

Review

Addiction and COVID: Issues, Challenges, and New Telehealth Approaches

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Abstract: In recent decades, the United States has seen a substantial increase in the number of people diagnosed with substance use disorder (SUD). Both SUDs and COVID-19 separately have had, and continue to have, a widespread impact on our society. While they are two distinct entities, they are intricately related and have been shown to influence one another. Lockdown mandates intended to enhance public safety produced unintended consequences for people with SUDs by decreasing access to treatment and disrupting their current care. Telehealth could offer a solution to this disruption as its utilization expands the provider's reach and increases access to treatment in underserved populations, including those with SUDs. The use of telemedicine seems to result in higher rates of patient satisfaction, compliance, and treatment retention rates while maintaining the need for social distancing. Even when pandemic restrictions resolve, telehealth can continue to provide invaluable benefits to individuals with addiction, particularly those in rural America. In summary, ongoing research regarding telehealth delivery and the expansion of telehealth is a byproduct of the pandemic and can advance the American healthcare system beyond the days of COVID-19. This manuscript will review studies regarding the use of telehealth in SUD with the hope that further research within and beyond the COVID-19 pandemic will lead to the increased use of telehealth by those involved in and those receiving care for SUDs.

Keywords: addiction; telemedicine; telehealth; addiction care; COVID-19



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1. Introduction

In recent decades, the United States has seen a substantial increase in the number of people diagnosed with substance use disorder (SUD) [1]. Specifically, opioid use disorder (OUD) has exploded since the 1990s, when pharmaceutical companies aggressively marketed opioid analgesics for pain management [2]. Individuals struggling with SUDs are marginalized, stigmatized, and underserved by the United States healthcare system [3,4]. The nationwide response to the opioid crisis was beginning to progress as access to addiction treatment became more widely available [4,5]. Then, in the spring of 2020, the COVID-19 pandemic struck, and with it came a massive shift in our healthcare delivery systems.

Addiction treatment has suffered during the pandemic due to reduced hours and a decrease in services that were safely available through in-person visits [3]. Lockdown

mandates intended to enhance public safety also produced unintended consequences for people with SUDs by decreasing access to treatment and disrupting their current care [6]. Social isolation creates an extraordinarily dangerous situation for people with SUDs, making them more likely to relapse, use alone (increasing their overdose death risk), or engage in risky use behaviors because of exacerbated stress and loneliness [3,4,6]. Telehealth offers a solution. The remote delivery of healthcare through telemedicine has allowed providers to continue treatment while remaining compliant with the social distance mandates that began during the COVID-19 pandemic. Widespread telemedicine utilization can benefit patients because it expands the provider's reach and increases access to treatment in underserved populations, such as those with SUDs [1].

Tightly controlled legislative policies once regulated how providers were able to utilize telemedicine. However, policy adaptations made after the start of the pandemic have increased the access and delivery of telehealth services [6]. For example, The Ryan Haight Online Pharmacy Consumer Protection Act passed in 2008 required providers to evaluate patients in person before prescribing controlled substances via telehealth avenues [6]. Following the start of the pandemic, the Federal Drug Enforcement Administration (DEA) lifted these restrictions if providers and patients used a two-way communication system with both audio and visual components. Despite the loosened requirements, the Substance Abuse and Mental Health Services Administration (SAMHSA) recognized that access to care was still limited for those without digital tools, such as computers and the internet. In response, the DEA further specified that telephone-only appointments could be utilized [6]. Low-threshold options, such as buprenorphine, can now be prescribed via telehealth without an in-person visit for OUD, owing to these newly loosened restrictions [3,6]. Medicaid and Medicare have also expanded their reimbursements to states supporting the expansion of telehealth services amid the COVID-19 pandemic [1,4].

Pilot programs, such as the Addiction Telehealth Program (ATP) in San Francisco, increased the accessibility of treatment options for patients struggling with addiction [1]. Additionally, Rhode Island established a twenty-four-hour buprenorphine hotline in response to the new guidelines after participants voiced challenges associated with obtaining treatment elsewhere and expressed anxiety about leaving their homes during the pandemic [3]. This hotline allows patients with OUD to have remote access to qualified providers who can perform assessments, prescribe medication, and connect them to outpatient services [3]. Studies have shown that a treatment delivered through telehealth is as effective as an in-person treatment, and patients are highly satisfied with the care received [1]. This manuscript will evaluate these studies by investigating telehealth services for the population suffering from an SUD.

