

Impact of Virtual X-waiver Training on Perceptions of Barriers and Facilitators to Medications for opioid Use Disorder

Keywords: X-Waiver Training; Virtual; Buprenorphine; Barriers; Facilitators

Abstract

Background: DATA 2000 X-waiver training has existed for over 20 years, however, less than 10% of eligible practitioners have been waived. The purpose of this study was to understand practitioners' perceptions of X-waiver training and to assess the feasibility of virtual X-waiver training.

Methods: Three separate virtual X-waiver training courses were provided from December 2020 through September 2021. Pre- and post-training surveys were developed to understand practitioners' attitudes toward patients with opioid use disorder (OUD) and to evaluate the effect of the training. All participants were invited to complete surveys anonymously via Qualtrics.

Results: Among 168 participants, 140 and 133 completed pre- and post-training surveys, respectively. Analysis of the pre-training survey data showed that 80% of practitioners were willing to treat patients with OUD. Post-training responses documented significant improvements in diagnosing OUD and recognizing opioid withdrawal symptoms. Similarly, post-training results showed 96% of respondents noted improved confidence in their capacity to prescribe buprenorphine. Approximately 69% of respondents in the pre-training survey were not aware of local community resources to refer patients for substance use treatment; this was reduced to 34% in post-training responses. Post-survey qualitative data revealed that participants thought the virtual training was efficient, however, suggested more in-person interaction and lecture-based discussion. In addition, respondents continued to report persistent barriers to implementation of buprenorphine prescribing.

Conclusion: This study demonstrated the feasibility of delivering X-waiver training virtually. In addition, X-waiver training improved practitioners' knowledge and comfort in identifying and managing OUD although persistent barriers to buprenorphine prescribing remain despite training.

Introduction

Nationally, approximately 80% of patients with opioid use disorder (OUD) do not receive recommended medications for opioid use disorder (MOUD).[1] Despite evidence that patients receiving MOUD are more likely to remain engaged in treatment and less likely to use illicit opioids,[2,3] widespread adoption of this approach has lagged.[4,5] This implementation gap is stark in Alabama where, according to the Substance Abuse and Mental Health Services Administration (SAMHSA) database and publicly available data on the number of physicians in Alabama, approximately 15% of physicians statewide had undergone Drug Addiction Treatment Act (DATA) 2000 X-waiver training as of January 1, 2021.[1,6] Given the number of patients with OUD in Alabama, each waived provider is expected to serve over 500 patients, which is far beyond the cap established by the federal regulations before the Drug Enforcement Administration's new regulation was announced in January 2023.[7] Furthermore, many waived providers do not actively prescribe buprenorphine for



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their patients with OUD due to a variety of reasons, including but not limited to, stigma associated with this patient population and lack of training and expertise.[8-10] Thus, it is not surprising that in Jefferson County, the most populous county in Alabama, less than 20% of eligible patients receive evidence based MOUD.[7] Taking this into account, educating practitioners, assisting waived practitioners in delivering MOUD, and expanding MOUD training to include non-addiction medicine physicians is urgently needed to increase capacity to treat patients with OUD in Alabama.

To address the overwhelming need, the University of Alabama at Birmingham (UAB) was awarded a grant through the Foundation for Opioid Response Efforts to provide X-waiver training to practitioners primarily at UAB Hospital and Cahaba Medical Care Foundation using a multidisciplinary approach. UAB Hospital is the largest medical center in the Southeast region, and Cahaba Medical Care Foundation is a Federal Qualified Health Clinic (FQHC), also located in Jefferson County, Alabama, serving over 20,000 patients annually. The educational objectives were: (1) to understand the practitioners' willingness, attitudes, and perceptions regarding the treatment of patients with OUD, and capacity to provide MOUD; (2) to evaluate the impact of X-waiver training on practitioners' knowledge and comfort related to OUD and MOUD; (3) to determine any barriers impeding buprenorphine prescribing; and (4) to identify opportunities to make improvements in X-waiver training that would lead to increased treatment of OUD.

