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Optimizing Buprenorphine Training During Undergraduate Medical Education: Medical Student Feedback and Attitudes

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Abstract

Background and Objectives: Strong evidence supports efficacy of medications for opioid use disorder (MOUD), but stringent prescribing policies impair access. Many physicians report discomfort prescribing MOUD due to inadequate knowledge. Most medical students believe MOUD training should occur during undergraduate medical education (UME). As legislation surrounding buprenorphine prescribing shifts, it is timely to consider how best to incorporate MOUD training into UME.

Methods: At the start of third year all students (n=290) received a survey regarding experiences working with people with OUDs, and beliefs and knowledge regarding harm reduction and treatment. During orientation, students completed an 8-hour online MOUD training. Afterwards, students completed another survey, including questions about training perceptions.

Results: One third of students (32.8%) completed MOUD training and both surveys. Before training, 60.0% had not heard of the waiver, but 82.1% endorsed interest in prescribing buprenorphine. Despite mixed feelings about training content and delivery, 79.1% believed future classes should receive it. Most thought it should be integrated longitudinally throughout the curriculum rather than as separate online training.

Conclusions: Medical students want more MOUD education throughout their training; however, the 8-hour online training may be less-than-optimal. As this training is no longer required to prescribe buprenorphine, there is an opportunity to modify the content presented.

Scientific Significance: There is an urgent need for physicians with the knowledge and willingness to treat patients with OUD. Introducing integrated training about MOUD should help future physicians feel confident in their knowledge to treat patients and comfortable applying for the waiver.

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Author Contributions: EW and DL managed the inclusion of the PCSS course within the pre-clerkship orientation. MKG and TEHM developed the larger research project surrounding the training. TEHM took the lead in writing this manuscript. All authors provided critical feedback and contributed to writing the manuscript. All authors have reviewed the manuscript content and approved the final version for publication.

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Keywords

medical education; overdose; opioids; buprenorphine; stigma

1. Introduction

In the United States of America (US), more than 2 million people have an opioid use disorder (OUD); however, fewer than 10% are connected to treatment.¹ Medications for OUD (MOUD) are evidence-based, gold-standard treatments for OUD that lessen harmful health and societal effects of the disorder, and provide a highly effective tool for those seeking treatment. Current MOUD include the full opioid *mu*-agonist methadone, partial *mu*-opioid agonist buprenorphine, and opioid antagonist naltrexone.² Opioid agonist treatments (OAT), such as buprenorphine, are well-documented to reduce rates of relapse, decrease opioid craving, and increase quality of life.^{3–5} Despite strong evidence of association between receipt of OAT and decreased mortality⁶, stringent prescribing policies in the US can impair treatment access.⁷

For physicians who wish to prescribe buprenorphine, the Drug Addiction Treatment Act of 2000 (DATA-2000) allows physicians to obtain a Drug Enforcement Administration (DEA) waiver to prescribe buprenorphine for OUD. Under this regulation, physicians were eligible to prescribe buprenorphine-based medications only after they passed an 8-hour course, obtained their current state medical license and a valid DEA registration number, and then applied for a waiver.^{8,9} In April 2021, the US Department of Health and Human Services updated these requirements, stating that physicians can apply for a waiver to prescribe buprenorphine for up to 30 patients without completing the 8-hour course.¹⁰ Most recently at the end of December 2022, the DATA-Waiver Program was eliminated entirely, which means that physicians no longer need to apply for a waiver to prescribe buprenorphine nor do they have a cap on the total number of patients they can treat with buprenorphine.¹¹ Despite positive impacts of these modifications, the waiver was not the only barrier to increasing buprenorphine access; it is clear that increased education about SUDs and MOUD is needed at all levels of medical training.^{12–14}

