Digital Capacity and Interest in mHealth Interventions Among Individuals on Opioid Agonist Maintenance Treatment: A Cross-Sectional Community-Based Study

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ABSTRACT

Background: Integrating mobile technologies in healthcare (mHealth) is helpful to manage various medical conditions. mHealth applications can bridge the gap in the management of patients with opioid use disorder (OUD). Research evaluating the feasibility of mHealth to address OUD is limited in developing countries. We aimed to assess the digital capacity and interest in mHealth interventions in patients maintained on opioid agonist treatment (OAT).

Methods: 150 patients on OAT from a community drug treatment clinic in New Delhi, India, were included. We assessed the participants on their pattern of mobile and Internet use and their willingness to use mHealth technology to access health information and services related to OUD.

Results: 88% of participants ($n = 132$) owned a mobile phone at assessment; 2.7% ($n = 4$) had never used a mobile phone in their lifetime. 70% ($n = 105$) participants had Internet access. 80% ($n = 120$) of participants showed interest in receiving text messages related to the management of OUD. 60% of participants showed a willingness to download and use applications for monitoring their substance use.

Conclusions: In India, there is an interest among people on OAT to use mHealth interventions to manage their substance use. This population also has access to mobile phones and the necessary knowledge to install and run applications needed for various mHealth interventions.

Keywords: mHealth, opioid use disorder, opioid agonist treatment, mobile technology

Key Message: Most people accessing opioid agonist treatment in a community have mobile phones, have access to the Internet, and are interested in receiving help through mHealth technology for their substance use problem. mHealth technology can be exploited to plug some of the gaps in the treatment of opioid dependence syndrome.

The use of mobile phones and the Internet has increased dramatically over the last decade.[1] In India, by the end of March 2020, there were 1157.75 million wireless telephone subscribers, with a teledensity of 85.87%.[2] Mobile phones are used for communicating with people, watching videos, and getting general information.[3] Mobile technologies have increased the people's receptivity to new information.[4,5] There has been mounting interest in the use of mHealth to manage conditions such as diabetes, hypertension, and HIV infection.[6–8] The World Health Organization (WHO) defines mHealth or mobile health as medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices.[9] mHealth solutions encourage adherence to medication, regular follow-up visits, and health-promoting behaviors.[8] Meta-analysis of mHealth clinical

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interventions for smoking cessation, weight loss, and diabetes control showed that these interventions are cost-effective and helpful.[10] mHealth interventions are increasingly utilized in various health settings across diverse cultures.[11]

The World Drug Report, 2019, estimated that 5.5% of the global population aged 15 years to 64 years had used an illicit drug at least once in 2017.[12] Opioid group of drugs are responsible for two-thirds of drug-related deaths globally. Opioid agonist treatment (OAT) is the most effective treatment for opioid use disorders (OUD).[13–16] However, most treatment programs require the patients to come to the clinic daily to receive their medications, which can act as a deterrent for initiation of and retention into OAT. mHealth applications can find utility in bridging some of the gaps in treatment availability and retention. Studies have revealed a strong interest among injecting drug users in using mHealth-based tools that promote HIV prevention.[7] Similarly, a study found that patients on agonist maintenance show a strong interest in mHealth services to receive medication reminders.[17] Real-time assessment of various facets of OUD (e.g., craving, intoxication, withdrawal) has been tried by mobile devices.[18,19]

However, studies evaluating the application of mHealth to address OUD are from western countries. India has a sizable number of people with OUD. A study on the extent of substance use in India reported that 2.1% of the population aged 10 years to 75 years used opioids at least once in the past 12 months.[20] The study also reported that just one in 20 persons affected by drug use disorders have received any treatment ever. Also, the retention rates of patients on either buprenorphine or methadone maintenance treatment is 50% to 60% by the end of nine months to one year.[21,22] In such a situation, mHealth interventions have the potential to improve reach and retention. However, before planning and setting up mHealth interventions in developing countries, it would be important to assess mobile literacy among recipients of OAT services and their interest in using mHealth applications. The present study aimed to assess the knowledge of mobile technologies, mobile use behavior, and interest in the use of mobile technology for drug treatment services in patients maintained on OAT for OUD.

Methods

Study Setting

The participants were recruited from a community drug treatment clinic located in a poor urban area in India. The clinic provides treatment for people with OUD living within the clinic's catchment area. The clinic uses both methadone and buprenorphine as OAT to treat opioid dependence syndrome. The clinic also runs a mobile methadone van to dispense methadone to patients living 6–8 kilometers away from the clinic. The clinic dispenses OAT medicines to approximately 500 individuals on any given day.

