Mobile phone use patterns and preferences in safety net office-based buprenorphine patients

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Abstract

Background—Integrating mobile phone technologies in addiction treatment is of increasing importance, and may optimize patient engagement with their care and enhance the delivery of existing treatment strategies. Few studies have evaluated mobile phone and text message (TM) use patterns in persons enrolled in addiction treatment, and none have assessed use in safety net, office-based buprenorphine practices.

Methods—A 28-item, quantitative and qualitative semi-structured survey was administered to opiate-dependent adults in an urban, publicly funded, office-based buprenorphine program. Survey domains included: demographic characteristics, mobile phone and TM use patterns, and mobile phone and TM use patterns and preferences pertaining to their recovery.

Results—Surveyors approached 73 of the 155 eligible subjects (47%); 71 respondents completed the survey. Nearly all participants reported mobile phone ownership (93%) and TM use (93%), and most reported 'very much' or 'somewhat' comfort sending TM (79%). TM contact with 12-step group sponsors, friends, family members, and counselors was also described (32%). Nearly all preferred having their providers' mobile phone number (94%) and alerting the clinic via TM in the event of a potential relapse to receive both supportive TM and a phone call from their buprenorphine provider was also well received (62%).

Conclusions—Mobile phone and TM use patterns and preferences among this sample of office-based buprenorphine participants highlight the potential of adopting patient-centered mobile phone based interventions in this treatment setting.

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Background

Approximately 10 percent of opioid-dependent Americans are linked to treatment despite extensive evidence demonstrating treatment associated reductions in morbidity, mortality, and medical expenditures (Nosyk et al., 2013). The Affordable Care Act is anticipated to expand funding for substance abuse treatment and facilitate its integration within mainstream healthcare systems (Buck, 2011). Advancing systematic approaches, such as those leveraging health information technologies, in substance abuse treatment settings may optimize existing treatment strategies and provide a platform for integrative, team-based patient centered models of care.

Recent studies have utilized a variety of technology-based interventions in substance abusing populations, including smartphones, desktop computers, web-based interventions, and other technologies (Marsch, 2011). Mobile phones and text messaging (TM) have gained increased attention due to their low cost, privacy, and accessibility. Mobile-cellular penetration rates have now reached 96% globally (Union., 2013) and 91% in the United States (Muench, Weiss, Kuerbis, & Morgenstern, 2013); mobile phones also promise to surpass the 'digital divide' with its expansion in underserved populations, including low-income (86%) (Brenner, 2013), homeless (44%) (Eyrich-Garg, 2010), and safety net patients enrolled in outpatient substance abuse treatment settings (91%) (McClure et al., 2013).

Harnessing the surge in mobile phone ownership, novel and cost-effective mobile phone interventions (i.e. 'mHealth') have yielded positive findings in mainstream health systems, including improvements in appointment adherence (Car et al., 2012), smoking cessation (Free et al., 2011), and medication adherence (Horvath et al., 2012; Vervloet et al., 2012). Recent mHealth studies in substance abuse treatment settings have demonstrated high rates of mobile phone use (91%) and TM (79%), with no significant differences between age, education, and income (McClure et al., 2013), and overwhelming interest in integrating interactive text messaging interventions with their addiction treatment (98%) (Muench et al., 2013).

Participants with co-morbid borderline personality disorder and substance use disorders receiving mHealth-based dialectical behavior therapy intervention reported high acceptability, reduced urges to use substances, risky behaviors, depression symptomatology and psychological distress (Rizvi et al., 2011). In young adults screened positive for hazardous drinking using the AUDIT-C screening instrument in an emergency room, a TM-based intervention was a feasible method in gathering weekly information regarding frequency and quantity of alcohol use, encouraging strategies to reduce excessive drinking, and may be associated with decreases in hazardous alcohol intake in young adults discharged from the emergency room (Suffoletto et al., 2012). Assessing alcohol use in another sample of young adults was also found to be feasible with high rates of retention during the study period (Kuntsche & Robert, 2009).

Despite these advances, technology based interventions and mHealth have yet to fully reach their potential. Recent meta-analysis and review articles of technology based interventions and mHealth highlighted the lack of consistent treatment outcomes, inadequate

understanding of intervention mechanisms (i.e. 'black-box' problem), and limited integration of participant mobile phone use patterns and behavioral principles in the design of technology based interventions (Kaplan & Stone, 2013; Litvin et al., 2013; Riley et al., 2011). Additionally, further studies are needed in safety net substance abuse treatment settings to assess acceptability and potential barriers to implementation.

