



Feasibility and Evaluation of a Pilot Buprenorphine Training for Medical Students

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Scholarly Report submitted in partial fulfillment of the MD Degree at Harvard Medical School

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Student Name: John A. Weems, BA

Scholarly Report Title: Feasibility and Evaluation of a Pilot Buprenorphine Training for Medical Students

Mentor Name(s) and Affiliations: Joji Suzuki, MD, Department of Psychiatry, Brigham and Women's Hospital

Abstract

Feasibility and Evaluation of a Pilot Buprenorphine Training for Medical Students.

John Weems BA, Joji Suzuki MD.

Purpose: Morbidity and Mortality associated with opioid addiction is climbing in the US. Physicians' inadequate knowledge and negative attitudes toward addicted patients remain significant barriers to treatment. We hypothesize that a buprenorphine training for medical students will be associated with an increase in knowledge of buprenorphine administration, more favorable attitudes toward addicted patients, and enhanced intention to treat addicted patients in future practice.

Methods: A cohort of 19 Harvard medical students completed a buprenorphine waiver training and completed pre- and post-training surveys. A convenience sample of 34 who did not sign up for the training completed identical surveys. Attitudes, intentions, and beliefs were assessed by 29-item instrument scored on a 7-point Likert scale. Knowledge of buprenorphine administration was assessed by multiple choice exam.

Results: Trainee and control groups had similar demographic compositions. Trainees showed significant improvement in sum scores on an 11-item exam (7.44. vs. 9.9 $p= 0.0001$). At baseline, trainees expressed stronger intentions to prescribe buprenorphine and more favorable attitudes towards patients with opioid use disorder than controls. Completion of the course was associated with enhanced favorable attitudes, intentions, and confidence to treat opioid addicted patients.

Conclusions: Our results indicate that a pilot buprenorphine training for medical students increased knowledge of buprenorphine administration and enhanced favorable attitudes towards opioid addicted patients, attitudes toward buprenorphine treatment, intentions to treat in future practice, and confidence in treating patients with opioid use disorder. Training in buprenorphine administration in medical school may lower barriers to the provision of buprenorphine in the United States.

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Glossary of abbreviations

AAAP: American Academy of Addiction Psychiatry

ASAM: American Society of Addiction Medicine

DATA: Drug Abuse Treatment Act

MAT: Medication-Assisted Treatment

MCRS: Medical Condition Regard Scale

NBME: National Board of Medical Examiners

OD: Opioid Use Disorder

OAT: Opioid Agonist Therapy

OSCE: Objective Structured Clinical Exam

PCP: Primary Care Physician

SAD: Substance Abuse Disorders

SAMHSA: Substance Abuse and Mental Health Services Administration

SBIRT: Screening, Brief Intervention and Referral to Treatment

SUD: Substance Use Disorder

VA: Veteran's Administration

Section 1: Introduction

In the United States, opioid overdose deaths quadrupled from 2000 to 2014, leading to a dramatic rise in age-adjusted mortality from poisoning deaths (1)(2). Opioid overdoses have reached epidemic proportions in Massachusetts, prompting governmental action and the release of recommendations for enhanced medical education (3). The number of physicians providing evidence-based treatments for opioid use disorder, such as buprenorphine, has failed to close the gap between what the medical system can provide and the demonstrated burden of illness (4). Buprenorphine is a partial opioid agonist with proven efficacy in the treatment of opioid use disorder (5). The provision of buprenorphine in the United States is regulated by the Drug Abuse Treatment Act (DATA) of 2000, which stipulates that physicians must have attended an 8-hour training before becoming eligible to prescribe buprenorphine. A consistently demonstrated barrier to physicians prescribing buprenorphine is lack of knowledge and training (6). Recent attention has turned toward incorporating DATA waiver training into residency training, with evidence that completing necessary training during residency is predictive of prescribing buprenorphine in future practice (7)(8). Some evidence indicates that buprenorphine training itself is associated with confidence in treating addicted patients, suggesting that greater access to buprenorphine training could improve access to treatment (9). In addition to an inadequate number of physicians obtaining DATA waivers, stigma, both toward addicted patients and buprenorphine itself, poses a significant barrier to the implementation of evidence-based treatment (10).

The rising burden of overdose deaths due to underlying opioid use disorder and the consistently-identified barriers of inadequate knowledge and stigma all indicate the need for interventions in undergraduate medical education that reduce stigma, instill knowledge, and potentially lead to increased access to vital medicines.

The purpose of this study is to investigate the short-term outcomes of a novel intervention in medical education. A cohort of 19 medical students received the Substance Abuse and Mental Health Services Administration (SAMHSA)-supported buprenorphine training in February 2016.

This standardized, established training, which is required for physicians to prescribe buprenorphine, is being provided to medical students. No other instances of a training provided exclusively for medical students is described in the addiction medical education literature. We carried out a survey-based evaluation of participants and a matched group of medical students who did not sign up for the training. We aim to understand the effect of this novel training for medical students in the domains of knowledge of buprenorphine administration, attitudes towards patients with opioid use disorder, and intentions to treat such patients in future practice. We hypothesize that medical students who participate in buprenorphine training will gain significant knowledge of buprenorphine administration, express a more favorable attitude toward addicted patients, and express enhanced intention to treat addicted patients in future practice.

Literature Review

This literature review aims to situate our study within the wider literature and addresses several topics, including: (i) study designs in medical education pilots in addiction medicine, with a focus on best-established methods for assessing attitudes, intentions, and knowledge regarding Substance Use Disorders (SUDs); (ii) established approaches to integrating substance use disorders, opioid use disorder, and buprenorphine into undergraduate medical curricula; and (iii) barriers for providers in obtaining buprenorphine waivers and utilizing buprenorphine in the treatment of opioid-addicted patients.

(i) Study designs in medical education pilots in addiction medicine, with a focus on best-established methods for assessing attitudes, intentions, and knowledge

Christison and Haviland report on the impact of a one-week addiction treatment experience embedded within a six-week psychiatry clerkship on student attitudes (11). The authors utilize their own Medical Condition Regard Scale (MCRS), a 6-point Likert scale designed and validated in previous publications (12). 153 participants were assessed with the MCRS pre- and post-clerkship. Patients in the MCRS prompt suffered with alcohol dependence. Two control conditions were also tested: major depressive episode, and patients with emphysema. 107 controls, students who had rotated through six weeks of psychiatry without addiction exposure, were used to compare scores on a knowledge subject examination. There was no significant

differences in exam scores. Analysis of the MCRS utilized t tests for matched samples on mean MCRS scores (11-66), then assessed with unpaired t-tests by gender, site of clerkship, and time of clerkship. Results showed increased scores for alcoholic patients and stable regard for emphysema and major depressive patients. Authors argued for evidence of effect of curricular change, though worried that embedment in psychiatry potentially reinforced stigmatization of addictive disorders

In a more recent report, Berland et al describe an intervention adding opioid overdose prevention with Naloxone to standard basic life support training (13). Attitudes were assessed with 11-item MCRS, knowledge was assessed with 35-item survey comprised of Opioid Overdose Knowledge Scale and Opioid Overdose Attitude Scale, both validated measures. Data was controlled for participants who had previously been trained in Naloxone rescue. Independent sample t-tests were used to assess pre- and post-test differences. Paired T-tests were used to assess pre- and post-training scores. Knowledge and preparedness increased with reportedly significant effect sizes. Attitudes, however, showed no significant difference. We do not have the full data set to assess for trends in attitude data or the potential clinical significance of reportedly large effect size (although effect sizes are reported, scale is not), but the methods used are rigorous, and results are very encouraging for this particular intervention.

