient-centeredness, more empathy, more positive patient affect, and more positive patient ratings overall. Clinician talk related to the technical component of MI, in terms of MI adherent and non-adherent behaviors, did not significantly change with either

intervention. Even more striking was the fact that there was an interaction between clinician intervention arm and patient change and commitment talk such that patients of clinicians in the limited intervention made more change in commitment talk whereas patients of clinicians in the intensive intervention arm made less change and commitment talk. This was opposite to what we hypothesized and suggests further that the dose of feedback/coaching was insufficient to impact practitioner behavior this significantly. The workshop alone may have been sufficient to bring about attitudinal change and the feedback sessions were not powerful enough to move the practitioners to a level of complete technical competence, yet the reasons for moving the in the opposite direction are not completely understood.

This pilot study was not designed to look at actual behavior change, but rather to examine in a preliminary way the extent to which communication behaviors could be modified to facilitate better relationships and more effective adherence counseling. Previous studies have demonstrated that the effective patient-clinician relationships and communication are important and associated with adherence to ART [41–48] and retention in care [49]. HIV patients have described physicians as lecturing or scolding them about adherence, and some reported concealing their non-adherent behavior or in some cases discontinuing clinic attendance or stopping medication taking altogether as a result [50]. Another study found that that physicians are reluctant to raise the issue of ARV adherence, and that discussion of the issue in routine HIV care visits is typically cursory [51]. Finally, two recent reviews support the role of patient-clinician relationships as important to patient adherence [52, 53]. Our study therefore focused on what is arguably the most effective method to improve this communication. Larger studies would be required to determine whether improved communication improves patient behaviors, and additional measures such as the Client Experience of Motivational Interviewing scale could be used to assess the association between patient perceptions and subsequent adherence.

There are several study limitations. First, this was a pilot study with a limited number of providers. The full intervention providers had more positive communication behaviors globally across all measures at baseline, for example higher baseline levels of total and complex reflections, empathic statements, MI adherence and lower rates of MI nonadherence. This may have made it more difficult to demonstrate an improvement in the full intervention group because of possible ceiling effects. Further, although we saw significant differences across multiple measures in the follow-up versus baseline communication behaviors, we don't know the extent to which temporal

trends might explain the difference. This is less likely in our view because these were all experienced HIV providers who are unlikely to make major changes in their communication behaviors years after starting practice. Finally, we do not have long term follow up on the providers and do not know the extent to which any changes might persist over time based on the one-day training versus personalized feedback.

Given the results of this pilot study, further studies are needed to determine how to best teach practicing HIV care providers to implement the relational and technical elements of MI. The one-day workshop had clear positive effects on communication, but we cannot know from this study design whether the improvements positively impact ART adherence or other patient outcomes. We found that busy clinicians were far more appreciative of personalized feedback than we expected, but this personalized feedback did not change their communication behaviors appreciably compared to a one-day workshop. Whether more or different personalized feedback and training would have been more effective is unknown, but it is a salient finding that the level of extra resources that we invested in this additional training did not produce demonstrably improved patient-provider communication. MI is a set of skills that is difficult to teach, and difficult to learn. More research on how to effectively and efficiently train HIV providers, and primary care providers more broadly, in MI is urgently needed.

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Compliance with Ethical Standards

Conflict of interest None of the authors have a conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Appendix: One-Day MI Training Details

Learning Objectives

1. Practitioners will understand the value of a reflective listening interview style and will be able to formulate simple reflective statements in response to patient utterances.
2. Practitioners will understand the concepts of sustain talk and change talk and be able to recognize examples of each.
3. Practitioners will understand the limitations of a direct persuasion approach to motivational enhancement, and be able to use simple reflective statements and ask questions that elicit change talk.
4. Practitioners will understand the value of and be able to demonstrate the ability to ask permission before directive conversational utterances.
5. Practitioners will understand the “ask-tell-ask” model of information exchange and its utility with respect to non-conflictual discussions and action planning.
6. Practitioners will understand and demonstrate in skills practice sessions the capacity to discuss difficult and/or conflictual topics in a manner that maintains rapport with the patient.
7. Practitioners will demonstrate an understanding of the use of structuring techniques to develop and maintain focus in clinical conversations.