The overall aim of the training was to increase access to MOUD through education and telehealth. To evaluate these educational objectives, pre- and post-training surveys were developed to understand practitioners' perceptions on DATA X-waiver training and buprenorphine prescribing, as well as to identify potential barriers to opportunities in improving the quality of trainings and expanding MOUD access.

Methods

Study design

The study was approved by the Institutional Review Board at the UAB. X-waiver training was advertised via departmental emails at UAB Hospital and Cahaba Medical Care Foundation. All interested health care providers at UAB Hospital and Cahaba Medical Care Foundation were encouraged to attend. X-waiver training consisted of four hours of synchronous virtual training, followed by four hours of online Providers Clinical Support System (PCSS) asynchronous modules for physicians and physicians in training or sixteen hours for advanced practice providers. The four hours of virtual training were provided by physicians at UAB Hospital who were certified by the PCSS. Training materials were provided by the PCSS and approved by the American Academy of Addiction Psychiatry. Three separate virtual X-waiver trainings were provided from December 2020 through September 2021.

Survey Development and Data Collection

Two staged participant surveys were developed by the authors using Qualtrics, an online survey platform, to evaluate practitioners' perceptions, to measure the effect of the virtual training, as well as to receive general feedback on the educational objectives stated above. Both pre- and post- training surveys were disseminated to participants via email through an anonymous link or QR code. The pre-training survey was administered one to two weeks ahead of the virtual X-Waiver training event. Participants were asked to complete the post-training survey within one week after the virtual training. Quantitative and qualitative data were collected simultaneously for data analysis. While both pre- and post-training surveys included questions to assess the demographics of participants, no personal identifying information was otherwise obtained. No incentive was offered to respondents.

The pre-training survey included 28 items assessing practitioners' knowledge and experience of OUD and MOUD. We included questions in the pre-training survey to understand participants' attitudes, willingness to work with, and perceived stigma towards patients with OUD. They were also asked about their understanding of the OUD disease course. The pre-training survey collected objective data, including the number of patients previously treated with buprenorphine and the clinical capacity of practitioners to treat patients with buprenorphine.

The post-training survey included 24 items and was developed to determine the feasibility of providing buprenorphine treatment upon completing virtual X-waiver training. The primary outcomes related to feasibility were assessed by the same seven questions in both pre- and post- training surveys, which was assessed as improved knowledge and comfort with regards to the recognition of opioid withdrawal symptoms, the diagnosis of patients with OUD, and the pharmacology of buprenorphine, including induction, contraindications to, clinical indications for, and side effects. Secondary outcomes included improved awareness of community resources for substance use treatment, broader consideration of non-addiction clinical environments as appropriate medical venues to engage and treat patients with OUD using buprenorphine.

Qualitative data via free text open-ended questions were also collected in both pre- and post-training surveys. On the pre-training

survey, participants were asked "What barriers have you encountered or do you anticipate with regard to assessing and treating patients with OUD using buprenorphine or naltrexone". On the post-training survey, participants were asked about: (1) the most beneficial aspect of the training; (2) the least beneficial aspect of this training; and (3) what could have made the training better. Open-ended survey responses were analyzed using thematic analysis by one coder. Adopting an inductive approach, the coder became familiar with the responses for each open-ended question and then developed a preliminary coding scheme per question to seek out emergent patterns and concepts. Following initial analysis, the codes were further refined and sorted into appropriate categories of related themes and findings. This process involved analyzing the existing codes to find similarities and group them into categories based on common properties.

Quantitative and qualitative data from three separate virtual training courses were collected independently and integrated during data analysis. Statistical analyses were performed using SPSS version 26 (IBM). Descriptive data are presented as frequencies and percentages unless otherwise specified. The Pearson chi-square test was utilized for comparing categorical responses from pre- and post-training surveys, with a significance level set at $p < 0.05$. Qualitative data analysis was performed to characterize training effectiveness, suggestions for improvement, and barriers to implementing buprenorphine provision.

