Literature Reviews of Telemedicine on Opioid Treatment in Rural Areas

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ABSTRACT

Combatting Substance Use Disorder (SUD) is an evolving matter in public health safety and the economy. In this study, we conducted a literature review to the past six-year research on telemedicine applications related to OUD. Our purposes are to 1) synthesize the literature, 2) examine contributions of prior studies, and 3) identify future areas for study. We found that telemedicine treatment on SUD is under-researched and prior studies cover different areas. Given the limited studies on specific topic, we still need more time to see how evidence is produced to draw meaningful conclusion.

INTRODUCTION

Combatting Substance Use Disorder (SUD) is an evolving matter in public health safety and the economy. Not only does SUD affect individual health outcomes but it also impacts the quality of life for society as a whole [1]. Substance use is the utilization of things like alcohol, cigarettes, opioids, or coffee for medical, recreational, or spiritual reasons. As these substances are stimulants, depressants, or hallucinogens, they can affect brain function in a variety of ways [2]. In some cases, neuroadaptations in the striatum can occur after substance use, which can escalate substance intake, thereby leading to physical dependence on substance [3]. One of the emerging SUD is opioid use disorder (OUD). Opioids refer to a class of narcotics used to treat postoperative care and manage pain [4]. In a medical setting, prescriptions opioids are used to treat moderate to severe pain; however, it is associated with abuse risks and side effects. Common opioids under this category are oxycodone (OxyContin), hydrocodone (Vicodin), and morphine, and methadone. Fentanyl is a high potency opioid that is less likely to be prescribed though is widely used in treating severe cancer pain. Heroin is an illicit opioid and its usage has increased across the US as prescription opioids have become less available [5].

Only 26% of OUD patients received treatment for this chronic disease, according to the 2005-2013 National Survey on Drug Use and Health [6]. In addition, only 19% received a treatment that targeted OUD specifically [6]. Digital technology is evolving in health care in multiple forms, including telemedicine, monitoring devices, sensor devices, and implants. Telemedicine is a treatment model that utilizes technology for communication between service providers and patients. Successful telemedicine initiatives have been launched to treat patients with hypertension, diabetes, and heart failure [7], [8]. But OUD treatment through telehealth remains a challenge in real-world practice. In 2016 Health Resources and Services Administration (HRSA) received funding to expand the use of telehealth in rural areas. Several barriers exist for the adoption of tele-MOUD (Medication for Opioid Use Disorder) before the pandemic. These barriers include government regulations, technological challenges for providers and patients, and concerns about patients' satisfaction [9]. We, therefore, use 2016 as the starting year when searching for relevant literature. In this study, we conducted a literature review of the past six-year research on telemedicine applications related to OUD. Our purposes are to 1) synthesize the literature, 2) examine contributions of prior studies, and 3) identify future areas for study.

LITERATURE REVIEW

Prior studies on OUD have produced fruitful results over the past 6 years for opioid management, OUD treatment, and OUD treatment effectiveness. Our reviews focus on recent developments related to rural health, telemedicine, and COVID-19.

Rural health and technology

Drug overdose is a significant challenge in rural areas, with mortality rates increasing 325% from 1999 to 2015, double that in metro areas [10]. Specifically, opioid prescription misuse-related death is prevalent in states with large rural populations [11]. To combat the opioid epidemic in rural communities, increasing MOUD treatment capacity is vital. Despite its effectiveness, there are still several restrictions on prescribing medication treatment for OUD patients. For physicians to prescribe buprenorphine, they need to obtain a waiver and then can only treat a specific number of patients at the same time [12], [13]. However, even though treatment capacity did increase overall, access to buprenorphine is still limited in rural areas [14]–[16]. As of 2017, 60.1% of the rural counties in the US did not have a DATA waivered provider [17]. Consequently, OUD rural individuals tend to drive long distances or have to cross state lines to access treatment [18], [19]. Integrating emerging

technology into service delivery may be necessary to address this rural healthcare gap. Telemedicine could increase treatment access to health care services for people living in rural and remote areas [20]. Expanding and evaluating the use of telemedicine in rural areas could help close a healthcare treatment gap. However, rural areas also lack infrastructure, broadband access which presents barriers for successful telemedicine implementation.