Matthews et al utilized several statistical strategies to compare a wealth of data compiled on over 200 students over 4 years producing a thorough report on a novel intervention in substance abuse education (14). The team assessed the impact of a brief, 1-2 day interclerkship on substance abuse with pre- and post-clerkship survey of attitudes and knowledge of SUDs, including questions modified from a previously-validated instrument, specifically those items that had been shown to discriminate between clinicians with and without experience working with patients with SUDs. Original items were also generated and added to the instrument. Additionally, in one of the four years, students were assessed with standardized patient encounters up to 6 months after the intervention. Analysis utilized unpaired t-tests to assess means, and paired t-tests to assess changes in scores. Spearman correlations were used to examine the relationship between separate scores on knowledge, confidence, and self-reported past experiences to determine statistical dependence between the many variables. Multiple regressions were used to understand

the impact of previous clerkship experience as potential predictors of performance.

Questionnaires demonstrated improved attitudes, knowledge, and confidence in treating SUDs, while the OSCE data demonstrated sustained retention.

Cape et al traced student approaches to SUDs across the undergraduate curriculum by assessing knowledge, skills, and attitudes (via 5-point Likert) of medical students in New Zealand during their first pre-clinical health sciences year, first clinical year, and final year of medical school via questionnaire (15). 43-item questionnaires also gathered discriminatory data including demographics, English as first language, and personal history of substance use. Instrument was generated de novo for the purpose of the study. In analysis, knowledge questions were unweighted, mean scores were assessed with ANOVA, Fisher's, and chi-squared statistics. Knowledge and skills increased as students advanced. Confidence in treating alcohol and tobacco increased, though decreased for benzodiazepine and other drugs of abuse. Improvements were associated with alcohol consumption and English as a first language in respondents. Perception of preparedness diminished despite increasing knowledge scores, though it is unclear if students responded out of respect for the complicated, relapsing nature of addictive illness, or a sense of increased therapeutic nihilism. It is suggested that qualitative data might have helped further delineate this difference. Finally, the authors conclude that a greater focus on "therapeutic commitment" would aid NZ students: role adequacy, or sufficient competence; role legitimacy, or accepting addiction as medical illness; and role support, the belief that engaging patients will help.

Parish et al developed substance abuse Objective Structured Clinical Exams (OSCE) to test PGY3 internal medicine and family medicine residents' communication, assessment, and management skills and provided immediate feedback for improvement (16). 5 patient scenarios were presented, including one patient on MAT (specifically methadone). Residents scored much higher on combined Standardized Actor and faculty-rated scores of communication than on assessment and management. Residents rated the experience highly. Interestingly, success in the OSCE was not associated with self-assessed interest or competence. The authors' conclusions included a recognition that a focus on assessment and management skills was necessary to improve the treatment of patients with SUDs.

Starrels et al conducted an informative study that offers a cautionary tale in assessing confidence and intention without separate measures of knowledge and ability (17). Internal Medicine residents expressed great confidence in their ability to interpret urines in the setting of chronic pain, though objective knowledge scores demonstrated that they didn't know what they didn't know—their results were abysmal. These results support the practice of assessing learners' confidence in future practice, but exercising caution in interpreting learners' confidence in their own knowledge. Co-administered knowledge assessments can accurately identify whether interventions actually increase demonstrable increases in knowledge.

Although very well designed and described, Walsh et al report on a large-scale (n=154) trial assessing the impact of alcohol education programs which required significant resources and failed to produce the desired learning benefit (18). In two controlled trials, fifth year Australian medical students from a single traditional and single non-traditional medical school (which emphasized skill acquisition) were trained with either didactic-based or didactic plus skills-based trainings on brief interventions with alcoholic patients. Success was measured by pre- and post-intervention videotaped interviews, rated by multiple observers shown to have high inter-rater reliability. While students from non-traditional medical school had higher pre-test scores, and students from both schools improved in their overall mean scores (without significant difference between schools), both groups failed to reach satisfactory scores on the assessment.

Satre et al report on a novel approach to integrating community needs assessment into curricular development (19). The team surveyed academic physicians vs. community non-physicians before developing a screening, brief intervention, and referral to treatment curriculum. Questions included clinical and educational priorities, importance and confidence in screening and intervention techniques. Several notable differences between community and academic reporters were noted and informed the curriculum. This is especially important to keep in mind in suggesting further implementation of this model at other medical schools, and potentially more buprenorphine trainings for a larger cohort of medical students.

Wakeman et al report on MGH Internal Medicine residents' preparedness to treated SUDs and basic knowledge of SUDs (20). As reported in 2013, 75% felt prepared to diagnose and 37% felt prepared to treat addiction. After providing the enhanced curriculum, which did not explicitly include buprenorphine waiver training, the group reported that 87% felt prepared to diagnose and 60% felt prepared to treat addiction. Despite increases and an overwhelmingly positive review of the curriculum, the intervention did not improve performance on knowledge questions, leading the authors to argue for implementation of a more comprehensive curriculum as well as implementation and evaluation at other sites.

Clinicaltools inc. has produced a series of presentations on an online intervention aimed at engaging medical students about opioid abuse and buprenorphine using interactive online learning platforms, including standardized patients via web chat (21–23). In 2007, the team's original report detailed a prototype module driven by the theory that buprenorphine treatment for OUD "are topics well suited to teach medical students about the role of practicing physicians in substance use treatment, complicated multi-disciplinary treatment issues, complex biological and social basis of addictions, and how new treatments are developed and moved into practice." Initial testing assessed student attitudes, self efficacy, intended behavior, knowledge, and satisfaction. In 2010, the group reported that their tool held promise in addressing biases toward patients with OUD. Results from a convenience sample of 24 volunteer medical students from year 2-4 from multiple institutions included improved medical knowledge/competency and improved self-efficacy. Attitudes, specifically attitude toward treatment of opioid dependence, as well as interpersonal skills as assessed by OSCE-style interviews of standardized patients via online chat, did not improve. The outfit now provides online DATA waiver training, as well as a "Buppractice," a platform for translating research into primary care practice through expert-reviewed, industry-free online resources.