Results

Characteristics of participants

One hundred sixty-eight participants engaged in the three virtual training courses. Demographics of participants are presented in Table 1. Response rates were 83% (n=140) and 79% (n=133) for

Table 1: Participants' Characteristics

Variable	Descriptor	N (%)	
		Pre-training, n=140	Post-training, n=133
Gender	Male	49 (35%)	52 (39%)
	Female	91 (65%)	81 (61%)
Age, years	18-24	1 (1%)	1 (1%)
	25-34	77 (55%)	66 (50%)
	35-44	35 (25%)	37 (28%)
	45-74	27 (19%)	29 (21%)
Race	Asian	19 (14%)	17 (13%)
	Black	19 (14%)	21 (16%)
	White	96 (69%)	86 (64%)
	Other	6 (3%)	9 (7%)
Ethnicity	Hispanic, Latino or Spanish origin	8 (6%)	6 (5%)
	Not Hispanic, Latino or Spanish origin	132 (94%)	127 (95%)
DEA registration	Yes	81 (58%)	
	No	59 (42%)	
Number of X-Waivered	Yes	5 (4%)	
	No	94 (67%)	
	N/A	41 (29%)	
Number of patients treated with MOUD	0	82 (59%)	
	1-5	23 (16%)	
	6-10	7 (5%)	
	>10	28 (20%)	

Note: DEA, Drug Enforcement Administration; MOUD, medications for opioid use disorder.

pre- and post-training surveys, respectively. Physicians (58%), including residents (PGY1-PGY5) (42%) and attending physicians (16%), represented the majority of participants who completed the pre-training survey. Advanced practitioners (26%), including nurse practitioners and physician assistants, also participated. Post-training survey respondents were physicians in training (42%), attending physicians (14%), and advanced practitioners (28%). There were more female than male responses in both the pre- and post-training surveys. Furthermore, over two-thirds of both sample populations were in the 25-34 and 35-44 years-old age groups. Most participants self-identified as white and non-Hispanic.

Quantitative analysis in pre- and post-training surveys

Attitudes and stigma assessment in pre-training survey.

As shown in Table 2, in the pre-training survey, most participants were willing to take care of patients with OUD. They also felt that it was rewarding and satisfying to work with this specific population and agreed that OUD is analogous to other chronic diseases. Most participants agreed that health insurance plans should cover OUD treatment similar to treatment of other medical conditions.

Effect of X-waiver training in addressing barriers to prescribe buprenorphine. In the pre-training survey, more than half (57%) of participants indicated they were comfortable identifying and diagnosing OUD in their practice; however, this increased further to 87% post-training (Table 3). Similar results were demonstrated in participants feeling comfortable recognizing opioid withdrawal signs and symptoms, with 74% feeling comfortable pre-training compared to 93% post-training. In the pre-training survey, only 42% reported understanding buprenorphine indications and contraindications, and 31% expressed comfort prescribing buprenorphine to manage patients with opioid withdrawal symptoms. There was a significant increase (93%) in understanding the induction, contraindications, clinical

Table 2: Stigma and Attitudes Assessment in Pre-training Survey

Questions	Disagree (%)	Not sure, but probably agree (%)	Agree (%)
I prefer not to work with patients with opioid use disorder.	79.4	14.2	6.4
Patients like this irritate me.	89.3	7.1	3.6
I enjoy giving extra time to patients like this.	32.8	24.3	42.9
Patients like this are particularly difficult for me to work with.	72.2	17.1	10.7
Working with patients like this is satisfying.	30.0	35.7	34.3
I feel especially compassionate toward patients like this.	18.6	24.3	57.1
I can usually find something that helps patients like this feel better.	32.9	32.1	35.0
There is little I can do to help patients like this.	85.7	9.3	5.0
Insurance plans should cover patients like this the same degree that they cover patients with other conditions.	7.1	19.3	73.6
Treating patients like this is a waste of medical dollars.	98.6	0.7	0.7
Relapse was part of the recovery process like other chronic diseases.	0.7	13.6	85.7