These stringent requirements have led many physicians not to obtain a waiver.^{15–17} As of 2018, approximately 47% of counties in the US lacked a physician with a DATA-2000 waiver. Initiation of buprenorphine treatment by physicians across multiple specialties (e.g., emergency medicine) can be an effective way to engage patients with treatment services; however, this point of care is hindered by the waiver requirement.^{18,19} Physicians in the US cite regulations on buprenorphine prescribing a key barrier to their ability and willingness to prescribe the medication.^{15–17} Furthermore, many physicians state that even if these policy barriers were removed, they would not feel comfortable prescribing MOUD due to inadequate knowledge.^{12–14} A growing consensus on the need for increased education regarding substance use disorders (SUDs) has led many schools to improve curricula on these topics.^{20–23} One way undergraduate medical education (UME) was addressing this was by introducing DATA-2000 approved trainings. Goals of providing this training are

to educate students about MOUD and to ensure they are ready and able to prescribe buprenorphine upon graduation.^{24–27}

Although initial data suggest that incorporating MOUD waiver training into UME is desired by students and increases knowledge regarding OUD treatment,^{28–31} it is important to recognize this training was developed for physicians, not medical students. Most medical students believe training in these topics should occur during UME; however, with the shift in legislation allowing physicians to prescribe buprenorphine without a waiver, it is the optimal time to consider how best to incorporate training regarding MOUD into UME to ensure future physicians have sufficient knowledge to treat patients with SUD.

At our institution, we incorporated a Substance Abuse and Mental Health Services Administration (SAMHSA) and DEA approved 8-hour online MOUD training into our clerkship curriculum with the goal of ensuring all students graduate with the knowledge and ability to apply for a DATA-2000 waiver. The present study examined the experiences of medical students who were required to complete the Providers Clinical Support System (PCSS) free, online, 8-hour medical student waiver training during a 3-week pre-clerkship orientation. This study aims to examine student responses to receiving the training and identify impacts that training may have on student knowledge and attitudes surrounding MOUD and working patients with SUDs. Additionally, now the specific 8-hour training is no longer required for physicians to prescribe buprenorphine, we aim to use student feedback to highlight the necessary content for future training in MOUD and identify the optimal timing and methods for incorporating this training into UME. We believe results of this study will advance future implementation of relevant curricula and provide important insights into educational desires and needs of current medical trainees.

2. Methods

2.1. Participant Selection

This analysis was conducted using data from a larger, ongoing project examining longitudinal effects of SUD-related curricula. The study was designed to track the Class of 2023 throughout UME to monitor changes in attitudes and behaviors surrounding substance use, treatment, and harm reduction.

At matriculation, all medical students (N=296) were asked to complete a first-year (M1) baseline survey. Students receive annual follow-up surveys each academic year. They received their second annual follow-up survey at the start of their third year (M3, completed March 19–24, 2021) during the first week of a 3-week pre-clerkship orientation. During this orientation course, all students were required to complete the PCSS training. Approximately 50% of the class also received a 1-hour Opioid Overdose Prevention and Response Training (OOPRT); the other 50% of the class had received that training at the start of M1. For details on this training and curriculum, see Moses *et al.*, 2021.³²

After the orientation course, students were asked to complete a brief post-training survey (completed April 2–8, 2021) focused on orientation-specific content. While the annual and post-training surveys were optional at every stage, the trainings (both the PCSS online

training and the OOPRT) were required for all students. Figure 1 illustrates the study design and groups included in analyses.

2.2 Measures

Annual surveys completed as part of the curriculum included various questions regarding previous healthcare experiences, experiences working with people with SUDs, harm reduction, and treatment. To measure knowledge and attitudes related to SUDs we used several validated assessments: Opioid Overdose Knowledge Scale (OOKS), Opioid Overdose Attitudes Scale (OOAS)³³, Medical Conditions Regard Scale for SUDs (MCRS)³⁴, and Naloxone Related Risk Compensation Beliefs (NaRRC-B).³⁵ For details on these assessments and scoring, see Moses *et al.*, 2020.³⁶ The post-training survey also included questions about the perceived efficacy of the MOUD training and their experiences and reflections following training.

2.3 Data Analysis

All participants who completed the M3 annual follow-up (M3 baseline) survey and the post-clerkship orientation (M3 post-orientation) survey were included in the initial analysis. To evaluate the impact of MOUD training on specific outcomes, we included only students who did not receive the concurrent OOPR training. Descriptive data are presented as mean \pm one standard deviation. Wilcoxon signed-rank tests were used to compare the key ordinal outcomes at the start of M3 with those measured post-training. The criterion of $p < .05$ was used to reject the null hypothesis (SPSS v.26).

