Examining the Effects of COVID-19 Related Policy Changes on Access to Medications for Opioid Use Disorder in the United States

by
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Introduction

The state of emergency that COVID-19 instigated in March 2020 has exacerbated the opioid epidemic that has been ongoing for decades in the United States. With the pandemic disrupting all operations of society, the US healthcare system faced an especially large shock in response to COVID-19. Mandatory social distancing creating more isolation, a heightened level of mental health distress, on top of pandemic-related economic stressors have all resulted in a "perfect storm" scenario for worsening drug-related morbidity and mortality across the US. Estimates based on CDC provisional drug overdose data suggest that monthly deaths increased by about 50 percent between February and May 2020 to greater than 9,000 deaths, although prior to 2020 the U.S. monthly overdose death count had never been higher than 6,300.[1] Opioids were involved in 56,064 drug overdose deaths in the United States from April 2019 to April 2020, with provisional data for the same 12-month period from 2020 to 2021 showing an alarming increase to 75,673 opioid related drug overdoses.[1,2] While COVID-19 is certainly a public health emergency of its own, it is essential that continued attention is focused on the millions of Americans suffering from opioid use disorder (OUD), especially considering how the crisis has only been intensified by COVID-19 with the pandemic increasing barriers to accessing in-person OUD treatment.

The COVID-19 pandemic has disrupted the use of medication for opioid use disorder (MOUD) such as methadone and buprenorphine pharmacotherapy in conjunction with counseling used to treat individuals with OUD. Prior to pandemic disruptions, the long-standing policy for methadone maintenance treatment was a strict requirement mandated by the 2008 Ryan Haight Act to be physically treated in-person at facilities with an Opioid Treatment Program (OTP) certified by the Substance Abuse and Mental Health Services Administration (SAMHSA). Additionally, the U.S. Drug Enforcement Administration (DEA) enforced that there must be an in-person assessment with a "DATA-waived practitioner" to prescribe buprenorphine for OUD treatment. These DATA-waived practitioners must meet specific SAMHSA qualifications (e.g., completing an 8-hour training) in addition to obtaining DEA authorization for the special ability to prescribe buprenorphine for treating OUD. This DATA-waiver process has made it so there is a general shortage of practitioners willing and able to prescribe buprenorphine for OUD in the United States.[3] Although, ever since March 2020 when the United States Federal Government declared a state of emergency in response to COVID-19, the SAMHSA and DEA have temporarily altered these long-standing regulations for MOUD treatment in hopes of reducing COVID-related disruptions to accessing MOUD throughout this unprecedented time. Furthermore, in April 2021, the Department of Health and Human Services issued new practice guidelines for the administration of buprenorphine for treating opioid use disorder to provide an exemption from the DEA DATA-waiver certification requirement needed for practitioners to prescribe buprenorphine for up to 30 OUD patients. This regulation change was implemented about a year after the initial emergency MOUD policy changes were enacted in response to COVID-19 as a way to further expand access to buprenorphine treatment for opioid use disorder given the alarming increase in overdose mortality rates since the onset of the pandemic.[4]

With pandemic-related disruptions to health care services, it was essential that access to these lifesaving MOUD treatments be expanded to counteract the impact of the pandemic. Methadone and buprenorphine are guideline-recommended and evidence-based treatments for OUD. In fact, mortality rates have been found to decrease by 59% among OUD patients receiving methadone and 38% for those on buprenorphine maintenance treatment in the year following an opioid overdose episode.[5] Thus, in response to the constraints COVID-19 presented for receiving in-person treatments, the SAMHSA effective March 16, 2020, eased MOUD methadone restrictions to allow for up to 28 days of take-home methadone doses for "stable" OUD patients and 14 days

of take-home doses for “less stable” patients, whereas before it was mandatory for all patients to physically go to an OTP facility to receive methadone MOUD treatment.[6] Additionally, effective March 30, 2020, the Drug Enforcement Administration changed regulations for buprenorphine prescribing by allowing DATA-waived practitioners to prescribe buprenorphine via telemedicine, whereas before an in-person evaluation was mandated to prescribe buprenorphine MOUD.[7] These sudden temporary changes to MOUD policy were implemented with the intention to offset the inevitable disruption of COVID-19 on receiving MOUD by easing restrictions and expanding treatment options through reducing the need for in-person visits.

This thesis incorporates a comprehensive literature review to examine the changes in MOUD treatment access and how the experiences of MOUD patients and providers have been impacted since these temporary policies were implemented. The literature review was conducted in concert with a secondary analysis of the SAMHSA National Survey of Substance Abuse Treatment Services (N-SSATS) datasets from 2019 and 2020 to examine how the policy changes affected the availability of MOUD treatment services in substance use disorder treatment facilities and OTPs more specifically. The literature review serves to contextualize the findings of the N-SSATS secondary data analysis to assess any changes to MOUD treatment delivery along with the perspectives of both MOUD patients and providers regarding the pandemic-related easing of MOUD treatment restrictions. Findings from both the secondary analysis and literature review were taken into consideration to inform a discussion about the potential benefits of extending these policy changes beyond being only a temporary COVID-19 emergency response.

Review Question

The literature review is aimed at examining the current state of the evidence regarding the impacts of COVID-19 related policy changes made effective in March 2020 by the SAMHSA which allowed OUD patients to take home doses of methadone treatment along with the DEA easing restrictions on administering buprenorphine treatment via telemedicine. The Joanna Briggs Institute (JBI) PCC (Population, Concept, Context) framework was employed to inform the development of a scoping review protocol. The overarching research question to guide the review and synthesis of the literature was:

How have access to, and use of, medication treatment for OUD been impacted or altered since the enactment of COVID-19 related policies easing restrictions on the administration of methadone and buprenorphine for OUD?

Per the JBI PCC framework, the “Population” being considered in this review are OUD patients receiving MOUD as well as the providers of MOUD treatment. It is important to gain insight into not only patient perspectives but also provider perspectives on MOUD treatment in light of policy changes. The “Concept” aspect guiding the literature review is examining in what ways, if any, have access to MOUD (specifically methadone and buprenorphine) and treatment options for MOUD been impacted since the enactment of COVID-19 related policy changes around the administration of MOUD treatments in March 2020. Finally, the “Context” used for this review is examining MOUD treatment within the United States only, since these policy changes were implemented across all of the United States via the SAMHSA and the DEA in March 2020 following the declaration of a “State of Emergency” by the US Federal Government in response to COVID-19 on March 13, 2020. In addition to the overarching research question, two sub-questions were formulated to examine how the policy changes impacted more vulnerable populations receiving MOUD treatment:

1. How have COVID-19 related policy changes for MOUD impacted access and treatment options for incarcerated populations?

2. How have COVID-19 related policy changes for MOUD impacted access and treatment options for rural populations who have historically struggled with accessing MOUD treatment?

Eligibility Criteria

The JBI PCC framework was also employed in developing inclusion and exclusion criteria for guiding the review of the literature.

Articles must satisfy the following criteria to be included in the literature review:

1. Be the product of original research or a systematic/scoping review of research. Editorials, case reports, and opinion pieces will be excluded because they contribute little generalizable knowledge.
2. Be published between March 30, 2020, and October 21, 2021 (date of the database search).
3. Source content must examine a timeframe after the COVID-19 policy changes were implemented on March 30, 2020.
4. Examines the MOUD treatments methadone or buprenorphine in the United States.
5. Uses either a quantitative, qualitative, or mixed-methods research design.
6. Be published in English.
7. Full text of the articles must be available.

Criterion 3 is specific to the study period considered by the article rather than publication date to exclude articles on MOUD that may have been published after March 30, 2020, but the article contents are not studying the timeframe after policies were enacted in March 2020. These sources will be excluded due to not being relevant to the review's research question(s).

Types of Sources

This literature review considered quantitative study designs such as experimental and quasi-experimental study designs including randomized controlled trials, non-randomized controlled trials, and before and after studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies will be considered for inclusion. The review also considered descriptive observational study designs for inclusion.

In addition to quantitative study designs, qualitative studies that collect data regarding OUD treatment programs, MOUD patients, and providers of MOUD were also considered. Study types include, but are not limited to, designs such as phenomenology, case studies, grounded theory, qualitative description, and surveys. In addition, systematic and scoping reviews that meet the inclusion criteria were considered. Text, editorials, and opinion papers were not considered for inclusion in this literature review.

Methods

A search of Embase and PubMed (Medline) databases was conducted on October 21, 2021, using the following search strategy.

Search Strategy

The search strategy aims to locate both published and unpublished studies. An initial limited search of Medline and Embase was conducted to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy for PubMed and Embase (see Appendix). The search strategy, including all identified keywords and index terms, was kept consistent to be employed in both the Embase and Medline database searches.

The databases searched include Medline via NCBI's PubMed platform and a search of the Embase database excluded all sources that were also included in Medline to avoid duplicate articles. The exact search query and combined terms used to conduct the searches of Medline and Embase for this literature review can be found in the Appendix.

Study/Source of Evidence Selection

Following the search, the 125 identified citations (n = 125) from the combined database searches were collated and uploaded into the citation management system Zotero. The citations were also uploaded to the review management system Covidence where 2 duplicate sources from the Embase and Medline searches were removed (n = 123). Titles and abstracts were then screened for assessment against the inclusion and exclusion criteria for the review using the Covidence software. In the title and abstract review 61 studies were found to be irrelevant to the review resulting in 62 sources to be included in the full text review (n = 62). The 62 sources that were sorted in the initial title and abstract screening were included in a full text review which resulted in 17 additional sources being excluded from the literature review due to not meeting the inclusion criteria. Thus, a total of 45 articles were included in the literature review from which relevant outcomes and details were documented using a data extraction tool. The data extracted from the review of the literature was used to inform the results and discussion of this thesis. A flow diagram depicting this process of screening and removing articles that did not meet inclusion criteria for the literature review can be found in Figure 1.

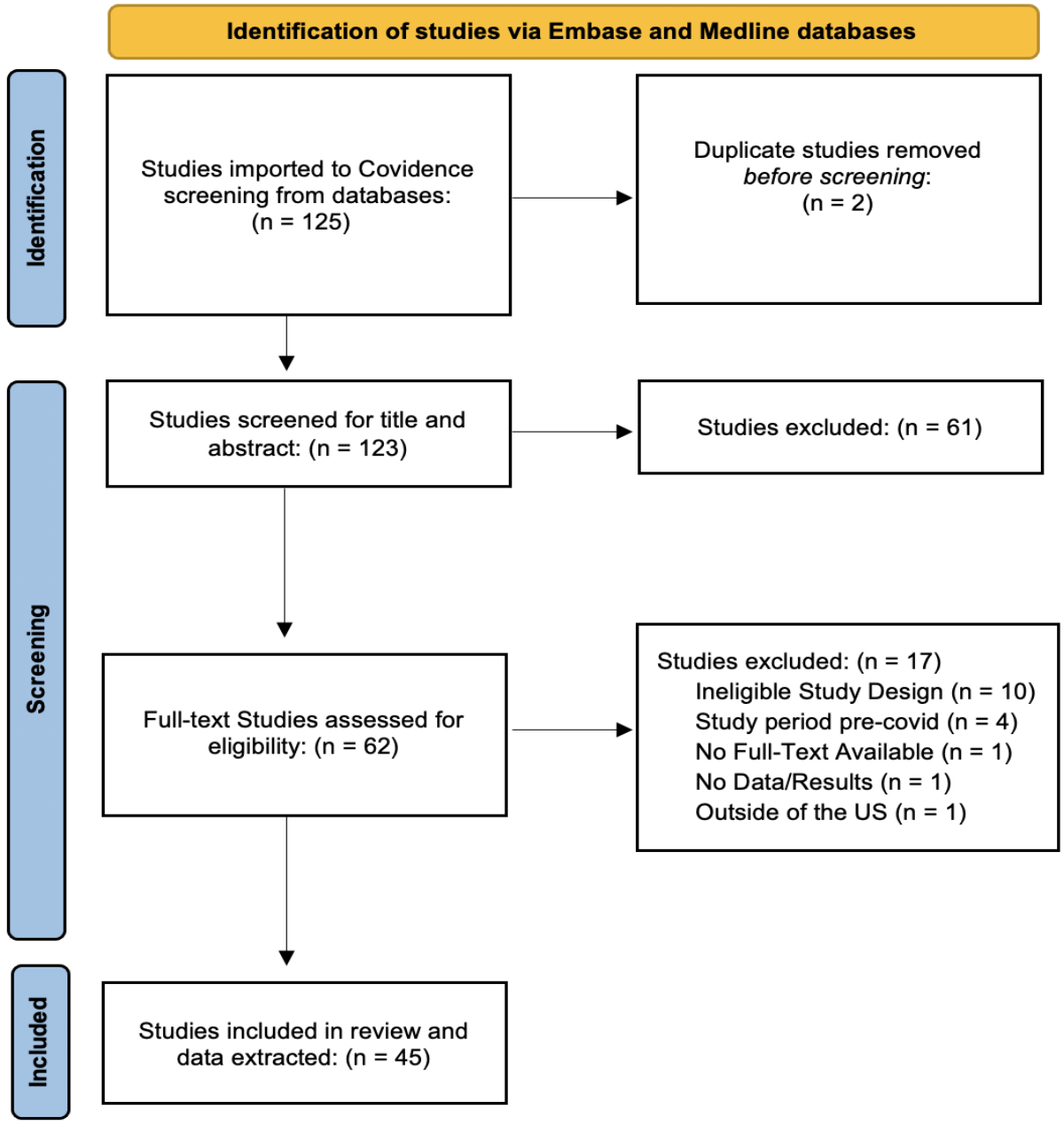
Data Extraction

Data extracted from sources included in the literature review using a data extraction tool developed by the reviewer in Microsoft Excel. The data extracted included specific details about the participants, concept, context, study methods and key findings relevant to the main review question and sub-questions to document the perspectives of both MOUD patients and providers. Additionally, the tool was employed to evaluate the successes and setbacks of programs and MOUD treatment options that emerged in response to COVID-19 related MOUD policy changes.