Kunins et al report on the implementation of a buprenorphine education curriculum into primary care residency training (24). The study determined that the curriculum, including didactics, motivational interviewing, case conferences, and a supervised clinical experience, was feasible. The study reported the details and implementation of the curriculum in great detail. Evaluation included experiences in residency, measurement of post-residency experiences and patient-level

retention in treatment. 27.5% of graduating participants later obtained a waiver, and 17.5% went on to prescribe buprenorphine. Retention was similar for patients cared for by attending and resident physicians. The authors concluded that their model was feasible and could increase number of physicians prescribing buprenorphine, declaring “Only by increasing the number of physicians who are experienced in and willing to provide buprenorphine in primary care settings, will access to treatment for opioid dependence be meaningfully expanded.”

(ii) established approaches to integrating substance use disorders, opioid use disorder, and buprenorphine into undergraduate medical curricula

Note: The extracurricular pilot training that this study seeks to evaluate takes place amid wider efforts to integrate addiction into undergraduate medical curriculum at HMS and other schools. Most reports in the literature describe and evaluate innovations that take place within existing curricula. Ideally buprenorphine training would take place within a wider framework of opioid-specific undergraduate medical education that includes comprehensive pain management, appropriate and safe prescribing of opioids, prevention, screening, and treatment of opioid abuse. Understanding the context of curricular innovations to incorporate SUDs will inform later efforts to do so.

A literature review conducted by El-Guebaly et al in 2000 assessed how knowledge and skills to manage SUDs across the spectrum of medical education with a focus on educational strategies and outcomes (25). Nine studies were identified in undergraduate medical education. Authors noted that student groups and curricular interventions both typically contained didactic and interactive components. Overall the authors support more interactive approaches, though cannot point to evidence of cost-effectiveness of this approach. Definition of interactive include “small group discussion, computer-assisted modules, simulated patient encounters, and field trips.” Pre- and post-surveys were standard assessment tools in all studies that were examined. Overall, authors found behavioral skills and knowledge were more readily captured than changes in attitudes.

A subsequent literature review conducted by Miller et al in 2001 specifically aimed to understand barriers in educational reform in SUDs (26). Barriers identified included: perceiving addictive diseases as medical diseases; “lack of parity and physician advocacy in medical education” to resolve stigma and promote evidence-based approaches; ;negative attitudes and lack of positive role models in addiction; poor curricula; personal and family history of drug and alcohol problems. Successful interventions are limited in their focus. Although these authors surveyed an educational landscape that is arguably different than that of today, the barrier of personal history of SUD inspired our inclusion of questions that attempt to capture participants’ history with opioid use disorder as a potential predictor of attitudes toward OUD and buprenorphine.

Morley-Forster et al critique 3 pilot pain curricula which were implemented to mitigate the risk of opioid abuse (27). Evaluation of these pilots found that evidence of improved content knowledge was offset by a lack of experiential aspects included in the curricula. The authors conclude that pain curricula should ideally contain both didactic and experiential components in order to expose medical students to faculty who embody the art of medicine through integration of best practices and sound clinical reasoning.

Kahan et al assessed how faculty from various medical specialties rated a set of learning objectives within substance abuse, and found statistically significant differences between different groups of specialties (28). Faculty from internal medicine, surgery, emergency medicine and anesthesia rated domains of attitudes, epidemiology, screening and assessment, nonmedical interventions, and specific populations (including women, the elderly, and adolescents) significantly higher than colleagues in family medicine, psychiatry, and pediatrics. Other variations in assigned importance were identified. Overall, results suggested that interventions for medical undergraduates could be delivered in a discipline-specific manner to better meet the favored learning objectives of respective departments. However the authors’ justification for grouping specialties holds more statistical power than conceptual consistency. Our participants ranged from a variety of departments. We are likely underpowered to identify differences amongst prospective disciplines, but our characteristics indicate at least a level of interest across disciplines.

Kothari et al 2011 assessed the quality of studies of SUD interventions in undergraduate medical education using the Medical Education Research Study Quality Instrument (MERSQI) tool (29). In an effort to inform a new SUD curriculum at New York University Medical School, they found relatively few (31 out of >1000) studies contained sufficient information to be evaluated for effectiveness. Most studies evaluated were of low quality, though the quality increased correlatively with year of publication. Recommendations for future research in SUD medical education included: controlled trials across institutions; evaluation methods drawn from patient-level knowledge, attitudes, beliefs and skills that are captured with standardized outcome measures such as NBME exams and the MCRS; longer-term follow-up studies to assess for retention of knowledge; and better reporting of curricula and interventions, best achieved by standardized publication policies and detailed appendices. Overall, this study set the stage for improved reporting of SUD interventions and curricula, though was not perfectly applicable to our intervention as the outcomes most desired were SBIRT.

(iii) Barriers for providers in obtaining buprenorphine waivers and utilizing buprenorphine in the treatment of opioid-addicted patients

Midmer et al report on a web-based survey of medical students from all 5 of Ontario's medical schools that captured data on learning events having to do with addictions (28). Results showed that psychosocial aspects of patients' experience of addiction especially affected students. Students also viewed addiction as a choice rather than an illness. Perhaps tellingly, patients were most often encountered in the emergency department and hospital, potentially manifesting uncontrolled disease. While this study clearly demonstrates deficiencies in medical students' ability to diagnose and respond to patients' addictive disease, it also demonstrates that clinical experiences in addiction are not necessarily positive, and perhaps can reinforce stigma in the absence of positive clinical experiences of well-controlled disease.

Lindberg et al assessed the attitudes of trainees as they progressed from 3rd year of medical school through the 4th year of residency (30). Researchers found degradations in attitudes toward addicted patients and satisfaction in treating them throughout the continuum of education, with

worsening scores more drastic in drug-using than alcohol-abusing patients. Items for this survey tool were generated to assess personal views related to patients with alcohol abuse or controlled substances excepting tobacco.

Geller et al produced the classic cross-sectional survey study of Johns Hopkins medical undergraduate and house staff showing that over time, doctors in training develop increasingly negative attitudes toward patients with SUDs and decreasing confidence in their skills to intervene on addictive disease (31). The authors postulate that lack of knowledge and skills on the part of older generation of physicians, paired with frequent exposures in medical education to end-stage addiction, might drive this negative outlook.

Upshur et al used mailed surveys to PCPs at 8 community clinics to assess training for and satisfaction taken in the treatment of chronic pain (32). T-tests comparing mean ratings were utilized to compare results. Findings included only 28.8% of respondents reporting that they were highly likely to prescribe opioids, with most significant reasons being fear of iatrogenic addiction and fear of redirection. This study indicates that concerns about addiction affect chronic opioid prescribing, and that improved education regarding addiction might inform improved provider approaches toward chronic pain.

Polydorou et al review the literature on specific initiatives in addiction medicine and describe goals for knowledge, skills, and attitudes across the spectrum of medical education, with an emphasis on interactive learning, expanded role of addiction specialists, and online training modules (33). The authors cite an evident lack of knowledge in clinical practice, with 20% of PCPs report being very prepared to identify alcohol use disorder and drug dependence. Barriers to improvement in medical school include space within curricula, coordination across departments, addiction treatment resources in terms of both clinical sites and faculty. Authors engage in a chronologic review of undergraduate SUD literature and identify a unifying theme of exposure to patients outside of end-stage disease, placing an emphasis on the importance of experiential and interactive learning for future curricular efforts. While discussing buprenorphine specifically, the authors cite barriers to buprenorphine as “reported lack of experience, induction difficulty, low reimbursement, potential DEA involvement, and limited compliance.”