Telehealth and Telemedicine

According to The Department of Health and Human Services (HHS) Health Resources and Services Administration (HRSA), telehealth is the use of electronic information and telecommunication technologies to support long-distance clinical healthcare, patient and professional continuing medical education, public health, and health administration [21]. Four basic modes of telehealth deliveries include real-time, store-and-forward, and remote patient monitoring, and mobile health (Mhealth). Real-time technology refers to videoconferencing for direct care, while store-and-forward utilizes secured electronic transmission to send captured diagnostic information between healthcare providers for later examination. Remote patient monitoring transfers personal health and medical health data from a patient's location to a clinician in another location. Mhealth is the use of mobile phone devices are designed to foster health and well-being through smartphone apps or text messages. While telehealth covers a broad range of remote health care services, telemedicine refers specifically to remote clinical care. Recent literature examining the use of telemedicine in OUD treatment refers to telemedicine as remote diagnosis or treatment on a synchronous telecommunication platform between physicians and patients or healthcare providers and physicians [9], [22]. State Medicaid defined telemedicine as a two-way, real-time interactive communication between the patient, and the physician or practitioner at the distant site and requires the use of interactive telecommunications equipment like audio and video equipment at a minimum [23]. Telehealth may improve OUD treatment access for rural areas, structural barriers remain as challenges for adoption. Nationally, only 22.9% of OTP offers any type of telemedicine as a means of service delivery [24]. Key payer for OUD treatment, state Medicaid payer covers synchronous services in all 50 states but only 18 states will reimburse for store-and-forward service [25]. Therefore, we refer to videoconferencing or real-time telecommunication as a main mode of telemedicine due to the more comprehensive coverage for OUD patients. Videoconferencing may be an efficient way to initiate SUD treatment for patients in an ED and ease the physical space needed for programs that use peer supports. Several programs in Indiana have been started to use video conferencing for peers to communicate with individuals with OUD after a non-fatal opioid overdose [26]. Although COVID-19 has necessitated the adoption of telemedicine for OUD medication management and behavioral health therapy, it is integrated into only 27% of SUD facilities in the early stages of COVID-19 [27]. Promoting the use of telemedicine and modifying insurance reimbursement policies might increase OUD treatment delivery.

COVID-19 impact

Covid-19, a new coronavirus (SARS-CoV-2), is a contagious respiratory disease. The US leads the world for the country with the most deaths (over 500,000 as of this writing) and the number of diagnosed infected people (over 28 million as of this writing) [28]. In Kentucky, the number of opioid overdoses rose significantly during the pandemic, and the number of those who refused transport after an overdose also increased dramatically [29]. Similarly, non-fatal opioid overdoses increased in an urban ED in Virginia [30].

People with OUD face numerous challenges coping with their disease while maintaining respiratory health [31], [32, p. 19], [33]. They are at a higher risk for complications from COVID-19 due to opioid-related respiratory depression, and they may have adverse cardiac events due to the drug interaction between opioids and medication for COVID-19 [34]. In addition, the social isolation brought on by COVID-19 may increase relapse rates and worsen outcomes for OUD patients who have psychiatric comorbidity [35]. During COVID-19, a growing number of treatment facilities also adopt tele-OUD behavioral therapy, along with MOUD, as their preferred treatment method [36]–[38]. Expanding traditional telemedicine, along with face-to-face “telephone booth” interactions, increases access to harm reduction services in SUD patients during the pandemic (Tringale & Subica, 2021, Krider & Parker, 2021). Telemedicine for OUD treatment is promising and COVID-19 has required the health care system to adapt to the service expansion.

METHODOLOGY

When conducting the literature review, we followed guidelines recommended by Cram et al. (2020) and Okoli (2015).