Study Procedure

The study was conducted between November 2019 and January 2020. The selection criteria for enrollment of participants in the study included: Age above 18 years, fulfilling criteria for opioid dependence syndrome (as per *International Classification of Diseases*, ICD-10 criteria), started on OAT more than two months ago, and willingness to provide informed consent. Considering the time available for data collection, it was decided to recruit 150 patients. From the pool of approximately 500 patients on OAT from the clinic, 150 patients fulfilling the selection criteria were recruited through purposive sampling.

Data Collection

The data was collected in a one-to-one interview with the participants, in a single sitting. Each interview lasted 40–45 minutes. The domains of the interview included:

Sociodemographic Profile: Including the highest level of education attained and current employment status. The socioeconomic status was assessed using the modified Kuppuswamy scale.[23] It is commonly used in India to measure socioeconomic status.

Clinical Details: Including duration of opioid use, other psychoactive substance use, injecting drug use, comorbid psychiatric diagnosis, comorbid medical diagnosis, duration of registration in the community clinic, and type and duration of OAT. Some details such as lifetime use of psychoactive substances, lifetime history of comorbid psychiatric illnesses, duration of treatment, etc., were recorded from the file records kept in the clinic. The clinic usually follows the ICD-10 criteria for diagnosing psychiatric illness.

Mobile Phone and Internet Use Habits: A structured questionnaire (available as an online-only supplementary file) was prepared, based on existing literature on the use of mobile-based technologies in patients with mental illness and substance use disorders. The questionnaire included questions on phone ownership, type of phone, frequency of changing mobile phone and numbers in the past year, mobile technology use (including the Internet, Facebook, WhatsApp, games, maps, camera), access to various forms of communication (such as the Internet, landline, text messages), number of apps (including health apps) installed, etc.

Willingness to Use Mobile Phone to Access Health Information and Services: Participants were asked about their interest in receiving mHealth services related to various aspects of substance use and OAT, such as receiving reminders for follow-up, craving management, and monitoring substance use. The various mHealth services included receiving text messages, providing online information, and downloading and using an app (to monitor substance use, management of craving, and tracking to locate the mobile methadone van).

Statistical Analysis

The data were entered in Microsoft Excel spreadsheet and analyzed using SPSS version 23.0 software (Armonk, NY, IBM Corp 2012). The descriptive statistics mean (SD) and median (interquartile range, IQR) were calculated for continuous variables, and frequencies and percentages were calculated for categorical variables.

The study was conducted after receiving clearance from the Institute Ethics Committee.

Results

We approached 153 eligible participants, out of whom 150 completed the survey. The remaining three participants declined to participate in the study stating that they were late for their work and did not have adequate time for the interview.

Participant Profile

The mean (SD) age of the participants was 25.2 (5.9) years; all participants were males (98%, *n* = 147). 9.3% (*n* = 14) of participants were not educated. Most participants worked as skilled workers (32.7%, *n* = 49) and were employed full-time (58.7%, *n* = 88). 40% of the participants (*n* = 60) were from lower-middle socioeconomic status (**Table 1**).

The mean duration of opioid use was 3.8 (SD 2.5) years when initially seeking treatment from the community clinic. 19.3% (*n* = 29) participants were on buprenorphine and 80.7% (*n* = 121) on methadone maintenance. The median duration of the current treatment was 7.5 (IQR 4, 20) months. 9.3% (*n* = 14) of the participants had a history of injecting drug use. The rates of other substance use before seeking the current treatment were: alcohol (22.7%, *n* = 34), cannabis (43.7%, *n* = 65), tobacco (95.3%, *n* = 143), and sedatives (19.3%, *n* = 29). The lifetime rates of psychiatric illnesses included 6.7% (*n* = 10) for depressive disorders and 6% (*n* = 9) for anxiety disorders. The lifetime rates of comorbid medical conditions were: 2.7% (*n* = 4) for tuberculosis, 2% (*n* = 3) for HIV, 4% (*n* = 6) for hypertension, 1.3% (*n* = 2) for diabetes mellitus, and 1.3% (*n* = 2) for hepatitis.

TABLE 1.

