

## ORIGINAL RESEARCH

# Family nurse practitioner workforce response to the public health opioid crisis through curriculum revision

Dayle B. Sharp\*<sup>1</sup>, Marcy Doyle<sup>1,2</sup>, Michelle Capozzoli<sup>3</sup>

<sup>1</sup>School of Nursing, College of Health and Human Services, University of New Hampshire, United States

<sup>2</sup>Institute for Health Policy and Practice, College of Health and Human Services, University of New Hampshire, United States

<sup>3</sup>Department of Mathematics and Statistics, College of Engineering and Physical Sciences, University of New Hampshire, United States

**Received:** November 24, 2025

**Accepted:** February 2, 2026

**Online Published:** March 24, 2026

**DOI:** 10.63564/jnep.v16n3p47

**URL:** <https://doi.org/10.63564/jnep.v16n3p47>

## ABSTRACT

The opioid crisis continues to pose a critical public health challenge in the United States, demanding an adequately trained primary care workforce. In response, a Family Nurse Practitioner (FNP) program revised its curriculum to prepare students to care for individuals with Opioid Use Disorder (OUD) through a multi-pronged educational intervention. Grounded in Social Cognitive Theory, Situated Learning Theory, and Community of Practice Theory, the revised curriculum integrated a 24-hour Medication for Opioid Use Disorder (MOUD) waiver training, clinical shadowing with MOUD providers, and participation in a 10-month Project ECHO telementoring series based on SAMHSA's Treatment Improvement Protocol (TIP) 63. Results demonstrated statistically and clinically significant improvements in knowledge across all domains, with an average score increase of 14.13 points (95% CI: 9.99–18.27). Notable gains were observed in understanding prescribing guidelines, addiction as a chronic condition, state laws, and use of de-stigmatizing language. Data from reflective narratives revealed several emergent themes, including reduced stigma, recognition of addiction as a chronic illness, and the value of dignity and empathy in patient care. Students reported shifts in perception due to experiential learning and exposure to recovery-focused clinical environments. This innovative curriculum highlights the effectiveness of integrating didactic, clinical, and community-based strategies to enhance FNP student readiness to address OUD in primary care. Future research should explore long-term impacts on clinical practice and patient outcomes. The approach may lend itself to other pressing challenges in public health.

**Key Words:** Medication for opioid use disorder, MOUD curriculum, Nurse practitioner student training, Opioid use disorder

## 1. INTRODUCTION

This article describes an innovative curriculum revision within a family nurse practitioner program, preparing students to care for individuals with Opioid Use Disorder (OUD). Prior to the initiation of the curriculum revision, in 2018, over 67, 000 Americans died of an opioid overdose.<sup>[1]</sup> OUD was and remains a national public health crisis despite being a treatable chronic condition. Providers, includ-

ing nurse practitioner students need to be educated with the knowledge and skills to treat the complexities of individuals struggling with OUD.

### Background

According to the Centers for Disease Control, since 1999 more than one million people have died from a drug overdose.<sup>[2]</sup> The 2018 National Survey on Drug Use and Health

\*Correspondence: Dayle B. Sharp; Email: [dayle.sharp@unh.edu](mailto:dayle.sharp@unh.edu); Address: School of Nursing, College of Health and Human Services, University of New Hampshire, USA, Hewitt Hall Room 257, Durham, NH 03824, United States

found that only 2.4 million Americans had access to substance use disorders services despite over 21.2 million needing care.<sup>[3]</sup> In 2021, nearly 107,000 people died from drug overdoses in the US.<sup>[2]</sup> Health care providers can play an important role supporting patient treatment. While the consequences of OUD, a chronic health disorder, can be devastating, many people can and do recover, improving their health by accessing options. Offering Medications for Opiate Use Disorder (MOUD) in primary care settings has reduced mortality.<sup>[4]</sup> However, negative provider attitudes and a lack of health knowledge have led to poor patient health care outcomes.<sup>[5]</sup>

The role of nurse practitioners (NPs) in primary care has expanded significantly, with approximately 70% of the 385,000 NPs in the United States currently practicing in primary care settings—a number that is expected to grow.<sup>[6]</sup> Prior to 2016, MOUD was only prescribed by physicians. However, the Comprehensive Addiction and Recovery Act (CARA) of 2016 allowed NPs to obtain a DATA waiver upon completion of MOUD training requirements.<sup>[7]</sup> The first waivers for NPs were issued in 2017.<sup>[8]</sup>

