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HealthCall: Technology-based extension of Motivational Interviewing to reduce non-injection drug use in HIV primary care patients: a pilot study

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Abstract

To reduce non-injection drug use (NIDU) among HIV primary care patients, more than single brief interventions may be needed, but clinic resources are often too limited for extended interventions. To extend brief Motivational Interviewing (MI) to reduce NIDU, we designed and conducted a pilot study of “HealthCall”, consisting of brief (1–3 min) daily patient calls reporting NIDU and health behaviors to a telephone-based Interactive Voice Response system, which provided data for subsequent personalized feedback. Urban HIV adult clinic patients reporting 4 days of NIDU in the past month were randomized to two groups: MI-only (n=20), or MI +HealthCall (n=20). At 30 and 60 days, patients were assessed and briefly discussed their NIDU behaviors with counselors. The outcome was days used primary drug. Medical marijuana issues precluded HealthCall with patients whose primary substance was marijuana (n=7); excluding these, 33 remained, of whom 28 patients (MI-only n=17; MI+HealthCall n=11) provided post-treatment data for analysis. Time significantly predicted reduction in days used in both groups ($p < .0001$). At 60 days, between-group differences approached trend level, with an effect size of 0.62 favoring the MI+HealthCall arm. This pilot study suggests that HealthCall is feasible and acceptable to patients in resource-limited HIV primary care settings, and can extend patient involvement in brief intervention with little additional staff time. A larger efficacy trial of HealthCall for NIDU-reduction in such settings is warranted.

Keywords

HIV; treatment; drug use; IVR; brief intervention

Introduction

For nearly two decades injection drug use (IDU) has been identified as a global principal means of HIV transmission. While IDU remains highly associated with incident HIV infections in countries outside the U.S. (Amirkhanian et al., 2011; Des Jarlais, Arasteh, Semaan & Wood, 2009; Metzger, Woody & O’Brien, 2010; Metzger & Zhang, 2010), the U.S. has seen a shift in the connection between HIV transmission and drug use, with HIV

infection now equally prevalent among injection- and non-injection drug users (Des Jarlais et al., 2007; Mitchell & Latimer, 2009). Further, HIV heterosexual risk behaviors increasingly occur while under the influence of non-injected drugs (Des Jarlais et al., 2007; Metzger & Zhang, 2010; Mitchell & Latimer, 2009). In addition, non-injection drug use (NIDU) is associated with poor adherence to antiretroviral therapy (ART), leading to drug-resistant strains of HIV and increased mortality (Mausbach, Semple, Strathdee, Zians & Patterson, 2007; Woody, Dugosh, Crits-Christoph, Ball & Carroll, 2009). Reducing NIDU in HIV-infected individuals is therefore an important health priority. Evidence-based behavioral treatment can reduce substance abuse (e.g., Carroll et al. (1994), McKee et al. (2007), and Meade et al. (2010)), but these interventions require between 6 and 15 60–90 min sessions in which counselors administer complex manualized treatment. Brief interventions such as motivational interviewing (MI) have also been proposed (Burke, Arkowitz & Menchola, 2003; Miller & Rollnick, 2002; Rollnick & Miller, 1995), but among patients with complex problems, evidence suggests that more extensive intervention is required for efficacy (Emmons & Rollnick, 2001). Many HIV-infected individuals are treated in HIV primary care clinics, where resources limit the time and training for staff to focus on NIDU reduction. In such settings, innovative solutions are needed to extend the “dose” of NIDU-reduction intervention without placing unrealistic demands on clinic staff.

