Published in final edited form as:

Am J Drug Alcohol Abuse. 2018 ; 44(3): 294–301. doi:10.1080/00952990.2017.1329311.

The Daily Progress System: A Proof of Concept Pilot Study of a Recovery Support Technology Tool for Outpatient Substance Abuse Treatment

S.B. Carswell^{1,*}, M.S. Gordon¹, J. Gryczynski¹, and S.A. Tangires^{1,2}

¹Friends Research Institute, 1040 Park Avenue, Suite 103, Baltimore, MD 21201

²Epoch Counseling Center, 800 Ingleside Avenue, Catonsville, MD 21228

Abstract

Background—Illicit substance use remains highly prevalent in the US and epidemiological surveillance surveys estimate that in 2015 over 27 million individuals (10.1% of the US population) 12 years of age or older used illicit drugs in the past 30 days.¹ Outpatient treatment delivered in community-based settings is the dominant modality for addiction treatment, typically involving weekly psychosocial counseling sessions in an individual and/or group format.^{2,3} Unfortunately, relapse and premature treatment discontinuation are quite common in outpatient treatment.^{3–5}

Objectives—This is a pilot proof of concept feasibility study involving clients presenting for outpatient SUD treatment. This study sought to examine the feasibility and acceptability of the Daily Progress System (DPS), a telephone-based software program, using interactive voice response (IVR), designed to enhance quality care and improve client outcomes.

Methods—Individuals who presented at the participating treatment clinic, who met study eligibility criteria and provided written informed consent to participate, were included in the study ($N=15$; 53.3% females). Incentives were paid to participants for calls completed.

Results—Participants completed 65% of scheduled daily call-ins, representing 273 person-days of data on client cravings, mood, substance use, and involvement in recovery support activities. The average call duration was approximately 2 minutes and 42 seconds. There was a high degree of client and counselor acceptance and satisfaction using the system.

Conclusions and Clinical Significance—Findings suggest that the DPS appears to be a feasible means of potentially addressing relapse and treatment engagement issues based on client and counselor engagement and satisfaction with the system.

Keywords

substance use disorders; substance abuse treatment; technology-based interventions

*Correspondence concerning this article should be addressed to Steven B. Carswell, Friends Research Institute, 1040 Park Avenue, Suite 103, Baltimore, MD 21201. Telephone number: 410-837-3977. Fax number: 410-752-4218. scarswell@friendsresearch.org.

Financial Disclosures

Two of the authors are co-owners of the small business to whom the award was made. The authors alone are responsible for the content and writing of this paper.

Introduction

Substance use disorders (SUDs) continue to be one of the most serious public health problems in the US,¹ leading to negative physical and mental health problems, family disruption, and premature death.^{6–8} In 2015, approximately 21.7 million individuals (8.1% of the US population) 12 years of age or older needed substance use treatment for SUDs.¹ Even though 2.3 million people received treatment nationally in 2015,¹ less than half of those individuals who initiate treatment successfully complete it.^{3,9,10}

Outpatient Treatment is the Dominant Modality but has Challenges

In the US, SUD treatment generally takes place in community-based settings involving inpatient or outpatient services.³ Outpatient treatment is by far the dominant modality. Of the 14,500 specialty substance abuse treatment facilities operating in the US, over 81% are outpatient programs.^{2,11}

Research has consistently found that regardless of treatment modality, longer retention in treatment is associated with better outcomes in terms of substance use, mental health, and societal costs.^{12,13} However, retention in treatment remains a vexing challenge,^{14,15} with more than half of admitted clients nationwide dropping out of treatment during the first three months.^{3–5} Previous research suggests that low treatment completion rates can be attributed to a variety of factors including lack of motivation, weak therapeutic alliance, and lower perceived need for treatment.^{3,16,17} Relapse is relatively common among those in treatment, constituting an ongoing risk for escalating substance use and treatment dropout.³