In response to the regulatory changes allowing NPs to offer MOUD and a three-year grant from the Substance Abuse and Mental Health Services Administration (SAMSHA), a family nurse practitioner program incorporated training around treatment with MOUD aiming to increase student knowledge. Changes to the family NP (FNP) curriculum included students completing a free 24-hour Buprenorphine Training course offered through the American Psychiatric Nurses Association, shadowing MOUD providers and participating in monthly community-based Project ECHO sessions focusing on MOUD in the students' final clinical rotation. Project ECHO is a telementoring model used to create a virtual learning community sharing information using short didactic sessions shared by subject matter experts combined with case studies fielded from the community. Project Extension for Community Health Outcomes (ECHO) has been used extensively since its launch in 2003 as a case base learning modality.<sup>[9,10]</sup> Project ECHO was initially developed to provide virtual bi-directional learning for academic medical centers and rural practitioners providing best practice and protocol-driven health care. Project ECHO provides a learning environment focusing on an all teach, all learn approach.<sup>[11]</sup> The ECHO community included students, behavioral health clinicians, pharmacists, psychiatrists, occupational therapists, and peer support and recovery workers. The ECHO curriculum was based on SAMHSAs Treatment Improvement Protocol (TIP) 63: Medications for OUD, an evidence-based guide for the treatment of OUD.<sup>[12]</sup>

The aim of this educational intervention was to enhance the clinical competence of FNP students related to treating patients with OUD. To increase student knowledge, experiential learning opportunities were included in the FNP curriculum. The experiential learning experiences in the management of substance use disorders, supplemented didactic instruction and case-based learning through the ECHO model, with the goal of improving student knowledge and skills in the treatment of OUD.

The Institutional Review Board (IRB) approval was obtained from the primary academic center, ensuring the study met all ethical standards, regulatory requirements, and guidelines for the protection of human subjects. This approval allowed the research team to proceed with data collection and participant recruitment in compliance with institutional and federal oversight. The IRB's oversight ensured that informed consent procedures were properly implemented and that participant confidentiality was rigorously maintained.

## 2. METHODS

Social Cognitive Theory, Situated Learning Theory, and Community of Practice Theory (see Table 1) informed the construct of this educational intervention to survey participant knowledge pre and post intervention. Social Cognitive Theory influences individuals' experiences and actions using social supports. This can include observational learning and reinforcements to achieve a behavior. Individuals must believe that there exists benefit in learning a new behavior, develop confidence in their ability to perform, and receive reinforcement of positive behavior changes from influential individuals.<sup>[13]</sup> The Situated Learning Theory focuses on providing learners with modeled experiences to aid in their development of new skills and engage their interest. This theory suggests learning takes place through relationships between individuals such as a provider and/or subject matter expert and the student. Finally, the Community of Practice Theory emphasizes learning through continuous participation in a collaborative community comprised of peer learners and experts.

### 2.1 Project ECHO

The Partnership for Academic-Clinical Telepractice: Medications for Addiction Treatment (PACT-MAT) ECHO program included students from two cohorts. Ten monthly 90-minute sessions ran from February 2020–November 2020 and February 2021–November 2021. The ECHO curriculum was developed from Substance Abuse and Mental Health Services Administration Treatment Improvement Protocol 63, Medications for OUD publication.<sup>[12]</sup> Didactic topics (see Table 2) reinforced the DATA waiver training course and clinical

experiences. The subject material experts (SME) panel consisted of an interdisciplinary group of individuals including a medical librarian, pharmacist, peer recovery and support, occupational therapist, licensed drug and alcohol counselor, psychiatrist, physician and nurse practitioner.

**Table 1.** Learning theories

Theory	Description	Educational Intervention
Social Cognitive	People learn by observing others; learning is influenced by interaction between personal, behavioral, and environmental factors.	Project ECHO: supports learning through case-based sessions, interdisciplinary mentorship, and reinforcement from subject matter experts, helping learners gain confidence and recognize the value of new behaviors (e.g., MAT). Shadowing MOUD Providers: Students observe MOUD treatment with Methadone and Suboxone providers, then reflect on their experiences, promoting learning through modeled behavior and personal processing.
Situated Learning	Learning embedded in social and physical context; beginners learn by participating in real tasks.	Project ECHO: involves learners in realistic, socially embedded clinical discussions and mentorship. Shadowing MOUD Providers offers authentic experiences within real clinical settings, anchoring knowledge in practical context.
Community of Practice	Learning happens readily when the learners have a shared common interest.	Project ECHO: builds a collaborative learning community across disciplines with a shared focus on addiction treatment.