2. Traditional Treatment of Substance Use Disorder

Traditional treatments for SUDs vary greatly based upon the specific substance of use. Pharmacotherapy is effective in certain substance users, specifically those abusing opiates, tobacco, and alcohol. First-line treatment for OUD includes either methadone, a full opioid agonist, or buprenorphine, a partial agonist of the mu-opioid receptor [7,8]. Naltrexone, a competitive opioid antagonist at the mu-opioid receptor, can also be used to treat OUD; however, the patient must be opioid-free for seven to ten days due to the antagonist mechanism of action which can precipitate withdrawal [7]. Naltrexone is also used in alcohol use disorder (AUD) to reduce cravings. Methadone remains the gold standard approach for OUD because it increases treatment compliance compared to buprenorphine and naltrexone [8]. Longer periods of a pharmacological approach to OUD are associated with a lower likelihood of returning to use and better outcomes [8]. Methadone is mainly administered under direct supervision by clinic-based programs due to the increased risk of respiratory depression and overdose compared to buprenorphine or naltrexone [8]. In the inpatient setting, providers should consider the benefits of the early initiation of buprenorphine and outpatient care coordination for OUD patients [8].

Pharmacotherapy can also promote smoking cessation in tobacco use disorder [9]. The pharmacological treatments for tobacco use disorder include varenicline, bupropion, or nicotine replacement therapy (NRT), which encompasses a transdermal patch, nicotine gum, lozenge, or nasal spray [9]. Combined NRT, with a short and long-acting nicotine replacement, or varenicline, is considered to be the first-line approach for smoking cessation treatment [9]. AUD can also be treated pharmacologically with disulfiram, naltrexone, and acamprosate [10]. These medications increase abstinence from alcohol and have been approved by the Food and Drug Administration (FDA) for use in AUD [10]. Despite this, the pharmacological approach to AUD is considered underutilized in favor of alcohol-specific psychosocial treatments, including outpatient treatment and twelve-step programs, such as Alcoholics Anonymous [10].

Another treatment modality for SUD includes behavioral or psychosocial therapies, such as contingency management (CM), mindfulness-based interventions (MBIs), or motivational interviewing (MI). The pharmacological approach has been shown to be relatively ineffective for stimulant use disorder, specifically cocaine use [11]. Since there are no FDA-approved medications for cocaine use disorder, first-line treatment includes psychosocial therapies, such as CBT and CM [12]. CM is a behavioral therapy based on operant conditioning that uses concrete reinforcements to encourage behavioral changes [11]. CM usually occurs in a group setting and utilizes an “abstinence-delivery model” that rewards prizes, such as vouchers, for negative urine toxicology [11]. Due to the COVID-19 pandemic, the implementation and utilization of CM has been difficult since CM involves groups of participants. Virtual CM is beneficial for nicotine and alcohol use disorders; therefore, virtual CM should be considered when social distancing and other COVID-19 guidelines cannot be followed [11]. Urine toxicology can be completed at an outpatient location, and prize delivery can be conducted through electronic methods, such as a prepaid debit card [11].

Mindfulness-based interventions combine the widely-used techniques of behavioral therapy with mindfulness meditation and include mindfulness-based stress reduction (MBSR), mindfulness-based cognitive therapy (MBCT), mindfulness-based relapse prevention (MBRP), and mindfulness-oriented recovery enhancement (MORE) [13]. Mindfulness is defined as the self-awareness of thought, emotion, sensation, and perception in the present moment [13]. MBIs effectively reduce the misuse of alcohol, cigarettes, marijuana, and opioids [13]. The mental training of MBIs focuses on strengthening an individual’s awareness and the control of their attention and behavior, such as cravings, when exposed to cues related to their addiction [13]. Mindfulness-based therapies can treat addiction by increasing neuronal connections in the prefrontal area that have atrophied from the use of substances [13]. For example, patients exposed to an object that can cause cravings are taught to be aware of these cravings and resist the impulsive urge [13]. Using these techniques and behavioral modifications allows the patient to transfer these behavioral skills to reduce addiction [13].