Walley et al conducted a cross-sectional survey of 235 physicians carrying out office based opioid therapy (OBOT) by questionnaire, focusing on clinical practices and barriers (34). Factors associated with prescribing included being a PCP (vs. psychiatrist), and being in solo practice (vs. group). Multivariate logistical regressions identified factors associated with not prescribing to include low demand and insufficient institutional support. Barriers for non-prescribers included office, nursing, and institutional support, staff knowledge, and demand.

Roman et al draw on national survey data and data from treatment programs to describe barriers to adoption of a variety of medications used in the treatment of SUDs, including buprenorphine (35). Barriers included treatment ideology, lack of prescribing physicians, lack of clinical and administrative guidance, as well as lack of knowledge on the part of patients. Their work makes a case for training leaders in medicine, whose administrative roles might outpace their front line prescribing practices to increase the adoption of pharmacotherapies for substance use disorders.

Kissin et al published a seminal report on the early adoption of buprenorphine in 2006 (36). A random sample of 545 DATA-waivered physicians revealed that many physicians had obtained a waiver but had not begun prescribing in their first year. Challenges included office logistics, challenges of induction, 30-patient limit (the absolute limit at the time of publication), DEA involvement, and perceptions of patient compliance.

Cunningham and colleagues carried out interviews and adapted questionnaires of 99 university hospital affiliated residents and attending physicians with interesting results (6). 37.8% believed PCPs should prescribe buprenorphine and only 35.7% reported personal interest in doing so. However, 72.1% would be willing to prescribe themselves with training and support. Unsurprisingly, lack of knowledge or training was identified as the main barrier to adoption, cited by 47.5% of respondents. The authors concluded that training and support posed a substantial barrier to adoption of buprenorphine by PCPs.

Given the high prevalence of illicit drug use among HIV-infected patients, Cunningham et al conducted a questionnaire investigation of physicians at HIV educational conferences in 2006

(9). Barriers identified by respondents included lack of knowledge about MAT (54.9%), access to experts, “inability to send difficult patients to a substance abuse treatment program,” concerns of diversion, and concerns that “opioid-addicted patients having too many problems.” Confidence in ability to treat SUDs was associated with DATA waiver. These findings concur with other studies that demonstrate inadequate knowledge as a significant barrier to acquisition of DATA waiver and prescribing of buprenorphine. In addition, respondents’ emphasis on problematic patients suggests that the stigma of addicted patients and their perceived complexity is a barrier to care.

Gordon et al assessed barriers at the Veteran’s Administration (VA) through semi-structured phone interviews of a representative sample of VA providers (37). Specific provider barriers to adoption of buprenorphine included “lack of interest, stigma toward the population, and lack of education about buprenorphine-Opioid Agonist Therapy (OAT).” While authors concluded that barriers to implementation varied by individual facility, practices that had adopted buprenorphine cited role models as facilitators of implementing buprenorphine

O’Conner et al report on a convention of medical educators and substance abuse specialists brought together to by the Betty Ford institute to address the under-recognition and under-treatment of substance use disorders in primary care (38). The authors indicate that knowledge gaps are responsible for several of the patient-level deficiencies in the care of addicted patients. They pin this failure on training, and recommend “1) integrating substance abuse competencies into training, 2) assigning substance abuse teaching the same priority as teaching about other chronic diseases, 3) enhancing faculty development, 4) creating addiction medicine divisions or programs in academic medical centers, and 5) making substance abuse screening and management routine care in new models of primary care.” Published in the *Annals of Internal Medicine*, these recommendations speak to a growing acceptance of addiction as a chronic disease in the medical mainstream.

Gunderson et al’s seminal report of a combined “4+4” online and in-person DATA-waiver training also describes challenges physicians faced after obtaining buprenorphine waivers, specifically hesitation to begin prescribing (39). While the authors suggest several online

resources for meeting this barrier, perhaps early adoption of buprenorphine in residency or medical school can prepare students for more meaningful clinical experiences that assuage worry and address hesitation.

Hutchinson et al surveyed a cohort of primary care physicians, mostly family doctors, serving patients rural Washington, who had received a buprenorphine training (40). While an overwhelming majority of respondents reported positive attitudes toward buprenorphine, only 28% were prescribing. Prescribers were more likely to have waived practice partners. The most prominent barrier cited was a lack of mental health and psychosocial support (64%), time constraints, and lack of specialty backup. 42% cited resistance from practice partners. A lack of institutional support, cited by 36% of respondents, was statistically associated with not prescribing buprenorphine ($p= 0.04$).

Section 2: Student role

I have taken the lead on the literature review, study design, and recruitment of participants. In consultation with Dr. Suzuki, Dr. Krupat, and Dr. Sullivan, we generated, pilot tested, and revised the BAICS survey instrument and knowledge questions. I then created and maintain the secure key and collected survey data. With Dr. Suzuki, we conducted initial data analysis, I have begun to prepare the initial manuscript, will take drafts through edits, and submit for publication.

Section 3: Methods

This educational study aims to evaluate a Substance Abuse and Mental Health Survey Administration (SAMHSA)-supported Buprenorphine training for medical students provided by the American Academy for Addiction Psychiatry (AAAP) at Harvard Medical School. We carried out a survey-based study to better understand changes in participant knowledge, attitudes, intentions, and confidence that result from this training.

First, a literature search was conducted in order to understand the context this study fits within. Next, a study was designed based on this literature search and consultation with Dr. Suzuki, Dr.

Krupat, with subsequent revisions during the HMS Academy IRB and Dr. Amy Sullivan and HSPH IRB approval process. The survey consists of pre- and post-course survey questionnaires for participants and a control group of matched medical students who did not sign up for the training.

The survey consists of three sections: the Buprenorphine Attitudes, Intentions, and Confidence Scale (BAICS); the Medical Condition Regard Scale (MCRS); and a multiple-choice knowledge assessment consisting of 11 questions. We developed the BAICS from 11 items used in previously-reported assessments of physician attitudes toward buprenorphine, with 7 additional questions generated to specifically capture medical student attitudes, intentions, and confidence (8,41). The survey was refined and clarified using cognitive interviewing, then piloted with individual medical students on two subsequent occasions. The Medical Condition Regard Scale is a validated 11-item instrument that has wide use in assessing interventions in medical education (12,42,43). A 7-point Likert scale was applied for consistency in the instrument. The knowledge assessment instrument was created to test knowledge specific to the administration of buprenorphine that is covered in SAMHSA-sponsored buprenorphine trainings. The questions were generated to reflect critical content areas within the buprenorphine training curriculum, and subsequently reviewed by 4 board-certified addiction psychiatrists and one American Society for Addiction Medicine (ASAM)-certified Internist for relevance and level of difficulty.