Therapeutic Alliance

One of the strongest predictors of SUD treatment retention is the quality of the therapeutic alliance between client and clinician.^{3,17} Therapeutic alliance refers to the: 1) relationship or emotional bond between client and clinician, 2) agreement between client and clinician regarding the techniques or methods employed in treatment, and 3) consensus between client and clinician regarding treatment goals and tasks that need to be completed to accomplish those goals.³ Positive therapeutic alliance early in treatment, including ongoing client feedback to clinician regarding treatment progress, has been found to increase treatment engagement and retention, reduce dropouts, and lead to declines in drug use.^{17–21}

Therapeutic Information Deficits

The structure of outpatient treatment may leave clinicians with a deficit of information regarding clients' motivations, cravings, risk/protective factors, and substance use behaviors that occur between weekly treatment sessions. Client reports of such information retrospectively during treatment sessions may be subject to both recall and social desirability biases. For example, clients may not accurately remember the frequency or intensity of cravings in the past week, or may intentionally or unintentionally downplay their severity when discussing them with clinicians or recovering peers. Thus, clinicians must deliver care on the basis of information that is often not timely, complete, or accurate.

Recent survey results obtained from over 700 professionals representing substance use and behavioral health programs throughout the US highlight the challenges of inadequate information about client progress in treatment.¹³ High dropout rates and monitoring of clients between visits were identified as top priorities in outpatient treatment by 44% and 42% of respondents, respectively. Yet, few treatment providers have mechanisms in place to facilitate client monitoring between treatment sessions. Survey respondents indicated that obtaining information from clients between weekly treatment sessions would be particularly useful with respect to assessing: 1) whether clients have experienced cravings for, or have recently used, alcohol or drugs, 2) what types of triggers increased the likelihood of relapse, 3) what skills they are practicing to aid in their recovery, and 4) what additional support from clinicians would be helpful to them.¹³

Interactive Voice Response

Interactive Voice Response (IVR) is an assessment method in which individuals call a designated telephone number and respond to questions from a pre-recorded survey.²² Typically, respondents are required to enter a passcode before gaining access to the survey.²³ Once the survey is initiated, respondents answer questions by entering numeric responses on a telephone keypad (or through verbal input) that correspond to their answers, which are then automatically sent to a secure HIPAA-compliant database.^{23,24} Research indicates that IVR call-in rates average between 50%–85%, especially when incentives are paid for calls completed^{23,25–27} and if respondent burden is minimized (e.g., less than 15 survey questions and call duration under 3 minutes).^{27,28}

IVR has many advantages over traditional face-to-face interview methods including: 1) increased perceived confidentiality, potentially resulting in greater disclosure of sensitive information compared to live interviews [e.g., substance use, binge eating, risky sex]; 2) improved data quality due to the elimination of errors related to interviewer mistakes or transcription; 3) convenience for researchers, by reducing data collection time and intensity; and 4) being less demanding for study participants, who can respond to questionnaires remotely from a convenient location.^{22,29} IVRs can be programmed to accept verbal input; use pre-recorded surveys that match the accent, cadence, and dialect of respondents; include automatic telephone or text reminders, which are also effective in improving response rates; and allow respondents to contact the system twenty-four hours a day or only during a specified time window.²²

IVR Use in Research Studies

The first peer-reviewed publications regarding IVR use in clinical and behavioral research studies began appearing in the literature in 1989.^{22,29} Initial IVR use primarily involved: 1) the provision of health information regarding smoking cessation,²⁹ 2) conducting screenings to assess depression and hepatitis B risk among university students and substance abuse treatment needs among homeless individuals,^{24,29} 3) assessing the impact of automated reminder calls on increasing appointments and treatment compliance in health care settings,²⁹ 4) patient monitoring regarding symptoms or progress related to diabetes patients and recovering drug users and alcoholics,²⁹ and 5) behavioral interventions focused on cholesterol-lowering diet protocols, glycemic control, and smoking cessation.²⁹

IVR use has grown steadily in recent years and it has been used in a number of studies assessing sensitive topics including heavy alcohol drinking,^{28,30} sexual orientation,³¹ and HIV risk behaviors.³² It has been found to be both acceptable and feasible with various populations including low-income, underserved, and hard-to-reach participants.²² IVR research findings have indicated a high degree of user acceptance and satisfaction, good compliance with daily surveys, and minimal participant burden with respect to time and privacy.^{22,25} Yet, despite growing interest in the use of IVR in research, its use in substance abuse treatment studies has been limited, focused mainly on assessing the frequency and extent of alcohol or tobacco use.^{27,33–36} The few studies that have used IVR in substance abuse treatment research related to drug use have used it primarily to convey therapeutic information and motivational messages to participants regarding substance use, with study results indicating that it was both an acceptable and feasible method for conveying this type of information.^{37,38}