One potential way to extend intervention is through emerging telephone-based technologies, which offer ways to improve health outcomes in resource-limited settings. One example is automated Interactive Voice Response (IVR), a flexible telephone-based technology that has shown promise in helping patients to manage chronic illness and medications (Kaplan, 2006; Lester et al., 2010; Oake, Jennings, van Walraven & Forster, 2009; Reid, Pipe, Quinlan & Oda, 2007). IVR has been used for alcohol screening and as an adjunct to standard care (Helzer et al., 2008; Rose et al., 2010). This strategy seemed particularly appropriate for urban HIV primary care clinics, where limited staff time and resources make extended interventions for substance abuse unfeasible (Strauss et al., 2009).

Accordingly, we designed an enhancement of brief Motivational Interviewing consisting of 1–3 minute patient calls to “HealthCall”, utilizing a telephone Interactive Voice Response (IVR) platform. Originally targeting heavy drinking, we designed HealthCall to facilitate ongoing self-monitoring, awareness of use and self-efficacy regarding reduction. Patients call HealthCall daily via a toll-free number to report on the targeted health behavior and potentially related moods, behaviors and situations occurring in the prior 24 hours. Call data are summarized for patients in monthly personalized feedback graphs. We previously showed that MI+HealthCall to reduce heavy drinking was acceptable to disadvantaged minority HIV primary care patients (Aharonovich et al., 2006). A subsequent large randomized clinical trial in this population showed significantly greater drinking reduction for participants in MI+HealthCall compared to MI-only or an educational control condition (Hasin et al., under review). The intervention was implemented over a 60-day period, which the earlier study showed was the optimal duration based on reduction in substance use relative to continued participation (Aharonovich et al., 2006).

Given patients’ positive responses to HealthCall for reducing heavy drinking and at the urging of the HIV primary clinic medical staff, we adapted the MI+HealthCall intervention to focus on reduction in NIDU as the outcome. We report on a proof-of-concept pilot study consisting of a small randomized trial comparing MI+HealthCall to MI-only to reduce NIDU in urban HIV primary care patients. Our primary outcome was number of days the patient used his/her primary drug in the prior 30 days.

Method

Data collection for the study took place between August, 2008 and February, 2009.

Participants

Inclusion criteria consisted of: being HIV-positive, English- or Spanish-speaking, aged 18 years, enrolled in a New York City hospital-affiliated HIV primary care clinic, using drugs four or more days during the prior 30 days (including illicit non-injection drugs or prescription drugs taken without prescription or more than prescribed). Exclusion criteria included active psychosis, suicidality, gross cognitive impairment (Halstead-Reitan Trails A; Reitan & Wolfson, 1992), injection drugs use in the last 30 days, or alcohol as primary substance. Participants provided written informed consent. The study protocol was approved by the hospital institutional review board.

Procedures

Recruitment: Substance abusing patients attending their HIV clinic visit were informed about the study by their HIV providers, who referred them, if interested, to meet with the study counselors for written informed consent and assessment of eligibility. Potential participants were told that the study was investigating whether a brief meeting with a trained health care worker that was followed or not followed by 4-minute daily phone calls about drug use would help patients with HIV reduce their drug use. Of 43 patients referred and screened for the study (Figure 1), 40 met inclusion criteria.

Randomization and blinding

After assessment, patients were randomized as follows: MI-only (N=20) and MI+HealthCall (N=20). The randomization was done via 10-block standard ABAB design. Patients were blinded to their HealthCall assignment until after they completed the MI session. After receiving the treatment condition (MI or MI+HealthCall), patients returned at 30 and 60 days for assessments and brief meetings (10–15 min) with the study counselors. Patients received \$20 gift certificates for each assessment. Calling HealthCall was not compensated as HIV clinics are unlikely to pay patients to participate in treatment and we wanted to test a potentially sustainable intervention.

Counselors

Counselors were bilingual (English/Spanish) and from the same race/ethnic groups as most of the patients. One had a MA in health education, and the other a BA in psychology. Both were trained in the delivery of brief MI and HealthCall for drinking reduction (Hasin et al., under review), but neither had previous experience in substance abuse counseling. Counselors were supervised weekly by a licensed psychologist (EA). MI sessions were audiotaped and 10% were randomly selected for fidelity ratings, which indicated acceptable MI performance using a standardized coding system (MITI; Moyers, Martin, Manuel, Hendrickson & Miller, 2005).