The training was provided by the American Academy of Addiction Psychiatry (AAAP), and consisted of 4 hours of online curriculum followed by 4 hours of in-person training with a certified trainer in a standard classroom setting. AAAP regulations limit trainings to 20 learners, therefore 20 trainees were selected out of a pool of potential learners. The pool consists of medical students from across four years who attested to their availability and willingness to participate in the entire training. A separate group of HMS medical students were sought out to complete the survey to allow for a control group comparison. The training was organized with help from Joji Suzuki MD of the BWH Addiction Psychiatry division, who is an AAAP trainer and has volunteered to give the training.

The 20 trainees were informed of this study by language attached to the e-mail informing them if they had been selected to participate in the training. The trainees were sent an email inviting them to participate in this survey-based study more than 24 hours before login materials to begin the online portion of the buprenorphine training were sent. This email also contained informed consent language. Participants were informed that clicking on the provided link would be taken as an indication of informed consent. External controls were contacted via email and class Facebook page post. The survey for external controls was modified to contain all informed consent language on a front page, so that clicking to begin the survey was taken of indication of informed consent. Potential external controls were informed of a chance to win \$50 Amazon gift card for their participation, one of which will be rewarded to respondents at random. Initially, survey takers were asked to generate a Participant ID, which was used to sign-in to post-training survey. Record of Participant ID matched with participants name was recorded on a secure key and will subsequently be discarded. No identifying information or IP addresses are attached to study data. Participants completed an online Qualtrics survey containing both attached documents. After completion of the course, trainees who completed the pre-course questionnaire were sent an identical follow-up survey. Long term follow-up will take place for those who opt-in within 12 months, and again 3-8 years from the time of the study.

Data analysis

BAICS is an 18-item survey scored by 7-point Likert scale. MCRS is an 11-item survey, items from which were adapted to the 7-point Likert scale. We dichotomized future specialties into those that account for the vast majority of buprenorphine prescribers (Internal Medicine, Family Medicine, and Psychiatry) and others, based on historical data (44). For evaluation of pre- and post-intervention scores for the intervention group, we used t tests for matched samples. For evaluation of variables between intervention and external control groups, we used t tests for independent samples. Any statistically significant differences on MCRS, BAICS, or questions will be re-analyzed using demographic discriminators as predictors in a regression analysis. Results include mean scores for MCRS, BAICS, and knowledge questions, and all standard deviations.

Section 4: Results

Of 19 participants who completed the buprenorphine training, 19 respondents completed the pre-course survey and 18 completed the post-course survey for response rates of 100% and 94.7% respectively. Of 399 potential control group participants, 34 fourth and fifth year medical students responded for a response rate of 8.5%.

Results are summarized in tables 1-3. Participants in the training group did not differ significantly from the control group in age, gender, ethnicity, class year, exposure to opioid-addicted patients before and during medical school. However, training group members (68.4%) were more likely to be going into specialties that make up nearly all buprenorphine prescribers—internal medicine, family medicine, and psychiatry-- than control group members (41.2%) with a trend toward significance ($p=0.055$).

There were no significant differences between control and training groups on pre-training knowledge test scores, either on individual items or cumulative scores. Participants in the training group had improved cumulative scores on post-test questions (7.44. vs. 9.9 $p= 0.0001$) and improvement on individual items assessing knowledge of buprenorphine induction (55.6% vs. 100%, $p=0.0029$, Fisher's) urinalysis (38.9 vs. 83.3% $p=0.005$), side effects and (11.1% vs. 77.8% $p<0.0001$). Significant differences in exam scores were maintained in univariate analyses controlling for specialty choice, gender, graduation year, frequency of interactions with opioid addicted patients before or during medical school.

Attitudes, intentions, and confidence differed between training group members before training and control group members differed on several items. Members of the training group were more likely to agree that they felt more compassionate towards patients with opioid use disorder (5.4 vs. 4.3, $p=0.003$) and were less likely to agree that patients with opioid use disorder are especially difficult to work with (3.3 vs. 4.2, $p=0.04$), and were less likely express a preference not to work with patients with opioid use disorder (2.1 vs. 2.9, $p=0.039$). Pre-training group members were more likely to agree that they intended to seek opportunities to treat opioid-addicted patients during clinical rotations (5.8 vs. 4.8 $p=0.002$), intended to prescribe

buprenorphine during residency (6.0 vs. 5.2, $p=0.039$), intended to prescribe buprenorphine in future practice (5.4 vs. 6.2, $p=0.035$), and intend to obtain a DEA waiver (5.7 vs. 4.5, $p=0.009$). Pre-training trainees also expressed greater confidence that they required more supervised prescribing experience before residency (6.4 vs. 5.9, $p=0.03$) relative to controls.

For trainees, pre- and post-course surveys showed several changes in attitudes, intentions, and confidence. After the training, participants were less likely to agree that patients on buprenorphine are not really in recovery (2.5 vs. 1.7, $p=0.024$), that patients on buprenorphine are substituting one drug for another (3.2 vs. 2.0 $p=0.028$). Participants were more likely to agree that buprenorphine is an effective treatment for opioid addiction (5.7 vs. 6.6, $p=0.009$), that there is a need for more buprenorphine prescribers in their community (5.9 vs. 6.7, $p=0.027$) that buprenorphine should be offered to all medical students (6.2 vs 6.7 $p=0.040$). Trainees trended toward significance in agreement that working with patients with opioid use disorder is satisfying (4.7 vs. 5.6, $p=0.071$), and were more likely to agree that they can usually find something that helps patients with opioid use disorder feel better (3.6 vs. 4.8 $p=0.020$).

After the training, trainees trended toward significance in greater intention to prescribe buprenorphine in future practice (5.4 vs. 6.3 $p=0.073$), were more confident that their medical education had prepared them to treat opioid addiction (1.8 vs. 4.6, $p<0.0001$), and less confident that they require more supervised experience prescribing buprenorphine before residency (6.4 vs 5.2, $p=0.002$).

Section 5: Discussion, Limitations, Conclusions, and Suggestions for Future Work

Discussion:

This study shows that participants in the treatment group largely resembled controls in terms of age, gender, ethnicity, class year, exposure to opioid-addicted patients before and during medical school. More members of the treatment group that volunteered for the buprenorphine training are entering into specialties typical of buprenorphine prescribers in the US, though the difference did not reach significance ($p=0.055$). Thus overall, these similarities make for a reasonable demographic match between groups. Training group members expressed more positive regard toward patients with OUD in two of the eleven items in the Medical Condition Regard Scale.

These results are overall encouraging as mean scores in both groups reflect generally positive regard toward patients with opioid use disorder and buprenorphine as a treatment for opioid use disorder.