Literature Review Results

The database search of Medline and Embase resulted in 125 total articles, of which 45 met inclusion criteria. The search decision process is depicted below in Figure 1. The researcher conducted full-text data extraction of the 45 sources to inform the results of this literature review.

Figure 1: Flowchart of article screening and inclusion process for literature review



Primary Review Question Results

The primary research question “How have access to, and use of, medication treatment for OUD been impacted or altered since the enactment of COVID-19 related policies easing restrictions on

the administration of methadone and buprenorphine for OUD?" must be examined to assess the impact of this policy change on accessing MOUD treatment among general OUD patients within the United States. This portion of the literature review results describes how access to and delivery of MOUD treatment has changed since the onset of COVID-19 and related relaxation of MOUD regulations. The results consider the perspectives and experiences of MOUD providers and patients as well as examine the facilitators and barriers of MOUD programmatic adaptations in light of COVID-19 MOUD policy changes. Results of articles from the review that did not necessarily examine a specific program innovation but rather reported on general MOUD outcomes data are presented separately from the results on programmatic adaptations.

MOUD Treatment Programmatic Adaptations

OUD treatment programs implemented various programmatic adaptations in response to COVID-19 and MOUD policy changes that authorized treatment modifications. Out of the 45 total articles examined in this literature review, 24 articles examined programmatic adaptations to MOUD treatment. Although, six of the 24 articles reviewed focus on the rural and incarcerated OUD subgroups of interest. These six articles describe population specific programmatic changes and are reviewed separately in the rural and incarcerated population sections of the results. Therefore, 40% of all articles in the literature review described programmatic adaptations to MOUD treatment programs that were not specific to an OUD sub-population of interest (n = 18). Of these eighteen articles, 27.7% (n = 5) examined methadone treatment adaptations, 61.1% (n = 11) looked at buprenorphine treatment adaptations, and 11.1% (n = 2) described treatment adaptations that pertained to MOUD more generally and included both medications. Table 1 below depicts the six types of MOUD treatment programmatic adaptations identified by the reviewer.

Table 1: Programmatic Adaptations to MOUD Treatment Services

Programmatic Adaptation to MOUD Treatment:	MOUD Treatment Type:	Number of Articles:	Author, Location, and Period under review:
Electronic Pillbox used to dispense take-home methadone doses	Methadone	n = 2	1. Kidorf et al., Maryland, April – July 2020 2. Dunn et al., N/A, March 2018 – March, 2020
Opioid Treatment Programs increasing quantity of take-home doses	Methadone	n = 3	1. Joseph et al., New York City, NY, March – May 2020 2. Amram et al., Washington, April – December 2020 3. Tracy et al., New York City, NY, N/A
Virtual Buprenorphine Clinics	Buprenorphine	n = 2	1. Tofighi et al., New York City, NY, March – May 2020 2. Clark et al., Rhode Island, April – November, 2020

Emergency Department Patient Outreach after Opioid Overdose Episode	Buprenorphine	n = 3	1. Grunvald et al., Vermont, March – May 2020 2. Samuels et al., Rhode Island, January 2020 – April 2021 3. Langabeer et al., Houston, TX, March – June 2020
"Low-Threshold" Buprenorphine Programs	Buprenorphine	n = 5	1. Leo et al., Chicago, IL, N/A 2. Mehtani et al., San Francisco, CA, April – May 2020 3. Griffen et al., Ithaca, NY, April – December 2020 4. Nordeck et al., Maryland, March – May 2020 5. Castillo et al., Miami, FL, March – June 2020
General MOUD Treatment Adaptations	Both	n = 2	1. Patton et al., Boston, MA, March – August 2020 2. Hughto et al., Rhode Island, N/A

Programmatic Adaptations: Methadone MOUD Treatment

All five articles that discussed methadone MOUD treatment program adaptations involved increasing the amount of patients receiving take-home methadone as well as supplying larger doses for take-homes.[8–12] This is a positive indication that some MOUD treatment programs are utilizing the increased flexibility for methadone take-home doses sanctioned by the SAMHSA on March 16, 2020. All articles with the exception of Tracy et al.[12] reported some type of quantitative outcomes data for programmatic adaptations. Two of the five articles employed an electronic pillbox for take-home methadone doses to ensure safe use of the medication and reduce potential harm to MOUD patients.[8,9] The remaining three articles examine general OTP programmatic adaptations that increased access to take-home doses of methadone.

Two articles identified in the literature review utilized an electronic pillbox to safely administer methadone take-home doses for OUD patients during COVID-19. The pillbox contains daily methadone doses in compartments that do not open unless it is the correct day and dosing window, and providers are notified if patients attempt to access doses outside of the set times. Both articles demonstrate the safety and efficacy of using an electronic pillbox for dispensing take-home doses of methadone. For example, Kidorf et al. describe adaptations to a MOUD treatment program in Baltimore where 42 patients deemed vulnerable to take-home mismanagement were provided the electronic pillbox for methadone treatment. This MOUD program rapidly transitioned to dispensing take-home methadone in response to COVID-19 and utilized the pillbox as an adaptation that allowed less stable MOUD patients to receive take-home doses safely. Only 5 of 42 patients had the pillbox removed due to notifications of tampering with the pillbox and no

overdoses occurred throughout the April to July 2020 timeframe under study. At this MOUD treatment program, patients' average monthly take-home doses increased from 11 to 25.6 take-homes per month and the article described the pillbox as an effective method for supplying methadone take-homes to patients at higher risk for misusing the medication.[8] The article by Dunn et al. also described providing methadone take-home doses in an electronic pillbox to patients who would not otherwise be candidates for take-home doses due to safety concerns. The article reports that no methadone diversion occurred among patients using the pillbox, 86.3% of patients expressed that they would use the pillbox again, and 95% would recommend the pillbox to other less stable MOUD patients,[9] and this supports the safety and efficacy of methadone pillboxes as a program adaptation demonstrated by Kidorf et al.

The remaining three articles examine OTP adaptations that made take-home methadone more accessible or supplied longer doses of take-homes for MOUD patients in response to COVID-19. Amram et al. measured the number of patients on take-home methadone doses prior to policy and programmatic changes as well as after they were implemented in one OTP in Washington. The article reports that of the 183 patients getting MOUD treatment at this OTP, 90.7% increased their doses of take-home methadone after the programmatic changes were implemented during COVID-19, and the mean number of take-home doses increased 200% to an average of 22.3 doses per 30-day period.[11] The Joseph et al. article describes initial programmatic adaptations to 5 OTPs in the Bronx borough of New York City consisting of increasing the number of patients permitted take-home methadone doses along with eliminating toxicology screening for methadone patients in March 2020. Out of 3,600 MOUD patients receiving methadone across the 5 OTPs, the percentage of patients granted take-home methadone increased from 52.8% to 90.6% of patients receiving take-home doses after the program adaptation during COVID-19.[10] Finally, the third article by Tracy et al. did not provide quantitative data about the program adaptation. Instead, it qualitatively describes the response of 10 OTP methadone clinics in New York City during the early months of COVID-19 shutdowns. All 10 OTPs immediately adopted the SAMHSA policy guidelines by allowing 14- and 28-day take-home methadone doses for "less stable" and "stable" patients, but new patients were not offered take-home methadone for safety reasons.[12]

Each of these articles demonstrate ways that MOUD programs took advantage of the SAMHSA policy changes that eased strict regulations on take-home methadone doses to improve accessibility of take-homes for their patients. For opioid treatment programs that did not offer take-homes to new patients due to safety concerns, like the one described by Tracy et al., a promising solution to this apprehension may be providing take-homes in an electronic pillbox, as this adaptation was proven to be safe and effective for providing take-homes to higher risk MOUD patients in the Kidorf and Dunn et al. articles.

Programmatic Adaptations: Buprenorphine MOUD Treatment

There were eleven total articles pertaining to programmatic adaptations for buprenorphine MOUD treatments identified in this review. Notably, every programmatic adaptation in these articles that utilized telemedicine resulted in improved buprenorphine MOUD access, and the one program described by Grunvald et al.[13] that did not adopt telemedicine experienced setbacks to MOUD treatment during COVID-19 as a result. This suggests that MOUD treatment programs are utilizing the policy changes that allowed for buprenorphine induction via telemedicine to adapt their programs and successfully expand access to buprenorphine. While almost all adaptations described across the eleven articles involved telemedicine, three general adaptation strategies were identified and will be used to separate articles and examine results based on which strategy

was employed. The adaptation strategies consist of the following: (1) Two articles (18.2%) examine MOUD treatment programs that launched novel virtual buprenorphine clinics after the DEA authorized buprenorphine induction via a phone call in March 2020, eliminating the need for an in-person evaluation.[14,15] (2) Three of the eleven articles (27.3%) were specific to buprenorphine MOUD programs that aimed to connect OUD patients who were recently released from the emergency department for an overdose event with a buprenorphine provider to start MOUD treatment.[13,16,17] (3) Five out of eleven articles (45.5%) reported on adaptations to low-threshold buprenorphine programs that capitalized on the removal of an in-person appointment for initiating buprenorphine treatment and utilized telehealth to expand access to MOUD, especially for vulnerable populations like individuals experiencing homelessness.[18–22] Additionally, only one article reported general outcomes of a singular opioid treatment program's shift to buprenorphine treatment via telemedicine,[23] and thus did not fit with any of the three strategies. Out of the eleven articles, only 37.5% (n = 3) did not provide some form of quantitative data about the programmatic adaptation.[17,18,20]

One article by Cales et al. did not fit into any of the 3 identified adaptation strategies for buprenorphine MOUD treatment programs. This article examined the shift to telemedicine services at the largest MOUD program facility in Louisville, Kentucky, and reports on the uptake of the program's adapted services.[23] After adapting to telemedicine, the program initiated 92 additional patients on buprenorphine from March to October 2020. Interestingly, the clinic offered telemedicine services to all OUD patients yet only 3.1% of patients utilized telemedicine for clinical visits. Telemedicine was more popular among patients for MOUD counseling services, with 56.7% of patients transitioning to virtual counseling appointments post programmatic adaptations.[23] The following section will review the results of articles that were identified as belonging to one of the three programmatic adaptation strategies.