To explore how the deployment of mHealth may better complement patients' care in a safety net, office-based buprenorphine program, we conducted a descriptive survey (Muench et al., 2013; Sussman, 2001) in a safety net, office-based buprenorphine program to explore mobile phone use patterns and preferences for improving communication with the clinic providers.

Methods

Participants and Recruitment

The study was conducted in the office-based buprenorphine program in Bellevue Hospital Center, a safety net tertiary referral center in the New York City Health & Hospitals Corporation network. Since 2006, Internal Medicine physicians have provided buprenorphine treatment to a primarily uninsured and Medicaid-insured adult opioid dependent patient population utilizing unobserved ('home') buprenorphine induction approaches described elsewhere (Lee et al., 2009, Lee et al., 2012).

Convenience sampling targeted the entire clinical cohort (n=155) from June until September 2013 to ensure a quasi-representative sample of eligible adult, English-speaking, opioid-dependent participants scheduled for an initial or follow-up visit in a safety net, office-based buprenorphine program. No patients were excluded for participation based on language barriers. Participants were informed that all responses would be kept confidential, have no impact on their regular medical care, and would receive a $5 metro card as compensation. The New York University School of Medicine Institutional Review Board approved the study protocol.

Survey Instrument

The 28-item cross-sectional survey was conducted in-person in English by two trained study staff and the primary investigator, and required approximately 10 minutes to complete. The survey instrument was piloted in 10 participants and revised based on their feedback. The survey incorporated 5-point Likert scales, multiple-choice answers, binomial "Yes/No" questions, and open-ended responses. The demographic characteristics included 7 items adapted from a prior survey conducted in the same clinic following Hurricane Sandy and included age, gender, race/ethnicity, education, employment status, recent incarceration, and current residence (Tofighi et al., 2014).

The second and third sections consisted of 11 items adapted from a survey conducted by Muench and colleagues (Muench et al., 2013) and the Pew Internet & American Life Project survey (Fox, 2012) that assessed for mobile phone and TM use patterns, number of mobile phones and phone numbers 'owned' in the past year, barriers to ownership, and features utilized on the mobile phones. TM use patterns explored participants' comfort levels with

sending and receiving TM, privacy concerns regarding TM content, preferred mode of contact (i.e. phone, TM, or both), and their current TM payment plan. The last section surveyed mobile phone and TM use patterns pertaining to communication patterns with buprenorphine provider(s), family, friends, and 12-step group sponsors. The 9 items were adapted from the Pew Internet & American Life Project survey (Fox, 2012) and from concepts that emerged after a review of the literature (Chin et al., 2005; Horvath et al., 2012; Lindquist et al., 2013; McClure et al., 2013; Muench et al., 2013).

Data collection and statistical analysis

Survey responses were recorded in writing by the interviewer and entered into REDCap data management software (Harris et al., 2009). The primary investigator randomly selected 8 surveys and manually compared the paper survey responses with the entered data to identify any discrepancies.

Analysis was descriptive and consisted of counts and proportions based on self-reported outcomes of interest. A single open-ended question assessed the use of prior TM contact with family members and/or peers to support their recovery, was thematically analyzed, and generated a code list that was later quantified. No intercoder agreement methods were performed due to the limited size and simplicity in the content being analyzed.

Results

The study team approached 73 of the 155 eligible subjects (47%); 71 participants completed the survey (response rate 97%). The study sample's demographic characteristics reflect those of the treatment population in this office-based buprenorphine clinic. Respondents were predominately male (83%), African-American (42%), with a mean age of 46 years, completed high school (48%), dependent on social services (i.e. public assistance, supplemental security income, or social security disability) (35%), and lacked permanent housing (ie. homeless, residing with friends or family, or resident of a transitional housing program) (52%). (Table 1).

Nearly all reported mobile phone ownership (93%). However individual phones and numbers were transient, with respondents reporting having on average 1.9 mobile phones (range, 0–7) and 1.6 phone numbers (range, 0–5) in the preceding 12 months. Few reported having their phone accessed in a manner that invaded their privacy (16%), however 40% of respondents were 'very much' or 'somewhat' concerned about the privacy of TM. Most respondents used TM (93%), reporting 'very much' or 'somewhat' comfort sending TM (79%), and received approximately 53 messages (range 0–400) in the 1 week prior to the interview. Use of mobile phone based internet browsers, social media, and other smart phone applications were common. (Table 2). Of the 6 participants that reported recent incarceration (jail or prison within the last 12 months) (9%), only one respondent reported not having a mobile phone or using TM. The remaining five respondents reported using TM and rated themselves as 'very comfortable' using TM.