Members of the trainee group reported high intentions to pursue prescribing buprenorphine in medical school, residency, and future practice relative to peers in the control group. Interestingly, there were no significant differences in initial knowledge scores, suggesting that interest in buprenorphine sufficient to volunteer for an 8-hour course, and demonstrated to be significantly different on several BAICS items, did not predict a significant difference in knowledge about buprenorphine. After the training, trainees demonstrated improved overall knowledge, reflected in sum scores, as well as specific knowledge of induction, urinalysis, and side effects of buprenorphine. Such improvements are consistent with previous reports of medical student training in buprenorphine (21) and other brief interventions (13). However, the specific items used in those studies were not available for review and comparison, and our study utilizes a novel instrument to assess knowledge. Results could be more evenly interpreted if scored on a standardized measure. Further investigation of knowledge improvements with medical students, residents, and attending physicians after SAMHSA-sponsored buprenorphine trainings would build our understanding of the knowledge gained from such trainings.

Post-training results revealed changes in a number of attitudinal measures that, taken in sum, reflect a more favorable view of buprenorphine as a treatment. For example, agreement with the statement "patients on buprenorphine are substituting one drug for another," a common concern of patients and clinicians skeptical of buprenorphine, decreased from a mean of 3.2 to 2.0. Participants were also more likely to agree that buprenorphine is effective, and that all medical students should be offered a buprenorphine training. It is reasonable to conclude that the increased knowledge of buprenorphine's efficacy brought by the training contributed to this more favorable view.

Trainees also showed increased agreement with a number of items that suggested they saw themselves playing a role in engaging and improving the lives of opioid-addicted patients. Such role acceptance is in line with key recommendations for better preparing physicians to treat

patients with SUDs made in other studies involving medical undergraduates (15). In our study, trainees increasingly agreed that more buprenorphine providers were needed in the community and showed a trend toward significance in their intention to prescribe in future practice. This role acceptance was accompanied by a significant change in trainees' understanding of their preparedness to act in this role, reflected in increased confidence that their medical school education had prepared them to treat opioid addiction, with a change from 1.8 pre-training to 4.6 after the training.

Increased confidence in the adequacy of trainees' medical education was echoed by a decrease in their confidence that more training would be necessary before starting residency. Although this increase in confidence is encouraging, previous interventions indicate that increases in confidence in participants' ability to treat addiction are not consistently matched by improved knowledge scores (17,20) or competence (16). In Wakeman's study, after an enhanced addictions curriculum for internal medicine residents, confidence in diagnosis and treatment improved without increases in knowledge scores (20). In Parish's study, an intervention that involved the use of OSCEs to improve residents' skills in addiction medicine, despite increases in interest and confidence scores, residents failed to demonstrate adequate competence on observed interviews (16). Our results showed both an increase in confidence and knowledge, though we did not measure competence, and increased confidence should be interpreted with caution.

Surprisingly, trainees had significant changes in their attitudes toward patients with opioid use disorder despite having no interactions with patients as part of the course. Specifically, trainees after the training agreed significantly more strongly that they are usually able to find something to help patients with OUD feel better, and showed non-significant increased satisfaction with working with patients with OUD ($p=0.071$). This improvement runs counter to previous studies showing declining attitudes toward addicted patients throughout the continuum of medical education (30) and prominent voices in substance abuse medical education calling for more experiential learning in substance abuse innovations (33). One potential explanation, consistent with Polyodorou's proposal for more prominent addiction specialists in undergraduate curricula, is that these results represent students whose views were influenced by a powerful role model

conveying compassion and positive regard for patients with opioid addiction (33).

A second, potentially complementary explanation is that the knowledge gained during this training helped contextualize students' understanding of opioid addicted patients they had met on previous clinical rotations (trainees reported a trend toward frequent encounters with opioid addicted patients). This re-framing would run counter to more typical encounters with patients in the end stages of their disease that shape medical students' negative views of addicted patients (28). Finally, perhaps students are just more malleable by virtue of being students. Most other studies of interventions in undergraduate medical education that demonstrate similar changes in attitudes toward patients with addiction investigate curricular changes to pre-clinical courses and clerkships (11,28). In all of these studies, learners are accompanied by their peer group, and play a predominantly learning role, putting them in an ostensibly more malleable position relative to the high-demand environment of residents and attending physicians. Further study comparing attitudinal changes between students, residents, and attending physicians would clarify the effect of a learner's stage in educational development on any changes in regard for addicted patients associated with buprenorphine training.

Given the well-documented barriers of insufficient knowledge of addiction and negative attitudes towards patients with addiction (9,34,37), our results suggest that training in buprenorphine during medical school could address these barriers and result in more physicians prescribing buprenorphine in future practice (6). Our results indicate that a pilot buprenorphine training for medical students had a significant impact on knowledge of buprenorphine administration, attitudes towards, intentions to treat, and confidence in treating patients with opioid use disorder. Thus, training in buprenorphine administration in medical school may lower barriers to the prescription of buprenorphine in the United States

Limitations:

This study has several limitations. The results have limited generalizability, as the nature of this pilot study required single-site enrollment of a convenience sample of volunteers that are not representative. Similarly, small sample sizes limit the ability of our analysis to detect all but large effect sizes. However, several significant differences were detected. Additionally, survey instruments attempt to capture reported attitudes and views, and might not correlate with

corresponding responses when students interact with patients in actual clinical situations. However, including objective, validated items to understand attitudes enhances results from this study beyond what can be gathered from self-report alone.

Ultimately, a careful understanding of these limitations, as well as subsequent exploratory analyses will be crucial as future buprenorphine waiver trainings are planned, executed, and studied with medical students. Results from this pilot will be assessed for the purposes of multi-institution studies in the future. Individual items from the BAICS and question set will be assessed for their overall performance and sensitivity to change. Finally, this study will lay the groundwork for future patient-level outcomes. Most participants in this study have consented for long-term follow-up at 12 months and 3-8 years to allow for subsequent measurement of practice-based outcomes.

Suggestions for Future Work

In addition to future work suggested in the Discussion sessions, future investigations of buprenorphine trainings for medical students would benefit from study designs that include multiple institution and sufficient students to allow for randomization—this would lead to both greater statistical power to detect smaller changes and more reliable results. More robust and objective measurements of demonstrated attitudes and competence, including OSCE exams with standardized patients and/or online standardized patients, would also offer more reliable data. Finally, movement toward more patient-centered outcomes such as eventual prescribing of buprenorphine would make a more powerful case for the value of such trainings. Most participants in the current study indicated willingness to be contacted in 3-8 years to determine if outcomes match the attitudes, intentions, and confidence expressed at the time of this study.

Future work should also include continued development of survey instruments. While a shared 7-point scale between BAICS items and MCRS made for consistency in the instrument, we did not calculate a summative attitude score, as additive scales were of dubious value given the variety of items included. Therefore, there was no single measure of regard, which could have been utilized in statistical analyses. Utilizing a validated additive score would allow for more in-depth

analysis of the relationships between attitudes, intentions, confidence, and knowledge relative to training in buprenorphine.