(1) Virtual Buprenorphine Clinics

The first theme of adaptation strategies in response to the COVID-19 pandemic and MOUD policy changes was the addition of virtual buprenorphine clinics to MOUD treatment programs. Tofighi et al. describe one office based opioid treatment program in New York City adapting its treatment delivery during COVID-19 through adding a virtual buprenorphine clinic. This virtual clinic adaptation facilitated same day buprenorphine induction by connecting OUD patients with a provider via telemedicine, and from March to June 2020 this program successfully provided buprenorphine MOUD treatment via telemedicine to 78 patients. The program adaptation also showed promising retention rates with 53.8% of patients remaining in treatment after two months, and 30.8% of patients who received buprenorphine through this virtual clinic were new to MOUD treatment.[14] Additionally, the Clark et al. article also examines a virtual buprenorphine clinic that was established through the Rhode Island Department of Health as a programmatic adaptation to MOUD treatment in response to COVID-19 and subsequent policy changes.[15] The adaptation consisted of a "tele-bridge" buprenorphine hotline where patients could be immediately connected to a virtual buprenorphine prescriber to initiate MOUD treatment via telemedicine, similar to the program adaptation described by Tofighi et al. in New York. From April to November 2020 this virtual clinic hotline fielded 93 phone calls and successfully initiated buprenorphine treatment and established longitudinal outpatient MOUD care for 74 new patients. It is important to note that 92% of these 74 patients had never been enrolled in MOUD treatment and many expressed that treatment was made possible by telemedicine reducing the barriers that prevented them from accessing care prior to COVID-19.[15]

(2) Emergency Department Opioid Overdoses: Patient Outreach to Initiate Buprenorphine Treatment

The second MOUD treatment adaptation strategy that was found in three of the eleven articles consist of programs that specifically target OUD patients who were recently in the emergency department (ED) recovering from an opioid overdose. These programs, excluding the Grunvald et al. article, contacted OUD patients that were recently released from the ED on the phone to connect patients to a buprenorphine prescriber and begin MOUD treatment via telemedicine. The "Start Treatment and Recover" (STAR) program described in the Grunvald et al. article experienced barriers with the STAR ED-based buprenorphine MOUD program due to not shifting to telemedicine induction after policy changes were implemented in March 2020. The program continued to only conduct outreach to patients who were physically in the ED after an opioid overdose and consequently experienced a significant 82.6% reduction in STAR enrollments in the early months following COVID-19 and MOUD policy changes.[13] Alternatively, the two programs that employed a similar strategy of engaging OUD patients who were recently in the ED for opioid overdose did implement telemedicine for buprenorphine induction into their programs and experienced programmatic benefits as a result.

The Samuels et al. article examines a program implemented by a Rhode Island hospital where follow-up phone calls were made to patients who were recently released from the ED after an overdose to gauge interest in initiating buprenorphine MOUD treatment via a telemedicine appointment. This program experienced success with connecting 254 recently released OUD patients to MOUD treatment referrals and support services, and 15 patients saw a provider for same day telemedicine buprenorphine initiation. Notably, the article reported that most OUD patients referred to a telemedicine buprenorphine provider expressed that they would not have otherwise entered recovery treatment if not for being contacted by the program.[16] The other ED buprenorphine induction outreach program that utilized telemedicine as an adaptation was done by a Houston Texas based OTP and is described qualitatively in the Langabeer et al. article. Prior to COVID-19 disruptions, this program involved outreach to OUD patients who were recently discharged for opioid overdose at an affiliated hospital's ED. If patients accepted treatment, they receive an initial screening and induction on buprenorphine for 4-6 weeks accompanied by peer recovery support and addiction counseling. This program was able to adapt services to telemedicine in response to COVID-19, although the OTP did not see a greater number of patients as a result of this shift to telemedicine. However, telemedicine did improve patients' engagement in care with peer recovery meetings being attended by 10 more patients on average. It also improved attendance at individual counseling sessions after this service became available through tele-MOUD.[17]

(3) "Low-Threshold" Buprenorphine Programs

The final adaptation strategy that was identified in five of the eleven articles is modifications to low-threshold buprenorphine treatment programs. Two of the five articles describe novel low-threshold programs that were created in response to COVID-19 to operationalize the relaxed regulations for buprenorphine prescribing.[19,22] The remaining three articles examine adaptations to existing low-threshold buprenorphine programs that were implemented to expand access to MOUD treatment amid COVID-19 by utilizing the flexibility offered by MOUD policy changes.[18,20,21]

Two of the five articles describe novel low-threshold buprenorphine MOUD programs that were created during COVID-19 to innovate and increase buprenorphine treatment access by removing barriers to care. Both articles include some form of quantitative outcomes from the program. The first of these programs is described by Castillo et al. as a syringe service program that shifted to a model of tele-MOUD to initiate buprenorphine treatment for OUD patients based in Miami,

Florida. This novel low-threshold buprenorphine prescribing program took the place of a syringe service harm reduction program after policy changes were implemented in March 2020 allowing buprenorphine induction via only a telemedicine appointment and served 15 patients between March to June 2020. Through this low-threshold program, OUD patients requested appointments online and medical students coordinated care between patients and a buprenorphine prescriber to set up a telemedicine appointment for buprenorphine induction. Eighty percent of the patients served were able to pick up buprenorphine prescriptions and 83% of patients completed a follow-up visit.[22] A second article by Mehtani et al. describes a novel low-threshold buprenorphine program that was developed in San Francisco's Isolations and Quarantine (I&Q) sites during early COVID-19 (April – May 2020). This program identified 12 individuals with OUD staying at the I&Q sites to initiate buprenorphine treatment via telemedicine while patients were quarantining at the site, and 4 of these patients continued MOUD treatment outside of the I&Q site after discharge.[19]

Additionally, three of the five articles examined adaptations that were implemented by low-threshold buprenorphine MOUD programs in response to COVID-19 and MOUD policy changes. All the programs utilized telemedicine for buprenorphine initiation and found that this made low-threshold buprenorphine treatment more accessible to vulnerable OUD populations who benefit most from these types of low-threshold programs, such as OUD patients experiencing homelessness. The Leo et al. article qualitatively describes adaptations to a Chicago based MOUD program "The Night Ministry" that serves homeless OUD patients. The Night Ministry program partnered with a federally qualified health center in Chicago to connect homeless OUD patents with a buprenorphine prescriber at the health center via telemedicine and initiate buprenorphine treatment. After the buprenorphine induction was completed, the Night Ministry delivered the medication directly to patients using the program's mobile health van.[18] This programmatic adaptation made use of the MOUD policy changes through partnering with another local health center to reduce the barriers that prevent patients from accessing treatment by offering telemedicine buprenorphine induction. Another article by Griffen et al. also qualitatively describes a programmatic adaptation to an existing MOUD treatment program in New York. This program rapidly transitioned to telemedicine in March 2020 and noticed a need to support the program's homeless patients who were unable to engage in virtual health services. The program adapted to this identified need by sending community health workers into local homeless encampment sites with smartphones to schedule a MOUD visit or complete a virtual visit with a buprenorphine prescriber in real time. This adaptation proved to be successful with maintaining 23 homeless OUD patients' engagement in the program and 4 new homeless patients initiated buprenorphine MOUD treatment.[20]

The last article examining low-threshold buprenorphine MOUD program adaptations by Nordeck et al. explains the transition to telemedicine in a Baltimore based MOUD program. After COVID-19 related policy changes were established in March 2020, this MOUD treatment program quickly moved buprenorphine induction to telemedicine rather than in-person. As a result, the program experienced a significant increase in buprenorphine MOUD patient intakes (68 new intakes) during the last two weeks of March 2020. From March to May 2020, 140 new patients were initiated on buprenorphine treatment and 96.5% of patients returned for a second telemedicine MOUD appointment. The most significant result of this programmatic adaptation was that 64% of patients (n = 72) remained engaged in care for at least 30 days after transitioning to telemedicine, yet during the same time frame in 2019, before telemedicine was a treatment option, only 62% of patients (n = 23) remained engaged in care after 30 days.[21] This demonstrates that telemedicine not only improved patient engagement in treatment but also increased the total number of patients accessing care because of the program's telemedicine adaptation.

Programmatic Adaptations: General MOUD Treatment

Finally, two out of the eighteen total articles identified as programmatic adaptations were not necessarily specific to methadone or buprenorphine treatment adaptations, but rather examined programmatic changes to MOUD treatment more generally. One article by Patton et al. identifies programmatic adaptations to implement telemedical services for a MOUD treatment program run by Boston Medical Center, where 53% and 34% of patients were enrolled in methadone or buprenorphine MOUD treatment respectively. The article reported that adapting services to telemedicine has improved patient engagement in MOUD treatment and no-show rates fell from 34% pre-adaptations to only 10% after telemedicine was implemented.[24] Another article by Hughto et al. examined adaptations to MOUD counseling services in a Rhode Island based outpatient substance use and mental health treatment program and experienced similar improvements in patient engagement with MOUD care.[25] The transition to virtual MOUD counseling was found to increase the number of patients who showed up to MOUD appointments by 10%, going from 77% when only in-person visits were allowed to 88% after transitioning to telemedicine. Additionally, 101 new MOUD patients received counseling via telemedicine in the initial months of COVID-19 shutdowns and both new and existing patients expressed that telemedicine made engaging in their MOUD care significantly easier.[25]

MOUD Provider Experiences

Out of 45 total articles reviewed, nine articles focused solely on the experience and perspective of MOUD providers since COVID-19 and related MOUD policy changes. Providers expressed that the policy changes facilitated MOUD treatment in some way across all nine articles, although five articles also described providers perceptions of barriers to treatment since the onset of COVID-19 in addition to these facilitators.[26–30] Some quantitative data was provided in four of the nine articles,[26,28,30,31] and the remaining 5 articles focused on evaluating qualitative data from MOUD providers.[27,29,32–34] The breakdown of articles pertaining to MOUD provider experiences with methadone, buprenorphine, or both medications for OUD was 22.2% (n = 2), 55.5% (n = 5), and 22.2% (n = 2) respectively.

For the two articles specific to methadone MOUD treatment, Levander et al. surveyed 170 OTP providers and found that 47% of OTP providers allowed 14-day take-home doses for newly enrolled MOUD patients, 52% allowed 14-day take-home doses for "less stable" MOUD patients, and 66% allowed 28-day take-home for "stable" patients.[30] Potential reasons for this unequal implementation of increased methadone MOUD take-home doses across OTPs is offered in the qualitative survey conducted by Madden et al. which interviewed 59 OTP providers about their perspective on MOUD policy changes. Madden et al. identified three major themes among MOUD providers who did not increase methadone take-home allowance for their patients. Their reasons included (1) patient care benefits from the “structure” of supervised methadone dosing, (2) attributing improved MOUD patient safety to methadone take-home dose regulations, and (3) fearing liability for methadone-related harms to patients as a result of expanding access to take-home doses.[29] However, some MOUD providers in the Madden et al. article supported the regulation changes for methadone take-home doses citing that the stricter regulations undermined patient-centered care and restricted access to methadone for treating OUD.[29] The reasons for not increasing take-home doses of methadone detailed by MOUD providers in the Madden et al. article could be a potential explanation for Levander et al. finding that increased allowance for take-home methadone doses was not consistently adopted across opioid treatment programs in the survey.

