CASE STUDY

xuron

Education to Address Opioid Use Disorder in Practice:

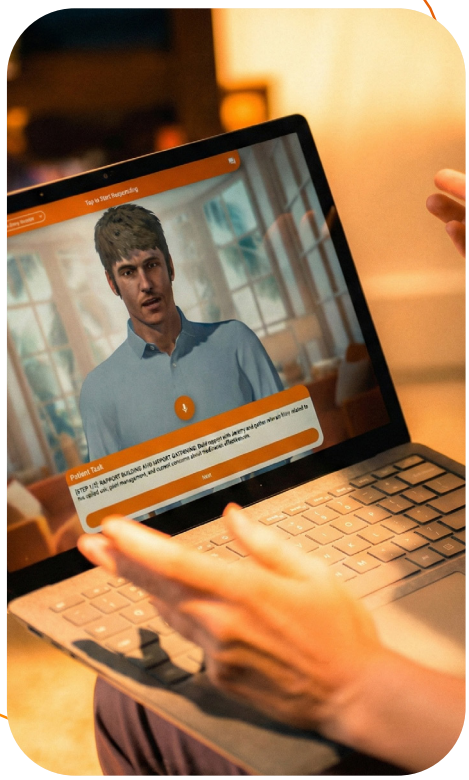
From Brief Intervention to Treatment with an AI Standardized Patient

VALIDATED + TRUSTED + VERSATILE +

RESPONSIBLE + REPEATABLE + OUTCOME-BASED

Modernizing Opioid Education with AI Virtual Patients

Knowing the guidelines is not the same as **using them with a real patient.**



Why This Topic (and Why Now)

The opioid epidemic remains one of the most urgent public health challenges in the United States. While the drivers of harm have evolved over time, clinicians remain central to prevention, early identification, and treatment of opioid use disorder (OUD). Expectations for prescriber competence have increased sharply, with federal and state requirements now mandating education in pain management, opioid prescribing, and OUD.

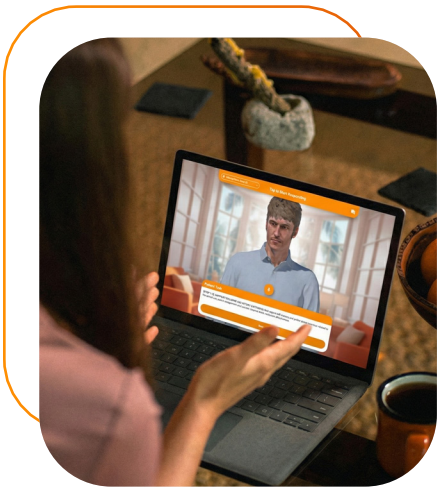
At the same time, many clinicians continue to report discomfort with the real-world conversations that matter most: screening for OUD, discussing a diagnosis, and offering evidence-based treatment. **Knowing the guidelines is not the same as using them with a real patient.**

Why Traditional Education Isn't Enough

Most opioid education relies on passive learning: reading materials, recorded lectures, and multiple-choice tests. These approaches are effective for delivering information but fall short when it comes to building confidence, communication skills, and clinical judgment.

Conversations about opioid use are often complex and emotionally charged. They require empathy, clarity, and shared decision-making. All are skills that are difficult to develop without practice. As a result, clinicians may complete required CME yet still feel unprepared when these situations arise in practice. **Education without practice leaves a critical gap.**

Why AI Virtual Patients (Now)



Recent advances in artificial intelligence have made it possible to close that gap. AI-powered virtual patients can engage clinicians in realistic, open-ended conversations that mirror real clinical encounters. Learners can ask questions, respond to patient concerns, and make decisions—then receive immediate, structured feedback on both clinical and communication skills.

This approach offers something traditional education cannot: a safe place to practice difficult conversations without risk to patients. It is scalable, consistent, and available on demand, making it especially well suited for national, REMS-aligned CME initiatives.

What This Case Study Contributes

This case study examines an AI-powered virtual patient simulation delivered as part of a four-part, REMS-aligned CME curriculum. The activity is designed to help clinicians move beyond knowledge acquisition and into practical application, with a focus on screening for OUD, diagnostic assessment, brief intervention, initiation of medication for OUD, and harm reduction planning.