Table 3: Comparisons between Pre- and Post-training Surveys

Questions	Pre-training	Post-training	P values
	Agree or strongly agree (%)	Agree or strongly agree (%)	
I feel very comfortable identifying and diagnosing OUD in the practice.	57.1	87.2	<0.001
I feel very comfortable recognizing opioid withdrawal signs and symptoms.	73.6	93.2	<0.001
I understand buprenorphine indications and contraindications as well as its clinical effects and side effects.	42.1	92.5	<0.001
I feel very comfortable prescribing buprenorphine and naltrexone for patients with opioid withdrawal.	31.4	75.2	<0.001
I feel very comfortable instructing my patients on how to take buprenorphine at home including initiation of home induction.	22.9	80.1	<0.001
Your practice setting is an appropriate venue to engage patients with OUD using buprenorphine or naltrexone.	87.9	90.2	0.71
I am aware and familiar with local community resources to refer patients with OUD for definitive substance abuse treatment, including medication management.	37.1	76.7	<0.001

Note: OUD, opioid use disorder.

indications, and side effects of buprenorphine post-training. Comfort levels also significantly increased with 75% reporting improved confidence with regards to prescribing buprenorphine to manage opioid withdrawal symptoms post-training. Similar results were seen in the percentage of participants' reporting comfort with instructing patients on how to take buprenorphine at home, increasing from 23% pre-training to 80% post-training.

Among the participants who completed both pre- and post-training surveys, the majority believed that their clinics were appropriate places to engage patients with OUD using buprenorphine or naltrexone and this did not change significantly as a result of the training (88% vs. 90%, $p=.71$). Familiarity with local community resources was significantly lacking (37%) prior to training with providers unaware or unfamiliar with local referral options for definitive substance abuse treatment, including MOUD. In the post-training survey, familiarity increased to 77%.

Qualitative analysis

Pre-training

Our analysis identified five main themes regarding participants' perceptions of barriers to providing OUD treatment in their clinic: resources, financial, compliance, regulatory, and comfort barriers (Table 4). Several of these themes were interconnected and were comprised of sub codes to better understand and filter the data.

Resource barriers were identified as responses reporting a general lack of necessary resources, either in clinic or in the community, to provide and maintain OUD treatment. Participants mostly reported on a lack of knowledge, training, or confidence in prescribing buprenorphine, as well as a lack of time and availability and lack of access to treatment for patients. Similarly, many participants also

Table 4: Perceived barriers to providing care to OUD patients in pre-training

Code	N	%	Sub-code (%)
Resource Barriers	48	35.0%	-
Community resources	7	5.1%	14.6%
Knowledge/training	31	22.6%	64.6%
Time/availability	7	5.1%	14.6%
Access	3	2.2%	6.3%
Financial Barriers	14	10.2%	-
General financial stressors	5	3.6%	35.7%
Insurance	4	2.9%	28.6%
Cost	5	3.6%	35.7%
Compliance Barriers	27	19.7%	-
Follow-up	6	4.4%	22.2%
Compliance/Adherence	16	11.7%	59.3%
Honesty	5	3.6%	18.5%
Regulatory Barriers	13	9.5%	-
Staff pushback	3	2.2%	23.1%
Regulation confusion	2	1.5%	15.4%
No license/lack of authority	8	5.8%	61.5%
Comfort Barriers	19	13.9%	-
No experience	8	1.5%	42.1%
Early career	2	1.5%	10.5%
Stigma/Social Support	9	6.6%	47.4%
Misc.	16	11.7%	-

reported barriers related to comfort, either for the patient or the provider. These participants noted that a lack of experience and being early in their career provided significant personal challenges in terms of barriers to care for their clinic; however, many noted that the lack of social support services and perceived stigma provided more extensive barriers in their practice.

Financial barriers included general financial stressors for patients, specifically in terms of cost to the patient or lack of insurance coverage. Regulatory barriers included general staff pushback to treating addiction patients, confusion around government authorizations and restrictions, and not having personal authority or licensure in their clinic to provide such treatment.

Notably, many respondents reported adherence to treatment as a primary barrier to care for this patient population. Participants noted that lack of or confusion around follow-up procedures, a lack of adherence to treatment regimen, and patient transparency around addiction were top barriers to providing treatment.