Out of all nine articles that examined MOUD provider experiences, five articles specifically looked at buprenorphine for MOUD treatment. Notably, all five articles described the COVID-19 related MOUD policy changes as allowing for increased access to treatment through buprenorphine induction via telemedicine. Sixty percent of these articles (n = 3) also identified barriers that providers experienced for administering buprenorphine for OUD treatment.[27,28,26] Across the five articles, buprenorphine MOUD treatment was facilitated by policy changes as patients could now begin treatment without completing an in-person evaluation. Two consistent themes were identified as facilitators of MOUD among the five articles which were (1) telemedicine buprenorphine induction removes traditional barriers to accessing treatment and allowed for more patients to be treated by providers,[26,27,28,32,34] and (2) telemedicine improved the overall quality of providers' interactions with their OUD patients by enhancing continuity of care and increasing patients' satisfaction with treatment.[27,28,34] In the three articles that described barriers, the common barrier was that many OUD patients lack access to the necessary technologies for facilitating MOUD treatment via telemedicine.[26,27,28] Another barrier expressed by buprenorphine providers in the Uscher-Pines et al. article was that telemedicine appointments for buprenorphine treatment offered less physical information to inform their clinical decision making and made it difficult to establish meaningful connections with their OUD patients.[27] A unique barrier to expanding MOUD treatment in light of policy changes was reported in the Jones et al. article, where 31% of the 10,238 data-waived prescribers surveyed were not aware of the DEA exemption of in-person examinations to initiate buprenorphine MOUD treatment.[26]

Finally, both methadone and buprenorphine MOUD treatment changes were examined from the provider perspective in two out of the nine total articles. Both articles only identified facilitators of MOUD treatment after COVID-19 related policy changes and did not mention any barriers experienced by MOUD providers. In the Treitler et al. article, 20 New Jersey MOUD providers were interviewed and all expressed support for the regulation changes to continue beyond COVID-19. In qualitative interviews, these providers described the new regulations as allowing them to have more frequent contact with their patients which improved treatment retention rates and most providers allowed a greater number of patients take-home methadone doses as well.[33] Caton et al. conducted a survey of 118 MOUD providers across 57 primary care clinics in California collecting quantitative data and found that policy changes had significantly facilitated MOUD treatment. This survey reported that the policy changes allowed for positive adaptations to treatment such as more assertive outreach to MOUD patients (48.1%), reducing barriers for patients to start and continue MOUD (61.5%), and over half of respondents expressed an easier or unchanged experience with retaining and engaging patients in MOUD care via telemedicine.[31]

MOUD Patient Experiences

There were five articles included in the literature review that exclusively examined OUD patients' experiences with accessing MOUD treatment amid the COVID-19 pandemic and subsequent MOUD policy changes. It is important to note that all five articles report on perspectives of MOUD patients in the earliest months of the pandemic, from March to September 2020, when nationwide shutdowns and transitions to remote modalities were occurring, accompanied by high public anxiety over global impacts of the novel coronavirus. Interestingly, 60% of articles (n = 3) assessed MOUD patient perspectives by analyzing posts from the social platform Reddit,[35–37] where users post in 'sub-reddits' like "*r/OpiatesRecovery"* to discuss their experiences with MOUD treatment. The other two articles were surveys of patients at OTP and MOUD facilities, both of which described barriers patients faced when accessing MOUD treatments during the early months of COVID-19.[38,39] Only one article by Nobles et al.[36] focused on methadone alone, the other four articles pertained more generally to MOUD treatment, including buprenorphine.

Three of the five studies that examine MOUD patient perspectives were sourced from posts on the social platform Reddit. One article focused specifically on methadone MOUD patients' perspectives, identifying barriers that patients faced in the early months of COVID-19 with accessing their methadone MOUD treatments.[36] The other two Reddit articles examined OUD patient experiences with accessing treatment more generally and identified both barriers and aspects that patients viewed as facilitators for maintaining their MOUD care. The article by Nobles et al. examined 3,077 Reddit posts from patients' describing their experience on methadone treatment during the initial months of COVID-19 and identified that 54.4% of posts reported experiencing some form of difficulty accessing methadone, 28.4% of posts reported impediments accessing OTPs due to COVID-19 shutdowns, and 20% of posts discussed self-management of OUD care due to decreased access to OTPs and MOUD treatment.[36]

The remaining two articles by El-Bassel et al. and Krawczyk et al. also used Reddit to capture the perspective of MOUD patients taking methadone or buprenorphine and identified some common themes of MOUD treatment facilitators and barriers from these posts. In both articles, OUD patients deemed telemedicine as a facilitator for their continuation of MOUD treatment, even in the midst of mass shutdowns during the earliest stage of the pandemic.[35,37] Krawczyk et al. also reported that patients viewed the MOUD regulation changes as a facilitator by allowing for increased take-home doses of methadone and quantitates of buprenorphine prescriptions, with many posts claiming that these changes allowed patients to better maintain engagement in their MOUD treatment.[37] However, these two articles also described common barriers faced by patients when accessing MOUD treatments such as patients expressing concern over OTP shutdowns, and this created uncertainty about when they would receive their next dose of medication. Additionally, both articles discussed frustrations of OUD patients with having to continue to physically visit OTP facilities to receive treatment if they were not granted methadone take-home doses, and patients felt that treatment unnecessarily increased their risk of COVID-19 with multiple posts even discussing switching to buprenorphine MOUD to avoid this heightened risk.[35,37]

Finally, two out of the five articles that investigated patient perspectives of MOUD treatment did not use Reddit to analyze patient experiences but rather employed surveys to gauge the opinions of patients at MOUD treatment facilities. Both articles focus on barriers to care from the perspective of MOUD patients during the initial months of COVID-19. For example, Jacka et al. conducted a survey of 188 patients across 8 OTPs and found that 52% of patients reported disruption to MOUD treatment and 58% of patients did not have greater access to take-home methadone throughout this early transition phase of the pandemic.[38] This quantitative data demonstrates that the majority of MOUD patients surveyed did not have greater access to take-home methadone doses, despite policy changes that authorized increased take-home doses. This may reflect the frustrations detailed in Reddit posts by MOUD patients who identified having to continue in-person methadone treatment during COVID-19 as a major barrier to treatment.[35,37] The other article by Bayers et al. surveyed 109 patients at a MOUD treatment facility in Kentucky and identified the overall negative effect on mental health as a major barrier for patients, with many expressing that the stress of COVID-19 made it more difficult to continue treatment and stay away from drug use[39] Although, this survey also found high patient agreement on openness to telemedicine as a treatment modality, which echoes the sentiment of MOUD patients' Reddit posts regarding telemedicine for treatment.

None of the patient perspective articles identified by this literature review examined a period later than the earliest months of the pandemic (March – September 2020). Thus, it is important to acknowledge that the barriers and facilitators identified in these five studies may not be representative of the treatment experiences of MOUD patients throughout later stages of the ongoing COVID-19 pandemic.

MOUD Treatment Outcomes

Finally, seven articles identified by the literature review did not examine a specific program adaptation but instead report on more general MOUD treatment outcomes data during COVID-19 after the MOUD policy changes were enacted. One of the seven articles that reported data on outcomes focused on incarcerated OUD populations and is described in that section of the results.[40] Among the remaining six articles that reported MOUD treatment outcomes data, there were two articles on methadone,[41,42] and four articles examining buprenorphine.[43–46]

Two out of the six total articles (33.3%) reporting MOUD treatment outcomes data focused specifically on methadone. The first of these articles by Joudrey et al. examined methadone treatment access differences between Medicaid versus self-pay methadone clinics and found that 54% of Medicaid clinics versus 48% of self-pay clinics contacted were not accepting new patients due to COVID-19 throughout the months of May and June 2020.[42] This study also investigated differences in "timely methadone access", which was defined as MOUD patients being able to receive an appointment and initiate methadone treatment within 1 day of contacting the clinic and found that 24% of Medicaid clinics versus 20% of self-pay clinics offered "timely methadone access". Finally, the article reported that 86% of Medicaid clinics and 85% of self-pay clinics initiated methadone MOUD treatment at the patient's first appointment.[42] The second article reporting on methadone treatment outcomes data during COVID-19 by Brothers et al. provides data on methadone treatment delivery across all Connecticut OTPs, which serve a total of 24,261 MOUD patients, and analyzed changes in methadone overdoses from July to August 2020.[41] This analysis found that as a result of COVID-19 and related MOUD policy changes, the number of patients receiving a 28-day supply of take-home methadone increased significantly from 0.1% before COVID-19 to 16.8%, and the number of patients receiving 14-day supply of methadone also increased from 14.2% to 26.8% during COVID-19. Interestingly, the number of patients attending group counseling in-person or via telemedicine decreased from 42.5% to only 15.4% during COVID-19, while the number of patients attending individual counseling sessions increased from 57.5% to 84.5% during COVID-19. Finally, there was no significant increase in methadone overdoses within Connecticut hospitals found by this study, demonstrating that the increase in take-home methadone allowance for Connecticut OTP patients did not result in higher rates of methadone overdose for the state.[41]

Four of the six total articles (66.6%) reporting MOUD treatment outcomes data examined buprenorphine. With the exception of Rahman et al.,[43] all articles compared data from before the onset of COVID-19 to data collected during COVID-19 and after MOUD policy changes were implemented. The Rahman et al. article examined the electronic health records of 75 patients receiving office-based buprenorphine MOUD treatment at an urban health center from March to June 2020 and found that 94.6% of patients had at least one documented telemedicine visit during this period. Although, 62% of MOUD patients did not attend any mutual aid meetings or group counselling sessions during the COVID-19 study period despite these services being available via telemedicine.[43]

The following three articles all examine changes in buprenorphine prescriptions filled prior to COVID-19 versus during COVID-19. The Herring et al. article examined pre COVID-19 (May 2019 – March 2020) versus COVID-19 (April 2020) utilization of buprenorphine across 52 MOUD clinics in California and reported a 48% decrease in the average number of MOUD patients prescribed buprenorphine and a 33% decrease in the average number of patients attending at least one follow-up MOUD treatment visit.[46] Another article by Hammerslag et al. also compared buprenorphine utilization from pre COVID-19 (September 2018 – March 2020) to COVID-19 (April – August 2020), although this study examined IQVIA's longitudinal nationwide Rx claims data to assess buprenorphine prescription changes.[44] This study found that the average buprenorphine

prescription supply increased by 1.34 days in April 2020, meaning that MOUD patients were prescribed longer doses. However, the average number of buprenorphine prescriptions filled dropped significantly in April but quickly rebounded to pre-pandemic levels by August 2020, and the pre COVID-19 average monthly increase in individuals receiving buprenorphine prescriptions stayed constant during the COVID-19 study period.[44] Finally, the third article by Myers et al. examines MOUD buprenorphine treatment outcomes data from the Veterans Affairs Corporate Data Warehouse and analyzed trends in buprenorphine prescriptions data for 42,579 veterans with OUD from September 2019 until August 2020. The study found a significant decrease by 14.9% in buprenorphine prescriptions filled during April 2020 and as of August 2020 the rates of buprenorphine prescriptions filled had not returned to pre-COVID-19 levels.[45]

Subgroups of Interest: Rural and Incarcerated OUD Populations

Only 6.6% of studies examined changes in MOUD treatment access for incarcerated populations (n = 3) and 8.8% of studies examined rural MOUD populations (n = 4), the other 84.4% of articles (n = 38) pertain to the primary research question and were not related to the sub-questions under review. Descriptive characteristics of articles that described MOUD treatment for rural populations and incarcerated populations are summarized in Tables 2 and 3; respectively.

Rural OUD Populations

As shown in Table 2, only four articles out of 45 reported on rural populations' access to MOUD treatment in light of COVID-19 and related policy changes. All of the articles focused on the facilitation of MOUD treatment access among rural OUD populations. All articles addressed buprenorphine access and none were on methadone. Notably, the facilitation of MOUD in each article was achieved through utilizing telemedicine to virtually connect rural patients to providers who could initiate patients on buprenorphine via telemedicine due to COVID-19 policy changes removing the requirement for an in-person assessment for buprenorphine induction. While quantitative data was not available for one of these articles,[47] the remaining three articles all demonstrate significant increases in rural patient's access to MOUD as a result of programmatic changes that expanded access through initiating buprenorphine treatment via telemedicine.[48–50]

Table 2: Programmatic Adaptations to MOUD Treatment Services for Rural Subpopulation

Author, Location, and Time Frame under Study	Name and Description of Clinic or Organization	Care Setting	MOUD Treatment Type	Adaptations to MOUD Treatment since COVID-19 and Policy Changes	Primary Outcomes resulting from Adaptations
Hughes et al.,[48] North Carolina, pre-COVID (Jan 16-March 15, 2020), transition phase (March 16-April 15, 2020), and COVID (April 16-June 15, 2020)	Clinic name not provided; a family medicine clinic that offers office based MOUD to rural population in Appalachian Mountains region	Family Medicine Clinic (Non-OTP)	Buprenorphine	Clinic adopted telemedicine modality for buprenorphine induction in March 2020.	1. Significant increase in the amount of MOUD patients from rural counties after policy changes 2. New MOUD patients represented 7.7% of all new patient visits in the transition phase, increasing from 3% during pre-COVID
Wang et al.,[50] Ithaca, New York,	Clinic name not provided; a Harm	Public Harm Reduction	Buprenorphine	Clinic increased telemedicine for	1. Through collaborating with upstate SSP program (over 3hrs