By measuring changes in knowledge, confidence, simulated clinical performance, and learner-perceived value, this case study offers a practical look at how AI virtual patients can modernize opioid education and better prepare clinicians for real-world care.

How to Read the Rest of This Paper

1. **Methods & Learner Cohort**
   A concise overview of the REMS-aligned CME activity design, learner characteristics, and how the AI virtual patient simulation was structured. This section is most useful for readers looking to benchmark this program against other opioid education, CME initiatives, or skills-based training models.

2. **Results**
   A data-driven summary of changes in knowledge and confidence, along with performance inside the AI standardized patient encounter. This section highlights where learners improved most, where challenges persisted, and how effectively learners translated education into simulated clinical practice.

3. **Discussion**
   Interpretation of the findings in the context of national opioid education efforts, REMS requirements, and emerging evidence on AI-enabled simulation. This section explains what these results suggest about readiness for real-world OUD care and where AI virtual patients may add value beyond traditional CME.

4. **Conclusions & Implications**
   Key takeaways for educators, healthcare organizations, and partners considering AI-based simulation as part of opioid education. This section focuses on scalability, practical impact, and how this approach can help bridge the gap between knowledge and clinical action.

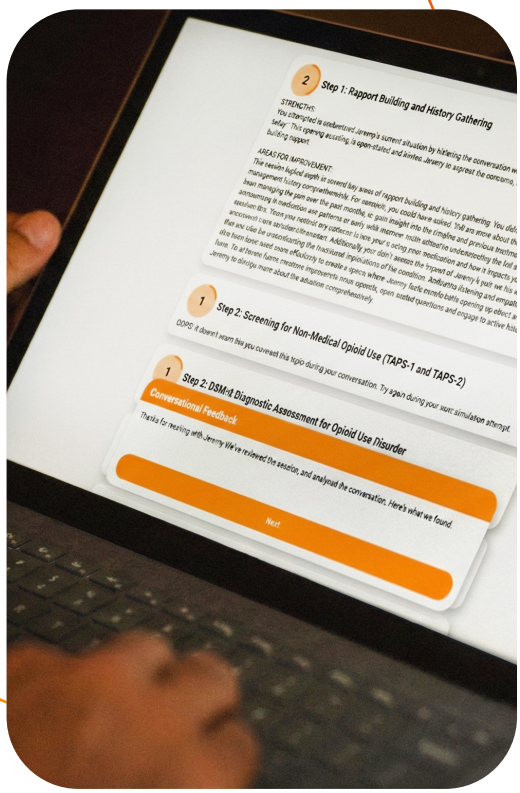
Education to Address Opioid Use Disorder in Practice: From Brief Intervention to Treatment with an AI Standardized Patient

Introduction

The United States has faced a persistent opioid overdose epidemic for more than two decades, resulting in hundreds of thousands of opioid-involved deaths since 1999 and tens of thousands of deaths annually in recent years.[1,2] Public health authorities commonly describe the epidemic as occurring in three overlapping waves: an initial rise associated with increased prescription opioid use in the late 1990s, followed by a surge in heroin-related deaths around 2010, and a third wave beginning in approximately 2013 driven by illicit fentanyl and other synthetic opioids.[2-4] Despite shifts in the primary drivers of overdose, prescription opioids and clinical pain management continue to play an important role in patient risk and prevention efforts.