Treatments

MI-only—In MI-only arm, counselors administered a 20–25 min MI at baseline, using standard MI techniques, e.g., dialogue about health consequences of NIDU, exploring ambivalence, barriers to change, developing a change plan, including (for those who chose) a specific NIDU-reduction goal (reflected in \$ amounts) for the next 30 days. Patients then received a digital alarm watch which they were told they could use as a medication reminder. At 30 and 60 days, counselor and patient met for 10–15 minutes to review overall drug use and set or re-set a drug reduction goal for the next 30 days.

MI+HealthCall—In the MI+HealthCall arm, counselors conducted all baseline activities described in the MI arm. They then instructed patients in the use of HealthCall and asked patients to call daily for the next 30 days. Patients then completed a practice call to HealthCall. The HealthCall menu for NIDU included a short set of pre-recorded questions in English or Spanish about the previous day covering use of primary drug, dollar amount of the drug used, use of other drugs, HIV medication adherence and feelings of wellness, stress and overall quality of the day. All HealthCall questions are asked about “yesterday” (morning, afternoon, evening) to ensure a consistent reporting period regardless of the hour called. Patients responded by pressing numbers on the telephone keypad. After the practice call, counselors helped patients identify an accessible telephone and convenient time for daily calls, and set the watch alarm to this time as a reminder to call.

HealthCall data were automatically uploaded to a database and used to provide personalized feedback to patients about their drug use in a single-page form (Figure 2) that included a computer-generated graph of patients’ drug use as called into the IVR, and a set of summary statistics during the 30-day and 60-day visits. The personalized graph contained the patient’s goal set in the baseline MI interview with the counselor (“NIDU Goal”), with diamond-shaped dots representing the dollar amount of drugs used on the days that the patient called HealthCall. The summary statistics provided totals of days used, mean amount spent on drugs daily, and reasons for drug use. For the hypothetical example shown in Figure 2, the goal was to keep drug use below \$50 a day. The patient called on 23 days, reported \$0 drug use on 18 days, and met the goal on 21 days. During the 60 days, if patients went longer than 48 hours without calling, counselors made a brief reminder call about the importance of regular calling. If needed, the 30-day meeting included discussion of ways to improve calling frequency.

Assessment

Patients were assessed using a self-administered audio computer-assisted interview (A-CASI) for baseline variables such as demographics, years since HIV diagnosis, current primary drug and history of drug use. All measures were administered at the HIV clinic in the patient’s choice of English or Spanish. The primary study outcome, days using primary drug, was assessed at baseline, 30 days and 60 days in both arms with the Time-Line Follow Back Interview (TLFB), which uses a calendar and memory aids to reconstruct estimates of drug use levels (Sobell & Sobell, 1995). While concerns are often raised about self-reported drug use (Chermack et al., 2000), reports of drug use are often highly correlated with biological measures (Preston, Silverman, Schuster & Cone, 1997) and are more likely to be valid when they are made in privacy and when individuals understand there are no punitive consequences for reporting drug use (Chermack et al., 2000; Grucza, Abbacchi, Przybeck & Gfroerer, 2007; Magura, Goldsmith, Casriel, Goldstein & Lipton, 1987; Zanis, McLellan & Randall, 1994), the conditions in the present study. We used these data to create composite variables indicating mean days using primary drug. We did not analyze HealthCall data as the primary outcome because these data were available only from the MI+HealthCall group. Patient feedback was elicited at 60 days (end of treatment) with structured questions and unstructured comments.