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Tables and Figures

Table 1: Participant Characteristics, Trainees vs. Controls

	Trainees (n=19)	Controls (n=34)	Significant Differences?
Age	27.0 (SD 1.9, range 25-31)	26.9 (SD 1.8, range 24-32)	NS
Gender	F: 11 (57.9%)	F: 21 (61.8%)	NS
Ethnicity	W: 9 (47.4%) B: 0 A: 7 (36.8%) H: 1 (5.3%) O: 2 (10.5%)	W: 20 (58.8%) B: 3 (8.8%) A: 7 (20.6%) H: 2 (5.9%) O: 2 (5.9%)	NS
Class year	5 th yr: 3 (15.8%) 4 th yr: 13 (68.4%) 3 rd yr: 3 (15.8%)	5 th yr: 3 (8.8%) 4 th yr: 31 (91.2%) 3 rd yr: 0	NS
Future specialty	IM/FM/psych: 13 (68.4%) Other: 6 (31.6%)	IM/FM/psych: 14 (41.2%) Other: 20 (58.8%)	NS (p=0.055)
Exposure before med school	Never: 4 (22.2%) Rarely: 4 (22.2%) Occasionally: 9 (50.0%) Often: 1 (5.6%)	Never: 12 (36.4%) Rarely: 9 (27.3%) Occasionally: 5 (15.2%) Often: 7 (21.2%)	NS
Exposure during medical school	Never: 0 (0%) Rarely: 1 (5.6%) Occasionally: 6 (33.3%) Often: 11 (61.1%)	Never: 0 (0%) Rarely: 1 (18.2%) Occasionally: 13 (39.4%) Often: 14 (42.4%)	NS

Table 2: Knowledge Questions

Knowledge Content Area	Pre Training(n=19)	Post Training (n=18)	Pre vs. Post	Control (n=34)	Pre Training vs. Control
Buprenorphine Pharmacology	16 (88.9%)	17 (94.4%)	ns	25 (73.5%)	NS
Buprenorphine Induction	10 (55.6%)	18 (100%)	P=0.0029 (Fisher's)	19 (55.9%)	NS

Opioid Use Disorder (OUD)	10 (55.6%)	15 (83.3%)	NS (0.067)	21 (61.7%)	NS
OUD Recovery	18 (100.0%, n=18)	18 (100%)	NS	33 (97.1%)	NS
Urinalysis	7 (38.9%)	15 (83.3%)	P=0.005	11 (32.4%)	NS
Illicit Opioids	16 (88.9%)	18 (100%)	NS	23 (67.6%)	NS
Opioid Overdose	17 (94.4%)	18 (100%)	NS	29 (85.3%)	NS
Safe Prescribing	13 (72.2%)	17 (94.4%)	NS	26 (76.5%)	NS
Side Effects	2 (11.1%)	14 (77.8%)	P<0.0001	8 (23.5%)	NS
Regulatory Requirements	11 (61.1%)	16 (88.9%)	NS	17 (50.0%)	NS
Special Populations	14 (77.8%)	12 (66.7%)	NS	21 (61.8%)	NS
Total:	7.44 (SD 1.7)	9.9 (SD 1.5)	P=0.0001	6.9 (SD 1.7)	NS

Table 3: Attitude, Intentions, and Confidence: Means, SDs, Comparisons of Pre-training scores vs. Post-training scores, Comparisons of Pre-training scores vs. Control scores

	Pre Training (n=19)	Post Training (n=18)	Pre v post	Control (n=34)	Pre Training v Control
Opioid addiction is a problem in the community that I come from	4.7 (SD 1.6)	5.2 (SD 1.8)	NS	4.0 (SD 1.9)	NS
Opioid addiction is a treatable illness	6.0 (SD 1.3)	6.3 (SD 0.9)	NS	5.8 (SD 1.0)	NS
Patients on buprenorphine maintenance are not really in recovery	2.5 (SD 1.5)	1.7 (SD 1.0)	P=0.024	2.3 (SD 1.1)	NS
Only addiction specialists should prescribe buprenorphine	3.0 (SD 1.7)	2.1 (SD 1.5)	NS	2.9 (SD 1.6)	NS
I intend to obtain a DEA waiver to prescribe buprenorphine	5.7 (SD 1.4)	6.1 (SD 1.5)	NS	4.5 (SD 1.9)	P=0.009

Buprenorphine diversion is a significant problem	4.2 (SD 1.4)	3.9 (SD 1.7)	NS	4.1 (SD 1.2)	NS
I will seek out opportunities to treat opioid-addicted patients during my clinical rotations	5.8 (SD 1.2)	6.1 (SD 1.1)	NS	4.6 (SD 1.5)	P=0.002
Buprenorphine maintenance is an effective treatment for opioid addiction	5.7 (SD 1.3)	6.6 (SD 0.7)	P=0.009	5.3 (SD 1.3)	NS
I need more supervised experience prescribing buprenorphine before residency	6.4 (SD 0.6)	5.2 (SD 1.4)	P=0.002	5.9 (SD 1.2)	P=0.03
Buprenorphine training should be offered to all medical students	6.2 (SD 0.9)	6.7 (SD 0.5)	P=0.040	6.2 (SD 0.9)	NS
Patients on buprenorphine are substituting one drug for another	3.2 (SD 1.8)	2.0 (SD 1.3)	P=0.028	2.8 (SD 1.4)	NS
I intend to prescribe buprenorphine in my future practice	5.4 (SD 1.4)	6.2 (SD 1.0)	NS (p=0.073)	4.5 (SD 1.6)	P=0.035
Detoxification should be attempted before maintenance with buprenorphine	3.5 (SD 1.8)	2.7 (SD 1.9)	NS	4.1 (SD 1.4)	NS
Preparing medical students to treat opioid dependence is important	6.6 (SD 0.7)	6.8 (SD 0.5)	NS	6.6 (SD 0.7)	NS
I will prescribe buprenorphine under the supervision of attending physicians in residency	6.0 (SD 1.2)	6.2 (SD 1.0)	NS	5.2 (SD 1.5)	P=0.039

Abstinence-based therapy should be attempted before maintenance treatment with buprenorphine	2.9 (SD 1.9)	2.6 (SD 1.9)	NS	3.2 (SD 1.7)	NS
I feel confident that my medical education has adequately prepared me to treat opioid addiction	1.8 (SD 1.4)	4.6 (SD 2.1)	P<0.0001	2.0 (SD 1.3)	NS
There is a need for more buprenorphine prescribers in my community	5.9 (SD 1.3)	6.7 (SD 0.5)	P=0.027	6.0 (SD 1.1)	NS
Working with patients like this is satisfying	4.7 (SD 1.6)	5.6 (SD 1.2)	NS (p=0.071)	4.3 (SD 1.5)	NS
Insurance plans should cover patients like this to the same degree that they cover patients with other conditions	6.1 (SD 1.2)	6.6 (SD 0.8)	NS	6.1 (SD 1.1)	NS
There is little I can do to help patients like this	2.5 (SD 1.5)	1.8 (SD 0.9)	NS	2.6 (SD 1.3)	NS
I feel especially compassionate toward patients like this	5.4 (SD 1.1)	5.4 (SD 1.3)	NS	4.3 (SD 1.3)	P=0.003
Patients like this irritate me	3.1 (SD 1.3)	2.8 (SD 1.2)	NS	3.4 (SD 1.7)	NS
I wouldn't mind getting up on call nights to care for patients like this	5.5 (SD 1.4)	5.5 (SD 1.5)	NS	4.8 (SD 1.6)	NS
Treating patients like this is a waste of medical dollars	1.6 (SD 1.2)	1.4 (SD 0.9)	NS	1.4 (SD 0.7)	NS
Patients like this are particularly difficult for me to work with	3.3 (SD 1.4)	2.7 (SD 1.0)	NS	4.2 (SD 1.6)	P=0.04