Reference

1. Althoff KN, Rebeiro P, Brooks JT, et al. Disparities in the quality of HIV care when using US Department of Health and Human Services indicators. *Clin Infect Dis*. 2014;58(8):1185–9.
2. Paterson DL, Swindells S, Mohr J, et al. Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Ann Intern Med*. 2000;133(1):21–30.
3. Bangsberg DR, Perry S, Charlebois ED, et al. Nonadherence to highly active antiretroviral therapy predicts progression to AIDS. *AIDS*. 2001;15:1181–3.
4. Simoni JM, Pearson CR, Pantalone DW, Marks G, Crepez N. Efficacy of interventions in improving highly active antiretroviral therapy adherence and HIV-1 RNA viral load. A meta-analytic review of randomized controlled trials. *J Acquir Immune Defic Syndr*. 2006;43(Suppl 1):S23–35.
5. Pollak KI, Coffman CJ, Tulsy JA, et al. Teaching physicians motivational interviewing for discussing weight with overweight adolescents. *J Adolesc Health*. 2016;59(1):96–103.
6. Miller WR, Rollnick S. *Motivational interviewing*. 3rd ed. New York: Guilford Press; 2013.
7. Rollnick S, Miller WR, Butler CC. *Motivational interviewing in health care*. New York: Guilford Press; 2008.
8. Farbring C, Johnson W. Motivational interviewing in the criminal justice system. In: Arkowitz H, Westra H, Miller W, Rollnick S, editors. *Motivational interviewing in the treatment of psychological problems*. New York: Guilford Press; 2008.
9. Resnicow K, Jackson A, Blissett D, et al. Results of the healthy body healthy spirit trial. *Health Psychol*. 2005;24(4):339–48.
10. Golin CE, Earp J, Tien HC, Stewart P, Porter C, Howie L. A 2-arm, randomized, controlled trial of a motivational interviewing-based intervention to improve adherence to antiretroviral therapy (ART) among patients failing or initiating ART. *J Acquir Immune Defic Syndr*. 2006;42(1):42–51.
11. Beach MC, Roter DL, Saha S, et al. Impact of a brief patient and provider intervention to improve the quality of communication about medication adherence among HIV patients. *Patient Educ Couns*. 2015;98(9):1078–83.
12. Madson MB, Loignon AC, Lane C. Training in motivational interviewing: a systematic review. *J Subst Abuse Treat*. 2009;36(1):101–9.
13. Schwalbe CS, Oh HY, Zweben A. Sustaining motivational interviewing: a meta-analysis of training studies. *Addiction*. 2014;109(8):1287–94.
14. Baer JS, Rosengren DB, Dunn CW, Wells EA, Ogle RL, Hartzler B. An evaluation of workshop training in motivational interviewing for addiction and mental health clinicians. *Drug Alcohol Depend*. 2004;73(1):99–106.
15. Mitcheson L, Bhavsar K, McCambridge J. Randomized trial of training and supervision in motivational interviewing with adolescent drug treatment practitioners. *J Subst Abuse Treat*. 2009;37(1):73–8.
16. Bohman B, Forsberg L, Ghaderi A, Rasmussen F. An evaluation of training in motivational interviewing for nurses in child health services. *Behav Cogn Psychother*. 2013;41(3):329–43.
17. Schoener EP, Madeja CL, Henderson MJ, Ondersma SJ, Janisse JJ. Effects of motivational interviewing training on mental health therapist behavior. *Drug Alcohol Depend*. 2006;82(3):269–75.
18. Laws MB, Rose GS, Bezreh T, et al. Treatment acceptance and adherence in HIV disease: patient identity and the perceived impact of physician-patient communication. *Patient Prefer Adherence*. 2012;6:893–903.
19. Miller WR, Rose GS. Towards a theory of MI. *Am Psychol*. 2009;66:297.
20. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42(2):377–81.
21. Broers S, Smets E, Bindels P, Evertsz FB, Calff M, de Haes H. Training general practitioners in behavior change counseling to improve asthma medication adherence. *Patient Educ Couns*. 2005;58(3):279–87.
22. Kennedy S, Goggin K, Nollen N. Adherence to HIV medications: utility of the theory of self-determination. *Cogn Ther Res*. 2004;28(5):611–28.
23. Roter DL. *Roter interaction analysis manual*. Baltimore: Johns Hopkins University Bloomberg School of Public Health; 1999.
24. Cooper LA, Roter DL, Johnson RL, Ford DE, Steinwachs DM, Powe NR. Patient-centered communication, ratings of care, and concordance of patient and physician race. *Ann Intern Med*. 2003;139(11):907–15.
25. Bertakis KD, Roter D, Putnam SM. The relationship of physician medical interview style to patient satisfaction. *J Fam Pract*. 1991;32(2):175–81.
26. Levinson W, Roter DL, Mullooly JP, Dull VT, Frankel RM. Physician-patient communication. The relationship with malpractice claims among primary care physicians and surgeons. *JAMA*. 1997;277(7):553–9.
27. Roter DL. Patient participation in the patient-provider interaction: the effects of patient question asking on the quality of interaction, satisfaction and compliance. *Health Educ Monogr*. 1977;5(4):281–315.