Statistical Analysis

We analyzed change among participants with data from the 30-and/or 60-day assessments. The primary outcome, days used primary drug in last 30 days, was transformed ($\log+1$) to better meet normality assumptions and then analyzed with repeated measures analysis using generalized linear models (GLM). Generalized estimating equations (GEE) were applied to estimate model parameters. GEE takes into account within-subject correlations of the

repeated measures, uses all available data, and allows incorporation of covariates, which included gender, age, race and log of days used at baseline.

Results

Retention

Of 40 participants, seven whose primary drug was marijuana were excluded from further consideration due to complications arising from medical marijuana issues. Of the remaining 33 patients, retention to 30 days was 84.8% and to 60 days, 78.8%. Patients not retained in the study either had known relocations outside New York City ($n=3$) or simply did not return to the HIV clinic at all ($n=2$). Treatment groups did not differ on attrition ($p>0.10$) and thus attrition is not likely to be a source of bias in our results.

Baseline Characteristics

Table 1 presents the demographic and drug-use characteristics of the baseline sample ($N=33$). Of all participants, 75.8% were male, 63.6% were African American, 21.2% were Hispanic and the rest Caucasian. Over a third (36.4%) lived in shelters or other unstable housing, 48.5% had chart-documented active hepatitis A, B or C, and the mean age was in the mid-40s. As self-reported by the patients to the counselors during initial screening, cocaine/crack was the predominant primary substance (75.8%), with rest heroin (15.2%) and methamphetamine (9.1%) abusers.

Call Data

Of the patients assigned to MI+HealthCall, 55.6% had cell phones; 33.3% had ready access to landline phones only and 11.1% had neither. There was no difference in calling rates by type of phone access: mean calling rates for cellphone, landline and no phone were 0.55, 0.50 and 0.43, respectively ($F=0.32$). Calls to HealthCall lasted a mean of 1 minute, 59 seconds. Among those in the MI+HealthCall group, the mean and median number of possible calls to HealthCall (excluding days incarcerated or hospitalized) was 58% and 56%. Analyses showed that age, sex, race, primary drug, and counselor were unrelated to call response ($p>0.05$).

Reduction in Days of Drug Use

In terms of actual days used at baseline and 60 days, the MI-only group declined from a mean of 10.2 days (standard deviation [SD] 6.88) to 6.2 (SD 8.73) at 30 days and 4.1 (SD 4.95) at 60 days, while the MI-HealthCall group declined from a mean of 9.2 (SD 6.97) to 3.4 (SD 4.76) at 30 days and 2.0 (SD 4.35) at 60 days (see Table 2). Figure 3 shows this clear downward trend. Using the GEE model, a significant effect of time ($p<0.0001$) was found for both treatment groups over the 60-day period. Group differences at 30 day and 60 day time points were not significant, but approached trend level at 60 days ($p=0.13$), with an effect size of 0.62 (Cohen's d) indicating that the log-transformed means of the two groups are separated by 0.62 times their pooled standard deviation, typically understood as a moderate effect (Cohen, 1988).

Patient Feedback

Using the patient feedback from the end-of-treatment (60-day) assessment, all patients said calls were easy and increased awareness of their drug use. Many (69.2%) said the calls helped them reduce drug use; 57% said that they would continue calling if possible. Patients commented that using HealthCall was "exciting and provided positive reinforcement" and helped "become more alert" and "maintain focus." Patients responded positively to the accessibility and interactive quality, saying that "it is like having to answer to someone

every day,” “gave... attention never received from doctors.” A few patients who found HealthCall helpful nonetheless said making the calls was “hard to remember” or “annoying.” Seeing the personalized graphs gave patients a sense of accountability (the graphs allowed seeing “the peaks of when I went beyond my goal” “make me think about the money I’m spending,” “it was depressing to see how much I used”) or accomplishment (“show that I can do it”). Patient reactions to counselor reminder calls were generally favorable; one patient said “they are really on top of me and would like me to maintain awareness of my usage.” Participants also made suggestions to improve HealthCall, e.g., that we add questions about their drinking.