MI is a loosely defined behavioral technique that effectively reduces alcohol, marijuana, and nicotine substance use [14]. MI techniques include open questions and affirmations that explore a patient’s thought process and elicit change by uncovering one’s underlying motivation [15]. Interestingly, in adult males and college students, a shorter duration of MI therapy was proven to be effective in reducing alcohol consumption; however, similar therapy did not significantly affect adult women [14]. MI does have limitations—it is ineffective at reducing SUDs related to opioids and stimulants [14].

3. Substance Use Disorders and the COVID-19 Pandemic

Both SUDs and COVID-19 separately have had, and continue to have, a widespread impact on our society. While they are two distinct entities, they are intricately related and have been shown to influence one another. The pandemic caused detrimental effects on mental health, with subsequent increases in substance use rates, relapses, and overdoses [16]. An overwhelming mental health burden resulted from financial insecurities,

social isolation, health anxiety, and anxiety due to the uncertainty of the situation [17]. In times of stress or uncertainty, people could turn to substances to relieve those unsettling, anxiety-provoking feelings. This was exemplified in the 34.4% increase in alcohol sales and 13.2% increase in tobacco sales witnessed over three months in 2020 in comparison to the previous year [18]. In individuals with SUDs, these staggering stressors place increased hardship on their current substance use and/or recovery [16]. A daily routine's stability and active support are crucial for continued recovery, with breaks in routine causing an increased risk of relapse [19].

Because of the implementation of social distancing guidelines, many individuals began or continued to use substances in isolation, increasing their risk of a fatal overdose [20]. In particular, in terms of opioid use, individuals were administered life-saving naloxone less often in the event of an overdose due to increased isolation during the pandemic [20]. Kentucky recorded a 50% increase in suspected opioid overdoses with subsequent deaths at the scene upon EMS arrival [19]. Addiction services adhered to social distancing guidelines, resulting in the disruption of resources while making these adjustments [19]. Individuals with SUDs rely on clinics and other treatment centers for harm reduction services, including fentanyl test strips and clean needle packages [20]. In Hawaii, the pandemic resulted in a 38.4% increase in overdoses, to which fentanyl was the predominant contributor [21]. To minimize the spread of the virus in jails and prisons, many individuals with drug-related offenses were released, but without the necessary resources required to ensure adequate recovery, putting this population at a further increased risk of overdose [19]. Additionally, while the incidence of overdoses was increasing, emergency rooms were overwhelmed with COVID-19 patients, resulting in a decrease in care for patients suffering from other medical emergencies, including substance-related cases [22].

Research has also shown how individuals with SUDs are at an increased risk of exposure to and worse outcomes from COVID-19 [1]. This population is at an increased risk of exposure largely due to an overall decrease in social distancing in the activities leading up to and directly involving the use of substances [20]. In addition, individuals who utilize harm reduction services or addiction services can also have increased exposure when visiting those facilities [20,22]. Individuals experiencing homelessness are at a further increased risk of exposure due to even less control over social distancing and access to proper hygiene facilities [23]. Residing in congregate housing facilities from homes to encampments can result in barriers to following social distancing guidelines [23]. This is an important consideration for health care providers, as about 36% of individuals who are experiencing homelessness are also suffering from an SUD [23].

4. Issues with Addiction Treatment and COVID-19

COVID-19 has caused rapid modifications in the treatment of SUDs to maintain adequate social distancing guidelines. Prior pillars of treatment, including addiction centers, support group-based therapies, and peer support groups, were disrupted, leaving a vital gap in care for a patient's recovery [16]. Times of extreme stress can worsen individuals with an SUD and their treatment [17,18]. The social aspect of care is crucial to provide decreased isolation, examples of successful recoveries, and interactions with individuals with similar experiences [16].

A promising solution to the lapse of in-person interaction from group therapy was the implementation of web-based care [16]. The incorporation of telemedicine use was vital in helping bridge this affected area of care. With only the use of a computer or cell phone, individuals could have access to the social aspect of care [16]. While this system is favorable for those who have the means, many individuals do not have access to the equipment or software needed for telemedicine to take place, creating disparities in care for this particular population [24]. Some communities have adopted prepaid cell phone donations, telemedicine kiosks, and iPads for use in shelters to help minimize this imbalance [24].