3. Results

3.1. Participant Characteristics

All students completed the PCSS training but only 95 students completed the majority of both the M3 baseline and post-orientation surveys. Of those, average age was 24.8 ± 2.5 years (range: 22-43 years) and 57.9% (n=55) identified as female. The majority (55.8%, n=53) self-identified as white and 10.5% (n=10) identified as Hispanic or Latino. Students were asked to indicate their current 'top choice' specialty; the three most popular were internal medicine (16.8%, n=16), obstetrics/gynecology (10.5%, n=10), and psychiatry (8.4%, n=8), although 11.6% (n=11) remained unsure about their desired specialty.

In the preceding year, most students (92.6%; n=88) had attended a required clinic and/or volunteered in a clinical setting (64.2%; n=61). Approximately half (51.6%, n=49) knew someone personally who had a SUD or had experienced one themselves. Approximately one-third (32.6%, n=31) believed they had seen a patient with an OUD during the past year and 18.9% (n=18) believed they had seen a patient who would benefit from MOUD induction. Some students had already been exposed to MOUD, with 12.6% (n=12) having seen a physician offer MOUD to a patient during the past year.

3.2. Impact of Online MOUD Training

To minimize confounding effects of other relevant trainings when examining the impact of MOUD training, only students who did not receive the OOPR training during M3

orientation were included in these analyses (n=41). These students received the same OOPR training two years earlier. We used Wilcoxon signed-rank tests to compare pre- to post-training changes in knowledge and attitudes regarding opioid overdose (OOKS and OOAS), patient attitudes (MCRS), and attitudes towards harm reduction measures such as naloxone (NaRRC-B). Table 1 shows the results.

Completing MOUD training was not associated with any significant increases in objective knowledge about opioid overdoses; surprisingly, it was associated with a significant decrease in self-perceived readiness to respond to an overdose situation. The training also did not impact attitudes towards patients with SUDs as measured by the MCRS. There was no effect of MOUD training on perceptions towards harm reduction for 4 of the 5 statements; however, there was an attitude shift towards limiting patient access to naloxone use.

3.3. Knowledge and Attitudes About MOUD Training

Prior to starting M3, 60.0% (n=57) were unaware of the DATA-2000 waiver for prescribing MOUD, but most (82.1%, n=78) indicated interest in being able to prescribe buprenorphine. Students (n=92 total; 3 had missing data) were asked whether they believed that receiving online MOUD training and obtaining the DATA-2000 waiver would be useful for their intended specialty: 53.3% (n=49) indicated it would be useful, 9.8% (n=9) thought it would not be useful and the remainder (37.0%, n=34) were uncertain. Responses were similar when students were asked whether they believed they would use the waiver to prescribe buprenorphine in their practice after graduation. Most indicated they might (59.8%, n=55) or definitely (28.3%, n=26) intended to do so, and only 12.0% (n=11) stated no intention to prescribe buprenorphine. Students who were uncertain about prescribing buprenorphine ('no' or 'maybe' responders [n=64]) were asked to indicate all reasons they were not interested and choose the primary reason. There were five main themes behind students' hesitation to prescribe buprenorphine (Table 2).

Students were asked about their experiences taking the PCSS course. Although more than two-thirds (82.4%, n=75/91) endorsed training as useful, only half (56.0%, n=51/91) enjoyed it. Despite mixed feelings about training content and delivery, most (79.3%, n=73/92) believed future medical school classes should receive MOUD training. Students thought MOUD training should either occur at the start of clerkships (44.6%, n=41/92) or sometime during the pre-clinical curriculum (39.1%, n=36/92). The subgroup of students who did not believe the MOUD training should be provided to medical students (20.0%, n=19) indicated 5 key reasons for this (see Table 3); the most common was a belief that it was premature in their training for this content (57.9%, n=11/19). When all students were asked to provide more details about how training should be delivered, only 34.8% (n=32/92) believed it should be provided in the separate online training they had received. The majority believed it should be more integrated in the curriculum: 34.8% (n=32/92) stated it should be integrated into pre-clinical training and 26.1% (n=24/92) stated it should be integrated into clinical training.