Miscellaneous barriers included unique responses that did not fit within the existing coding scheme. These responses addressed barriers such as complexities surrounding comorbidities in this population, referring to other clinics, working within the court system, and lack of established relationships with patients.

Post-training

Five main themes emerged when participants were asked about the most beneficial aspects of the training: case studies, treatment, topic relevance, type of information covered, and presentation style and format.

The overwhelming majority of participants (40.8%) commended the presenters and appreciated the interactive nature of the training

course. Participants noted that having comprehensive slides, as well as frontline physicians with firsthand experience in treating this population, as being the most beneficial component of this training. Several participants noted that “the presenters were great,” “well rounded,” “engaged,” and “invested” which contributed to the delivery of the training. Many participants (22.4%) also noted that they found the case studies to be the most beneficial portion of the training, as it enables them to apply material covered in the course and think through real-world scenarios. One participant wrote “going over the case studies made the learning more meaningful and allowed application of learned material,” with another noting that the interactive examples “helped provide perspective.” Similarly, many participants (22.4%) found the information on MOUD and OUD treatment in the training to be greatly beneficial and relevant. Key areas participants mentioned as the most useful included understanding withdrawal symptoms, information on prescribing suboxone, how to best instruct patients on taking their medications, and general dosing guidance for MOUD. Lastly, some respondents (7.2%) noted specific information as being the most beneficial, such as understanding the connection of dual diagnosis, inclusion of non-judgmental terminology, and the process of becoming x-waivered, while others (7.2%) provided general statements on the training being “interesting,” “high yield”, and “relevant to [their] patient population”. Such statements included “The whole thing was helpful. I appreciated the background/history information and the practical how-to information,” and “the whole training was beneficial.”

When asked about the least beneficial aspect of the training, four main themes emerged, including: presentation style and format, length of training, additional instructions, and topics/information provided. While many had reported they found the presentation style and format to be engaging and beneficial, when asked “what could have made this session better,” many participants (50%) reported that they did not like the current format. Key areas participants noted as needing improvement included providing even more case studies and interactive elements or making the training on demand. However, some respondents recommended moving the training to all in-person rather than virtual to enhance engagement. Similarly, many participants reported issues with the length of the training. While the majority found the training to be too long and would have appreciated it being broken up over several days or having more breaks, two participants reported they would have liked the training to be longer to provide more information and time for interactive elements.

While participants previously praised the content covered, when asked how to improve the training, many (17.4%) responded with specific topics they would like to see covered in future sessions. Notably, participants seemed interested in information on post-surgical pain management for patients with OUD, addressing and overcoming stigma, understanding more unique aspects to care, and more information on local resources available. Lastly, some participants (8.1%) reported that they would appreciate more instruction or direction prior to class, either in terms of pre-course work to help with comprehension during the training, or by providing more reminders about training requirements.

Discussion

This study demonstrates that virtual delivery of X-waiver training

course is feasible and has the capacity to improve practitioner's knowledge, comfort level, and attitudes as they relate to OUD treatment.

Changes to practitioners' perceptions

Buprenorphine can be prescribed by both physicians and advanced practice providers who have X-waiver numbers before January of 2023. However, practitioners generally lack the training in assessing substance use disorders, including OUD, and related treatment options. In 2019, there were only 3,000 certified addiction specialists in the United States.[11] The lack of addiction training begins at the level of undergraduate and medical school education and proceeds through residency and fellowship with only 66 of the nation's 187 accredited medical schools offering addiction medicine fellowships in 2019.[12-17] Increased opioid-related overdose death and addiction provider deficit may spur more eligible practitioners to seek training and treat OUD.[18] Consistent with this, results from our pre-training survey found moderate to strong attitudes and enthusiasm to learn about OUD and treat patients with OUD among respondents. Our post-training survey results also indicate that virtual X-waiver training can improve practitioners' ability to understand buprenorphine's pharmacology, which is imperative to treating patients with OUD. Results from the comparative analysis of the pre- and post-training surveys showed participants increased their knowledge related to identifying and treating patients with OUD as well. This increase in knowledge is reflected in provider's comfort in engaging patients with OUD, which is a positive step toward combating the opioid epidemic. [19,20] Therefore, our findings underscore the positive impact that X-waiver training can have on practitioners' knowledge of OUD and their ability to treat it.