In addition to the social aspect of recovery and treatment, receiving medications was difficult for many patients during this time. For individuals with an opioid use disorder,

issues arose with receiving necessary medication therapies and harm reduction services due to shutdowns, creating a potential rise in relapses and overdoses [17]. In addition, emergency rooms experienced decreases in buprenorphine administration due to the overwhelming amount of COVID-19 patients, potentially adversely affecting individuals' recoveries [17]. Many individuals also struggled with balancing the cost of treatments with increased financial insecurity due to the pandemic, forcing some patients to forgo care [19]. As explained previously, a further impact of COVID-19 on the treatment of SUDs was its capacity to increase relapse rates and overdoses due to the increased psychological burden from the pandemic, increased social isolation, and issues with care [18]. Can telehealth help bridge the gaps created by the COVID-19 pandemic and provide patients access to multiple aspects of care safely and efficiently? The current literature on this subject will be reviewed in the next section.

5. Clinical Studies: Safety and Efficacy

In a 2020 retrospective study conducted before the COVID-19 pandemic, data from the National Directory of Drug and Alcohol Abuse Treatment Facilities spanning from 2016 to 2019 regarding the adoption of telemedicine in treatment facilities in the United States was collected. The study's goal was to gather evidence regarding trends in telemedicine use by SUD facilities and how this varied based on local factors. The data were analyzed based on participant responses to the National Survey of Substance Abuse Treatment Services. The main outcome was telemedicine use by an SUD facility. The independent variables included geographical location, patient populations, drug poisoning death rates, telemedicine policies assigned an American Telemedicine Association (ATA) grade, and telemedicine parity law. Based on data from 12,334 SUD treatment facilities, the use of telemedicine reportedly grew from 13.5% in 2016 to 17.4% in 2019 ($p < 0.001$). A wide state-to-state variation was also seen in 2019, with some states having <7% of their SUD treatment facilities offering telemedicine compared to >40% of facilities in other states. Notably, it was found that rural facilities offering multiple treatment settings, offering pharmacotherapy, or serving both pediatric and adult populations implemented significantly more telemedicine than those that did not ($p < 0.005$ for all comparisons). There were no statistically significant differences in SUD facility telemedicine adoption regarding state-level telemedicine policies, drug-related mortality, Medicaid acceptance, or facility ownership. Although the data reflect an overall increase in telemedicine adoption, <20% of licensed SUD treatment facilities offered telemedicine in 2019. However, the study implied that if new data were to be analyzed following COVID-19, the pandemic will likely have had a major impact on telemedicine implementation due to social distancing and the relaxation of telemedicine policies [25].

In a 2007 randomized parallel-group clinical trial known as the Telephone Enhancement of Long-term Engagement (TELE) study, researchers examined the feasibility and efficacy of phone calls to patients following their discharge from residential and inpatient substance use treatment programs. A total of 339 patients were randomized into either the standard care group (SCG; control group) or the telephone call group (TCG; experimental group). TCG patients received phone calls from trained counselors on weeks 1, 2, 4, 6, 8, 10, and 12 after discharge from their programs. The caller would give positive feedback and encourage compliance with their outpatient treatment plan. All subjects attended a follow-up visit at week 13 for an interview regarding their involvement and satisfaction with their continuing care plan, as well as a urine drug screen and breath alcohol test. The primary outcomes of the study included self-reported attendance to outpatient counseling sessions and the documentation of attendance at these sessions. Secondary outcomes included drug use, alcohol use, and self-reported participation in 12-step groups. After the study, no significant difference was found in self-reported attendance to counseling between groups; however, program attendance records revealed that TCG subjects (48%) had higher attendance than SCG subjects (37%). The results were statistically significant due

to the Hochberg correction. Therefore, the researchers suggested further investigation to determine the efficacy of phone calls in improving substance use treatment outcomes [26].