**Table 2.** PACT-MAT ECHO sessions and objectives

ECHO Session	Objectives
1. Understand addiction as a chronic condition; addressing bias, stigma. What can NH do to reduce stigma and bias?	<ul style="list-style-type: none"> <li>Understand addiction as a chronic condition</li> <li>Discuss the role of addressing bias and stigma in relation to addiction and trauma</li> <li>Describe the biologic basis of addiction</li> <li>Describe the role of trauma and the importance of trauma-informed care</li> </ul>
2. Harm Reduction, current evidence from SAMHSA TIP63, discuss polysubstance use and treatment	<ul style="list-style-type: none"> <li>Describe the current evidence within SAMHSA TIP63</li> <li>Describe the harm reduction approach, working with patients who continue use of other substances (e.g. marijuana, alcohol, benzos)</li> <li>Summarize the approach to recommending vs. requiring BH/SUD counseling</li> </ul>
3. Discuss naltrexone, buprenorphine, methadone	<ul style="list-style-type: none"> <li>Discuss induction issues, buprenorphine dosing, new formulations, approaches to risks &amp; benefits of tapering buprenorphine in stable patients, using naltrexone, urine drug screening (indications, frequency, testing options, approach to dealing with unanticipated results, approaches to relapse), and opioid maintenance and detoxification</li> </ul>
4. Applying Motivational Interviewing during crisis situations, accessing compassion. Using comfort, medications and strategies	<ul style="list-style-type: none"> <li>Describe the role of trauma and the importance of trauma-informed care and the importance of using de-stigmatizing language</li> </ul>
5. Discuss promoting recovery & support for patients	<ul style="list-style-type: none"> <li>Discuss supporting recovery, connecting with local recovery community, and connecting with community resources to support social health needs</li> <li>Describe evidence-based BH treatments for SUD, individual vs. group counseling, and intensive outpatient (IOP)</li> <li>Understand how to provide support for patients with challenges (i.e. acutely intoxicated, diversion, continued dangerous use, threatening, diversion control, and traumatic brain injury, etc.)</li> </ul>
6. Discuss practice flow, coding, and billing to support MAT services	<ul style="list-style-type: none"> <li>Review a team-based approach, 42 CFR to facilitate communication; Mentoring circles</li> <li>Approaches to addressing bias within the practice setting</li> </ul>
7. Discuss managing pain in patients being treated for SUD/OD	<ul style="list-style-type: none"> <li>Describe acute vs. chronic pain management, buprenorphine for pain, other pharmacologic options, non-pharmacologic options for managing chronic pain, individualized treatment planning, and assessment (including substance use monitoring)</li> </ul>
8. Discuss special populations with relation to SUD/OD	<ul style="list-style-type: none"> <li>Discuss special populations, adolescent, older adult and pregnancy</li> </ul>
9. Discuss overdose in MAT patients	<ul style="list-style-type: none"> <li>Review OD prevention education</li> <li>Discuss prescribing/promoting naloxone</li> </ul>
10. Discuss the treatment of Co-Occurring Disorders	<ul style="list-style-type: none"> <li>Review of cognitive behavioral therapy, contingency management and modified therapeutic communities (MTCs)</li> </ul>

**2.2 Clinical experience**

During the students’ last clinical rotation, students obtained clinical experience related to medication assisted treatment from a MOUD provider. Students completed a minimum of eight hours with two MOUD providers, one who prescribed treatment with methadone and another who prescribed sub-oxone. After the shadow experience, students reflected on the experience.

**2.3 MOUD waiver training**

Traditional pedagogy was used with students completing the 24-hour MOUD waiver training offered by the American Psychiatric Nurses Association. Students completed the Providers’ Clinical Support System for Medication Assisted Treatment (PCSS-MAT) 24-hour course which was specif-

ically developed for primary care NPs.<sup>[14]</sup> The 24-hours of coursework was mandated by the Comprehensive Addiction and Recovery Act (CARA). The course was divided into two parts: one including 8 hours of MAT waiver training and the other included 16 hours of training focusing on treating OUD (see Table 3).<sup>[15]</sup>

All students completed the Medications for Addiction Treatment 8-Hour Waiver Training – 2021 and Medications for Addiction Treatment 16 Hour Waiver Training – 2021 offered jointly by Providers Clinical Support System (PCSS) and the American Psychiatric Nurses Association (APNA). Students were encouraged to complete the training before their clinical experience with the MOUD providers. However, due to scheduling this was not always possible.