Although the Department of Health and Human Services announced in April 2021 that it would allow eligible practitioners to apply for X-waiver numbers without formal X-waiver training, many practitioners still feel they are not equipped with appropriate knowledge, and thus not comfortable enough, to properly engage in treating patients with OUD.[21,22] Acknowledging and filling in this gap in knowledge through X-waiver training course plays a critical role in expanding access to MOUD.[23,24] Feedback from our participants also found the need for practitioners to practice their knowledge and improve confidence with prescribing buprenorphine. Thus, a structured learning environment, including a mixture of training modules and practice, is critical to prepare practitioners to assess and treat patients with OUD. Similarly, the majority of participants expressed the need for further training in the post-training survey, echoing sentiments reported in previous research. [25] Continued interest from practitioners for more training on MOUD emphasizes the need among practitioners for more education and mentoring.

Barriers in prescribing buprenorphine

Historical barriers for prescribing MOUD have included practitioner stigma, insufficient training, education, and experience, as well as lack of specialized support, inadequate or burdensome reimbursement, and burdensome regulatory procedures.[26-29] In the current study, participants echoed many of these cited barriers. Additional barriers included lack of comfort prescribing

buprenorphine, negative perception of patient interest or ability to comply with medication requirements, practitioners' relationship with patients (e.g., limited rapport), limited time to assess patients, and lack of awareness of community resources and referral partners. While stigma and mitigating its influence on practitioners remains a public health priority to expand access to care for patients with OUD,[28,30] our study demonstrated practitioners' willingness to treat patients with OUD. Further, a majority of participants considered it "rewarding and satisfying" to treat patients with OUD, a sentiment that may be reflective of a trend toward decreased stigmatization of OUD.

Another persistently cited barrier amongst participants was the cost of MOUD, which may impact patient adherence to treatment and increase the risk of reuse or overdose. This cost impact is even broader in a Medicaid non-expansion state, including Alabama.[31] As a result, the National Institute on Drug Abuse has emphasized the need for further research on how to approach payment reimbursement for MOUD.[32] Moreover, further practitioner training can expand access to MOUD by addressing barriers and misconceptions, and in return increase much needed care for patients.[33] While the training directly addressed many reported pre-training survey barriers, some barriers persist, such as awareness of available community resources, which highlights an opportunity for future engagement and further targeted training.

Factors facilitating training

Qualitative responses indicated that experienced trainers specialized in addiction medicine are ideal facilitators. Participant feedback found that the presentations, which were conducted by the physicians currently practicing addiction medicine, were informative via the demonstration of "real-world experience". Similarly, participants found the case studies utilized throughout the training to be important in better understanding the decisions and situations they may face when providing care to patients with OUD. Furthermore, few participants noted they preferred in-person over a virtual format for future trainings. This may suggest a preference amongst providers for virtual training; however, further exploration is needed to support this. Given participant interest in available resources and referral options, developing locally informed training alongside addiction medicine specialists may be an effective route for ensuring future interest and engagement. These findings, and further investigation into preferred training formats, may prove useful in designing and implementing future X-waiver and other addiction-related trainings.

Study strengths and limitations

Due to the COVID pandemic, we adjusted the training modality from in-person to virtual to enable practitioners the flexibility of attending from any place and eliminate additional time commitments such as travel time. Although virtual training is feasible, our post-training survey results showed that practitioners preferred more case-based discussion and more interaction with trainers, which may be more suited for in-person training. A previously documented challenge for practitioners is the time commitment associated with X-waiver training. Prior research found that it was perceived as too burdensome for practitioners to fit X-waiver training into their already busy schedules.³⁴ To address this concern, we provided three

virtual training courses that allowed practitioners to complete their training hours in more than one training module. Thus, being flexible for practitioners to complete required training hours at their own pace could be an option to increase the number of waived practitioners and expand access to MOUD.