Early months of COVID-19 state of emergency (no definitive time frame given)	Reduction Primary Care Clinic in Rural New York (Ithaca)	Primary Care Clinic (Non-OTP)		buprenorphine induction and partnered with a distant Syringe Service Program (SSP) in far upstate NY	drive away) the Ithaca Primary Care Clinic initiated 32 new MOUD patients on buprenorphine from the 55 total patients on the SSP waitlist (64% of waitlisted patients began MOUD treatment) 2. Significantly reduced wait times to initiate MOUD buprenorphine treatment from the pre-COVID average of 12 weeks to initiation within same day over telemedicine after policy changes
Weintraub et al.,[49] Maryland, June - October, 2020	Caroline County Health Department, Maryland	Telemedicine Mobile Treatment Unit (TM-MTU)	Buprenorphine	Modified a Recreational Vehicle (RV) staffed with one nurse, one peer recovery specialist, and one substance use counselor. Traveled to remote areas of Caroline County to connect rural MOUD patients with a buprenorphine provider via telemedicine to start treatment	1. Saved rural MOUD patients an average of 6.52 travel miles to their nearest brick-and-mortar MOUD clinic 2. TM-MTU had strong retention rates: 78% retention at 1 week, 72% retention at 30 days, and 59% retention at 90 days from enrollment 3. Among the 94 patients enrolled in the program, prescription opioid use was reduced by 32.84% at 3 months
Moore et al.,[47] New England, Early months of COVID-19 state of emergency (no definitive time frame given)	Veterans' Healthcare Administration (VHA) of New England	Pre-COVID: Telehealth from a Rural Primary Care Clinic COVID: Telehealth from patient's homes	Buprenorphine	VHA adapted their pre-COVID telehealth program where rural OUD patients would be examined in person and then connected to a buprenorphine provider via telemedicine to start treatment.	After COVID-19 policy changes the VHA telehealth program removed the need for patients to go into clinics so providers could call rural patients to begin buprenorphine MOUD treatment from home. The program emphasized the importance of allowing audio-only telemedicine for buprenorphine induction because many rural patients had no access to video, but all had landlines that allowed them to maintain care via phone calls with licensed providers.

Incarcerated OUD Populations

As depicted in Table 3, three out of 45 articles described MOUD treatment access for incarcerated populations with OUD since the onset of COVID-19 and the subsequent policy changes for MOUD. While one article had no quantitative outcomes,[51] the other two articles contained quantitative data that describe both facilitators and barriers to MOUD for incarcerated populations.[40,52] Bandara et al. conducted a multistate survey of carceral systems offering MOUD services and found that COVID-19 created many barriers for incarcerated populations to receive MOUD treatment such as less clinical staff available and this contributed to 62.5% of carceral systems surveyed reporting reducing the scale of their MOUD treatment programs.[40] However, some carceral systems like the Minnesota county jail described in the Duncan et al. article, were able to adapt their MOUD treatment program to COVID-19 conditions by prescribing buprenorphine doses without the need for an in-person visit with a provider, and this allowed for

more incarcerated individuals with OUD to begin buprenorphine treatment both upon entry as well as discharge from the facility.[52]

Table 3: Programmatic Adaptations to MOUD Treatment for Incarcerated Subpopulation

Author, Location, and Time Frame under Study	Name and Description of Clinic or Organization	MOUD Treatment Type	Adaptations to MOUD Treatment since COVID-19 and Policy Changes	Primary Outcomes resulting from Adaptations
Donelan et al.,[51] Greenfield, Massachusetts, Early months of COVID-19 state of emergency (no definitive time frame given)	Franklin County Sheriff's Office in Greenfield Massachusetts, Carceral Opioid Treatment Program (OTP)	Buprenorphine, Methadone	Adapted MOUD treatment of the jail's OTP program into a "Hub and Spoke" MOUD Model	Behavioral Health Care and Social Worker staff were the organizational hub teleworking from home to organize health care needs of incarcerated MOUD patients, the essential worker staff in the jail set up patients with a telehealth computer to engage with caseworkers and clinicians or partnered addiction treatment agencies.
Duncan et al.,[52] Minneapolis, Minnesota, April - May 2020	Hennepin County Jail in Minneapolis Minnesota, Carceral Opioid Treatment Program (OTP)	Buprenorphine	Buprenorphine clinician conducts telemedicine visit to begin treatment induction for incarcerated individuals using a computer from the jail medical unit and assisted by an onsite nurse. Incarcerated MOUD patients are now offered a buprenorphine taper on admission to the facility.	1. Before COVID-19 only 2.8% of all jail discharges received buprenorphine but after policy changes 7.8% of MOUD incarcerated patients received a 7-day dose upon discharge. 2. Out of 219 patients, 121 (55.3%) received buprenorphine taper doses and telemedicine has helped jail clinicians see patients more efficiently and maintain social distancing.
Bandara et al.,[40] Array of Locations: 16 different carceral systems across the USA, May 2020	16 different carceral systems across the United States, not all systems had an OTP within the prison	Buprenorphine, Methadone	A survey of 16 carceral systems in the US and how their MOUD treatment programs adapted or changed due to COVID-19	1. 10 of the 16 systems (62.5%) reported reducing scale of MOUD treatment with no new enrollments 2. Carceral systems that were not also OTPs reported no longer being able to transport incarcerated MOUD patients to community-based OTPs for methadone treatments 3. 50% of systems reported challenges maintaining enough clinical staff for MOUD treatment

Descriptive Analysis of National Survey of Substance Abuse Treatment Services (N-SSATS) Data, 2019-2020

Objective

The objective was to measure the difference between the 2019 and 2020 N-SSATS years in the availability of the MOUD treatments buprenorphine and methadone across all facilities treating

substance use disorder (SUD) as well as opioid treatment programs (OTPs) more specifically. Additional services related to the administration of MOUD treatment such as mental health and counseling support services were also analyzed to determine how the availability of MOUD-related services changed across all SUD treatment facilities and OTPs between the survey years.

Methods

Data Source

Data on substance use disorder (SUD) treatment facilities in the United States from pre and post enactment of COVID-19 related medication for opioid use disorder policy changes were obtained from the 2019 and 2020 National Survey of Substance Abuse Treatment Services (N-SSATS) collected by the Substance Abuse and Mental Health Services Administration (SAMHSA). The SAMHSA conducts the N-SSATS annually to collect information on SUD facility characteristics, types of services provided, as well as types and counts of clients served at the facility. Client counts are not collected in even years when an abbreviated version of the questionnaire is fielded. However, SAMHSA fielded the full N-SSATS with client counts in 2020 despite it being an even year to better measure effects of the COVID-19 pandemic on the provision of SUD treatment services. Eligible facilities to be surveyed were defined by SAMHSA as "all facilities in the United States, both public and private, that provide substance abuse treatment" for both the 2019 and 2020 questionnaires.[53] N-SSATS defines opioid treatment programs (OTPs) as those that are certified by SAMHSA to treat opioid addiction with methadone, buprenorphine, and/or naltrexone. The response rates for the N-SSATS questionnaire in 2019 and 2020 were 91 percent and 90 percent; respectively. The 2019 N-SSATS was fielded from March through December of 2019, and the 2020 N-SSATS was fielded during this same period of March-December in 2020.[53]

Measures and Variables

The key measures for the analysis were sourced from questions in the N-SSATS that asked whether a facility offered medications used to treat opioid use disorder such as methadone and/or buprenorphine. Three primary variables of interest relating to medications for opioid use disorder (MOUD) were identified to assess the differences in availability of these medications in 2019 versus 2020 across all SUD treatment facilities surveyed. The three variables relating to buprenorphine and methadone MOUD were identified using survey questions that asked facilities whether they offered methadone pharmacotherapy services, buprenorphine with naloxone pharmacotherapy services, and finally whether outpatient methadone or buprenorphine maintenance was offered. For the analysis of facilities that operate as an opioid treatment program (OTP), the same three primary variables were utilized to assess differences in availability of MOUD explicitly in OTPs between the survey years. However, the OTP only analysis included two variables that were not applicable to all SUD treatment facilities due to these variables being taken from survey questions that were only answered if the facility answered "Yes" to operating as a certified OTP. These two variables described whether OTP facilities only served opioid use disorder clients and whether the facility provided detoxification from opioids with methadone or buprenorphine.

An additional variable that identified facility organization type was analyzed for all SUD treatment facilities as well as OTPs to better understand general characteristics of the facilities participating in each survey. For the analysis of all SUD facilities, a variable which identified facilities as certified OTPs was included to determine the distribution of OTPs across survey years along with another variable regarding whether a facility offered any outpatient substance abuse services.

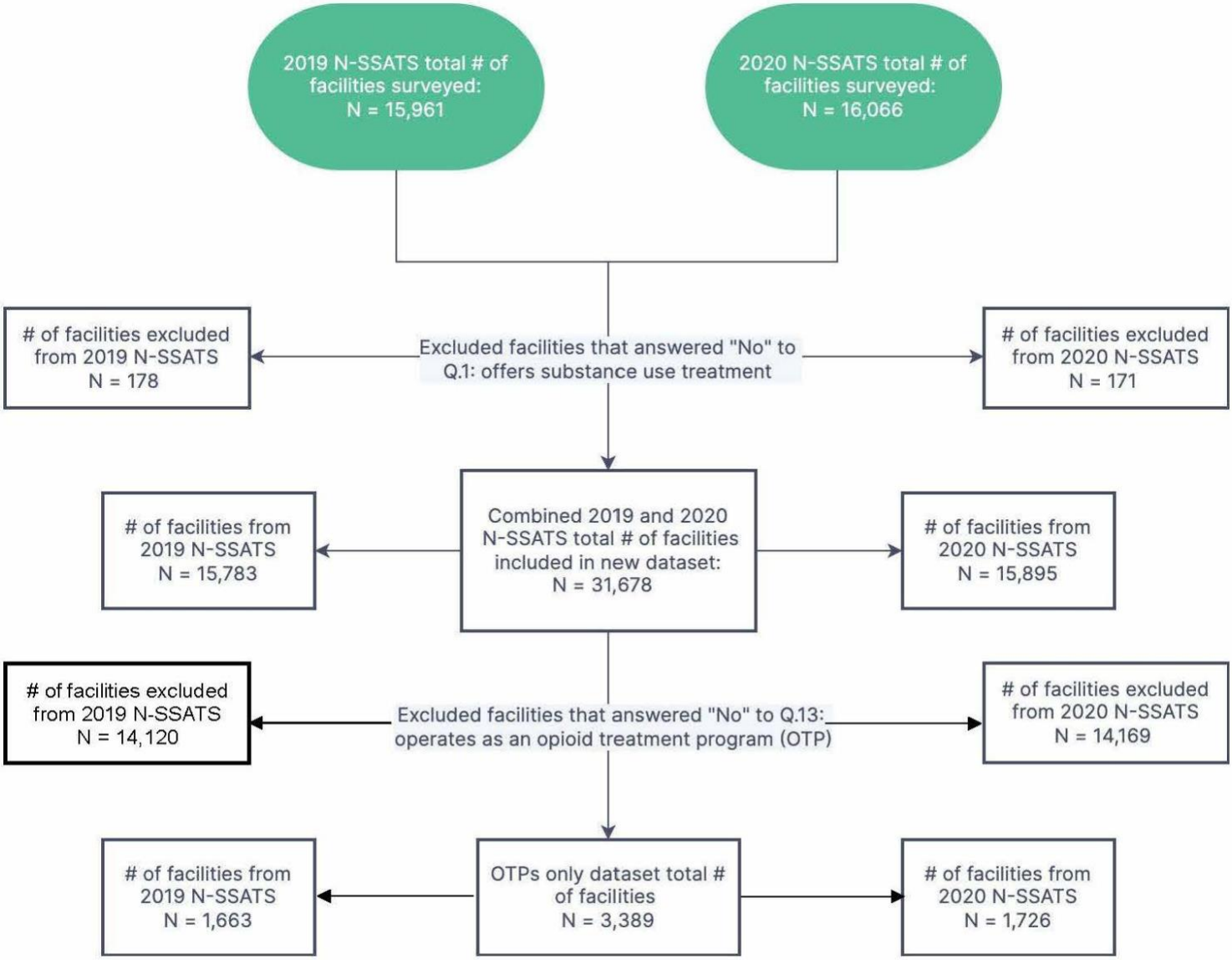
Furthermore, eight variables that indicated whether a facility offered services related mental health and substance use counselling or management were included in both analyses. These variables were identified from questions in the N-SSATS that asked if the facility offered: substance abuse assessment or diagnosis; mental health assessment or diagnosis; outreach to persons in the community who may need treatment; drug or alcohol urine screening; mentoring or peer support; self-help groups such as NA, AA, or SMART recovery; individual counselling; and group counselling services. The variables were included to measure differences in availability between 2019 and 2020 for counselling and other relevant MOUD-related services since psychosocial support in conjunction with medication maintenance is regarded as a key treatment element for sustaining successful MOUD treatment and achieving long term recovery.[54] Finally, a new variable "year" was created to indicate the calendar year during which survey responses were collected. N-SSATS data files for 2019 and 2020 were combined into a single dataset prior to analysis. The new analytic dataset included only the facilities that answered "Yes" to providing any substance use treatment. From this combined dataset an additional dataset was created by excluding any facilities that answered "No" to operating as an opioid treatment program in order to capture the characteristics and services offered only at OTP facilities. The process of combining the 2019 and 2020 N-SSATS files to create the combined datasets with all SUD facilities and OTPs only that were used for this descriptive analysis can be found in Figure 2.