The Present Study

The current study is a pilot proof of concept feasibility study that involved clients presenting for outpatient SUD treatment and their counselors. This study sought to examine the feasibility and acceptability of the Daily Progress System (DPS), a telephone-based software program designed to enhance quality care and improve client outcomes, among clients and counselors in an outpatient setting.

Method

Setting

The study was conducted at a community-based SUD treatment program that provides outpatient and intensive outpatient behavioral treatment for youth and adults with SUDs. The treatment program operates in three locations, has been in operation for over 40 years, and is adjacent to a large metropolitan city in which there are high rates of SUDs and criminal activity. The program provides evidence-based individual, group, and family treatment to clients, as well as mental health, anger management services, and buprenorphine treatment for opioid use disorders (on a limited basis). The program serves approximately 1,300 youth and adults per year, with approximately 60% of clients being uninsured at the time of admission and 85% having household incomes below \$30,000. In 2015, approximately 70% of clients were male; 65% were White, 32% were African American, and 2.7% were Hispanic; and the mean age was 32. The primary reported substance problems were alcohol (41%), marijuana (34%), and opiates (18%).

Daily Progress System (DPS)

The DPS is a telephone-based software program designed to improve therapeutic alliance, reduce therapeutic information deficits, and enhance treatment engagement and retention. The DPS collected information from clients in substance abuse treatment on a daily basis through IVR technology. Clients called into the DPS between 12am - 10pm using a toll-free number and entered a unique identification (ID) and passcode number to gain access to a survey. Clients used their telephone keypad to respond to questions regarding the following areas: 1) mood, 2) cravings, 3) stress, and 4) involvement in recovery support activities. A

series of yes/no questions assessed: a) alcohol and drug use; b) involvement in high-risk social and environmental situations that could trigger substance use; c) housing, employment, and childcare needs; and d) participation in recovery support activities. To ensure a consistent reporting period, clients reported on activities from the previous calendar day. If clients failed to call into the system by 7pm each day, they received an automated phone call reminder to their designated telephone number.

Prior to clients' weekly counseling sessions, the DPS generated a brief, one-page weekly summary report for counselors and clients that summarized client daily report information regarding the above domains. The weekly summary report included easy-to-interpret statistics with graphical representations allowing counselors to track their clients' motivation, cravings, risk/protective factors, and substance use over the immediate period since the last treatment session, as well as over a longer time frame. Because these reports were brief, they did not place an additional burden on counselor time. However, they conveyed meaningful information to inform service planning and delivery. Counselors used this information to inform therapeutic interactions allowing them to: 1) assess treatment progress, 2) identify relapse triggers and potential for relapse, 3) intervene prior to or immediately following relapse, and 4) make treatment services more responsive to client needs. Clients were able to use the weekly summary reports to assist in tracking treatment progress and potentially modify problem behaviors.

Study Eligibility Criteria

The study recruited clients and clinical staff. Clinical staff eligibility criteria included currently being a substance abuse treatment counselor. For clients to be eligible for inclusion in the study, they needed to meet the following requirements: 1) age 18 or older, 2) assigned to one of five participating counselors, 3) willing to complete daily phone calls to the DPS over 4 weeks of treatment, 4) have daily access to a landline or cell phone, and 5) remain enrolled in treatment at the program for at least two consecutive weeks after initial study enrollment. The exclusion criterion for clients was: 1) severe psychiatric problems or suicidality, as determined by treatment program clinical staff (e.g., untreated psychosis, bipolar disorder), which could make participation in a novel treatment hazardous.