Inadequate training of healthcare providers in pain management and addiction care has been identified as a contributing factor to the epidemic.[5-8] Historically, many clinicians received limited formal education in identifying opioid misuse, diagnosing opioid use disorder (OUD), or initiating evidence-based treatment. In response, prescriber education has expanded substantially through updated clinical guidance and federal training requirements focused on pain care, opioid prescribing, and OUD.[9-11]

A major federal effort in this area is the FDA's Opioid Analgesic Risk Evaluation and Mitigation Strategy (REMS), which requires opioid manufacturers to fund accredited CME activities aligned to an FDA-approved Blueprint covering safe prescribing, patient counseling, and recognition of misuse and OUD.[12-14] These REMS-aligned CME programs are designed to improve prescriber competence while maintaining independence from promotional influence through accredited continuing education providers.[12-14]



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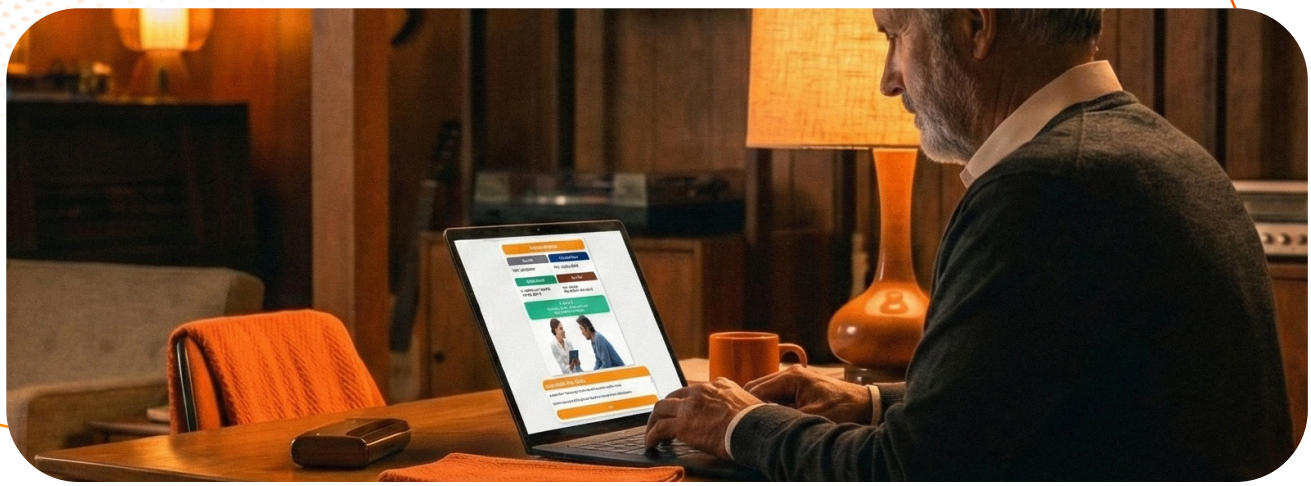


Advances in AI are enabling virtual patient simulations that let clinicians practice realistic clinical encounters without risk.[18-21]

While REMS and other educational initiatives have increased awareness and knowledge among large numbers of clinicians, their impact on real-world clinical behavior has been difficult to measure.[15-17] Traditional educational formats such as lectures, readings, and knowledge-based assessments, are effective for delivering information. However, they may be less effective for teaching communication skills, clinical judgment, and shared decision-making.[15-17] These skills are particularly critical in OUD care, where clinicians must navigate sensitive conversations about substance use, stigma, treatment readiness, and harm reduction.

Recent advances in artificial intelligence (AI), including large language model-enabled dialogue systems, have enabled **a new generation of virtual patient simulations that allow clinicians to practice realistic clinical encounters in a risk-free environment.**[18-21] AI-driven virtual patients engage in open-ended dialogue, respond dynamically to learner input, and provide immediate feedback on both clinical and communication skills.[21] Emerging evidence suggests that such simulations improve clinician performance in motivational interviewing and other brief-intervention skills relevant to substance use care.[22,23]

Real-world evaluations of AI-powered virtual patient simulations embedded within large, REMS-aligned CME curricula remain limited. This case study examines outcomes from an AI-driven standardized patient simulation delivered as part of a four-part REMS-aligned CME curriculum focused on safe opioid prescribing and opioid use disorder care. The activity was designed to support clinicians in translating education into practice, with emphasis on screening for OUD, diagnostic assessment, brief intervention, medication for opioid use disorder, and harm reduction planning.