28. Wissow LS, Roter D, Bauman LJ, et al. Patient-provider communication during the emergency department care of children with asthma. The National Cooperative Inner-City Asthma Study, National Institute of Allergy and Infectious Diseases, NIH, Bethesda, MD. *Med Care*. 1998;36(10):1439–50.
29. Roter DL, Hall JA, Katz NR. Relations between physicians' behaviors and analogue patients' satisfaction, recall, and impressions. *Med Care*. 1987;25(5):437–51.
30. Houck JM, Moyers TB, Miller WR, Glynn LH, Hallgren KA. Motivational interviewing skill code 2.5 (MISC). N.M.: University of New Mexico CASA; 2017.
31. Stata Statistical Software: Release 11.0. College Station, TX; 2009.
32. Miller WR, Mount KA. A small study of training in motivational interviewing: does one workshop change clinician and client behavior. *Behav Cogn Psychother*. 2001;29:457–71.
33. Miller WR, Yahne CE, Moyers TB, Martinez J, Pirritano M. A randomized trial of methods to help clinicians learn motivational interviewing. *J Consult Clin Psychol*. 2004;72(6):1050–62.
34. Moyers TB, Martin T, Catley D, Harris KJ, Ahluwalia JS. Assessing the integrity of motivational interventions: reliability of the motivational interviewing skills code. *Behav Cogn Psychother*. 2003;31:177–84.
35. Soderlund LL, Madson MB, Rubak S, Nilsen P. A systematic review of motivational interviewing training for general health care practitioners. *Patient Educ Couns*. 2011;84:16–26.
36. Scwalbe CS, Oh HY, Zweben A. Sustaining motivational interviewing: a meta-analysis of training studies. *Addiction*. 2014;109:1287–94.
37. Miller WR, Rollnick S. *Motivational interviewing: preparing people for change*. 2nd ed. New York: Guilford Press; 2002.
38. Boardman T, Catley D, Grobe JE, Little TD, Ahluwalia JS. Using motivational interviewing with smokers: do therapist behaviors relate to engagement and therapeutic alliance? *J Subst Abuse Treat*. 2006;31(4):329–39.
39. Moyers TB, Martin T. Therapist influence on client language during motivational interviewing sessions. *J Subst Abuse Treat*. 2006;30(3):245–51.
40. Moyers TB, Martin T, Christopher PJ, Houck JM, Tonigan JS, Amrhein PC. Client language as a mediator of motivational interviewing efficacy: where is the evidence? *Alcohol Clin Exp Res*. 2007;31(10 Suppl):40s–7s.
41. Schilder AJ, Kennedy C, Goldstone IL, Ogden RD, Hogg RS, O'Shaughnessy MV. "Being dealt with as a whole person." Care seeking and adherence: the benefits of culturally competent care. *Soc Sci Med*. 2001;52(11):1643–59.
42. Murri R, Antinori A, Ammassari A, et al. Physician estimates of adherence and the patient-physician relationship as a setting to improve adherence to antiretroviral therapy. *J Acquir Immune Defic Syndr*. 2002;31(Suppl 3):S158–62.
43. Wu AW, Ammassari A, Antinori A. Adherence to antiretroviral therapy: where are we, and where do we go from here? *J Acquir Immune Defic Syndr*. 2002;31(Suppl 3):S95–7.
44. Roberts KJ. Physician-patient relationships, patient satisfaction, and antiretroviral medication adherence among HIV-infected adults attending a public health clinic. *AIDS Patient Care STDS*. 2002;16(1):43–50.
45. Davis-Michaud M, Yurk R, Lansky D, Asch S, Wu AW. Quality care for people with HIV/AIDS: patients' perspectives. *HIV Clin Trials*. 2004;5(6):406–15.
46. Bakken S, Holzemer WL, Brown MA, et al. Relationships between perception of engagement with health care provider and demographic characteristics, health status, and adherence to therapeutic regimen in persons with HIV/AIDS. *AIDS Patient Care STDS*. 2000;14(4):189–97.
47. Schneider J, Kaplan SH, Greenfield S, Li W, Wilson IB. Better physician-patient relationships are associated with higher reported adherence to antiretroviral therapy in patients with HIV infection. *J Gen Intern Med*. 2004;19(11):1096–103.
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):661–5.
49. Flickinger TE, Saha S, Moore RD, Beach MC. Higher quality communication and relationships are associated with improved patient engagement in HIV care. *J Acquir Immune Defic Syndr*. 2013;63(3):362–6.
50. Tugenberg T, Ware NC, Wyatt MA. Paradoxical effects of clinician emphasis on adherence to combination antiretroviral therapy for HIV/AIDS. *AIDS Patient Care STDS*. 2006;20(4):269–74.
51. Barfod TS, Hecht FM, Rubow C, Gerstoft J. Physicians' communication with patients about adherence to HIV medication in San Francisco and Copenhagen: a qualitative study using grounded theory. *BMC Health Serv Res*. 2006;6:154.
52. Arbutnot A, Sharpe D. The effect of physician-patient collaboration on patient adherence in non-psychiatric medicine. *Patient Educ Couns*. 2009;77(1):60–7.
53. Zolnierok KB, DiMatteo MR. Physician communication and patient adherence to treatment: a meta-analysis. *Med Care*. 2009;47(8):826–34.