Participants

Clients who met study eligibility criteria and provided written informed consent to participate were included in the study. Between April and August of 2015, twenty clients showed initial interest in the study and were pre-screened at two of the three treatment program locations. During the pre-screening process, it was determined that four clients were deemed not eligible for study participation because they failed to meet one or more of the eligibility criteria outlined above and were not consented. Of the sixteen clients that were consented, one person was removed from the study because they failed to meet the eligibility criteria as they did not remain enrolled in treatment at the program for at least two consecutive weeks after initial study enrollment. The remaining fifteen participants received at least one session in DPS and are included in the pilot study sample. With respect to counselors, eleven counselors were deemed eligible for study participation. However, a convenience sample was used such that the first five counselors that indicated interest and

met eligibility criteria were recruited, screened, and consented by research staff for study participation. This study was approved by the Friends Research Institute Institutional Review Board.

Recruitment and Screening Procedures

Potential client and counselor participants were recruited through the use of study flyers posted in the waiting rooms at the participating treatment program and following research staff presentations (approximately 5 minutes) at the beginning of counselor meetings and client group treatment sessions. Research staff met separately and at different times with clients and counselors who indicated interest in participating in the study. Eligible participants were informed that participation in the study was completely voluntary and they would not be denied treatment services if they chose not to participate or, if a counselor, declining to participate would not negatively affect their employment. Potential participants were informed that they could withdraw from the study at any time without jeopardizing their relationship with the treatment program. Finally, potential participants were provided an in-depth explanation of the study purpose, procedures, risks, and benefits of participation, and all questions were answered before written informed consent was obtained by research staff.

DPS Orientation

During a face-to-face orientation session, research staff conducted individual orientation sessions with clients and counselors to provide information regarding study activities (a baseline assessment with clients was also completed during this time). Clients were provided orientation materials outlining study procedures. As part of the orientation materials, clients and counselors were provided a copy of the IVR survey and a sample weekly summary report. Counselors also received a brief orientation from research staff regarding how to interpret the weekly summary reports.

DPS Implementation

Client participants were given a unique identification (ID) and passcode number, the phone number to the secure IVR system, and a brief orientation regarding how to use the DPS. Only study staff had access to the ID and passcode number. Client participants were informed that they should call the DPS on a daily basis, throughout the 4-week trial period, between 12am - 10pm and if they did not call the system by 7pm, an automated reminder call would be placed to their designated telephone number. If a client completed the survey for a given day but called in again that day in an attempt to complete it again, they would hear the following message *"You have already completed this survey today."* To ensure a consistent reporting period, participants were informed that they should report on activities from the previous calendar day.

Client participants received \$2 for completing each daily call-in and a \$15 bonus for completing 7 call-ins in a week, during weeks 1–3. During week 4, no incentives were provided. (The payment structure for weeks 1–3 was intended to encourage consistent compliance with daily assessments; however, we recognized that this per-call payment structure might not be sustainable in standard practice. Removing the call-in incentives in

week 4 allowed us to assess continued compliance in the absence of incentives to test the application of the DPS under more ‘real-world’ conditions.) In addition to the daily call-ins, clients completed a brief questionnaire at baseline (focusing on background characteristics, drug use, and treatment history) and after the 4-week trial (focusing on experiences and satisfaction using the DPS). Counselor participants completed a questionnaire only at the end of the trial to assess their experiences and satisfaction using the DPS. Clients and counselors were paid \$30 for completing these assessments in consideration of them taking out of their schedules to complete these questionnaires.

Results

Participant Characteristics

Client participants were primarily female (53.3%), 46.7% were White, and 40% were African American, with a mean age of 41.1 years ($SD=10.6$), and 60% had at least a high school education (see Table 1 below for additional information). Counselor participants were primarily female (80%), 80% were White, and all of them (100%) had master’s degrees and were licensed mental health counselors.

DPS Adherence

Fifteen participants were enrolled in the DPS trial and they had the opportunity to call-in to the system daily over 28 days. Overall, the call-in rate was 65% (273/420 possible calls, i.e., 28 days x 15 participants), which falls within the typical call-in range found in other IVR studies.^{23,25–27} [Two of the fifteen participants (13%) called the system every day and one participant never called the system (6%).] However, among those individuals that called into the system at least once (i.e., 14 participants), the call-in rate was 70% (273/392). The call in-rate for each participant over the 28 days of the study is shown in Figure 1. [It should also be noted that the first two participants did not receive reminder calls during their enrollment in the trial due to a technological glitch. Their combined call-in rate of 48% (27/56) was substantially lower than the 73% (246/336) call-in rate for the other participants that called into the system at least once and who received reminder calls.] Regarding the 14 participants that called into the DPS at least once, the average call duration was approximately 2 minutes and 42 seconds. Finally, once client incentives were withdrawn in week 4 of the trial, 71% (10/14) of the participants continued to call into the system (see Figure 2 below for additional information).