1 Methods & Learner Cohort

Design and Participants

"OUD in Practice: From Brief Intervention to Treatment with an AI Standardized Patient" is a self-paced, internet-based CME/CE activity (0.5 credits) developed in partnership with **Pri-Med** and distributed through **pri-med.com**. The activity launched December 1, 2025 (expiration December 1, 2026) and is supported by an independent educational grant from the Opioid Analgesic REMS Program Companies. This report summarizes data from 390 learners who finished all required components between **December 1, 2025 and January 5, 2026.**

This activity represents **Part 4 of a four-part Safe and Effective Pain Care curriculum,** designed to address Opioid Analgesic REMS educational requirements and support clinicians across the continuum of pain management and opioid stewardship. The curriculum progresses from foundational principles of pain assessment and opioid prescribing, through risk mitigation and monitoring strategies, to applied skills for identifying OUD and engaging patients in evidence-based treatment. Part 4 focuses on translating these principles into clinical practice through an interactive, skills-based simulation emphasizing screening, diagnosis, brief intervention, and initiation of medication for opioid use disorder (MOUD).

Virtual Human: **Jeremy**

34-year-old warehouse supervisor presenting with chronic back pain, reporting his medication "isn't lasting the whole month."

The target learner audience included primary care clinicians (e.g., physicians, nurse practitioners, and physician associates).

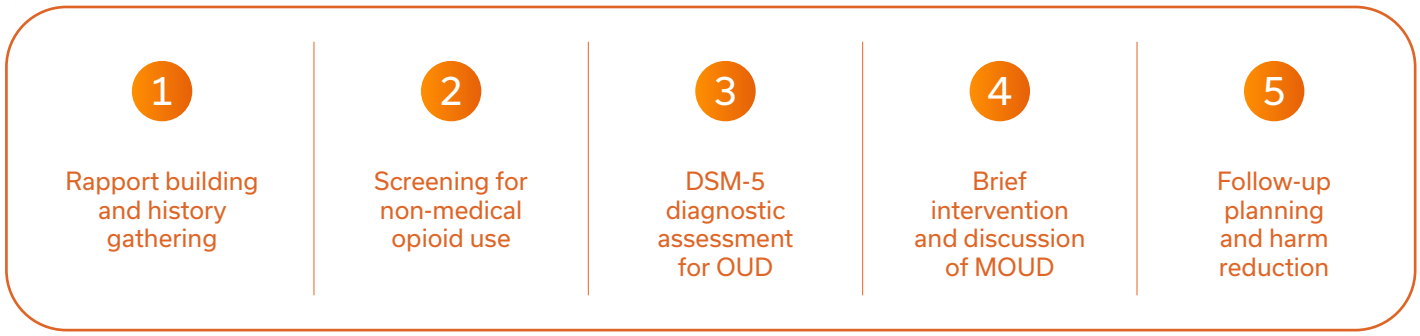
The activity followed a structured learning journey consisting of a baseline pre-test, brief didactic micro-learning, an AI-powered virtual patient simulation, and a post-test with automated feedback. In the simulation, learners interacted with **Jeremy Thompson,** a 34-year-old warehouse supervisor with employer-based commercial insurance, presenting for follow-up of chronic back pain and reporting that his opioid medication "isn't lasting the whole month anymore."

Structured Learning Journey

1. Baseline pre-test
2. Brief didactic micro-learning
3. AI virtual patient simulation
4. Post-test assessment
5. Automated feedback

The encounter consisted of five sequenced steps aligned 1:1 with learning objectives: (1) rapport building and history gathering, (2) screening for non-medical opioid use (TAPS-1 with required follow-up if positive), (3) DSM-5 diagnostic assessment for OUD, (4) brief intervention and discussion of MOUD using motivational interviewing principles, and (5) follow-up planning and harm reduction (including buprenorphine education and referral when warranted).

Step-by-step performance feedback was provided immediately after the simulation; the platform did not generate an overall encounter score.