**Table 3.** PCSS-MAT course outline

Part 1	Objectives
	<ul style="list-style-type: none"> <li>• Apply for a waiver to prescribe buprenorphine to their patients with opioid use disorders</li> <li>• Identify and assess patients who are appropriate for treatment with medications</li> <li>• Have specific knowledge concerning the use of medications to manage patients with addiction involving opioid use</li> <li>• Discuss the psychiatric and medical co-morbidities associated with opioid addiction</li> </ul>
	Topics
	<p>Opioid Maintenance and Detoxification</p> <ul style="list-style-type: none"> <li>• The ASAM National Practice Guideline on Medications to Treat Opioid Use</li> <li>• The ASAM National Practice Guideline Special Populations (Pregnant Women)</li> </ul> <p>Clinical Use of all FDA-Approved Drugs for MAT</p> <ul style="list-style-type: none"> <li>• Safe and Effective Use of Medication-Assisted Treatment: Tools for Providers</li> <li>• Novel Pharmacological Targets for Treating Alcohol Use Disorder</li> <li>• Developing Pharmacological Treatments for Alcohol Use Disorder: Implications for Clinical Practice</li> <li>• Opioid Abuse Treatment: New Forms and Delivery Systems for Buprenorphine</li> </ul> <p>Patient Assessment</p> <ul style="list-style-type: none"> <li>• Definitions, the ASAM Criteria and the DSM-5</li> <li>• Principles of Pharmacology and Toxicology</li> </ul>
Part 2	<p>Treatment Planning</p> <ul style="list-style-type: none"> <li>• Medical Co-Morbidities</li> <li>• Individuals with Co-Occurring Psychiatric Disorders</li> <li>• The ASAM National Practice Guideline for the use of Medications in the Treatment of Addiction Involving Opioid Use</li> <li>• HHS Opioid Initiative</li> <li>• Guidelines on Treating Substance Use Disorders During Pregnancy</li> <li>• The Epidemiology of Prescription Opioid Abuse and the Recent Transition to Heroin</li> <li>• CDC Guidelines for Prescribing Opioids in Chronic Pain</li> <li>• Opioid Therapy for Chronic Pain in the United States: Promises and Perils</li> <li>• Treating Women for Opioid Use Disorders During Pregnancy: The Latest Research</li> </ul>
	<p>Psychosocial Services</p> <ul style="list-style-type: none"> <li>• Cognitive Behavior Therapy &amp; Motivational Interviewing</li> <li>• 12-Step Facilitation and Other Psychosocial Interventions</li> </ul>
	Evaluation and Certificate

**2.4 Data collection**

Forty-six FNP students participated in all curriculum requirements with 50% of the students completing pre- and post-

surveys assessing changes in knowledge related to MOUD. A meta-analysis by Wu et al.<sup>[16]</sup> reported a mean online survey response rate of 44.1% in education-related fields.

Prior meta-analyses have reported mean response rates of 34%, and 39.6%.<sup>[17,18]</sup> The graduating cohort was less likely to complete the post-test however; the 50% completion rate exceeded the average.

The 16-question intervention survey was administered at the beginning and end of the students' last clinical rotation (see Table 4). The survey utilized a Likert scale for

knowledge. The knowledge scale ranged from Very Knowledgeable, Knowledgeable, Fairly Knowledgeable, Slightly Knowledgeable, to Not Knowledgeable. TIP 63 served as the key resource in developing the survey, subject matter experts were consulted in the development of each question. The curriculum and survey were aligned to ensure that participants were tested on their knowledge before and after the ECHO.

**Table 4.** Knowledge based questions for pre- and post-intervention survey

Survey Questions
1) Knowledge of screening for substance use disorder (SUD), including opioid Use Disorder (OUD).
2) Knowledge of assessment for co-occurring behavioral health needs in patients with SUD/OUD.
3) Knowledge of medication treatment options for treatment of opioid use disorder.
4) Knowledge of referral resources for local community resources and social supports services to support addiction care.
5) Knowledge of guidelines for prescribing and managing medication treatments for OUD.
6) Knowledge of Motivational Interviewing and other strategies to engage and gain the trust of your MOUD patients.
7) Knowledge of OUD treatment management for high-risk, special populations patients with OUD (i.e., pregnant women, homeless, adolescent, etc.).
8) Knowledge of assessment for overdose risk in MOUD patients.
9) Knowledge of best prescribing and patient education practices for prescribing nasal naloxone for opioid overdose reversal.
10) Knowledge of protocols for managing abnormal urine drug screen result to promote continued engagement with care.
11) Knowledge of best practices for patient education for relapse prevention and harm reduction.
12) Knowledge of pharmacological and non-pharmacological pain management for patients being treated for OUD.
13) Knowledge of standardized workflows and templates for Medications for Addiction Treatment (MOUD).
14) Knowledge of trauma informed care.
15) Knowledge of relevant state prescribing laws and evidence based best practices.
16) Knowledge of addiction as a chronic condition and the use of de-stigmatizing language and trauma informed care.

### 3. RESULTS

#### 3.1 Quantitative results

To determine if there was an increase in overall knowledge, the students' survey responses were coded using a Likert scale from 1 to 5, with 5 being very knowledgeable. Fifty percent of the FNP students completed a pre- and post-survey resulting in paired data. Only the completed pre- and post-survey data were used for analysis. The total pre-survey score of each completed survey was calculated to determine the mean score for all completed pre-surveys; total post-survey scores were determined in the same manner. The difference in the scores was calculated comparing the mean difference for each completed survey. In addition, summary statistics for each knowledge question (see Tables 5 and 6) were calculated with the mean difference reported. On average, NPs knowledge increased by 14.13 points, with 95% confidence interval ranging from 9.99 to 18.27 points. These gains suggest that the curriculum effectively addressed key gaps

in knowledge related to screening, assessment, treatment, and referral for patients with OUD (see Table 6). Further investigation into the survey questions using an increase of 1 point as of practical importance showed these gains were in knowledge guidelines for prescribing and managing medication treatments for OUD, standardized workflows and templates for Medications for Addiction Treatment (MOUD), relevant state prescribing laws and evidence based best practices, and addiction as a chronic condition and the use of de-stigmatizing language and trauma informed care (see Table 7).