Sociodemographic Characteristics of 150 Participants

Variable		*n*	%
Gender	Male	147	98.0
	Female	1	0.7
	Transgender	2	1.3
Marital status	Married	40	26.7
	Unmarried	105	70.0
	Separated	3	2.0
	Widower	2	1.3
Occupation	Technicians and associate professionals	2	1.3
	Clerks	8	5.3
	Skilled workers and shop and market sales worker	49	32.7
	Skilled agricultural workers	5	3.3
	Craft and related trade workers	23	15.3
	Plant and machine operators and assemblers	16	10.7
	Elementary occupation	25	16.7
	Unemployed	22	14.7
Education	Illiterate	13	8.7
	Primary (up to 5 years of formal education)	19	12.7
	Middle school (up to 8 years of formal education)	30	20.0
	High school (up to 10 years of formal education)	45	30.0
	Intermediate (up to 12 years formal education	35	23.3
	Graduate	8	5.3
Current employment status	Currently employed (full-time)	88	58.7
	Currently employed (part-time)	36	24.0
	Currently unemployed	26	17.3
Socioeconomic status	Upper middle (II)	22	14.7
	Lower middle (III)	60	40.0
	Upper lower (IV)	57	38.0
	Lower (V)	11	7.3
Residence	Urban (nonslum)	80	53.3
	Urban (slum)	70	46.7

Technology Characteristics

Phone Ownership

Most participants owned a mobile phone (88%, *n* = 132); 12% (*n* = 18) reported that they neither own any phone nor had a phone number at the time of the interview. 30% (*n* = 45) were using basic (nonsmartphone) phones and 58% (*n* = 87) owned smartphones at the time of assessment. The mean age of the basic-phone owners was 27.4 (SD 6.5) years and the mean age of smartphone owners was 23.6 (3.9) years. The majority (91.3%, *n* = 137) had at least one family member with a mobile phone. 4.7% (*n* = 7) did not have access to mobile phones (either self-ownership or ownership of phones by family members). 74.7% (*n* = 112) predominantly used their own mobiles, and 76.7% (*n* = 115) predominantly used their own phone numbers. The remaining participants used their family member's phone mainly, including mother's mobile (8.7%) and number (10%), followed by wife's mobile (4.7%) and number (4%), father's mobile (3.3%) and number (2.7%), brother's mobile (4%) and number (4%), and sister's mobile (0.7%).

Changes in Phone Devices and Phone Numbers

The median duration of owning the current mobile was six (IQR 2, 16.2) months, and the median duration of having the current phone number was seven (IQR 3, 24) months. 50% of the participants (*n* = 75) had changed their mobiles (range 1–8) and 46% (*n* = 69) had changed their phone numbers (range 1–8) in the previous 12 months. 20.7% (*n* = 31) changed their phone number once, 13.3% (*n* = 20) twice, and 12% (*n* = 18) ≥ 3 times in the previous 12 months. 35% (*n* = 26) reported that they had sold their earlier device for buying substance, while 29% (*n* = 22) reported that they had lost their previous device or that it was stolen. 15% (*n* = 11) reported changing their device as they needed a phone with improved technology, while 9% (*n* = 7) had broken their previous device in a fit of rage during a fight with family members. 8% (*n* = 6) changed their device as their earlier phone was old, and 4% (*n* = 3) did so because of accidental damage of their previous device. The common reasons for changing their phone numbers (*n* = 69) included loss of the previous SIM card (58%, *n* = 40) and change to a better service provider (25%, *n* = 17). 17% (*n* = 12) reported that they changed their previous numbers as unwanted contacts (including drug sellers and users) had their earlier numbers.

Digital Capacity

97.3% (*n* = 146) reported that they could make calls from a mobile phone. 91.3% (*n* = 137) could open and read the received text messages, and 64% (*n* = 96) used WhatsApp. 68% (*n* = 102) had played online or offline games on mobile, and 50.7%

(*n* = 76) knew how to email. 56% (*n* = 84) had shopped online through mobile phone, while 60% (*n* = 90) had used social media (Facebook, Instagram, and TikTok) on their mobile phone. 70.7% (*n* = 106) had used their mobile phone for seeing videos or movies, while 64% (*n* = 96) reported that they knew how to download mobile applications. 70% (*n* = 105) had access to either phone Internet or Wi-Fi at assessment. 2.7% (*n* = 4) had never used a mobile phone in their lifetime.

2.7% (*n* = 4) participants had access to the desktop alone, 4.7% (*n* = 7) had access to the laptop alone, and 7.3% (*n* = 11) had access to both laptop and desktop at home. 85.3% (*n* = 128) did not have either a laptop or desktop at home.

Interest in mHealth Interventions

In the past six months, 34% (*n* = 51) of participants had used smartphones to access general health care information. 25.3% (*n* = 38) had used the smartphone to get information related to personal health issues, by browsing the Internet and YouTube videos. However, only 27.3% (*n* = 41) were aware of specific mobile applications (apps) for general health information. 15.3% (*n* = 23) were aware of apps providing HIV-related information, while 14.7% (*n* = 22) were aware of apps on tobacco. 26.7% (*n* = 40) knew about apps for addiction-related information.