Our study has several limitations. First, our study is a cross-sectional design with surveys limited to pre-training and post-training within 1-2 weeks, and therefore, cannot predict long-term impacts of virtual X-waiver training. For this, longitudinal data on the perceptions of practitioners post-training would be beneficial in understanding the role of X-waiver training in addressing barriers associated with OUD management and MOUD access. Second, our respondents are practitioners who signed up for this training and thus may represent a biased sample regarding the degree of interest in OUD management, which might have influenced our results. Lastly, our study had a relatively small sample of participants which prevented us from considering conditional relationships that would have allowed us to identify common and unique preferences by subgroups (e.g., physicians vs. advanced practice providers). These findings may be further limited by having only one coder analyze the open-ended responses in pre- and post-training surveys.

Conclusion

Our study shows that virtual X-waiver training is feasible and contributes new understanding of the barriers and facilitators to X-waiver training and buprenorphine prescribing. Our findings emphasize the capacity of X-waiver training to address some barriers, especially practitioners' knowledge gap and comfort level. Future interventions aimed at improving access to MOUD may need to focus on being flexible with training modality, affordability, and community resource awareness and referral partners.

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Disclosure

The authors report no conflicts of interest

References

1. Substance Abuse and Mental Health Services Administration. Behavioral Health Barometer: Alabama, Volume 6: Indicators as measured through the (2019) National Survey on Drug Use and Health and the National Survey of Substance Abuse Treatment Services. Published (2020).
2. Connery, H.S (2015) Medication-assisted treatment of opioid use disorder: review of the evidence and future directions. *Harv Rev Psychiatry* 23: 63-75.
3. Shulman M, Wai JM, Nunes EV (2019) Buprenorphine treatment for opioid use disorder: an overview. *CNS Drugs* 33: 567-580.
4. Volkow ND, Jones EB, Einstein EB, Wargo EM (2019) Prevention and treatment of opioid misuse and addiction: a review. *JAMA Psychiatry* 76: 208-216.
5. Simpson SA, Hordes M, Blum J, Rinehart D, Al-Tayyib A (2021) Barriers to engagement in opioid use disorder treatment after buprenorphine induction. *J Addict Med*. 16: 479-482.
6. Frédéric Michas. Number of active physicians in Alabama in 2021, by specialty area. Published August 9, 2023.
7. SAMHSA. Waiver Elimination (MAT Act). Published January 10, 2023.
8. Olsson M, Zhang V(Shu), Schoenbaum M, King M (2020) Trends in buprenorphine treatment in the United States, 2009-2018. *Jama*. 323(3): 276-277.
9. Gertner R (2019) U.S. trends in the supply of providers with a waiver to prescribe buprenorphine for opioid use disorder in 2016 and 2018. *Drug Alcohol Depend* 204: 107527.
10. Weimer MB, Wakeman SE, Saitz R (2021) Removing one barrier to opioid use disorder treatment: is it enough? *Jama*. 325: 1147-1148.
11. Scutti S (2019) 21 million Americans suffer from addiction. Just 3,000 physicians are specially trained to treat them.
12. McCance-Katz EF, George P, Scott NA, Dollase R (2017) Access to treatment for opioid use disorders: Medical student preparation. *Am J Addict* 26: 316-318.
13. Rasyidi E, Wilkins JN, Danovitch I (2012) Training the next generation of providers in addiction medicine. *Psychiatr Clin North Am* 35: 461-480.
14. Ram A, Chisolm MS (2016) The Time is now: improving substance abuse training in medical schools. *Acad Psychiatry* 40: 454-460.
15. Tesema L, Marshall J, Hathaway R, Pham C, Clarke C et al. (2018) Training in office-based opioid treatment with buprenorphine in US residency programs: A national survey of residency program directors. *Subst Abus* 39(4): 434-440.
16. Klimas J, Small W, Ahamad K, Cullen W, Mead A et al. (2017) Barriers and facilitators to implementing addiction medicine fellowships: a qualitative study with fellows, medical students, residents and preceptors. *Addict Sci Clin Pract* 12: 21-30.
17. American Society of Addiction Medicine. MORE TRAINING NEEDED TO ADDRESS ADDICTION WORKFORCE SHORTAGE: Congress should fund authorized demonstration program at HRSA in FY20. n.d.
18. Stone W (2019) Aspiring doctors seek advanced training in addiction medicine. *Kaiser Health News*.
19. Levin FR, Bisaga A, Sullivan MA, Williams AR, Cates-Wessel K (2016) A review of a national training initiative to increase provider use of MAT to address the opioid epidemic. *Am J Addict* 25(8): 603-609.
20. Department of Health and Human Services. Practice guidelines for the administration of buprenorphine for treating opioid use disorder.
21. Lanham HJ, Papac J, Olmos DI, Heydemann EL, Simonetti N et al. (2022) Survey of Barriers and Facilitators to Prescribing Buprenorphine and Clinician Perceptions on the Drug Addiction Treatment Act of 2000 Waiver. *JAMA Netw Open*. 5: e2212419.
22. Russell HA, Sanders M, Meyer JKV, Loomis E, Mullaney T, et al. (2021) Increasing Access to Medications for Opioid Use Disorder in Primary Care: Removing the Training Requirement May Not Be Enough. *J Am Board Fam Med* 34: 1212-1215.
23. Cleary EM, Smid MC, Charles JE, Jones KM, Costantine MM et al. (2021) Buprenorphine X-waiver exemption - beyond the basics for the obstetrical provider. *Am J Obstet Gynecol MFM* 3: 100451.
24. Gordon AJ, Kenny M, Dungan M, Gustavson AM, Kelley AT et al. (2022) Are x-waiver trainings enough? Facilitators and barriers to buprenorphine prescribing after x-waiver trainings. *Am J Addict*. 31: 152-158.
25. Cioe K, Biondi BE, Easley R, Simard A, Zheng X, et al. (2020) A systematic review of patients' and providers' perspectives of medications for treatment of opioid use disorder. *J Subst Abuse Treat*. 119: 108146.
26. Salisbury-Afshar E, Smithenry D, Boley RA, Hill K, Karnik NS (2022) Expanding access to medications for opioid use disorder Treatment Through Incentivized Continuing Education. *J Contin Educ Health Prof*. 42(1): e102-e105.
27. Hutchinson E, Catlin M, Andrilla CHA, Baldwin LM, Rosenblatt RA (2014) Barriers to primary care physicians prescribing buprenorphine. *Ann Fam Med* 12(2): 128- 133.