#### 3.2 Themes that emerged from student reflections

Students completed a reflection of their clinical experience with the two MOUD providers. Transcripts of the student reflections were analyzed using Colaizzi's seven-step data analysis method.<sup>[19]</sup> Eight themes emerged from the students' reflections: different views on patients struggling with OUD, preconceived notions, eye opening, increased knowledge,

stigma, chronic disease, community services, and dignity.

**3.2.1 Different views on patients struggling with OUD**

All the students were practicing registered nurses. Many students practiced in acute care settings such as hospital emergency rooms, cardiac specialties, and behavioral health units where patients present for emergent care, related to OUD. The students’ views changed due to their shadowing experience with a MOUD provider. “I went into it with skepticism, due to my background.” “I often see patients at their worst. Unfortunately, this can skew a person’s viewpoint. I

found this experience to be very rewarding . . . this experience showed me the other side and how important it is to treat each patient with dignity, respect”.

**Table 5.** Summary statistics for total pre scores, post scores and difference (n = 23)

	Mean	Standard Deviation	95% Confidence Interval
Pre - Survey	36.26	11.70	(31.20, 41.32)
Post - Survey	50.39	11.38	(45.47, 55.31)
Difference	14.13	9.58	(9.99, 18.27)

**Table 6.** Summary statistics for each knowledge based question (n = 23)

Survey Question	Pre Intervention Mean	Post Intervention Mean	Difference
Knowledge of screening for substance use disorder (SUD), including opioid Use Disorder (OUD).	2.57	3.48	+0.91
Knowledge of assessment for co-occurring behavioral health needs in patients with SUD/OUD.	2.48	3.39	+0.91
Knowledge of medication treatment options for treatment of opioid use disorder.	2.43	3.34	+0.91
Knowledge of referral resources for local community resources and social supports services to support addiction care.	2.35	3.09	+0.74
Knowledge of guidelines for prescribing and managing medication treatments for OUD.	1.96	2.96	+1.00
Knowledge of Motivational Interviewing and other strategies to engage and gain the trust of your MOUD patients.	2.83	3.52	+0.69
Knowledge of OUD treatment management for high-risk, special populations patients with OUD (i.e., pregnant women, homeless, adolescent, etc.).	1.91	2.83	+0.91
Knowledge of assessment for overdose risk in MOUD patients.	2.30	3.17	+0.87
Knowledge of best prescribing and patient education practices for prescribing nasal naloxone for opioid overdose reversal.	2.43	3.17	+0.74
Knowledge of protocols for managing abnormal urine drug screen result to promote continued engagement with care.	2.04	2.91	+0.87
Knowledge of best practices for patient education for relapse prevention and harm reduction.	2.22	3.13	+0.91
Knowledge of pharmacological and non-pharmacological pain management for patients being treated for OUD.	2.30	2.96	+0.65
Knowledge of standardized workflows and templates for Medications for Addiction Treatment (MOUD).	1.78	2.78	+1.00
Knowledge of trauma informed care.	2.30	3.09	+0.78
Knowledge of relevant state prescribing laws and evidence based best practices.	1.69	2.82	+1.13
Knowledge of addiction as a chronic condition and ability best practice in use of de-stigmatizing language and trauma informed care.	2.65	3.74	+1.09

**3.2.2 Preconceived notions**

Students went into the shadowing experience with preconceived notions. Some students expected to see “patients who appeared under the influence and potentially unkept . . . due to stereotypes through media, friends, and family

who portray those with substance use disorder as such.” One student stated she was surprised to find the patients “were well kept” and “most you wouldn’t presume had a substance use disorder.”