DPS Client Satisfaction

Of the 15 client participants, 13 (87%) completed the post-satisfaction questionnaire. Overall, 100% (13/13) of these participants either strongly agreed or agreed that the DPS was easy to use and the call-in time was convenient (Likert response 1 = strongly agree to 5 = strongly disagree). Moreover, 92.3% (12/13) either strongly agreed or agreed that they were comfortable reporting information daily to the DPS such as cravings, drug use, and involvement in recovery support activities. Finally, 92.3% (12/13) of client participants indicated that they would recommend that the treatment program use the DPS throughout the entirety of their treatment and 100% (13/13) indicated that it should be used to treat other clients at the program.

DPS Counselor Satisfaction and Use

Five counselors participated in the DPS study. Overall, 100% (5/5) of the counselors either strongly agreed or agreed (Likert response 1 = strongly agree to 5 = strongly disagree) that the DPS weekly summary reports were sufficiently brief, but provided meaningful information. Counselors indicated that they used weekly summary report information during treatment sessions by aggregating report information from multiple clients. Without revealing information about a specific client, they initiated group discussions and/or integrated report information into weekly thematic discussions regarding client recovery and support needs during the week (e.g., cravings, recovery management, positive support networks, and stress reduction). In addition, counselors used weekly summary report information during group or individual counseling sessions to inform therapeutic interactions allowing them to: 1) assess treatment progress, 2) identify relapse triggers and potential for relapse, 3) intervene prior to or immediately following relapse, and 4) make treatment services more responsive to client needs.

Counselors either strongly agreed (2/5) or agreed (3/5) that the weekly summary reports were helpful in reducing therapeutic information deficits regarding client cravings. They also agreed (5/5) that the weekly summary reports were helpful in reducing information deficits regarding client involvement in recovery support activities and abstinence. Moreover, counselors either strong agreed (2/5) or agreed (2/5), with one undecided (1/5), that the weekly summary reports were helpful in determining client involvement in drug use. In addition, counselors agreed (4/5), with one undecided (1/5), that the weekly summary reports were helping in determining client mood. Finally, all of the counselors (5/5) endorsed DPS use throughout the entirety of treatment and to treat other clients at the community-based SUD treatment program.

Discussion

Overall, our findings demonstrated proof of concept for the DPS indicating client and counselor engagement and satisfaction with the system. Similar to literature findings,²² our pilot study results suggest that the DPS may be a feasible method of obtaining daily report information from low-income, underserved, and hard-to-reach clients using interactive voice response (IVR). However, unique to this study, IVR was used to collect information from participants enrolled in substance abuse treatment regarding their substance use and involvement in recovery support activities. Similar to other research findings,^{22,29} we found a high degree of client acceptance and satisfaction using the system and good compliance with daily surveys. Moreover, client call duration was low (i.e., approximately 2 minutes and 42 seconds), which is consistent with the ideal call duration reported in other IVR studies to minimize respondent burden and potentially increase participant calls to the system,^{23,25–27} and significantly less than the 5-minute call duration assessed at the outset of survey development. Finally, clients found the DPS to be helpful with respect to improving self-monitoring and treatment engagement while counselors found the weekly summary reports to be sufficiently brief, but they provided actionable clinical information that was useful for delivering and tailoring treatment.

Even though study findings indicated a high degree of client and counselor satisfaction with the system overall, post-satisfaction survey information also contained a number of notable suggestions for improving the system. For example, some clients indicated that they wanted to be able to use the Internet to report daily client information. In addition, some clients and counselors indicated that they wanted to be able to track treatment progress on a daily basis (without waiting for the weekly summary reports). Finally, with respect to reminder notifications, some clients indicated that they were more apt to respond to text messages than reminder calls. If such concerns are addressed in future research, we believe these modifications will improve the DPS and increase client and counselor engagement and satisfaction with the system.