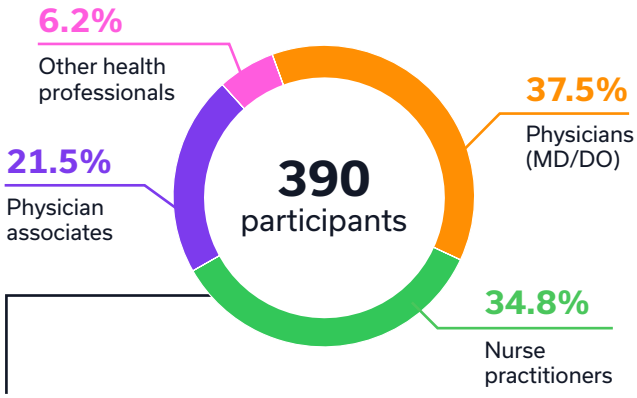
2 Results

Participants

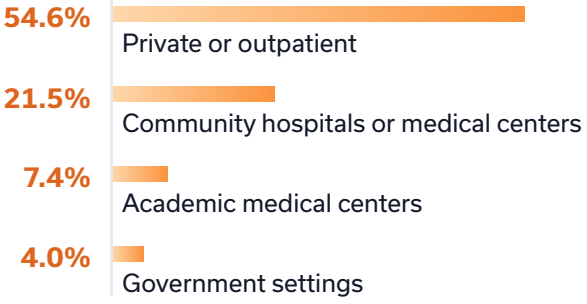
A total of **390 completed clinician learner sessions** were included in the analysis, with all participants completing both pre- and post-activity assessments.

Learners represented a broad range of clinical roles and settings. Professions included **physicians (MD/DO, 37.5%), nurse practitioners (34.8%), physician associates (21.5%), and other health professionals (6.2%).** More than half practiced in private or outpatient settings **(54.6%)**, followed by community hospitals or medical centers **(21.5%)**, academic medical centers **(7.4%),** and government settings **(4.0%)**. Experience levels were well distributed, with **36.8%** in practice for more than 20 years and **34.1%** practicing for 1–10 years.

Baseline exposure to OUD varied. Nearly **40% reported that seeing patients with potential substance use concerns was not applicable** to their practice, and **59% reported never or rarely screening** for OUD prior to participation.



Facility/practices

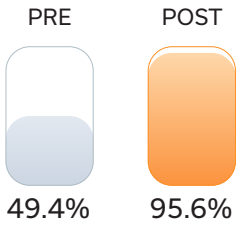


Experience levels

Knowledge Outcomes

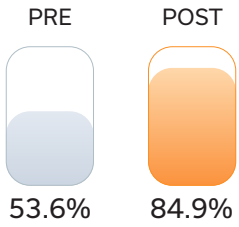
Knowledge improved across all three pre-/post-activity questions. When combined, the **overall knowledge score increased from 58.4% before the activity to 90.7% after,** representing an **absolute improvement of 32.3%.**

Identifying the correct screening tool (TAPS-1):



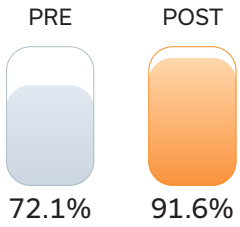
↑ +46.2%

Recognizing DSM-5 criteria for mild OUD (≥2 criteria):



↑ +31.3%

Choosing the appropriate next clinical step:*



↑ +19.5%

*(Motivational interviewing with same-day treatment):

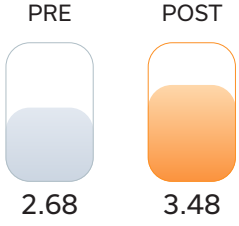
Confidence Outcomes

Mean confidence (1-5 scale)

Learners reported higher confidence across all three skill areas. When averaged together, **overall confidence increased from 2.66 to 3.60, a +0.94 increase,** corresponding to an **absolute increase of 18.8% of the full confidence scale.**

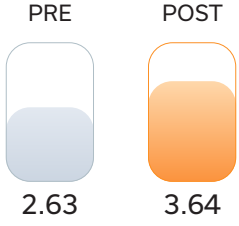
Item level changes were:

Screening for OUD:



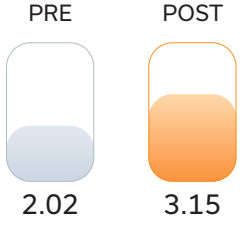
↑ +0.80 (+16.0%)