80% (*n* = 120) of participants showed interest in receiving text messages related to OUD. Most participants were willing to download apps (64%, *n* = 96) and use them on a daily basis (63.3%, *n* = 92) for monitoring their substance use. Only a few participants (18.7%, *n* = 28) felt that using an app would be a burdensome task. 56.7% (*n* = 85) of participants were interested in using the mobile application for tracking the mobile medication-dispensing van. 78% (*n* = 117) and 79.3% (*n* = 119) were interested in using mobile phones for managing their cravings and risks related to substance use.

Discussion

This study is among the first in India to assess the pattern of mobile use in patients with OUD on OAT and to explore patients' interest in using mobile technology to manage their substance use. We used a cross-sectional design and interviewed 150 patients receiving OAT from a community drug treatment clinic in an impoverished urban area in Delhi, India. The participants' use of mobile phone and their interest in mHealth interventions were assessed. The study showed that the majority of the participants owned a mobile phone and had their own phone number. Most participants knew the use of many smartphone-related features. While most participants were interested in receiving mHealth interventions, most were not aware of the online availability of information related to substance use or its associated diseases.

The sociodemographic and clinical profile of the participants in this study is in keeping with the profile of the opioid-using population in India.[20] In this study, 88% of participants had their own mobile phone, of which 66% were smartphones owners. A general-population survey conducted by Pew Research Center in 2019 reported that 70% of adults in India owned a mobile phone and 13% shared a mobile phone, while 17% did not use a mobile phone.[24] The survey also reported that only 32% of adults had access to smartphones. The proportion of smartphone users was much higher in the younger age group (48% in the 18 years – 29 years age group) and in those who were educated (59% in those educated up to class 10). The rate of mobile phone ownership in our study is similar to the general population. Therefore, the presumption that people who use drugs may not have access to technology is false, as seen in our study. The findings in our study are similar to other studies on the western population. Tofighi et al. surveyed 71 participants in addiction treatment and found that majority (93%) owned a mobile phone and were comfortable in using text messages.[19]

Most participants in our study reported accessing the Internet through their mobile phones rather than relying on desktops or laptops. This is in keeping with the general trend seen in India. The 2019 Pew Research Center survey reported that only 11% of Indians reported having access to a working desktop computer, laptop, or tablet.[24] Similarly, 28% of Indians reported that they access the Internet even though they do not have a computer or tablet at home, meaning that they use their smartphones to access the Internet. However, the proportion of individuals having Internet access is much higher in our study than that reported in the survey in the general population.

Since most participants in our study owned smartphones, used the Internet, and knew how to install applications or download videos, mHealth interventions can be planned for this segment by creating audiovisual aids or mobile applications. Such web-based interventions have been tried successfully in a population with limited access to computers.[25] The readiness to receive mHealth interventions is also seen from the finding that most participants in our study expressed interest in such interventions. Keeping in mind the response from the participants, different types of mHealth interventions in this population can be planned. As the majority of our participants have used short message service (SMS), the simplest mHealth intervention can include sending SMS. The SMS can remind the participants of their due date for follow-up or to restarting treatment in case they drop out of treatment. Also, other "complex" mHealth interventions such as creating mobile apps can also be planned, as > 60% of our participants reported that they could download and use mobile apps. The mobile app can provide personalized feedback for, say, management of craving, provide a reminder for follow-ups, and track intermittent substance use or adherence to OAT medications.

The high rate of change in phone numbers could be a challenge in delivering mHealth interventions in our study population. Almost half of our participants changed their phone numbers at least once in the past year. This would create potential problems in contacting the participants over the phone or sending them reminders for follow-up or medicines through text messages. Such apprehensions are noted in other studies as well.[19,26] Measures such as regular updating of the patients' contact details, including their phone numbers, would be required in the OAT clinics. It should, however, be remembered that everybody cannot be serviced through mHealth interventions alone, as the digital reach is not universal. Therefore, the traditional, existing approach of reaching out and providing OAT services to those with OUD needs to continue.

Limitations

There were some limitations in the study. As the data was collected from a single clinic providing OAT, the generalizability of the findings can be limited. However,

as the profile of our participants was similar to those seen in other studies on OUD from India, our findings can apply to other settings as well. The participants were selected by purposive sampling. The study did not inquire about the generation (2G, 3G, or 4G) and speed of the Internet connections used by the participants or the expenses incurred in accessing the Internet. Also, the study asked hypothetical questions on the client's willingness to use mHealth interventions. The acceptance may be different from the real world scenario. Nonetheless, the study provides an insight into the mobile phone behavior of patients on OAT, as well as their interest in receiving mHealth interventions in low-resource settings.

Conclusions

In India, there is an interest among people with OUD on OAT to use mHealth interventions to manage their opioid use problem. This population also has access to mobile phones and the necessary knowledge to install and run applications needed for various mHealth interventions, even in low-resource settings.

Declaration of Conflicting Interests

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Supplemental Material

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