Table 3 displays participants' communication experiences and preferences with the office-based buprenorphine program. Most respondents did not receive routine appointment

reminder phone calls from clinic staff (57%). Approximately 30% of respondents had made telephone calls to their buprenorphine providers, and reported an average of 3.3 calls during the preceding 6 months, (range, 1–10). TM contact was initiated by 17% of respondents with their providers, and sent an average of 3.2 messages in the prior 6 month period, (range, 1–10). Both TM and telephone contact was utilized less frequently with providers (13%). Nearly all respondents preferred having their providers' mobile phone number (94%). Alerting the clinic via TM in the event of a potential relapse to receive both supportive TM and a phone call from their buprenorphine provider was well received (62%).

Respondents also utilized TM contact with 12-step group peers and sponsors (15%), friends (9%), counselors (5%), and family members (3%) to assist with their recovery. Analysis of free-text responses of TM content most commonly pertained to supportive messages (65%), assisting peers into treatment (15%), sharing information about buprenorphine treatment (15%), and providing support to peers enrolled in substance abuse treatment that were at risk of relapse (5%). Other features that were also used on mobile phones included games (3%), Internet telephone services (Skype) (1%), and 12-step smartphone applications (1%).

Discussion

This descriptive survey is among the first to assess safety net, office-based buprenorphine patients' mobile phone use patterns and preferences. Respondents reported high rates of mobile phone and TM utilization comparable to previously reported national averages (Brenner, 2013) and those of urban outpatient addiction treatment populations (McClure et al., 2013; Muench et al., 2013).

An important finding of this survey was the high rate of turnover of both mobile phones and phone numbers, realities which underscore the challenges of clinic-to-patient mHealth interventions (McClure et al., 2013). Frequently querying updated contact information during clinic visits, providing a phone number for patients to send a text message and update the treatment program with their updated contact information, and offering subsidized mobile phones and monthly payment plans may better position the sustainability of future mHealth interventions (Tirado, 2011). Use of Internet browsers, smart phone applications, email, and social media from mobile phones underscores prospects for delivering web-based interventions to populations with limited access to desktop computers and tablet devices (Gustafson et al., 2011).

Clinic contact and mHealth preferences

Successful communication with the buprenorphine clinic staff was inconsistent, with less than half of respondents reporting having their needs unaddressed during prior attempts in calling the clinic through general hospital numbers. Similar frustrations were echoed by buprenorphine respondents after Hurricane Sandy during attempts to secure refills, follow-up visits, and resolve other health questions (Tofighi B, 2014). Few reported TM contact with their healthcare provider, yet most expressed interested in sending TM to their providers. Open access to 'on-call' providers via telephone calls or TM overlaps with findings from other specialty settings demonstrating improved patient satisfaction with their

provider and reduced episodes of medication discrepancies with limited burden to clinical staff (Chin et al., 2005, Lindquist et al., 2013).

Continued opioid and other drug and alcohol misuse are ongoing obstacles to successful treatment retention and medication adherence in office-based buprenorphine treatment (Lee et al., 2009; Riley et al., 2011). Real-time monitoring and feedback technologies, such as ecological momentary interventions which assess and provide interventions instantly in patients' natural environments, have demonstrated feasibility among opiate dependent participants in outpatient treatment settings by prospectively managing cravings that may lead to possible substance misuse (Epstein et al., 2009; Serre et al., 2012; Shiffman, 2009). In addition, these results may inform the design of future mHealth interventions that enhance buprenorphine home induction, a longstanding feature of this and similar office-based practices (Cunningham et al., 2011; Gunderson et al., 2010; Lee et al., 2009). However further studies are needed to assess healthcare systems and providers' acceptability and feasibility of adopting such interventions.

In addition to TM contact with buprenorphine providers, TM with 12-step group peers, friends, and family draws attention to an understudied use of mobile technologies as a valuable platform for enhancing peer connectivity and support. Not only did participants receive TM from non-providers to support their recovery, but reciprocated support by encouraging opioid-dependent peers to enter buprenorphine treatment and providing support to peers enrolled in substance abuse treatment that were at risk of relapse. Although social media and online forums have been recognized by researchers as novel approaches in harnessing peer driven networks (Centola, 2013), the increasing popularity of mobile phones provides a widely accessible platform to launch similar interventions among substance abusing populations.