Poor retention in substance abuse treatment has long been a major problem for public health. As such, new and innovative strategies are needed to improve client engagement and retention in outpatient SUD treatment. The DPS appears to be a feasible approach that could facilitate a paradigm shift in outpatient treatment towards ongoing client engagement and feedback to inform clinical service delivery in substance abuse treatment.

Limitations

A cautious interpretation of results is recommended in view of a number of limitations in the current study. First, the study consisted of both a convenience sample and small sample size derived from two of the three treatment program locations that agreed to use DPS in a proof of concept feasibility study. Second, although a control group would have been beyond the scope of this feasibility study, the lack of a comparison group that did not receive DPS should be an additional cause for caution in the interpretation of the findings. Finally, our data is limited to individuals that were actively enrolled in treatment, therefore, our findings are limited to a narrow window of time and we were not able to examine longitudinal outcomes after treatment completion or discharge.

Notwithstanding these limitations, the DPS is an innovative synthesis of existing technology to improve substance abuse treatment. This type of technology has not been applied to community-based outpatient substance abuse treatment. It has the potential to provide clinicians with new insights into a number of highly dynamic psychological and behavioral precursors to relapse and treatment discontinuation, including daily information on mood, cravings, substance use, and involvement in recovery support activities. Future research should examine the efficacy of DPS, possibly through a parallel two-group randomized controlled trial, and similar tools that may enhance client engagement and treatment retention.

Acknowledgments

Source of Funding

This study was funded by the National Institutes of Health, through the National Institute on Drug Abuse. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or the National Institute on Drug Abuse.

References

1. Center for Behavioral Health Statistics and Quality. Key substance use and mental health indicators in the United States: Results from the 2015 National Survey on Drug Use and Health (HHS Publication No. SMA 16-4984, NSDUH Series H-51). Retrieved from <http://www.samhsa.gov/data/>. 2017.
2. Substance Abuse and Mental Health Services Administration. National Survey of Substance Abuse Treatment Services (N-SSATS): 2011 Data on Substance Abuse Treatment Facilities. [BHSIS Series: S-64, HHS Publication No. SMA 12-4730]. Rockville, MD: Substance Abuse and Mental Health Administration; 2012.
3. White WL. Recovery Management and Recovery-Oriented Systems of Care: Scientific Rationale and Promising Practices. Jointly published by the Northeast Addiction Technology Transfer Center, the Great Lakes Addiction Technology Transfer Center, and the Philadelphia Department of Behavioral Health/Mental Retardation Services.; 2008.
4. Brorson HH, Ajo Arnevik E, Rand-Hendriksen K, Duckert F. Drop-out from addiction treatment: a systematic review of risk factors. *Clin Psychol Rev.* 2013;33(8):1010–1024. [PubMed: 24029221]
5. Graff FS, Morgan TJ, Epstein EE, et al. Engagement and retention in outpatient alcoholism treatment for women. *Am J Addict.* 2009;18(4):277–288. [PubMed: 19444731]
6. Mukku VK, Benson TG, Alam F, Richie WD, Bailey RK. Overview of substance use disorders and incarceration of african american males. *Front Psychiatry.* 2012;3:98. [PubMed: 23162480]
7. Alvarez J, Jason LA, Olson BD, Ferrari JR, Davis MI. Substance abuse prevalence and treatment among Latinos and Latinas. *J Ethn Subst Abuse.* 2007;6(2):115–141. [PubMed: 18192207]
8. Perron BE, Mowbray OP, Glass JE, Delva J, Vaughn MG, Howard MO. Differences in service utilization and barriers among Blacks, Hispanics, and Whites with drug use disorders. *Subst Abuse Treat Prev Policy.* 2009;4:3. [PubMed: 19284669]
9. Acevedo A, Garnick DW, Lee MT, et al. Racial and ethnic differences in substance abuse treatment initiation and engagement. *J Ethn Subst Abuse.* 2012;11(1):1–21. [PubMed: 22381120]
10. Hatzenbuehler ML, Keyes KM, Narrow WE, Grant BF, Hasin DS. Racial/ethnic disparities in service utilization for individuals with co-occurring mental health and substance use disorders in the general population: results from the national epidemiologic survey on alcohol and related conditions. *J Clin Psychiatry.* 2008;69(7):1112–1121. [PubMed: 18517286]
11. NIH. Principles of Drug Addiction Treatment: A Research-Based Guide (Third Edition). 2017; <https://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guidethird-edition/drug-addiction-treatment-in-united-states>.
12. Scott CK, Foss MA, Dennis ML. Pathways in the relapse--treatment--recovery cycle over 3 years. *Journal of substance abuse treatment.* 2005;28 Suppl 1:S63–72. [PubMed: 15797640]
13. Chiauuzzi E, Gammon J. Recovery 2.0: Substance Abuse Treatment in a Technological World: Inflexxion, Inc.;2012.
14. Williams R, Chang S. A comprehensive and comparative review of adolescent substance abuse treatment outcome. *Clinical Psychology: Science and Practice.* 2000;7:138–166.
15. Coviello DM, Cornish JW, Lynch KG, et al. A multisite pilot study of extended-release injectable naltrexone treatment for previously opioid-dependent parolees and probationers. *Substance abuse: Official publication of the Association for Medical Education and Research in Substance Abuse.* 2012;33(1):48–59.
16. Kaminer Y, Bukstein OG, eds. Adolescent Substance Abuse: Psychiatric Comorbidity and High-Risk Behaviors. New York, NY: Routledge/Taylor & Francis 2008.
17. Meier PS, Barrowclough C, Donmall MC. The role of the therapeutic alliance in the treatment of substance misuse: a critical review of the literature. *Addiction.* 2005;100(3):304–316. [PubMed: 15733244]
18. Barber JP, Luborsky L, Gallop R, et al. Therapeutic alliance as a predictor of outcome and retention in the National Institute on Drug Abuse Collaborative Cocaine Treatment Study. *Journal of consulting and clinical psychology.* 2001;69(1):119–124. [PubMed: 11302268]