Finally, students were asked to report additional comments about the online training or about prescribing MOUD. Most students did not provide feedback, but two themes emerged among those who did. First, students were unsure whether PCSS course content was

appropriate for their level of training and provided feedback such as, “*I think the training itself is necessary, but it was far too long and detailed for student doctors...a student version would be much more feasible and retain attention and interest*”, and “[*the course*] *specifically was above my training level so I don’t think I retained enough from it to be comfortable enough to prescribe buprenorphine*”. The second theme was wanting more interactive training including: “*The training is excessively long and feels largely passive*”, “*Training is important, but because it is just video format with little reinforcement, I find it hard to retain information...I think it would be better reinforced if incorporated into the clerkship years*”, and “*I would have loved to see slightly different content, like how to do a history or physical exam...or motivational interviewing video [for patients with SUDs]*”. This feedback indicated agreement that the content is important but should be provided in a different format.

4. Discussion

Primary goals of this study were to: 1) examine whether completing the 8-hour PCSS MOUD training impacted student knowledge and attitudes relating to MOUD use and working with patients with SUDs, and 2) identify student attitudes towards the training to facilitate development of a relevant, integrated MOUD-specific pre-clinical and clinical curriculum.

The first aim was to establish whether students knew about the training and required waiver prior to entering M3. The majority did not know about the DATA-2000 waiver requirement, but they knew what buprenorphine was used for and over three-quarters wanted the ability to prescribe buprenorphine. Interestingly, there was a large difference in the proportions of students who thought being able to prescribe buprenorphine might be useful in their intended specialty (87.9%) and those who believed obtaining the DATA-2000 waiver would be useful for their intended specialty (53.8%). For those who thought prescribing buprenorphine might be useful but did not believe that receiving the online MOUD training was useful, the primary concern was that the online training content was not engaging enough to retain and too advanced for their stage of training.

We also wanted to explore whether waiver training affected student knowledge and attitudes towards MOUD and working with patients with SUDs. Training had no significant impact on student attitudes towards working with patients with SUDs and minimal impact on attitudes towards harm reduction. This lack of change is unsurprising as MOUD training is not designed to impact these outcomes; alternative trainings such as OOPRT do significantly improve these outcomes.^{32,37} Unfortunately, we did not administer a specific survey focusing on MOUD knowledge; nonetheless, one objective of PCSS training is to “*describe and recognize manifestations of opioid intoxication, tolerance, overdose and withdrawal*” so it was reasonable to anticipate some improvement in knowledge in this area. Unexpectedly, we found significant post-training decline in student attitudes in two outcomes. Students were less likely to endorse feeling ready to respond to an opioid overdose and more likely to agree with the statement, “*There should be a limit on the number of times one person receives naloxone to reverse an overdose*”. It is unclear why these changes occurred and whether they were unique to this population in this context. Nonetheless, we

hypothesize that the decrease in subjective preparedness to respond to an overdose may have arisen from students' increased awareness about knowledge gaps and potential risks of naloxone (e.g., precipitated withdrawal). This finding echoes that of Sandhu et al., 2022, who found regression of improvement in confidence about responding to an opioid overdose 3-months after an OOPR training, a finding they attributed to students' self-awareness of knowledge lost.³⁸ This knowledge awareness could foster agreement with limiting naloxone access because students also indicated concern that patients should receive guidance and information before receiving multiple naloxone doses.

Our second aim was to identify whether students believed waiver training was relevant and useful to them. Although most students believed the training was important and should be provided to future medical students, only half enjoyed the current training format and most felt the format should be changed. Specifically, students believed training should be more integrated throughout the curriculum and include practical clinical skills (e.g., taking an appropriate substance use history and motivational interviewing). Interestingly, although 82.1% of students were interested in being able to prescribe buprenorphine, only half believed the specific training and receiving the DATA-2000 waiver would be useful and less than a third thought they would use the waiver. These findings align with existing physician buprenorphine prescribing behavior. A 2019 study found that fewer than 5% of practicing physicians had a DATA-2000 waiver^{12,39} and, of those, 25-50% of them were not prescribing buprenorphine.^{13,40} Our finding that over three-quarters of students were interested in prescribing buprenorphine is a promising indicator for improving buprenorphine access; however, students' low rates of believing the waiver would be useful or plans to use it in their practice are consistent with existing physician behavior. These data suggest more work is needed to identify prescribing barriers. Many students who thought they would not use the waiver stated they did not believe they would see patients with OUD or were uncomfortable working with patients with OUD. Given that physicians in almost every specialty will encounter patients with OUD, both attitudes are major barriers to patients receiving appropriate care, but they can be addressed through education.