This study has a number of limitations. The small sample size limited our ability to conduct any hypothesis testing and examine racial, socio-economic, and incarceration status on mobile phone use patterns and preferences. The predominately male sample in a safety net clinic also limits the generalizability of our findings. Patients that were not reached during enrollment were likely due to being scheduled for longer follow-up intervals, not having a working phone number, being missed by study staff during clinic visits, or were lost to follow-up. Despite a high response rate comparable to similar surveys in the past (McClure et al., 2013), self-reported responses may have been influenced by participants' preference to provide more favorable or critical responses leading to social desirability bias. Querying patients' prior experiences with the clinic and mobile phone use patterns may be susceptible to recall bias. Among respondents that were not comfortable using TM, or preferred telephone contact over TM contact, interest in receiving TM training was not assessed. Watson and colleagues found that among patients with limited Internet use, most were receptive to training in innovative technologies that could be integrated as a part of their clinical care (Watson et al., 2008). Nonetheless this descriptive survey was intended to better understand mobile phone use patterns and preferences for enhancing patient-provider mobile phone and TM communication in this public sector office-based buprenorphine program. Interest in adopting other technologies such as email, smart phone applications, and social media to improve communication between the patients and buprenorphine

providers were not collected. Lastly, further data is needed to evaluate the feasibility of mHealth interventions in safety net healthcare systems and clinic populations. Future studies should address these limitations and evaluate the feasibility and clinical effectiveness of mHealth interventions in addiction treatment settings.

Conclusion

Our findings highlight participant interest in enhancing patient-provider mobile phone and TM communications in a safety net, office-based buprenorphine program. It can also inform the potential acceptability of mHealth interventions in this clinic population. Although most reported mobile phone ownership, frequent turnover in mobile phones and phone numbers highlights the importance of strategies that may minimize communications disruptions in this clinical setting. The use of patient-driven information sharing about buprenorphine treatment and referrals to the office-based buprenorphine program with active substance using peers utilizing mobile phones and TM should be explored. Further studies are needed to evaluate the feasibility and cost-effectiveness of mHealth interventions in addiction treatment settings.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Demographic characteristics

variable	% (N=71)
Age (years)	
Mean (SD)	45.8 (9.2)
Range	25–67
Gender	
Male	83%
Female	17%
Race/Ethnicity	
African-American	42%
Caucasian	32%
Hispanic	21%
Other	4%
Education	
Completed high school or GED	48%
Some high school	11%
Completed college or associate degree	10%
Some college or associate degree	27%
Graduate school	4%
Employment	
Full-time	17%
Part-time	25%
Unemployed	20%
Public assistance (food stamps, welfare)	13%
SSI or SSD	22%
Other/No comment	3%
Recent incarceration (past year)	
Yes	9%
Residence	
Own' apartment (primary owner or rentee)	42%
Family or friends	35%
Single residency occupancy	6%
Halfway house	3%
Homeless	14%

Table 2

Mobile phone use patterns

variable	% (N=71)
Own a cell phone	93%
Percent reporting only one mobile phone in the past 12 months	44%
Percent reporting only one phone number in the past 12 months	58%
Phone accessed in a manner in which privacy was affected	16%
Send or receive TM	93%
Very much' or 'somewhat' comfortable sending TM	79%
Very much' or 'somewhat' concerned about privacy of TM	40%
Preferred mode of contact TM vs Phone call	
TM	44%
Phone call	34%
Either	22%
TM payment plan	
Flat fee for unlimited TM	83%
Flat fee for limited TM	7%
Pay-per-TM	10%
	Mean (SD)
Phones owned in the past 12 months	1.9 (1.1)
Phone numbers in the past 12 months	1.6 (.89)
TM received in the last week	52.6 (78)
Features used on mobile phone:	
Internet	68%
Smart phone applications	63%
GPS	64%
Camera	77%
Video	69%
Email	69%
Social media	68%
TM image/video attachments	72%

Table 3

Mobile phone use patterns and preferences pertaining to buprenorphine treatment

variable	%(N=71)
Called the buprenorphine clinic and had primary needs addressed	44%
Called the buprenorphine clinic but did not have primary needs addressed	44%
Never called the buprenorphine clinic	12%
Receive TM updates or tips from a medical provider	7%
Did not receive buprenorphine program appointment reminder calls	57%
Retains a buprenorphine provider's mobile phone number	43%
Has used TM contact with non-providers to help with their recovery	32%
mHealth preferences:	
Is not concerned with the use of 'suboxone' in TM content	74%
Used mobile phone to stay productive while in the clinic waiting area	85%
Sent or received supportive TM peers and family to help with recovery	34%
Prefer having buprenorphine provider's phone number	94%
Would alert the clinic if at risk of relapse to receive:	
Telephone support from the buprenorphine provider	79%
Supportive text messages from the buprenorphine provider	68%
Both supportive text messages and telephone support	62%