Search strategy

We individually searched the following digital bibliographic databases: Academic Complete Search, CINAHL Complete, MEDLINE, and APA PsycInfo, with the original aim of detecting all relevant journal articles relating to OUD telemedicine

treatment. We identified search terms from subthemes mentioned in the Literature Review and used Boolean phrases to maximize our search results. Search terms include 'opioid use disorder' or 'opioid abuse' or 'telemedicine', 'opioid management' or 'substance abuse' or 'substance use disorder' or 'opioid remote treatment' or 'opioid distant treatment'. Due to the vocabulary tree's differences across the databases, we customized the search terms to get the desired results. Due to SUPPORT and CARA policy implementation from 2012-2016, we limited our results to articles published within six years of February 2021, with no language restrictions. MEDLINE records and Pre-CINAHL were excluded from CINAHL Complete to prevent first-time duplication.

Inclusion and exclusion criteria

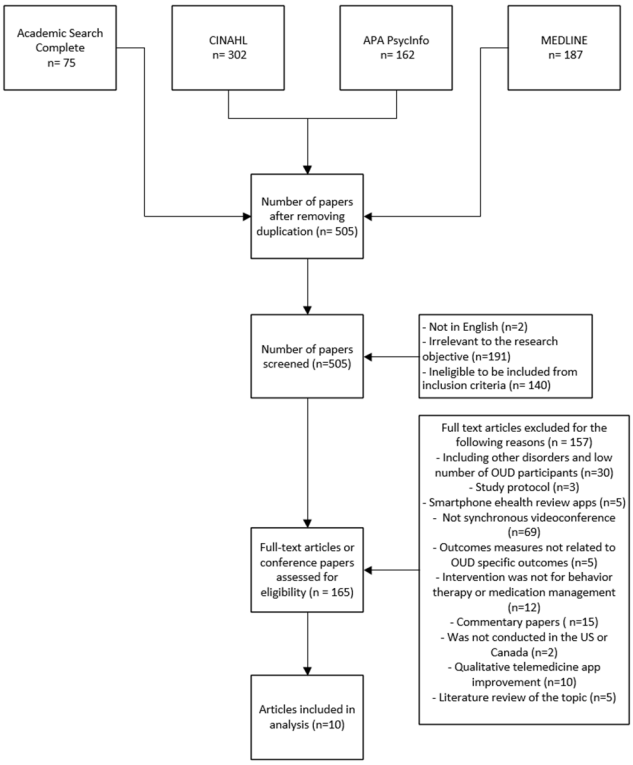
One reviewer screened titles and abstracts to identify relevant results. Studies were eligible for inclusion if they were peer-reviewed, published in English, and mentioned the use of telemedicine in an OUD treatment setting, including behavior therapy in conjunction with medication, telehealth recovery follow-up, and the adoption of tele-OUD treatment during the COVID-19 pandemic. Qualitative studies on telemedicine were excluded.

Quality assessment of the methodology

After screening titles and abstracts, available full-text articles were assessed. We excluded studies that were case reports, commentaries, conference papers, guidelines, and editorials.

After removing duplicates, the search yielded 501 results. After screening titles and abstracts, we excluded 3 non-English articles and 333 irrelevant or ineligible articles. Of 165 eligible articles, we accessed full-text articles to screen eligibility. Figure 1 shows our literature search flow chart. Our focus is on quantitative papers that produce decision data that could be used to guide future telemedicine projects. Nine peer-viewed articles were determined to be both eligible and relevant for the systematic review analysis.

Figure 1. Literature Search Flow Chart



PRELIMINARY RESULTS

We analyzed the title of the 9 eligible papers. Three mentioned the COVID-19 telemedicine adaption for OUD treatment, and six focused on the use of telemedicine in conjunction with MOUD.

Author	Methodology	Sample size	Comparison	Findings
[40]	Non-randomized comparison	3733	Telemedicine, in-person and mixed	Retention in telemedicine treatment and mixed treatment was higher than in-person treatment.
[41]	Retrospective chart review	177	None	Retention decreased significantly after 3 month-period, however, 86% of patients still engaged had negative urine drug screen.
[42]	Systematic review	13	Varies	Telemedicine may a beneficial option when access to treatment is scarce. Most studies suggested telemedicine increases consumer satisfaction.
[43]	Non-randomized clinical trials	98	Telemedicine and in-person	Telemedicine utilization shows similar results in maternal and neonatal outcomes compared to in-person treatment.
[44]	Retrospective chart review	100	Telemedicine and in-person	Buprenorphine telemedicine and in-person care are comparable in terms of additional substance use, days of abstinence, and treatment retention.
[45]	Open-label clinical trial	11	None	Medication adherence was confirmed for an average of 72% of study days and illicit opioid abstinence confirmed by urine toxicology fell 43% within 3 weeks post-intervention.