Statistical Analysis

Descriptive analyses were carried out to compare the proportion of facilities that provided pharmacotherapy for OUD and other related services prior to and during the pandemic. Bivariate descriptive analyses between the "year" variable and all variables in both datasets were conducted via cross-tabulations measure changes in availability of pharmacotherapy MOUD services along with counselling services from 2019 to 2020. Chi-square tests were conducted at a significance level of $\alpha = 0.05$ for each variable to measure the statistical significance (in P-values) of differences between 2019 and 2020 in the availability of MOUD related services across all facilities that provided SUD treatment as well as OTPs more specifically. All analyses were completed using the analytics software SAS 9.4 (SAS Institute, Cary NC). This study did not require Institutional Review Board review because de-identified, publicly available data does not meet the criteria for human subject research.

Results

Figure 2: Flowchart depicting the total number of facilities included in the combined N-SSATS 2019-2020 dataset(s)

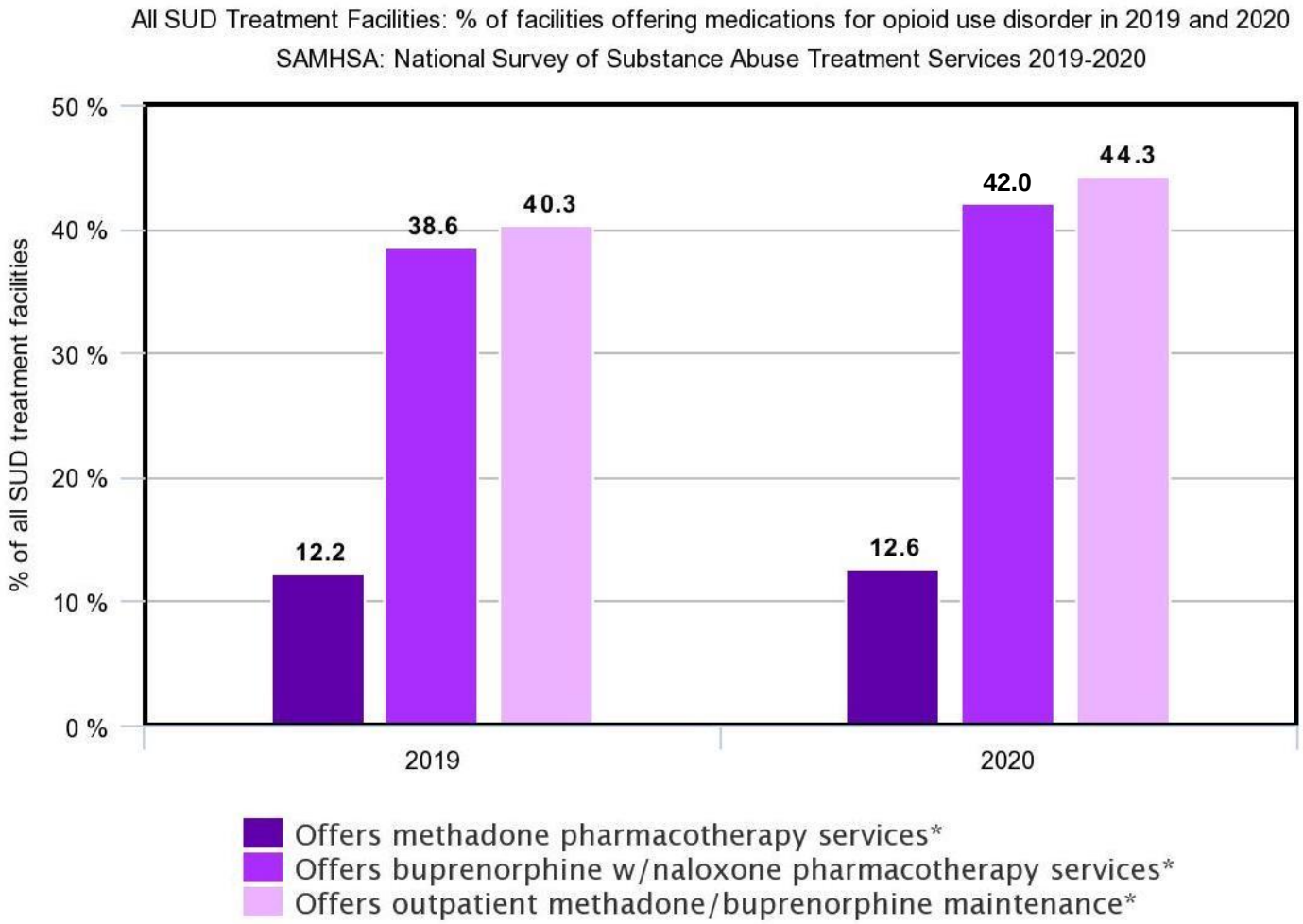


All Substance Use Disorder Facilities

A greater percentage of all SUD facilities offered pharmacotherapy treatment services with methadone as well as buprenorphine in 2020 than in 2019, increasing by 0.4 percentage points and 3.4 percentage points respectively (Figure 3). The percentage of all SUD facilities that reported offering outpatient methadone or buprenorphine maintenance also increased by 4 percentage points across the survey years. The chi-square analysis revealed that the difference between the percentage of facilities in 2019 versus 2020 that offered outpatient methadone or buprenorphine maintenance as well as buprenorphine with naloxone pharmacotherapy services

were statistically significant, with P-values of <.0001 for both of these variables. However, the difference in the percent of facilities that offered methadone pharmacotherapy services was not found to be statistically significant (P = 0.21) indicating no meaningful difference between the 2019 and 2020 survey years. Figure 3 below depicts the difference in the percentage of all SUD treatment facilities that offered these three primary medications for opioid use disorder variables of interest in 2019 versus 2020 according to N-SSATS facility data.

Figure 3: Percent of All Substance Use Disorder Facilities Offering Pharmacotherapy Maintenance Services with Medications for Opioid Use Disorder in 2019 versus 2020



**Offers methadone pharmacotherapy services, P = 0.21*
**Offers buprenorphine with naloxone pharmacotherapy services, P = <.0001*
**Offers outpatient methadone and/or buprenorphine maintenance, P = <.0001*

Additionally, results produced by the descriptive analysis of the eight MOUD-related service variables along with variables that identified facility characteristics such as organization type, operating as an OTP, and if the facility offered outpatient substance use services are depicted in Table 4 below. In both 2019 and 2020, a majority of all SUD facilities offering substance use treatment were identified as privately owned, with private for profit and private non-profit facilities together accounting for about 90 percent of the total facilities surveyed each year. The remaining 10 percent of facilities that offered substance use treatment in both 2019 and 2020 were operated by various types of governmental bodies. Both the variable measuring whether a facility operates

as an opioid treatment program (OTP) as well as the variable measuring whether any outpatient substance use services were offered at the facility did not have statistically significant differences from 2019 to 2020, producing chi-square p-values of 0.35 and 0.71 respectively.

Table 4: Services and characteristics of U.S. facilities that offered any substance use disorder treatment according to the National Survey of Substance Abuse Treatment Services 2019-2020

Table 4	**SUD treatment facilities 2019 (N = 15,783)**		**SUD treatment facilities 2020 (N = 15,895)**		**Chi Square Test**	
Facility Characteristics and Services Provided	**N**	**%**	**N**	**%**	**X^2 Value**	**P Value**
Organization Type:						
Private for-profit	6,283	39.8	6,490	40.8	4.636	0.462
Private non-profit	7,935	50.3	7,901	49.7		
State government	302	1.9	277	1.7		
Local, county, or community government	677	4.3	657	4.1		
Tribal government	254	1.6	248	1.6		
Federal government	332	2.1	322	2.0		
Operates as an OTP:						
Yes	1,663	10.5	1,726	10.9	0.86	0.354
No	14,120	89.5	14,169	89.1		
Offers any outpatient substance use services:						
Yes	13,036	82.6	13,153	82.8	0.131	0.717
No	2,747	17.4	2,742	17.2		
Offers substance abuse assessment or diagnosis:*						
Yes	14,827	93.9	15,037	94.6	6.263	**.0123**
No	955	6.1	858	5.4		
Offers mental health assessment or diagnosis:*						
Yes	8,899	56.4	9,279	58.4		**.0003**
No	6,883	43.6	6,616	41.6		
Offers community outreach:*						
Yes	10,197	64.6	10,568	66.5	12.33	**.0004**

No	5,585	35.4	5,327	33.5		
Offers drug or alcohol urine screening:*						
Yes	13,827	87.6	13,994	88.0	1.356	0.244
No	1,955	12.4	1,901	12.0		
Offers mentoring or peer support:*						
Yes	9,693	61.4	10,032	63.1	9.697	**.0018**
No	6,089	38.6	5,863	36.9		
Offers self-help groups like NA, AA, SMART recovery:*						
Yes	7,677	48.6	7,757	48.8	0.079	0.779
No	8,105	51.4	8,138	51.2		
Offers individual counseling:*						
Yes	15,312	97.1	15,404	96.9	0.369	0.543
No	469	2.9	491	3.1		
Offers group counseling:*						
Yes	14,725	93.3	14,745	92.8	3.609	0.058
No	1,056	6.7	1,150	7.2		

OTP, opioid treatment program; SUD, substance use disorder; NA, Narcotics Anonymous; AA, Alcoholics Anonymous
*One facility missing from 2019 N-SSATS