I can usually find something that helps patients like this feel better	3.6 (SD 1.5)	4.8 (SD 1.5)	P=0.020	4.2 (SD 1.0)	NS
I enjoy giving extra time to patients like this	4.7 (SD 1.5)	5.4 (SD 1.3)	NS	4.0 (SD 1.1)	NS (p=0.10)
I prefer not to work with patients like this	2.1 (SD 1.1)	1.9 (SD 1.0)	NS	2.9 (SD 1.5)	P=0.039

Appendices: Survey Instrument

Demographic Questions (Answer Options)

Original Class Year (2015, 2016, 2017, 2018, 2019)

Gender (Female, Male, Other)

Age (open response)

Ethnicity (White-Non Hispanic, Black, Asian, White-Hispanic, Native Indian/ Alaskan Native, Other w/open response)

Please indicate the frequency with which you have encountered the following situations

1 - Never

2 - Rarely

3 - Occasionally

4 - Often

I have encountered people with opioid addiction in my personal or professional life before coming to medical school

I have interacted with opioid-addicted patients since beginning medical school

Please indicate the degree to which you agree with the following statements:

A - Strongly Disagree

B - Disagree

C - Slightly Disagree

D - Neither Agree Nor Disagree

E - Slightly Agree

F - Agree

G - Strongly Agree

Opioid addiction is a problem in the community that I come from

There is a need for more buprenorphine prescribers in my community

Only addiction specialists should prescribe buprenorphine

Buprenorphine training should be offered to all medical students
Preparing medical students to treat opioid dependence is important
Buprenorphine diversion is a significant problem
Buprenorphine maintenance is an effective treatment for opioid addiction
Opioid addiction is a treatable illness
Patients on buprenorphine maintenance are not really in recovery
Patients on buprenorphine are substituting one drug for another
Abstinence-based therapy should be attempted before maintenance treatment with buprenorphine
Detoxification should be attempted before maintenance with buprenorphine
I will seek out opportunities to treat opioid-addicted patients during my clinical rotations
I intend to obtain a DEA waiver to prescribe buprenorphine
I intend to prescribe buprenorphine in my future practice
I feel confident that my medical education has adequately prepared me to treat opioid addiction
I will prescribe buprenorphine under the supervision of attending physicians in residency
I need more supervised experience prescribing buprenorphine before residency

Use the scale below to rate your degree of agreement or disagreement with each of the following items regarding patients with opioid use disorder:

A - Strongly Disagree

B - Disagree

C - Slightly Disagree

D - Neither Agree Nor Disagree

E - Slightly Agree

F - Agree

G - Strongly Agree

1. Working with patients like this is satisfying
2. Insurance plans should cover patients like this to the same degree that they cover patients with other conditions
3. There is little I can do to help patients like this
4. I feel especially compassionate toward patients like this
5. Patients like this irritate me
6. I wouldn't mind getting up on call nights to care for patients like this
7. Treating patients like this is a waste of medical dollars
8. Patients like this are particularly difficult for me to work with
9. I can usually find something that helps patients like this feel better
10. I enjoy giving extra time to patients like this
11. I prefer not to work with patients like this

Knowledge Assessment

Q1: Which best describes the pharmacology of buprenorphine?

A) full mu-agonist and high affinity at mu-receptor

- B) partial mu-agonist and low affinity at mu-receptor
- C) full mu-agonist and low affinity at mu-receptor
- D) partial mu-agonist and high affinity at mu-receptor
- E) None of the above

Q2: Which of the following adverse events is avoided by waiting for the emergence of withdrawal symptoms prior to starting buprenorphine?

- A) Relapse to illicit opioids
- B) Cravings for illicit opioids
- C) Precipitated withdrawal
- D) Withdrawal seizures
- E) Overdose

Q3: Which statement is true in regards to opioid use disorders?

- A) Opioid withdrawal is fatal if untreated
- B) Addiction to opioids is defined by tolerance to opioids and the emergence of withdrawal
- C) Detoxification from opioids does not lead to sustained abstinence in most patients
- D) Medication-assisted treatment should be reserved for the most severely ill patients
- E) About half of all patients addicted to opioids are currently receiving treatment

Q4: Recovery from opioid addiction often includes the following elements:

- A) Medication-assisted treatment with buprenorphine, methadone or naltrexone
- B) Counseling to learn relapse prevention skills
- C) Engagement with social and community supports
- D) All of the above
- E) None of the above

Q5: A urine sample provided by a patient in treatment with buprenorphine indicates the presence of morphine. Which of the following compounds could the patient have ingested?

- A) Heroin

- B) Codeine
- C) Hydromorphone
- D) A and B
- E) B and C

Question 6: Pain relievers used non-medically by individuals in the community are most often obtained from which source?

- A) Emergency Room Physician
- B) Online
- C) Friend or family member
- D) Drug dealer
- E) Raves, concerts, and other large gatherings

Question 7: Which of the following signs/symptoms would NOT raise suspicion for opioid intoxication

- A. Constricted pupils
- B. Stupor
- C. Elevated systolic blood pressure
- D. Reduced respiratory rate
- E. Sclerosed peripheral veins

Question 8: Which of the following classes of medications should a clinician consider weaning before initiating therapy with buprenorphine/naloxone due to concerns for drug-drug interactions

- A. Selective Serotonin Reuptake Inhibitors (SSRIs)
- B. Benzodiazepines
- C. Thiazide diuretics
- D. Amphetamines
- E. Osmotic Laxatives

Question 9: Common side effects of buprenorphine include all of the following except:

- A. Constipation
- B. Sweating
- C. Respiratory depression
- D. Headache
- E. Unpleasant taste

Question 10: Which of the following is NOT required for office-based administration of buprenorphine?

- A. Capacity to provide or refer patients to counseling
- B. Buprenorphine training sufficient to obtain DATA waiver
- C. Capacity to store and dispense buprenorphine directly to patients in the office setting
- D. Registration with the Drug Enforcement Agency
- E. Valid medical license under state law

Question 11: Buprenorphine is contraindicated in the following populations:

- A. Pregnant patients
- B. Patients with significant comorbid psychiatric disease
- C. Adolescents
- D. Patients with chronic pain
- E. None of the above