19. Miller SD, Duncan BL, Brown J, Sorrell R, Chalk MB. Using Formal Client Feedback to Improve Retention and Outcome: Making Ongoing, Real-time Assessment Feasible. *Journal of Brief Therapy*.> 2006;5(1):5–22.
20. Crits-Christoph P, Ring-Kurtz S, Hamilton JL, et al. A preliminary study of the effects of individual patient-level feedback in outpatient substance abuse treatment programs. *Journal of substance abuse treatment*.> 2012;42(3):301–309. [PubMed: 22036697]
21. Raes V, De Jong CA, De Bacquer D, Broekaert E, De Maeseneer J. The effect of using assessment instruments on substance-abuse outpatients' adherence to treatment: a multi-centre randomised controlled trial. *BMC Health Serv Res*.> 2011;11:123. [PubMed: 21609504]
22. Abu-Hasaballah K, James A, Aseltine RH, Jr. Lessons and pitfalls of interactive voice response in medical research. *Contemp Clin Trials*.> 2007;28(5):593–602. [PubMed: 17400520]
23. Campbell NM. Interactive Voice Response Systems and Reductions in Substance Use in Adults: The Department of Psychology and the College of Arts and Sciences, Ohio University; 2009.
24. Aiemagno SA, Cochran D, Feucht TE, Stephens RC, Butts JM, Wolfe SA. Assessing substance abuse treatment needs among the homeless: a telephone-based interactive voice response system. *Am J Public Health*.> 1996;86(11):1626–1628. [PubMed: 8916533]
25. Lieberman G, Naylor MR. Interactive voice response technology for symptom monitoring and as an adjunct to the treatment of chronic pain. *Transl Behav Med*.> 2012;2(1):93–101. [PubMed: 22448205]
26. Parks KA, Hsieh YP, Bradizza CM, Romosz AM. Factors influencing the temporal relationship between alcohol consumption and experiences with aggression among college women. *Psychol Addict Behav*.> 2008;22(2):210–218. [PubMed: 18540718]
27. Kaminer Y, Litt MD, Burke RH, Bursleson JA. An interactive voice response (IVR) system for adolescents with alcohol use disorders: a pilot study. *Am J Addict*.> 2006;15 Suppl 1:122–125. [PubMed: 17182427]
28. Helzer JE, Badger GJ, Searles JS, Rose GL, Mongeon JA. Stress and alcohol consumption in heavily drinking men: 2 years of daily data using interactive voice response. *Alcohol Clin Exp Res*.> 2006;30(5):802–811. [PubMed: 16634848]
29. Corkrey R, Parkinson L. Interactive voice response: review of studies 1989–2000. *Behav Res Methods Instrum Comput*.> 2002;34(3):342–353. [PubMed: 12395550]
30. Helzer JE, Badger GJ, Rose GL, Mongeon JA, Searles JS. Decline in alcohol consumption during two years of daily reporting. *Journal of studies on alcohol*.> 2002;63(5):551–558. [PubMed: 12380851]
31. Midanik LT, Greenfield TK. Interactive voice response versus computer-assisted telephone interviewing (CATI) surveys and sensitive questions: the 2005 National Alcohol Survey. *J Stud Alcohol Drugs*.> 2008;69(4):580–588. [PubMed: 18612574]
32. Schroder KE, Johnson CJ. Interactive voice response technology to measure HIV-related behavior. *Curr HIV/AIDS Rep*.> 2009;6(4):210–216. [PubMed: 19849964]
33. Mundt JC, Moore HK, Bean P. An interactive voice response program to reduce drinking relapse: a feasibility study *Journal of substance abuse treatment*.> 2006;30(1):21–29. [PubMed: 16377449]
34. Simpson TL, Kivlahan DR, Bush KR, McFall ME. Telephone self-monitoring among alcohol use disorder patients in early recovery: a randomized study of feasibility and measurement reactivity. *Drug Alcohol Depend*.> 2005;79(2):241–250. [PubMed: 16002033]
35. Simpson TL, Saxon AJ, Meredith CW, et al. A pilot trial of the alpha-1 adrenergic antagonist, prazosin, for alcohol dependence. *Alcohol Clin Exp Res*.> 2009;33(2):255–263. [PubMed: 18945226]
36. Toll BA, Cooney NL, McKee SA, O'Malley SS. Do daily interactive voice response reports of smoking behavior correspond with retrospective reports? *Psychol Addict Behav*.> 2005;19(3):291–295. [PubMed: 16187808]
37. Mosavel M The use of a telephone-based communication tool by low-income substance abusers. *J Health Commun*.> 2005;10(5):451–463. [PubMed: 16199388]
38. Moore BA, Fazzino T, Barry DT, et al. The Recovery Line: A pilot trial of automated, telephone-based treatment for continued drug use in methadone maintenance. *J Subst Abuse Treat*.> 2013;45(1):63–69. [PubMed: 23375114]