Discussion

This is the first study using IVR technology to extend brief MI aimed at reducing NIDU among HIV primary care patients. HealthCall was designed to be acceptable to patients yet not place unrealistic demands on staff time. In this proof-of-concept study, participants were largely members of disadvantaged minority groups, many with multiple problems including unstable housing. Retention in the study was excellent, and the patients made many of the possible daily calls to HealthCall. For both treatment arms (MI-only and MI+HealthCall), patients significantly decreased their number of days using their primary drug from baseline to 60 days. As predicted, participants in the MI+HealthCall group showed greater reduction, moving from an average of 9.2 to 2 days of NIDU per month, with a moderate effect size. Although we did not expect a significant difference between the groups due to the small sample size, the p-value for a group difference at 60 days approached trend level, and the effect size was well within the range supporting the value of a larger study. Results supported potential value of HealthCall as an extension to MI that would result in greater reduction of days used among patients whose primary drug was cocaine/crack, heroin or methamphetamine, and consequently further investigation of MI enhanced by HealthCall in a larger randomized trial.

Possible mechanisms of HealthCall’s action may include self-monitoring, reminders of the MI session, improved self-efficacy or self-regulatory skills. Another possible explanation is simply the provision of more intervention time (i.e., higher dose) than the other arms. At present, HealthCall’s mechanism of action is unknown, but exploration of mechanisms in a larger trial would be useful.

Given that this was a pilot phase of investigation, we explored whether MI+HealthCall could be helpful to patients whose primary drug was marijuana, despite knowledge of potential complications due to some patients’ use of marijuana for what they perceived as medical purposes. Although all patients whose primary drug was marijuana met DSM-IV criteria for abuse or dependence, agreed to participate in the study, and did not differ significantly from others in the sample on any of the demographic variables measured, this group proved reluctant to reduce what was, in several cases, daily marijuana use for health purposes such as stimulating appetite. This contrasted sharply from the users of other drugs, who had the expected ambivalence about reducing substance abuse that is addressed in MI, but clearly perceived the need to reduce. Thus, study results indicate that the screening and interventions in their current form are not optimal for HIV primary care patients whose primary substance is marijuana. Future studies could include further adaptations to be more suitable for this group.

Study limitations are noted. (1) This was a pilot study with a target N of 40. A larger randomized study with enough power to detect significant differences is warranted. (2) Given the scope of the study, we considered only reduction in days used NIDU as the primary outcome. Other indicators of drug use and other outcomes (ART adherence; sexual

risk behaviors) would provide a better understanding of the direct and indirect benefits of HealthCall. (3) Patients whose primary or only drug was marijuana differed from others on their motives for use. Different screening and/or intervention procedures would be needed to differentiate medical and other marijuana users, which would require formative developmental work and a new pilot study. (4) Drug outcomes were assessed with self-report. There is no reason to think that patients in one arm or the other had more motivation to conceal drug use in the private, self-administered drug use assessments, but future studies should obtain biological verification of such self-reports. On the other hand, the daily or near-daily reporting of substance use to the IVR might have caused patients to remember their drug use more accurately when making the 30- and 60-day reports of the study drug outcomes than those who were only asked to report drug use retrospectively at 30 and 60 days. If such an effect occurred, this could work against showing a benefit for the MI +HealthCall arm, leaving our results a conservative estimate of the HealthCall benefit. (5) While MI+HealthCall may have been useful in decreasing sexual risk behaviors and increasing ART adherence among the patients in this pilot study, data were not collected to directly test such hypotheses. Larger studies of MI+HealthCall in non-injection drug users should collect such data to test the impact of MI+HealthCall on these important HIV-related health behaviors. (6) In this pilot study, patients were blinded to their random assignment until after the MI session, but counselors were not. We do not know whether this affected counselor behavior during the MI session. A better design, incorporated in the larger trial we are now conducting, is to keep both patients and counselors blinded to HealthCall assignment until after completion of the MI session. (7) Data on readiness to change and level of ambivalence were not collected in this pilot study. They are important variables that should be included in future larger trials.