**Table 7.** Relationship of survey question to pedagogy

Survey Question	Pedagogy
Knowledge of guidelines for prescribing and managing medication treatments for OUD.	<ul style="list-style-type: none"> <li>• ECHO Session #3: Discuss naltrexone, buprenorphine, methadone</li> <li>• ECHO Session #8: Discuss special populations with relation to SUD/ODU</li> <li>• ECHO Session #9: Discuss overdose in MAT patients</li> <li>• ECHO Session #10: Discuss the treatment of Co-Occurring Disorders</li> <li>• PCSS-MAT Course Part 2: Opioid Maintenance and Detoxification</li> <li>• PCSS-MAT Course Part 2: Treatment Planning</li> <li>• Shadowing MOUD Provider</li> </ul>
Knowledge of standardized workflows and templates for Medications for Addiction Treatment (MOUD).	<ul style="list-style-type: none"> <li>• ECHO Session #6: Discuss practice flow, coding, and billing to support MAT services</li> <li>• Shadowing MOUD Provider</li> </ul>
Knowledge of relevant state prescribing laws and evidence based best practices.	<ul style="list-style-type: none"> <li>• ECHO Session #2: Harm Reduction, current evidence from SAMHSA TIP63, discuss polysubstance use and treatment</li> <li>• PCSS-MAT Course Part 1</li> <li>• Shadowing MOUD Provider</li> </ul>
Knowledge of addiction as a chronic condition and ability best practice in use of de-stigmatizing language and trauma informed care.	<ul style="list-style-type: none"> <li>• ECHO Session #1: Understand addiction as a chronic condition; addressing bias, stigma. What can NH do to reduce stigma and bias?</li> <li>• Shadowing MOUD Provider</li> </ul>

### 3.2.3 Eye opening

“Seeing patients through the spectrum of their life stages, patients of different ages and holding different positions in society, from being very high functioning to being just released from jail and on probation was a very eye-opening experience.”

### 3.2.4 Increased knowledge

During the semester, students were required to complete Medication Assisted Treatment Wavier Training. Students found having the knowledge from the training prior to their shadowing experience was beneficial as they “began to understand the pathophysiology of OUD and why these medications can be life-changing to patients.” “I am more aware of the treatment options, side effects of these medications, urine screening, discovering relapse in treatment plan, and/or barriers/triggers to abstinence.

### 3.2.5 Stigma

Students developed an understanding of the complexities of the medical diagnosis of substance use disorder. “I will . . . now . . . look at this population very individually and I will try not to use stigmatizing words”. “I will always look at the MOUD individuals as patients with medical condition and not patients with addiction problem.”

### 3.2.6 Chronic disease

One student stated that she asked the MOUD provider if she ever gets discouraged hearing from her patients repeatedly that they relapsed since their last visit. The provider responded (paraphrased by the student) that it doesn’t discourage her and that it’s no different than a diabetic patient

walking in for a diabetic follow-up and reporting that he’s been eating ice cream intermittently after dinner. The student stated, “I know that substance use disorder is a disease . . . but I never made that change in my way of thinking about their substance use from “just don’t use, you know better, to treating it as poor chronic illness management.”

### 3.2.7 Community services

Students became aware of the resources available in the community. Students stated they “feel comfortable providing patients with appropriate referrals and resources within the community”. “In medicine we are taught to, ‘do no harm’; however, when harm is an inherent risk of this population’s substance use, we must focus on promoting quality care with reasonable goals and expectations.”

### 3.2.8 Dignity

“I found this experience to be very rewarding . . . this experience showed me the other side and how important it is to treat each patient with dignity, respect, and like they have the potential for recovery, because they do have that potential.”

## 4. DISCUSSION

Project ECHO has been beneficial in developing physicians and inter-disciplinary teams’ preparedness to treat OUD by improving their knowledge and self-efficacy. In a systematic review conducted by Puckett, Bossaller, & Sheets,<sup>[20]</sup> knowledge and self-efficacy were two areas the physicians improved. The findings from this educational intervention demonstrate an improvement in FNP students’ knowledge regarding OUD and MOUD following a structured curriculum change that included didactic training and clinical shadowing

experiences.

Quantitatively, the pre- and post-intervention survey results revealed a statistically and clinically meaningful increase in knowledge across all assessed areas. On average, students' total knowledge scores improved by 14.13 points. These gains suggest that the curriculum effectively addressed key gaps in knowledge related to screening, assessment, treatment, and referral for patients with OUD. The greatest improvements were seen in domains such as understanding state prescribing laws and evidence-based practices (+1.13), recognizing addiction as a chronic condition and using destigmatizing language (+1.09), familiarity with prescribing and managing MOUD protocols (+1.00), and knowledge of standardized workflows and templates for Medications for Addiction Treatment (MOUD (+1.00)). These areas represent critical competencies for primary care providers managing patients with OUD, and the observed gains suggest students are more prepared to deliver safe, evidence-based care.

Student reflections provided further insight into the impact of the curriculum. Themes such as different views on patients with OUD, preconceived notions, and stigma reflect a shift in attitudes and beliefs, particularly as students moved from viewing patients through a narrow, acute care lens to understanding addiction as a chronic and complex medical condition. Many students expressed that their experience challenged deeply held stereotypes, revealing the diversity and humanity of individuals affected by substance use disorders. This change is essential in reducing stigma, which remains a major barrier to care for people with OUD.