Table #1: Telemedicine MOUD Result

Studies included in the analysis varied in size, methodology, and mode of telehealth. Eibl and colleagues found that predominantly telemedicine interventions had higher retention in treatment than predominantly in-person or mixed settings [40]. While Weintraub and colleagues noticed a significant decrease in retention, 86% of the remaining participants had negative drug screens. Telemedicine was effective in expanding buprenorphine access in rural settings and for pregnant women (Guille et al., 2020; Weintraub et al., 2018). Zheng and colleagues also found that delivering buprenorphine treatment via telemedicine was comparable to face-to-face delivery for three measured outcomes, including additional substance use, days of abstinence, and treatment retention. Given the potential use of telemedicine in increasing MOUD access to OUD patients, the heterogeneity in these studies' outcome measures makes it difficult to clarify the clinical effectiveness of this treatment modality [42].

COVID-19 Impact

Authors	Methodology	Findings
[46]	Archival Research	Despite an increase in overdose, admission to buprenorphine program tend to increase in COVID-19 due to telehealth protocol shift in Baltimore.
[47]	Experimental	The student and attending physician telemedicine program help increase access to OUD patients due to the ease of buprenorphine policy relaxation in COVID-19.
[48]	Descriptive study	Due to COVID-19, almost half of the jail census was reduced. The ease of buprenorphine regulation allows prisoners to initiate treatment through telemedicine, increasing treatment access to OUD individuals.

Table #2: COVID-19 Impact Results

The latest studies demonstrated an increase in the number of patients receiving buprenorphine due to the COVID-19 policy relaxation [46]–[48]. The change helped correctional facilities and prisons to increase access to treatment for incarcerated people with OUD as well [48].

DISCUSSION

In the studies examining synchronous telemedicine use, studies compared in-person and telemedicine delivery modes. Negative drug screens and treatment retention were the two most common measures of outcome in the eligible studies. In these studies, successful treatment outcomes in all modes were found to be low but were comparable to one another [40], [43], [44]. Treatment retention for telehealth was found to be superior to in-person and mixed modalities in methadone-maintained patients [40]. Drug screens also showed a lower rate of non-methadone substances during the last 30 days of treatment in the telemedicine group compared to in-person and mixed modalities. However, for patients on buprenorphine maintenance, no differences were found in terms of treatment retention or negative drug screens [43], [44]. Guille and colleagues found that telemedicine and in-person care show the similar result when providing addiction treatment in obstetric care [43]. A chart review of buprenorphine telemedicine treatment in rural areas revealed that, although retention in treatment in telemedicine dropped significantly after 3 months, 86% of the remaining participants had negative opioid drug screens [41], [44].

Treatment retention is an important factor in determining MOUD success. For those living in rural areas, access to MOUD may be more difficult. Expanding the use of telemedicine may be a potential solution to increase addiction treatment in rural areas (Lister et al., 2020), or for special populations, such as pregnant women or detainees. This review found an increase in the number of buprenorphine treatment access with the adoption of COVID-19 protocols. However, this could only be a temporary change and may stop when the pandemic is over. Telemedicine may be a potential service delivery model to address the accessibility, availability, and acceptability between patients and providers in rural areas.

CONCLUSION

In this study, we performed a preliminary analysis on the papers collected. We plan to further analyze papers on research design, sampling, data source, data collections, findings, assessing each study's quality, and will present our analysis. One of the limitations is that we solely focus on peer-reviewed journal articles. We did not include any conference proceedings, dissertations, newspapers, gray research papers, or editorials. Future studies should explore patients' outcomes through telemedicine intervention in patients' homes compared to the office as well as the potential for increased access to persons with disabilities.

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