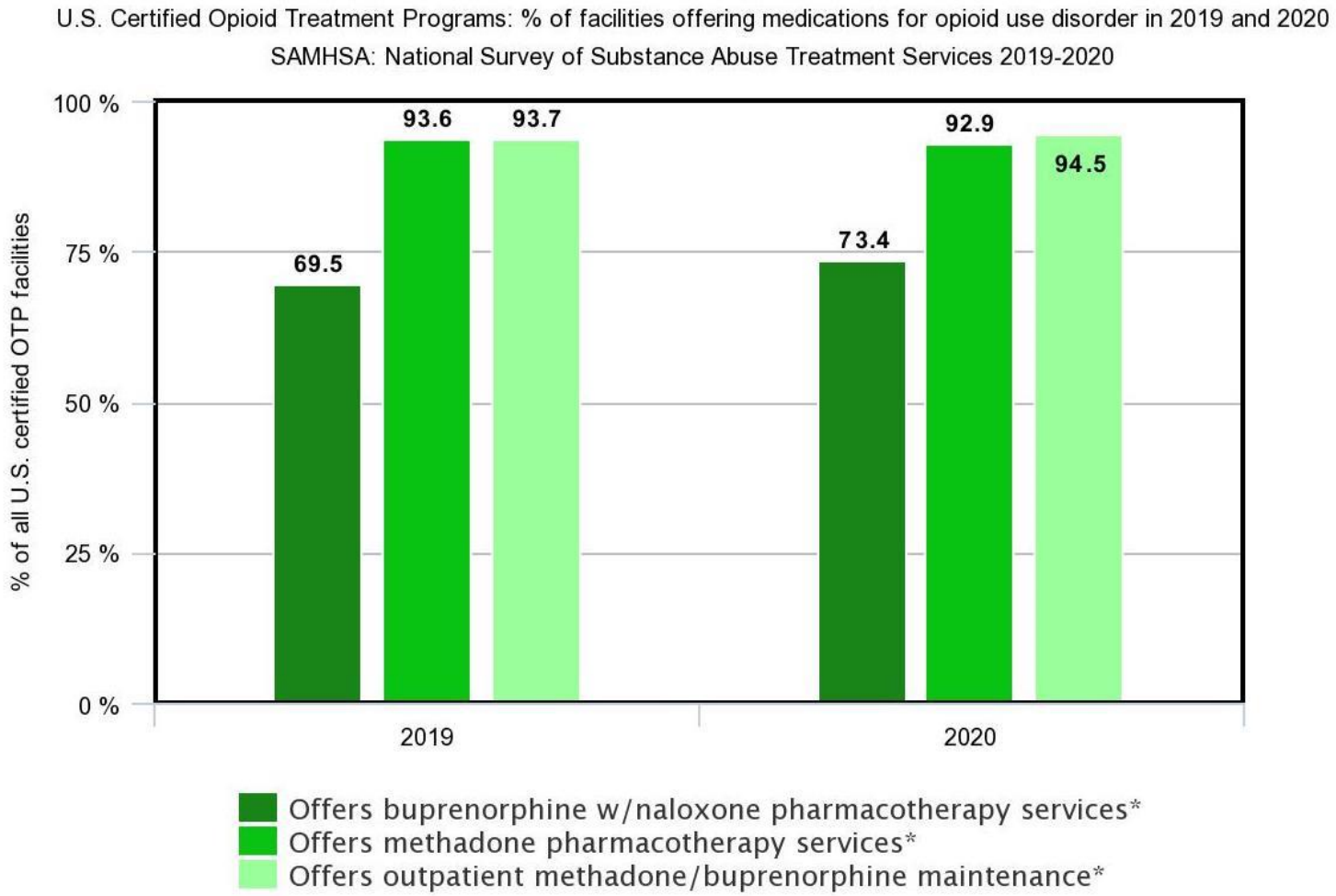
Four of the eight MOUD-related service variables of interest were found to experience a significant change in the prevalence of these services being offered across all SUD treatment facilities (Table 4). These service variables that were found to have a significant change between the 2019 and 2020 survey years included facilities offering substance abuse diagnosis (93.9% vs. 94.6%, P = .012), mental health diagnosis (56.4% vs. 58.4%, P = .0003), community outreach (64.6% vs. 66.5%, P = .0004), and mentoring or peer support (61.4% vs. 63.1%, P = .0018). The remaining four MOUD-related service variables depicted in Table 4 measured whether facilities offered drug or alcohol urine screening, self-help groups, individual counseling, or group counseling. For these MOUD-related service variables, the chi-square analyses did not reveal any statistically significant differences in the prevalence of these services being offered across all SUD treatment facilities in 2019 versus 2020 (see Table 4).

U.S. Certified Opioid Treatment Program (OTP) Facilities

As depicted in Figure 4, a greater percentage of OTP facilities offered buprenorphine with naloxone pharmacotherapy services in 2020 than in 2019, increasing by 3.9 percentage points

across the survey years. The percentage of OTP facilities that offered outpatient methadone or buprenorphine maintenance treatments increased by 0.8 percentage points from 2019 to 2020. The difference between years for both MOUD variables were found to be statistically significant with chi-square p-values of 0.01 and 0.03 respectively. However, there was a 0.7 percentage points decrease from 2019 to 2020 in the proportion of OTP facilities that offered methadone pharmacotherapy services. This difference in the availability of methadone pharmacotherapy at OTP facilities in 2019 versus 2020 was not statistically significant, producing a p-value of 0.46.

Figure 4: Percent of U.S. certified OTP Facilities Offering Pharmacotherapy Maintenance Services with Medications for Opioid Use Disorder in 2019 versus 2020



**Offers methadone pharmacotherapy services, P = 0.46*
**Offers buprenorphine with naloxone pharmacotherapy services, P = 0.01*
**Offers outpatient methadone or buprenorphine maintenance, P = 0.03*

The results from the descriptive analysis done on the eight MOUD-related service variables as well as variables that identified OTP facility characteristics in terms of organization type, serving only opioid use disorder (OUD) clients, and providing opioid detoxification with methadone or buprenorphine can be found in Table 5. Like the composition of organization types identified in the analysis of all substance use disorder treatment facilities, a majority of OTP facilities were privately owned in 2019 and 2020 with about 92 percent of all OTPs being privately operated in both years. The greatest percentage of OTP facilities were operated as private for-profit organizations in both 2019 and 2020, respectively making up 61 percent and 62 percent of all

OTP facilities surveyed. The remaining 8 percent of facilities in each year were publicly operated via different governmental bodies. There was not a significant change between the prevalence of OTP facilities that only served OUD clients in 2019 versus 2020 with the percentage of facilities only serving OUD clients decreasing by 2 percent (P = 0.44). No significant changes in the prevalence of OTP facilities providing opioid detoxification with methadone or buprenorphine were found (P = 0.116).

Table 5: Services and characteristics of U.S. certified opioid treatment programs according to the National Survey of Substance Abuse Treatment Services 2019-2020

Table 5	**Opioid Treatment Program Facilities 2019 (N = 1,663)**		**Opioid Treatment Program Facilities 2020 (N = 1,726)**		**Chi Square Test**	
Facility Characteristics and Services Provided	**N**	**%**	**N**	**%**	**X^2 Value**	**P Value**
Organization Type:						
Private for-profit	1,015	61.0	1,072	62.1	1.355	0.929
Private non-profit	522	31.4	532	30.8		
State government	36	2.2	34	1.9		
Local, county, or community government	46	2.8	41	2.4		
Tribal government	7	0.4	10	0.6		
Federal government	37	2.2	37	2.1		
Serves only OUD clients:*						
Yes	1,046	63.0	1,050	61.0	1.649	0.439
No	615	37.0	673	39.0		
*Provides detoxification from opioids**:*						
Yes	690	41.5	715	41.4	4.304	0.116
No	970	58.3	1,000	57.9		
Offers substance abuse assessment or diagnosis:						
Yes	1,570	94.4	1,643	95.2	1.06	0.304
No	93	5.6	83	4.8		
Offers mental health assessment or diagnosis:						
Yes	553	33.3	595	34.5	0.562	0.453
No	1,110	66.7	1,135	65.5		
Offers community outreach:						

Yes	1,120	67.4	1,227	71.1	5.57	**0.018**
No	543	32.6	499	28.9		
Offers drug or alcohol urine screening:						
Yes	1,649	99.2	1,713	99.3	0.084	0.772
No	14	0.8	13	0.7		
Offers mentoring or peer support:						
Yes	859	51.7	948	54.9	3.64	0.056
No	804	48.3	778	45.1		
Offers self-help groups like NA, AA, SMART recovery:						
Yes	729	43.8	755	43.7	0.003	0.956
No	934	56.2	971	56.3		
Offers individual counseling:						
Yes	1,650	99.2	1,718	99.5	1.39	0.238
No	13	0.8	8	0.5		
Offers group counseling:						
Yes	1,491	89.7	1,539	89.2	0.216	0.642
No	172	10.3	187	10.8		

OTP, opioid treatment program; OUD, opioid use disorder; NA, Narcotics Anonymous; AA, Alcoholics Anonymous

*Two facilities missing from 2019 N-SSATS and three facilities missing from 2020 N-SSATS

**Three facilities missing from 2019 N-SSATS and eleven facilities missing from 2020 N-SSATS

Finally, only the community outreach variable out of the eight total MOUD-related service variables of interest experienced a significant change in the prevalence of OTP facilities that offered the eight services in 2019 compared with 2020 (Figure 5). The share of OTP facilities that offered community outreach services significantly increased by 4.3 percentage points (67.4% vs. 71.1%, P = 0.02) from 2019 to 2020. For OTP facilities that offered substance abuse diagnosis (94.4% vs. 95.2%, P = 0.3) as well as mental health diagnosis (33.3% vs. 34.5%, P = 0.45) there was no significant change found in the prevalence of these two services being offered at OTP facilities in 2019 versus 2020. Additionally, the availability of both individual as well as group counseling services showed no significant changes in the percentage of OTP facilities offering these counseling services from 2029 to 2020, with p-values of 0.24 and 0.64 respectively. No significant changes were identified for neither the prevalence of OTP facilities that offered mentoring or peer support (P = 0.056), nor facilities that offered self-help groups (P = 0.96) between the 2019 and 2020 N-SSATS survey years.

Discussion

Primary Research Question: General Accessibility of MOUD

With regard to the primary research question of examining how accessibility and use of medications for opioid use disorder (MOUD) have been impacted since the enactment of COVID-19 related policy changes that eased restrictions on the administration of MOUD treatments methadone and buprenorphine, the results of both the literature review and descriptive analysis suggest that the policy changes have allowed for innovative adaptations to MOUD treatment programs as well as improved the overall availability of these medications across substance use disorder (SUD) treatment facilities in the United States. Following the enactment of COVID-19 related policy changes in March 2020, the percentage of all SUD treatment facilities as well as OTP facilities that offered MOUD treatment services with these medications increased from 2019 to 2020 according to the National Survey of Substance Abuse Treatment Services (N-SSATS). Furthermore, the literature review identified five major MOUD treatment adaptation themes that SUD and OTP facilities adopted as a response to COVID-19 disrupting access to in-person treatment, with these adaptations taking advantage of the flexibility that the COVID-19 related MOUD policy changes granted in order to prescribe greater amounts of take-home methadone doses for OUD clients as well as begin buprenorphine treatment without the need for a prerequisite in-person evaluation with a DATA-waived provider.

It is important to highlight that unlike buprenorphine pharmacotherapy treatment, the availability of methadone pharmacotherapy treatment decreased by 0.7 percentage points across OTP facilities from 2019 to 2020 according to the descriptive analysis of N-SSATS data. This result was unexpected given that the policy changes allowed OTP facilities greater flexibility to prescribe methadone take-home doses for OUD clients to counteract COVID-19 disruptions for receiving in-person methadone maintenance therapy. Although, the findings from the literature review concerning the perspective and opinions of MOUD providers toward the methadone policy changes may provide some context as to why this effect was observed. For example, Madden et al. identified three consistent justifications among OTP providers who did not increase quantities of methadone take-home doses which included (1) providers believing that MOUD patients benefit from the “structure” that supervised methadone dosing provides, (2) attributing improved patient safety to the take-home dosing regulations, and (3) fearing liability for methadone-related harms to patients if they were to expand access to take-home doses.[29] Even though COVID-19 related policy changes allowed OTP providers the flexibility to prescribe greater quantities of take-home methadone doses, it is ultimately up to the discretion of individual providers to act upon the regulation change by increasing the amount of take-home methadone doses they choose to prescribe. Thus, the hesitancy to increase take-home methadone doses expressed by OTP providers found by the literature review may provide a possible explanation for the observed decrease in the availability of methadone pharmacotherapy treatment among OTPs from 2019 to 2020, especially considering that the 2020 N-SSATS was fielded in the initial months of the COVID-19 pandemic when accessing in-person treatments was particularly challenging due to stay-at-home orders during this time.

Despite the share of facilities providing methadone pharmacotherapy treatment services declining slightly, there was increased provision of methadone and/or buprenorphine MOUD among all SUD treatment facilities as well as OTPs from 2019 to 2020. The percentage of all SUD facilities that reported offering outpatient methadone and/or buprenorphine MOUD maintenance services increased from 40.3 percent of facilities in 2019 to 44.3 percent in 2020 (9.9% change). The percentage of all SUD treatment facilities offering buprenorphine with naloxone pharmacotherapy

services also increased across the survey years, from 38.6 percent in 2019 up to 42 percent in 2020 (8.8% change). Similarly, the percentage of OTPs offering outpatient methadone and/or buprenorphine maintenance services increased from 93.7 percent in 2019 to 94.5 percent in 2020 (0.7% change), and the percentage of OTP facilities offering buprenorphine with naloxone pharmacotherapy treatment increased from 69.5 percent in 2019 to 73.4 percent in 2020 (5.6% change). The increase in the availability of these two MOUD treatment variables across all SUD treatment facilities as well as OTPs specifically all exhibited statistically significant differences between the 2019 and 2020 N-SSATS years. These results from the descriptive analysis of 2019 and 2020 N-SSATS data help support the notion that COVID-19 related policy changes may have had a role in the observed increase in accessibility of MOUD treatment across SUD treatment facilities, especially for buprenorphine MOUD maintenance, despite the pandemic presenting more barriers to accessing MOUD treatment.