28. Stone EM, Kennedy-Hendricks A, Barry CL, Bachhuber MA, McGinty EE (2021) The role of stigma in U.S. primary care physicians' treatment of opioid use disorder. *Drug Alcohol Depend* 221: 108627.
29. Kennedy-Hendricks A, Busch SH, McGinty EE, Bachhuber MA, Niederdeppe J et al. (2016) Primary care physicians' perspectives on the prescription opioid epidemic. *Drug Alcohol Depend* 165: 61- 70.
30. Tong ST, Hochheimer CJ, Peterson LE, Krist AH (2018) Buprenorphine provision by early career family physicians. *Ann Fam Med*. 16(5):443-446.
31. Lall A, Devereaux R, Flynn M, Vandever C, Tomskey-Jackson K (2021) Analysis of emergency department utilization in medicaid expansion and non-expansion states. *Cureus* 13: e18561.
32. NIDA. Research needed to advance the impact of medications for opioid use disorder: focus on benefit design and payor reimbursement practices (MOUDs).
33. Cheng H, Chokron Garneau H, Yuan M, McGovern MP (2021) A mapping review of NIDA-funded implementation research studies on treatments for opioid and/or stimulant use disorders. *Drug Alcohol Depend* 225: 108767.
34. McCollum CG, Eaton E, Creger T, Lee A, Gagnon K, et al. (2023) Physicians' experiences with buprenorphine: A qualitative study of motivations for becoming X waived and barriers to and facilitators of prescribing the medication for opioid use disorder. *Drug Alcohol Depend* 244:109777.