Students also highlighted an increased awareness of the chronic nature of addiction, aligning their understanding of relapse with that of other chronic diseases such as diabetes. This reframing indicates a maturing clinical perspective, in which compassion and continuity of care replace judgment and unrealistic expectations. Moreover, exposure to community resources and support systems equipped students with practical tools for linking patients to ongoing care, promoting a more holistic and integrated approach to addiction treatment.

The theme of dignity appeared repeatedly, reinforcing the importance of empathy and patient-centered communication. Recognizing the value of motivational interviewing, trauma-informed care, and non-stigmatizing language, students demonstrated not only cognitive but also emotional growth in their readiness to work with this vulnerable population.

Shadowing a MOUD provider had an impact on student perceptions. Students learned to have compassion for indi-

viduals struggling with OUD. Prior to the experience some students had a negative view of patients struggling with OUD due to their experiences in acute care settings. However, when the students were given an opportunity to observe patients receiving MOUD who were taking charge of their lives they began to understand OUD is chronic illness requiring continued treatment and support.

Students also gain knowledge related to MOUD through the 24-hour waiver training. Students completed the training either before or after their clinical experience. When students completed the training prior to their clinical experience, they found it beneficial as they understood the medications and addiction.

## 5. CONCLUSIONS

Family Nurse Practitioners are positioned to make an impact on the lives of individuals struggling with OUD. Providing MOUD education, a Project ECHO learning community and clinical practicums specific to MOUD increased students' knowledge, while offering an understanding of patient challenges and available resources.

This intervention supported the effectiveness of integrated educational models that combine didactic instruction with experiential learning to prepare FNP students for the complexities of treating patients with OUD. Enhancing knowledge, shifting perceptions, and building practical skills are all vital for future providers in addressing the opioid epidemic. This tripart educational intervention provides a framework for addressing other pressing public health issues.

Supported by various theories students were offered social support through observational learning and reinforcements during the case presentations and discussion during the ECHO sessions, experience/relationships with a MOUD providers and subject matter experts. Additionally, the ECHO sessions allowed the students an opportunity to be aware of the resources for individuals with OUD.

The findings in this intervention mirror the results of a study conducted by Puckett and colleagues<sup>[20]</sup> where they studied the impact of Project ECHO to increase physician knowledge and self-efficacy by comparing a pre- and post-participation self-reported preparedness survey. A study with physicians, nurses, physician assistants, and other healthcare providers using Project ECHO also demonstrated an increase in participate knowledge and confidence in office-based treatment for OUD.<sup>[21]</sup>

Future studies are warranted to determine long term impact and practice patterns in the treatment of OUD by FNP participating in such novel efforts. Future efforts may include

longitudinal follow-up to assess whether these educational gains translate into practice behavior and improved patient outcomes.

### Limitations

The small sample size of completed pre- and post-test and unbalanced nature of the data set are potential issues to keep in mind when considering the results of the analyses of the quantitative data. Causal inference can be considered as a limitation due to no control group; however, the intervention was to increase student knowledge therefore a pre- and post-test comparison does offer information on the effectiveness of the intervention. The qualitative data offered insight into the changes in student perceptions related to persons struggling with OUD.

### ACKNOWLEDGEMENTS

We greatly appreciate the valuable contributions of our learning community.

### AUTHORS CONTRIBUTIONS

Dr. Sharp and Dr. Doyle were responsible for study design and revising. Dr. Doyle was responsible for data collection. Drs. Sharp and Doyle drafted the manuscript. Dr. Sharp completed all final edits. Dr. Capozzoli conducted the statistical analysis. All authors read and approved the final manuscript and contributed to editing.

### FUNDING

A Provider Clinical Support Systems (PCSS) grant from Substance Abuse and Mental Health Services Administration (SAMSHA) supported the project. The study was completed independent of the grant.

### CONFLICTS OF INTEREST DISCLOSURE

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### INFORMED CONSENT

Obtained.

### ETHICS APPROVAL

The Publication Ethics Committee of the Association for Health Sciences and Education. The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

### PROVENANCE AND PEER REVIEW

Not commissioned; externally double-blind peer reviewed.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### DATA SHARING STATEMENT

No additional data are available.

### OPEN ACCESS

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).