A common reoccurring theme found in the literature review was programmatic adaptations that took advantage of COVID-19 related policy changes eliminating the requirement of an in-person assessment to prescribe buprenorphine through employing telemedicine for buprenorphine induction. Notably, all the programmatic adaptations to buprenorphine treatment that were identified in articles included in the literature review utilized telemedicine to expand accessibility of buprenorphine MOUD during the pandemic. Abolishing the need for an in-person assessment with a DATA-waived provider to prescribe buprenorphine allowed for innovative adaptations to buprenorphine treatment that were found to increase accessibility of MOUD, such as the creation of virtual buprenorphine clinics,[15,55] emergency department patient outreach to begin buprenorphine maintenance after an overdose episode,[16,17] as well as the formation and adaptation of various “low-threshold” buprenorphine programs.[18–22] These adaptations all utilized virtual modalities for prescribing buprenorphine MOUD which was found to expand accessibility according to multiple articles in the literature review that reported increases in the number of patients receiving buprenorphine MOUD maintenance after transitioning to telemedicine induction.[15,16,19–23,55] Thus, OUD treatment programs employing telemedicine for buprenorphine induction may have had a role in the significant increases found for buprenorphine with naloxone pharmacotherapy as well as outpatient methadone and/or buprenorphine maintenance across all SUD facilities and OTPs in the descriptive analysis. The findings of the literature review in conjunction with the results of the N-SSATS data analysis suggest that the COVID-19 related policy changes were potentially successful in increasing the overall accessibility of buprenorphine MOUD, although no direct inferences can be made due to this study employing descriptive bivariate analyses only.

An intriguing adaptation to MOUD treatment found by the literature review as well as the N-SSATS analysis results was that the percentage of all SUD facilities as well as OTPs that reported offering community outreach services increased significantly from 2019 to 2020. Moreover, the literature review identified various programmatic adaptations that involved community outreach initiatives to expand access to MOUD treatment, particularly for buprenorphine maintenance, by utilizing telemedicine for MOUD induction. Articles included in the literature review like Langabeer et al. and Samuels et al. describe a form of community outreach where recently released emergency department patients who were treated for opioid overdoses were virtually connected to buprenorphine prescribers to start buprenorphine MOUD maintenance, and the "low-threshold" buprenorphine program adaptations all involved community outreach using telemedicine to connect OUD patients to certified prescribers as well.[8–12] Altogether, the results of the literature review and descriptive analysis suggest that the COVID-19 related policy changes may have contributed to the increased prevalence of community outreach initiatives among SUD treatment facilities, especially for buprenorphine maintenance, due to allowing for buprenorphine MOUD induction via telemedicine.

Research Sub-questions: Accessibility of MOUD among Rural and Incarcerated Populations

For the two research sub-questions that focused on examining how COVID-19 related policy changes for MOUD impacted accessibility and treatment options for rural as well as incarcerated populations, there were no questions in the 2019 and 2020 N-SSATS pertaining specifically to these OUD sub-populations of interest. Despite the absence of N-SSATS facility level data on differences in MOUD accessibility for rural and incarcerated OUD sub-populations in 2019 versus 2020, the results of the literature review provided some insight into how treatment options were altered in light of COVID-19 and subsequent MOUD policy changes.

Notably, all four of the programmatic adaptations specific to rural OUD populations identified by the literature review used telemedicine to connect DATA-waived providers with rural OUD patients to begin buprenorphine MOUD treatment without conducting an in-person evaluation first. The outcomes reported by these four articles all demonstrated either significant reductions in wait times for initiating buprenorphine maintenance[50] and time spent traveling to receive MOUD treatment,[49] or a significant increase in the amount of rural MOUD patients receiving buprenorphine treatment.[48] Despite limited data on how MOUD treatment options for rural populations have been impacted since the enactment of COVID-19 related policy changes, the adaptations described in the literature review imply that some MOUD providers are embracing the policy changes to expand buprenorphine accessibility among rural OUD populations. The ability to initiate buprenorphine maintenance without an in-person evaluation is especially relevant for rural populations in terms of accessing MOUD treatment given that in 2016 there were no DATA-waived buprenorphine providers in a majority (60.1%) of rural counties across the United States.[56]

Finally, there were only three articles included in the literature review that examined how MOUD accessibility and treatment options were impacted by COVID-19 related policy changes for incarcerated OUD populations specifically. The adaptations and outcomes described by these three articles varied greatly, with Duncan et al. reporting an increase in the number of incarcerated individuals receiving buprenorphine MOUD after one carceral opioid treatment program transitioned to prescribing via telemedicine, while Bandara et al. reported widespread decreases in availability of MOUD treatment across ten US carceral systems in response to COVID-19 (see Table 3). Due to a lack of data on SUD treatment facilities in carceral settings, further research should be done in order to determine how MOUD treatment accessibility has been impacted for incarcerated OUD populations since the onset of COVID-19 and subsequent emergency MOUD policy changes.

Limitations

Both the literature review and secondary analysis have some limitations. Literature review: Most articles included in the review described programmatic adaptations to MOUD treatment and the perspectives of MOUD patients and providers during the earliest phase of the pandemic. Thus, the results of the literature review should not be considered as representing the current perspectives of MOUD patients and providers in 2022 and further research should be done to determine how these perspectives and treatment experiences may have changed throughout the pandemic's progression. Secondary analysis: First, the 2020 N-SSATS was fielded during the initial 9 months of the COVID-19 pandemic, with a reference date of March 31st, 2020, meaning the data reported by SUD treatment facilities captured the state of MOUD treatment services at the very beginning of the pandemic and should not be considered as representative of how MOUD treatment access may have been adapted at SUD facilities since this initial crucial pandemic

transition period. Additionally, the N-SSATS only surveys specialty addiction facilities and excludes addiction treatment offered in carceral settings, integrated care setting such as primary care clinics, or treatment by providers practicing independently. Thus, the N-SSATS data could not be utilized to examine the changes in MOUD treatment availability from 2019 to 2020 for neither the incarcerated OUD population of interest nor for rural OUD populations. Despite the 2019 and 2020 N-SSATS both collecting data on the number of clients receiving MOUD treatment across facilities that offered MOUD services, this data was not used in the analysis due to the counts not being coded as quantitative numerical data but rather were grouped into levels of counts and categorized on a scale of 1 to 5. This organization of the data made it impossible to properly conduct analyses on the MOUD outpatient client counts reported by N-SSATS facilities, and thus only the facility level data was used in the descriptive analysis of this study.

Only bivariate analyses were conducted to observe differences between 2019 and 2020 in the availability of MOUD pharmacotherapy treatments and related MOUD treatment service variables across SUD facilities. Since this study did not employ multivariable analysis techniques, the effects observed bivariate associations may be different or disappear altogether when controlling for other variables. Thus, a future direction for further research could be conducting an in-depth explanatory multivariable analysis on the 2019, 2020, and if possible 2021 N-SSATS data and beyond to determine how the availability of MOUD treatments in SUD facilities has changed since the onset of COVID-19 and the enactment of the emergency MOUD policy changes. The findings of this study's descriptive analyses do not allow for causal inferences to be made about the observed relationships between variables.

Conclusions and Implications

This thesis aimed to identify how access to, and use of, buprenorphine and methadone medications for OUD have been impacted since the implementation of COVID-19 related emergency policies that eased strict regulations around MOUD treatment delivery. The results found in the descriptive analysis of 2019 and 2020 N-SSATS data suggest that the availability of MOUD maintenance treatments in SUD facilities, particularly buprenorphine, increased from 2019 to 2020 despite COVID-19 disrupting treatment. While no definitive inferences or claims of causality can be made from the findings of the descriptive analyses, a statistically significant increase in the percentage of all SUD facilities that offered buprenorphine pharmacotherapy as well as outpatient methadone and/or buprenorphine maintenance treatments implies that the MOUD policy changes were likely successful in achieving their intended purpose of counteracting the additional barriers to accessing MOUD treatment imposed by COVID-19. The findings of the literature review also suggest that the ability to prescribe buprenorphine for OUD via telemedicine was a significant facilitator for expanding MOUD treatment accessibility during the COVID-19 pandemic. It was not possible to determine whether the increase in availability of buprenorphine pharmacotherapy services across SUD treatment facilities found by the descriptive analysis was due to the policy changes allowing for buprenorphine induction via telemedicine using 2019 and 2020 N-SSATS data. However, future directions for research on MOUD accessibility in light of COVID-19 should be focused on measuring the effect that buprenorphine induction via telemedicine has had on the accessibility of MOUD treatment.

Over two years have passed since the United States declared a state of emergency in response to the novel coronavirus on March 13th, 2020, and on February 18th, 2022, President Biden announced that the state of emergency must continue in effect beyond March 1st, 2022 due to the significant risk to the public health and safety of the Nation that COVID-19 continues to impose.[57] It remains unclear when the United States will no longer be considered as experiencing a state of emergency due to COVID-19, although the benefit of time demonstrates that the federal

government has remained committed to ensuring that MOUD treatment accessibility is expanded throughout this unprecedented pandemic period. This commitment is evident in the department of Health and Human Services creating an exemption for the DATA-waiver requirement to prescribe buprenorphine for OUD on April 28th, 2021, citing the waiver requirement as a perceived barrier to MOUD treatment accessibility in the United States.[58] Furthermore, on March 1, 2022, the Biden Administration released a White House fact sheet titled "Addressing Addiction and the Overdose Epidemic" outlining the President's comprehensive approach to combat the alarming increase in overdoses due to COVID-19. In this statement the Biden Administration demonstrated great support for the MOUD emergency policy changes, declaring that the policy changes will remain in effect and that the Administration plans to propose turning the emergency policies into permanent legislation.[59] This evident commitment to removing the long-standing barriers to MOUD treatment is a promising step toward permanently improving the accessibility of these lifesaving treatments for OUD patients across America. This study contributes to the understanding of ways in which MOUD treatment has been adapted since the onset of COVID-19 and subsequent emergency policy changes. It is essential that further research examining the effects of the policy changes is conducted to help inform the evidence-based decision-making regarding whether MOUD treatment policies implemented as part of the COVID-19 emergency pandemic response should be maintained or modified permanently in order to improve access of MOUD treatments in the United States.

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Appendix

Literature Review Search Strategy

PubMed Search Query:

Database	PubMed (MEDLINE)
Date of Search	**October 21, 2021**
Search Strategy	**#1 OR #2**
Search Field	**All Fields**
Publication Dates	**March 30, 2020, through October 21, 2021**
Search #1	("Methadone" OR "MOUD" OR "Medication assisted treatment) AND ("COVID-19" OR "Coronavirus") AND ("Opioid Use Disorder" OR "Opiate addiction")
Search #2	("Buprenorphine" OR "MOUD" OR "Medication assisted treatment") AND ("Telehealth" OR "Telemedicine") AND ("COVID-19" OR "Coronavirus") AND ("Opioid Use Disorder" OR "Opiate addiction")
Results Yielded from Search	86 Results

Embase Search Query:

Database	Embase
Date of Search	**October 21, 2021**
Search Strategy	**#1 OR #2 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) AND [30-3-2020]/sd NOT [21-10-2021]/sd**
Search Field	**All Fields**
Publication Dates	**March 30, 2020, through October 21, 2021**
Search #1	("Methadone" OR "MOUD" OR "Medication assisted treatment) AND ("COVID-19" OR "Coronavirus") AND ("Opioid Use Disorder" OR "Opiate addiction")
Search #2	("Buprenorphine" OR "MOUD" OR "Medication assisted treatment") AND ("Telehealth" OR "Telemedicine") AND ("COVID-19" OR "Coronavirus") AND ("Opioid Use Disorder" OR "Opiate addiction")
Results Yielded from Search	39 Results