In a 2010 randomized controlled trial, a telephonic patient support program known as Here To Help (HTH) was analyzed for its impact on compliance and treatment outcomes among patients undergoing buprenorphine treatment for opioid dependence [27]. At this time, buprenorphine medication-assisted treatment (B-MAT) was a new addition to medication replacement therapy for opioid dependence and had become the standard of care. Researchers sought to better understand B-MAT as a treatment approach and telephonic patient support as a potential treatment adjunct [28]. A total of 1426 patients new to buprenorphine treatment were enrolled, with 439 subjects randomized to receive buprenorphine alone (control) and 987 subjects randomized to receive buprenorphine plus HTH support (experimental). Outcome measures over a 12-month study period included compliance to buprenorphine therapy, as defined by medication dosage reports submitted by the subjects themselves; the results of the Addiction Severity Index (ASI) administered at baseline and at 12 months post-baseline; and the results of a Treatment Services Review (TSR) reflecting the utilization of substance use support services. Overall, no significant difference was found between the standard care control and experimental groups in either demographics or ASI composite scores. However, subjects receiving HTH support who completed at least three coach intervention phone calls were more compliant with buprenorphine treatment at month 12 than those in the control group ($p < 0.025$). Logistic regression revealed a significant positive effect for the number of calls ($p < 0.001$), indicating that HTH subjects who completed a greater number of calls were more likely to be compliant with treatment at month 12. Furthermore, HTH subjects were less likely than controls to resume opioid use at month 12 ($p < 0.05$), per the ASI results, and more likely to attend a 12-step/self-help group than control subjects. Therefore, the study concluded that the telephonic patient support program significantly increased compliance with treatment and thus positive outcomes [27].

In a 2014 multi-site randomized clinical trial, researchers sought to evaluate the effectiveness of a computer-delivered behavioral intervention known as the Therapeutic Education System (TES) for the treatment of SUDs in addition to direct care from providers. The study recruited and enrolled 507 patients entering outpatient addiction treatment programs, and they were randomized into either a treatment-as-usual group (TAU; control) or TAU + TES group (experimental) for 12 weeks.

TAU consisted of subjects attending individual and group counseling, while TES included computer-based interactive modules covering tools for achieving and maintaining abstinence and motivational incentives. This intervention was substituted for 2 h of standard care per week for those receiving TES. The outcomes of the study were abstinence, determined by urine drug screens, and retention in community-based treatment programs, as determined by the research staff tracking their participation. After the 12-week trial, 3-month follow-up, and 6-month follow-up, the data showed those receiving TES had increased odds of abstinence and decreased dropout rates compared to the control group ($p = 0.01$ and $p = 0.17$, respectively). Overall, the study determined that computer-based interventions effectively improved treatment outcomes among patients attending community-based addiction treatment programs [29].

In a 2017 study published in the International Journal of Behavioral Medicine, researchers designed a randomized clinical trial to explore the impact of therapeutic alliance and dysfunctional attitudes, such as perfectionism, on therapist-delivered and eHealth interventions for comorbid depression and substance use. A total of 274 volunteer participants were enrolled after reporting concurrent depressive symptoms and excess cannabis or alcohol use. After attending a baseline visit to establish an initial treatment goal, participants were randomized into one of three groups: therapist-delivered integrated cognitive behavioral therapy/motivational interviewing (CBT/MI); computer-delivered CBT/MI via Self-Help for Alcohol/other drugs and Depression ("SHADE") with brief therapy assistance (SHADE CBT/MI); or therapist-delivered supportive person-centered therapy

(PCT). Once they were assigned a group, the subjects attended nine sessions and follow-up assessments at 3, 6, and 12 months. While at each session, the subjects completed questionnaire assessments on mental health and substance use. The primary outcomes were self-reported measures of depression and alcohol or cannabis use throughout the study. It was found that the PCT and CBT/MI groups exhibited greater decreases in depression scores between 3 and 12 months follow-up compared to the SHADE CBT/MI group, with the PCT group reporting a more rapid change than the CBT/MI group ($p = 0.017$). A greater therapeutic alliance developed early in treatment led to reduced cannabis use in the SHADE CBT/MI subjects ($p = 0.0491$). Participants that exhibited higher “perfectionism” scores at baseline receiving CBT/MI reported an increase in depression over time ($p = 0.0121$), but a reduction in depression if they received SHADE CBT/MI instead. Overall, dysfunctional attitudes, therapeutic alliance, and substance use improved more in the SHADE and therapist CBT/MI groups than in the PCT group. Still, treatment allocation was not found to impact changes during follow-up. However, the results suggested that dysfunctional attitudes could lead to poorer depression outcomes and greater substance use. All results derived from the study were part of a larger randomized control trial and, therefore, are useful for modifying future research [30].