Despite changing legislation surrounding MOUD prescription,^{10,11} there will always be a need for thorough education on this topic during UME. Results of this study demonstrate that medical students recognize this need and want additional training. A benefit of the updated buprenorphine legislation is that clinicians who intend to prescribe buprenorphine no longer need to complete a specific 8-hour training. Thus, medical schools can tailor curricular content on MOUD more closely with students' needs. Feedback from students in this study show they want an integrated and interactive education on these topics, including clinical skill building. Furthermore, most students were unaware of legislation surrounding MOUD prescribing, highlighting another important area wherein increased education is needed. Finally, students are not confident in their knowledge on these topics, nor do they recognize the wide range of specialties that work with patients with OUD. Comments from students indicate widespread incorrect beliefs that only physicians in specific specialties (e.g., psychiatry) will interact with these patients; thus, future educational initiatives should address these misperceptions.

Clearly, more UME on MOUD is needed, regardless of intended specialty. Until recently, much of this education came from required trainings (e.g., PCSS) and did not occur until residency. Widespread efforts of medical students have highlighted a desire for increased earlier education on these topics and many UME institutions began incorporating required waiver trainings.^{28,30,41} Modifications to DATA-2000 waiver requirements and removal of the waiver provide an opportunity for medical schools to reorganize this training.⁷ Results from this study can guide such efforts. Most notably, but not surprisingly, students were not engaged with an 8-hour asynchronous training format. Nonetheless, students recognized the value of this content and highlighted key approaches for improvement. One key curricular update in this area should occur in practical clinical skills. All medical schools incorporate clinical skills practice and standardized patients as part of UME; these practical sessions should consistently include patients who are seeking MOUD as well as patients who are already on MOUD. Students should have opportunities to practice prescribing MOUD and to work with patients on MOUD who require treatment for an unrelated problem. Practical skill building is an integral aspect of UME; thus, incorporating training about MOUD into clinical skills practice is an important way to ensure students are actively engaging with material while highlighting the fact that patients who need MOUD can appear in any specialty. Existing evidence demonstrates the importance of practicing clinical skills and exposure to patients as part of training related to SUDs.^{41–44} Education surrounding MOUD and other SUDs should be integrated throughout all years of UME and all aspects of training, not just clinical skills.

This study has limitations, although efforts were made to mitigate them where possible. First, data were gathered at one medical school, however, the class was large and diverse with demographics matching those of medical students nationally.⁴⁵ Second, all data were self-reported, which may result in a bias toward social desirability, although we attempted to mitigate this concern by assuring students that responses were confidential. Third, we were unable to verify that students who stated they completed the online MOUD training did so; however, students were unaware that we could not verify this, so we believe it is unlikely that many (if any) students misrepresented their completion of training. Fourth, the sample size was limited due to the modest number of students who completed the surveys. This could also have created a self-selection bias in the results; however, we tried to mitigate this by informing students that completing the surveys was a required part of their training.

Our results suggest that medical students recognize the need for increased training regarding MOUD prescription and believe this training should begin early. The change in prescribing guidelines, allowing physicians to prescribe buprenorphine without completing additional training or applying for a waiver, provides a starting point for increasing the number of physicians who can treat these patients. Nonetheless, removing this training requirement does not ensure that physicians feel comfortable prescribing these medications; therefore, it is important they receive increased education on this topic. Feedback from medical students provides a foundation for developing and integrating MOUD training in UME, toward ensuring that students graduate feeling confident in their ability to treat patients with OUD. Findings from this study are encouraging and show that future physicians are engaged and thinking about how to work with patients with SUDs. Next steps include the development of a successful, integrated training on MOUD and identification of the best timings and

methods of delivery. Finally, it will be important to analyze how these trainings impact behavior and whether, upon graduation, students follow through with their plans to prescribe buprenorphine when this treatment may benefit their patients.