### COPYRIGHTS

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

### REFERENCES

- [1] DiNapoli TP. Continuing crisis: Drug overdose deaths in New York. 2022. Available from: <https://www.osc.ny.gov/files/reports/pdf/drug-overdose-deaths.pdf>
- [2] Centers for Disease Control and Prevention. Drug overdose deaths. 2023. Available from: <https://www.cdc.gov/drugoverdose/deaths/index.html>
- [3] Substance Abuse and Mental Health Services Administration. Key substance use and mental health indicators in the United States: Results from the 2018 National Survey on Drug Use and Health (HHS Publication No. PEP19-5068, NSDUH Series H-54). 2019. Available from: <https://www.samhsa.gov/data/report/2018-nsduh-annual-national-report>
- [4] Lagisetty P, Klasa K, Bush C, et al. Primary care models for treating opioid use disorders: What actually works? A systematic review. *PLoS ONE*. 2017; 12(10): e0186315. PMID:29040331 <https://doi.org/10.1371/journal.pone.0186315>
- [5] van Boekel LC, Brouwers EPM, van Weeghel J, et al. Stigma among health professionals towards patients with substance use disorders and its consequences for healthcare delivery: Systematic review. *Drug and Alcohol Dependence*. 2013; 131(1-2): 23-35. PMID:23490450 <https://doi.org/10.1016/j.drugalcdep.2013.02.018>
- [6] American Association of Nurse Practitioners. NP facts. 2024. Available from: <https://www.aanp.org/about/all-about-nps/np-fact-sheet>
- [7] United States Congress. Comprehensive Addiction and Recovery Act of 2016. *Pub Law*. 114-198, 130 Stat 695. 2016.
- [8] Jones CM, McCance-Katz EF. Characteristics and prescribing practices of clinicians recently waived to prescribe buprenorphine for the treatment of opioid use disorder. *Addiction*. 2018; 114(3): 471-482. PMID:30194876 <https://doi.org/10.1111/add.14436>

- [9] Arora S, Thornton K, Jenkusky SM, et al. Project ECHO: Link university specialists with rural and prison-based clinicians to improve care for people with chronic hepatitis C in New Mexico. *Public Health Reports*. 2007; 122(Suppl 2): 74-77. PMID:17542458 <https://doi.org/10.1177/00333549071220S214>
- [10] Arora S, Kalishman SG, Thornton KA, et al. Project ECHO: A tele-mentoring network model for continuing professional development. *Journal of Continuing Education in the Health Professions*. 2017; 37(4): 239-244. <https://doi.org/10.1097/CEH.0000000000000172>
- [11] University of New Mexico. About the ECHO model. 2024. Available from: <https://projectecho.unm.edu/model>
- [12] Substance Abuse and Mental Health Services Administration. Medications for opioid use disorder (Treatment Improvement Protocol [TIP] Series No. 63; HHS Publication No. SMA-18-5063FULLDOC). 2018. Available from: <https://store.samhsa.gov/product/TIP-63-Medications-for-Opioid-Use-Disorder-Full-Documents/SMA18-5063FULLDOC>
- [13] Bandura A. Social learning theory. General Learning Press. 1971. Available from: [http://www.asecib.ase.ro/mps/Bandura\\_SocialLearningTheory.pdf](http://www.asecib.ase.ro/mps/Bandura_SocialLearningTheory.pdf)
- [14] American Academy of Addiction Psychiatry. Treatment for opioid use disorder: Meeting an unmet need with no-cost MAT waiver training for NPs and PAs. 2017. Available from: <https://www.aaap.org/treatment-opioid-use-disorder-meeting-unmet-need-no-cost-mat-waive-trainings-nps-pas/>
- [15] ASAM eLearning. NP/PA 24-hour waiver training - AAPA. 2015. Available from: <https://asam.lv8testb.commpartners.com/products/nppa-24-hour-waiver-training-aapa>
- [16] Wu MJ, Zhao K, Fils-Aimé F. Response rates of online surveys in published research: A meta-analysis. *Computers in Human Behavior Reports*. 2022; 7: 100206. <https://doi.org/10.1016/j.chbr.2022.100206>
- [17] Shih TH, Fan X. Comparing response rates from web and mail surveys: A meta-analysis. *Field Methods*. 2008; 20(3): 249-271. <https://doi.org/10.1177/1525822X08317085>
- [18] Cook C, Heath F, Thompson RL. A meta-analysis of response rates in web- or internet-based surveys. *Educational and Psychological Measurement*. 2000; 60(6): 821-836. <https://doi.org/10.1177/00131640021970934>
- [19] Wirihana L, Welch A, Williamson M, et al. Using Colaizzi's method of data analysis to explore the experiences of nurse academics teaching on satellite campuses. *Nurse Researcher*. 2018; 25(4): 30-34. PMID:29546965 <https://doi.org/10.7748/nr.2018.e1516>
- [20] Puckett HM, Bossaller JS, Sheets LR. The impact of project ECHO on physician preparedness to treat opioid use disorder: A systematic review. *Addiction Science & Clinical Practice*. 2021; 16: 6. PMID:33482906 <https://doi.org/10.1186/s13722-021-00215-z>
- [21] Lutgen CB, Callen E, Robertson E, et al. Assessment of primary care team-based learning sessions for opioid use disorder. *The American journal on addictions*. 2020; 34(6): 631-642. PMID:40392592 <https://doi.org/10.1111/ajad.70050>