In 2020, a pilot randomized controlled trial known as the Trial for Adherence Application for Buprenorphine Treatment (TAAB) study was described to gather preliminary data for a future Phase III trial. The researchers describe implementing video directly observed therapy (DOT) via a smartphone application to evaluate its effects on office-based buprenorphine treatment outcomes for opioid OUD. A total of 80 eligible study participants will be recruited from office-based opioid treatment programs with similar models of buprenorphine treatments. They will be randomized into either the treatment-as-usual (TAU) arm (control) or the TAU + video DOT arm (intervention). The TAU arm will receive care via weekly or biweekly in-person appointments with providers, while the TAU + video DOT arm will receive the standard level of care via a mobile health application. The mobile health application is a video-based, HIPAA-compliant platform that offers several useful features to participants, such as links to support groups, medication reminders, and a calendar summary of their use of the application. Initially, participants will attend a baseline research visit to outline their demographics. They will then complete 12 in-person weekly visits where their adherence to the treatment regimen is assessed via a modified calendar timeline follow-back (TLFB) procedure and self-reporting. They will also provide a urine sample at each weekly visit to test for the presence of recent buprenorphine use and other illicit substances. At the end of the 12-week study period, participants will attend a final visit for an interview regarding their treatment and adherence to the treatment plan. The pre-specified outcome measures include the percentage of weekly urine drug tests negative for opioids over the entire study course and interest in engagement in treatment at week 12. The researchers hypothesize that the video DOT intervention will lead to overall better adherence to treatment and improved treatment outcomes due to the growing interest in mobile applications for medical use. This study is ongoing, and its researchers hope to gather enough evidence to support a future trial [31].

In 2021, during the COVID-19 pandemic, a study was performed to investigate patient experiences with telehealth services for SUDs and their perceptions of treatment service types. Although the use of telehealth for SUD treatment has grown over the past ten years, the onset of COVID-19 led to enormous growth in telehealth implementation to maintain social distancing and slow the spread of disease. The researchers wanted to assess patient satisfaction among those seeking treatment for an SUD during COVID-19 via three different treatment modalities, including individual therapy, group therapy, and medication management, as well as to examine the experiences of patients receiving outpatient SUD treatment via video conferencing telehealth. In Massachusetts, 58 subjects from an outpatient SUD treatment program known as the Alcohol, Drug, and Addiction Treatment Program (ADATP) were enrolled in the study. The participants completed the Telehealth Patient Survey, which had questions regarding their demographics, frequency and types

of services received via telehealth, satisfaction for each treatment service, preference for service delivery, likes and dislikes of telehealth, and any technical issues that occurred. Overall, most patients (86.2%) were satisfied with the quality of telehealthcare, and 82% of subjects reported that telehealth met their needs better than in-person visits. More subjects (90%) reported the greatest satisfaction with individual therapy compared to medication management (75%) and group therapy (58%).

Regarding the mode of delivery, 19–25% of subjects preferred a mixture of telehealth and in-person treatment. When COVID-19 regulations no longer dictate healthcare delivery, this should be something to consider. In conclusion, there was a high overall satisfaction with telehealth services and accessibility, and participants highlighted several barriers, such as a lack of connection with other participants and difficulty with internet connectivity. Moving forward, it will be important for researchers to explore the relationships between participant preferences of telehealth versus in-person treatments, treatment access, engagement, retention, and SUD treatment outcomes [32]. Table 1 summarizes the studies discussed in this section.

Table 1. Clinical studies regarding the use of telehealth modalities in substance use treatment.