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Declaration of Interests:

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Data availability statement:

Raw data were generated at Wayne State University School of Medicine. Derived data supporting the findings of this study are available from the corresponding author on request.

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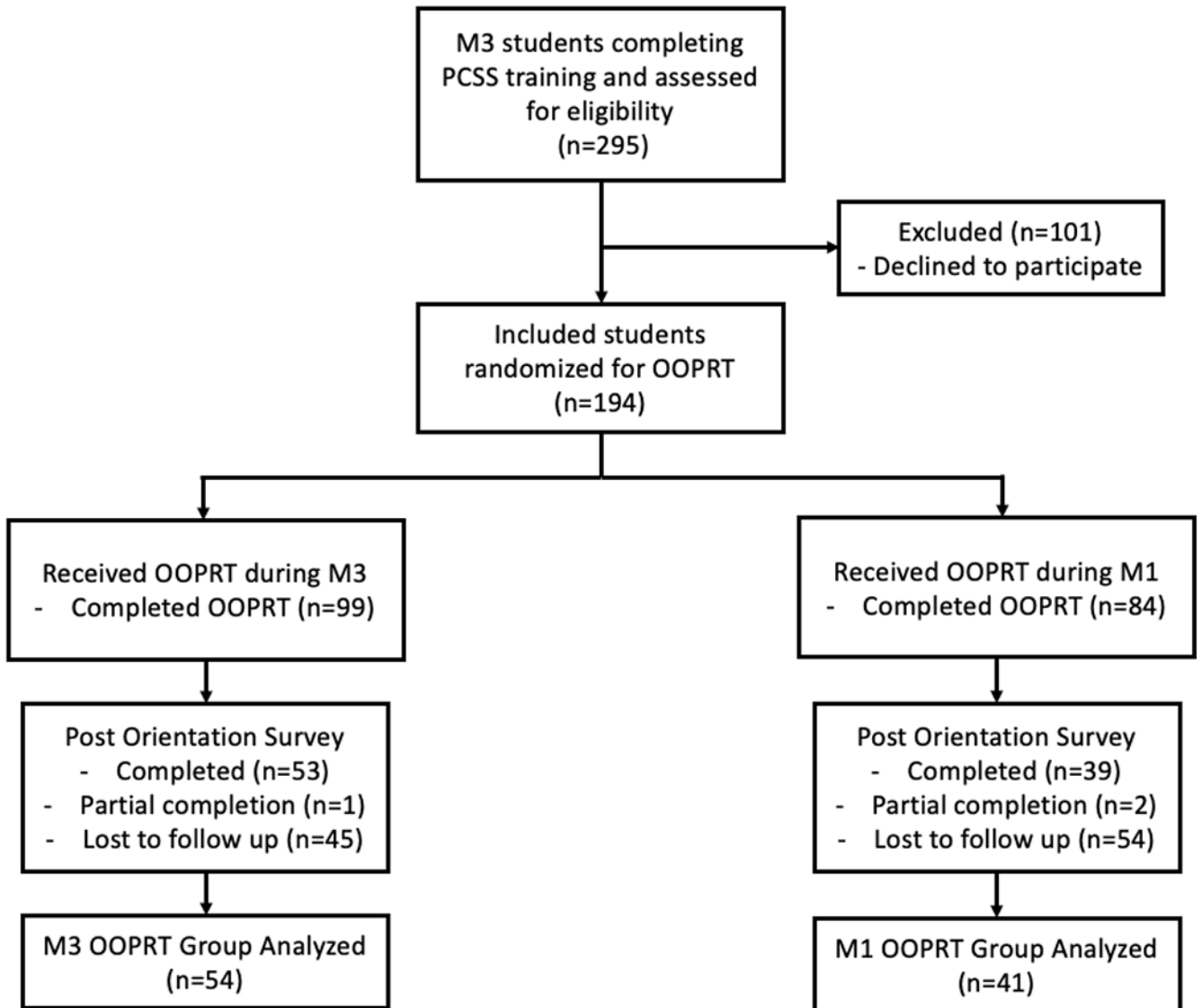


Figure 1:
Overview of study design.