Patients made suggestions to us on how to improve HealthCall, and we have incorporated these suggestions, as well as increasing the interactivity of HealthCall, which patients appear to value. We are currently preparing to conduct a larger randomized trial that will provide information about this version, as well as information on a much broader range of measures and post-treatment follow-up data on whether benefits extend past the end of treatment.

Our sample was drawn from an urban treatment setting with a disadvantaged patient population, and our minimal exclusion criteria and high retention rate support generalizability to similar populations. The study shows that IVR technology could be implemented by non-physician staff with few additional demands on clinic resources. Further studies are needed to demonstrate utility with alternative settings and providers (e.g., case managers, peer counselors). The flexibility and low cost of HealthCall (the platform cost ~\$11,000 U.S), the previous success in reducing heavy drinking in a larger randomized trial (Hasin et al., under review), the ubiquity of telephone access across national and class boundaries (Lester et al., 2010; Shacham, Stamm & Overton, 2009) and our successful implementation are all promising indicators of the dissemination potential of our HealthCall (IVR) intervention strategy.

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Figure 1.
Flow of study participants in study of HealthCall enhancement of Motivational
Interviewing: New York City HIV primary care patients who were non-injection drug users

Summary:

Days Met Primary Drug Goal:	21
Days with No Primary Drug Use:	18
Average Daily Amount Spent on Primary Drug:	\$12.17
Days You Took All Your Meds:	22

Reasons for All Drug Use:

Had Cash:	6
Around Others Using Drugs:	3
To Celebrate:	0
To Forget Worries:	2
To Improve Your Mood:	0
Out of Habit:	13

Figure 2.

Sample patient feedback form: graph and summary statistics based on prior 30 days of IVR calls¹

¹ Study of HealthCall enhancement of Motivational Interviewing: New York City HIV primary care patients who were non-injection drug users; data collected August 2008–February 2009; “primary amount” in figure legend refers to amount (in dollars) of use of primary substance reported on the call to HealthCall on each day that the patient called HealthCall.

Figure 3.
Days used primary substance (log-transformed), by treatment group and time point: New York City HIV primary care patients who were non-injection drug users

Table 1

Baseline characteristics of New York City HIV primary care patients who were non-injection drug users, by treatment condition¹

	MI+HealthCall (n=15) %	MI Only (n=18) %	p-value
Female	26.7	22.2	0.77
Ethnicity			0.88
African American	60.0	66.7	
Hispanic	26.7	16.7	
Caucasian	6.7	5.6	
Spanish-speaking	6.7	0.0	0.27
Unstable housing	53.3	22.2	0.07
Hepatitis ²	60.0	38.9	0.23
HIV meds prescribed ³	46.7	77.8	0.06
Primary drug ⁴			0.22
Cocaine/Crack	80.0	72.2	
Heroin	20.0	11.1	
Methamphetamine	0.0	16.7	
	Mean (s.d.)	Mean (s.d.)	
Age, years	46.3(5.7)	44.8(7.3)	0.50
Days used primary drug (30 days prior baseline)	9.2(7.0)	10.2(6.9)	0.68

¹Data collection conducted between August, 2008 and February, 2009

²Active Hepatitis A, B or C as indicated in the medical chart

³As indicated in the chart

⁴As self-reported by the patient to the counselor in the screening interview

Table 2

Mean days of non-injection drug use in the prior 30 days at baseline, 30 and 60 days: New York City HIV primary care patients who were non-injection drug users, by treatment condition

Mean days used primary drug	Baseline (N=33)	30 Days (N=28)	60 Days (N=26)	60-day effect Size *
MI-only	10.2	6.2	4.1	
MI+HealthCall	9.2	3.4	2.0	0.62

* log transformed