Author	Study	Results	Conclusions
Uscher-Pines (2020)	Data spanned from 2016–2019 regarding the adoption of telemedicine. Data were analyzed based on participant responses to the National Survey of Substance Abuse Treatment Services. The goal was to further evidence on trends in telemedicine use by SUD facilities and how it varies based on local factors.	Based on data from 12,334 SUD treatment facilities, the use of telemedicine reportedly grew from 13.5% in 2016 to 17.4% in 2019 ($p < 0.001$). A wide state-to-state variation was also seen in 2019, with some states having <7% of SUD treatment facilities offering telemedicine compared to >40% of facilities in other states. No statistically significant differences in SUD facility telemedicine adoption regarding state-level telemedicine policies, drug-related mortality, Medicaid acceptance, or facility ownership.	The use of telemedicine is increasing steadily among substance use disorder (SUD) treatment facilities. Uptake is uneven and relatively low. Telemedicine may be an underutilized tool to expand access to care for patients with SUDs.
Hubbert (2007)	Randomized parallel-group clinical trial known as the Telephone Enhancement of Long-term Engagement (TELE) study. A total of 339 patients were randomized into either the standard care group (SCG; control group) or the telephone call group (TCG; experimental group). TCG patients received phone calls from trained counselors on weeks 1, 2, 4, 6, 8, 10, and 12 after discharge from their programs. Subjects would give positive feedback and encourage compliance with their outpatient treatment plan. All subjects attended a follow-up visit at week 13 for an interview regarding their involvement and satisfaction with their continuing care plan, as well as a urine drug screen and breath alcohol test.	Primary outcomes of the study included self-reported attendance to outpatient counseling sessions and documentation of attendance at these sessions. Secondary outcomes included drug use, alcohol use, and self-reported participation in 12-step groups. No significant difference was found in self-reported attendance to counseling between groups; however, program attendance records revealed that TCG subjects (48%) had higher attendance than SCG subjects (37%). The results were statistically significant due to the Hochberg correction.	Researchers suggested further investigation to determine the efficacy of phone calls in improving substance use treatment outcomes.

Table 1. Cont.

Author	Study	Results	Conclusions
Ruetsch (2012)	A total of 1426 opiate-dependent patients new to BUP were randomized to receive buprenorphine treatment alone (standard care) or buprenorphine treatment plus the Here to Help patient support program. All patients completed the Addiction Severity Index (ASI) at the time of enrollment and at 12 months.	Subjects randomized to the Here to Help support program who accepted at least three care coach intervention calls were more compliant with buprenorphine treatment than the standard care group at month 12 (64.4% vs. 56.1%, $\chi(2) = 5.09, p < 0.025$). Patients that were compliant with treatment reported significantly lower scores on all seven of the ASI composite scores, indicating a lower severity of addiction-related problems.	The Here to Help intervention seemed to improve patient treatment outcomes indirectly by improving compliance with buprenorphine treatment. Supplementation with a structured, telephonic compliance-enhancement program is an effective way to improve compliance with medication, which subsequently improves patient outcomes
Campbell (2014)	A total of 507 patients entering 10 outpatient addiction treatment programs were randomly assigned to receive 12 weeks of either treatment as usual (N = 252) or treatment as usual plus TES, with the intervention substituting for about 2 h of standard care per week (N = 255). TES consisted of 62 computerized interactive modules covering skills for abstinence, plus prize-based motivational incentives contingent on abstinence and treatment adherence.	The TES group had a lower dropout rate (hazard ratio = 0.72, 95% CI = 0.57, 0.92) and a greater abstinence rate (odds ratio = 1.62, 95% CI = 1.12, 2.35). The effect was more pronounced among patients who had a positive urine drug or breath alcohol screen at study entry (odds ratio = 2.18, 95% CI = 1.30, 3.68).	Internet-delivered interventions have the potential to expand access and improve addiction treatment outcomes.
Kay-Lambkin (2017)	A total of 274 participants with concurrent depression and alcohol/cannabis misuse were randomized to 10 sessions of therapist-delivered cognitive behavior therapy/motivational interviewing (CBT/MI), computer-delivered CBT/MI with brief therapist assistance (SHADE CBT/MI), or supportive counseling (PCT). Follow-up occurred at 3, 6, and 12 months.	“Client initiative,” a subscale of therapeutic alliance, moderated change in depression scores between the 3- and 12-month follow-up for the PCT group, where higher scores were associated with decreases in depression. Higher therapeutic “bond” early in treatment for SHADE CBT/MI participants was associated with reduced cannabis use.	The sample size and number of comparisons in the analysis mean that the results are considered as preliminary. Replication is needed in larger trials.
Schramm (2020)	Part of an ongoing pilot study. Participants will be recruited from office-based opioid addiction treatment programs in outpatient clinics at two urban medical centers and randomized to either video directly observed therapy (intervention) delivered via a HIPAA-compliant, asynchronous, mobile health (mHealth) technology platform, or treatment as usual (control). Participants will complete 13 in-person weekly visits and be followed via electronic health record data captured at 12 and 24 weeks. Primary outcome is the percentage of weekly urine tests that are negative for opioids over the 12 weeks. Secondary outcome is engagement in treatment at week 12.	Study is ongoing and not finalized as of yet.	The researchers hypothesize that the video DOT intervention will lead to overall better adherence to treatment and improved treatment outcomes due to the growing interest in mobile applications for medical use.
Sugarman (2021)	The purpose was to examine patient perceptions of telehealth in an outpatient SUD treatment program offering individual therapy, group therapy, and medication management. A total of 270 adults receiving SUD outpatient treatment were eligible to complete a 23-item online survey distributed by clinicians. A total of 58 patients completed/partially completed the survey.	Of all the participants, 86.2% were “very satisfied” or “satisfied” with the quality of telehealth care. “Very satisfied” ratings were highest for individual therapy, followed by medication management and group therapy. Top reasons for disliking telehealth were not connecting as well with other members in group therapy and the ability for telehealth to be interrupted at home or work.	Telehealth visits were a satisfactory treatment modality for most respondents receiving outpatient care.