Note: Completion of the M3 baseline survey was voluntary for all students but all students were required to complete the PCSS MOUD training. At the start of their first-year, students had been randomized into two OOPR training groups depending on whether they were to receive training in M1 or M3. Completion of the M3 post-training survey was also voluntary. Due to expected “no-shows” at training and non-completion of surveys at each time point, the number of students included in the data analysis differs from the number in the class completing the trainings, and we indicate these differences below.

Table 1:

Outcome variables at the start of M3 and after the clerkship orientation (mean±SD) and results of Wilcoxon signed-rank tests to examine changes in outcomes.

		M3 Pre-Orientation Survey	M3 Post-Orientation Survey	Test statistic (Z-value)	p-value
OOKS Opioid Overdose Knowledge Domains	Overdose risk factors	8.4±1.4	8.4±1.3	0.540	0.589
	Signs of overdose	8.0±1.4	8.1±1.4	0.088	0.930
	Actions to take in overdose	10.0±1.0	10.0±1.1	0.912	0.362
	Naloxone use	13.8±1.3	13.9±1.6	1.285	0.199
OOAS Opioid Overdose Attitude Domains	Competencies	3.7±0.4	3.7±0.4	1.077	0.281
	Concerns	3.8±0.4	3.6±0.7	1.554	0.120
	Readiness to intervene	4.4±0.5	4.2±0.6	2.969	0.003
MCRS Medical Conditions Regard Scale	Total Score	48.5±7.4	47.7±7.4	1.474	0.140
NaRRC-B Naloxone-Related Risk Compensation Beliefs	Opioid/heroin users will use more opioids/heroin if they know they have access to naloxone	2.03±0.9	2.2±0.9	1.811	0.070
	Opioid/heroin users will be less likely to seek out treatment if they have access to naloxone	2.1±1.0	2.3±0.9	0.759	0.448
	Providing naloxone to overdose victims sends the message that I am condoning opioid misuse	1.7±0.8	1.9±0.7	1.414	0.157
	There should be a limit on the number of times one person receives naloxone to reverse an overdose	1.5±0.6	2.0±0.9	2.566	0.010
	Naloxone is enabling for drug users	1.9±0.9	2.0±0.9	0.615	0.539

Note: These data only include students who completed the 8-hour online PCSS MOUD training but did not complete the OOPR training (n=41) during the 3-week M3 clerkship orientation.

Table 2:

Medical students' reasons why they would not prescribe buprenorphine for OUD (n=64).

	Total indicating this reason	Total indicating this as primary reason
Did not believe they would see patients with OUD in their specialty	37.5% (24)	34.4% (22)
Did not want patients with OUD to be their primary patients	18.8% (12)	12.5% (8)
Belief that only physicians specializing in addiction medicine/psychiatry should prescribe MOUD	18.8% (12)	10.9% (7)
Did not feel comfortable prescribing buprenorphine for OUD	17.2% (11)	9.4% (6)
Do not intend to work with patients with OUD	12.5% (8)	3.1% (2)
Do not feel comfortable working with patients with OUD	3.1% (2)	0.0% (0)
Do not think patients with OUD should receive MOUD	0.0% (0)	0.0% (0)
Other	31.3% (20)	29.7% (19)

Note: Students were first asked to select "all that applied" and then indicate which was the primary reason. This question was only shown to students who selected "no" to the question "Do you think that you will prescribe buprenorphine after graduation?".

Table 3:

Medical students indicated why they believed future medical school classes should not receive MOUD training (n=19)

	Total indicating this reason	Total indicating this as primary reason
Too early for this content, it should be provided during residency	68.4% (13)	57.9% (11)
Already covered in the rest of the curriculum	15.8% (3)	10.5% (2)
Not relevant to all students	42.1% (8)	5.3% (1)
Not interesting to most students	15.8% (3)	10.5% (2)
Should only be provided as part of certain residency programs	26.3% (5)	0.0% (0)
Should only be provided during addiction medicine/psychiatry fellowships	5.3% (1)	0.0% (0)
There should not be a training, content should be part of standard medical school curriculum	15.8% (3)	15.8% (3)
Other	31.6% (6)	0.0% (0)

Note: Students were first asked to select “all that applied” and then indicate which was the primary reason. This question was only shown to students who selected “no” to the question “*Should future medical school classes receive the MOUD training?*”.