Figure 1.
DPS call-in rate for each participant.

Figure 2.

DPS call-in rate in days with and without per-call incentives Proportion of completed calls to the DPS during the period with incentives (days 1–21; 315 call-in opportunities) and without incentives (days 22–28; 105 call-in opportunities).

Table 1.**Participant Characteristics**

	Total Sample (N=15)[/]
Gender, n (%)	
male	7 (46.7)
female	8 (53.3)
Race, n (%)	
black	6 (40)
white	7 (46.7)
other	2 (13.3)
Age (years), mean (SD)	41.1 (10.6)
Education Level, n (%)	
less than HS	6 (40)
HS diploma	9 (60)
Referral Source, n (%)	
criminal justice	6 (40)
self	6 (40)
other	3 (20)
Lifetime Substance Use, n (%)	
heroin	8 (53.3)
cocaine	11 (73.3)
marijuana	14 (93.3)
alcohol	15 (100)
Past 30 Day Use, n (%) [/]	
heroin	2 (13.3)
cocaine	1 (06.7)
marijuana	7 (46.7)
alcohol	6 (40)
Previous Drug Treatment, n (%)	14 (93.3)
Arrests (ever), n (%)	13 (86.7)
Incarcerations (ever), n (%)	10 (66.6)

[/] Six participants reported no substance use during the past 30 days.