6. Conclusions

The COVID-19 pandemic has impacted mental health nationwide, and individuals suffering from addiction and substance use have suffered disproportionately. Substance use became a coping mechanism for many Americans whose daily life was shaken by societal change. Social isolation, financial hardships, and limited treatment options stunted the expansion of SUD treatment since the start of the pandemic. Group therapies and face-to-face provider visits were reduced for fear of viral spread. As an already vulnerable population, many patients with SUDs lost access to treatment. Without the social support necessary for recovery, many more users experienced relapse, overdose, and a loss of hope. These challenges have instigated a push for change in modern addiction therapy, and the solution must include the unprecedented integration of technology in healthcare delivery. Providers should consider implementing telemedicine to respect physical distancing practices and continue treatment for these underserved patients. Although most research does include some form of standard of care for SUD treatment and views telehealth measures as an adjunctive method, studies have shown that it can be a valuable component of care which can be continued while the need for social distancing is still needed or required by law.

The studies included in this review have shown promise that telehealth services can improve general outcomes, whether it be by use of telephone calls, modules, or virtual visits. During the COVID-19 pandemic, research has been undertaken to investigate outcomes using telehealth, especially virtual visits, to help either connect, reconnect, or keep patients connected to services. However, these studies are either new or still ongoing with their data collection process. This is a limitation of this review in that there can only be an inference that telehealth can be helpful during a pandemic. With that being said, hopefully, this manuscript can be a starting point for further empirical research in this area. More time and research will reveal how the implementation of telehealth may shape the future of addiction treatment; however, current studies are promising. The use of telemedicine seems to result in higher patient satisfaction, compliance, and treatment retention rates. Future studies should consider challenges such as connecting telehealth to patients with limited digital resources or technological difficulties. Many treatment centers still lag in the utilization of telehealth. Hopefully, as reimbursements for telemedicine grow, the financial incentive will encourage the expansion of such programs.

Unfortunately, the epidemic of addiction will continue to linger after COVID-19 dissipates. This pandemic has exposed many of the obstacles to the treatment of SUDs, pushing the healthcare system to discover new healing methods. Providers should constantly search for ways to innovate these therapies to meet the dynamic needs of their patients. Even when pandemic restrictions resolve, telehealth can still provide invaluable benefits to individuals with addiction, particularly those in rural America. Telehealth could also offer a new avenue of access to those who may feel stigmatized visiting a physical clinic. Ongoing research regarding telehealth delivery is one positive byproduct of the pandemic. The expansion of telehealth is another byproduct of the pandemic that we hope continues to advance the American healthcare system beyond the days of COVID-19.

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