Diagnosing OUD using DSM-5 criteria:



↑ +1.01 (+20.2%)

Offering same-day buprenorphine treatment:



↑ +1.13 (+22.6%)

Very/extremely comfortable (scale 4-5)

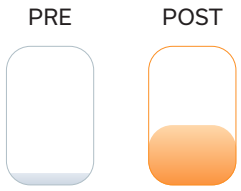
At baseline, only **8.0%** of learners rated themselves as **Very or Extremely confident** across the three skills. After completing the activity, this increased to **37.1%,** an **absolute increase of 29.1%.**

Item-level increases in high confidence were:

Screening for OUD:

↑ +24.9%

Diagnosing OUD using DSM-5 criteria:



↑ +33.8

Offering same-day buprenorphine treatment:

↑ +24.9

Simulation Performance

Performance varied across the five steps of the AI standardized patient encounter. The **average score across all steps was 2.8 out of 5.**

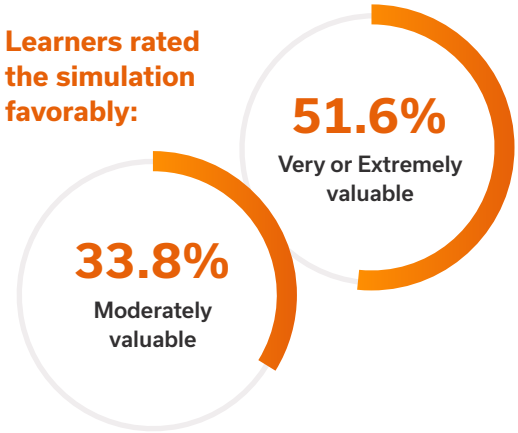
Simulation Step Performance Scores	Avg. Score: 2.8/5
Step 1 - Rapport building & history gathering	3.3
Step 2 - Screening for non-medical opioid use	3.3
Step 3 - DSM-5 diagnostic assessment	4.5
Step 4 - Brief intervention & MOUD discussion	2.7
Step 5 - Treatment planning & harm reduction	2.0

Step:	Key Strengths Observed	Common Gaps Identified
Step 1: Rapport & history	Learners reliably initiated visits with a clear purpose, used respectful language, and gathered core clinical information. Many acknowledged the patient's pain and functional limitations related to work and daily life.	Rapport was often task-focused rather than relational. Emotional cues and early refill concerns were frequently identified but not explored in depth, limiting early trust-building.
Step 2: Screening	Most learners recognized the importance of screening and attempted to use validated tools such as TAPS. Transitions from general history to screening were generally smooth.	Screening questions were often introduced without normalization, making them feel abrupt. Learners frequently paraphrased questions imprecisely, omitting key timeframes required for accuracy.
Step 3: Diagnosis	This was the strongest step. Learners effectively translated DSM-5 criteria into understandable language and framed OUD as a medical condition rather than a personal failing.	Many learners failed to exclude tolerance and withdrawal when appropriate or to clearly summarize the diagnosis and severity back to the patient.
Step 4: Treatment discussion	Most learners correctly identified buprenorphine as the standard of care and acknowledged its dual role in addressing pain and OUD.	Conversations often became instructional rather than collaborative. Learners struggled to address fears about "replacing one addiction with another" and rarely used motivational interviewing techniques to explore readiness or goals.
Step 5: Follow-up & safety	Learners who completed this step communicated next steps such as prescriptions and return visits. There was general awareness that treatment extends beyond medication alone.	Buprenorphine education, safe storage, and disposal were frequently omitted. Follow-up plans were often vague, and time management challenges prevented many learners from reaching this step.

Perceived Value and Behavioral Intent

Learners rated the simulation favorably compared with other educational approaches. **51.6%** rated it as **Very or Extremely valuable,** and an additional **33.8%** rated it as **Moderately valuable.**

After completing the simulation, **35.6%** of learners reported they were **Likely or Very likely** to offer same-day buprenorphine treatment in their practice.



Learner Sentiment Analysis

A total of **349 written comments** were analyzed. Most learners expressed positive views, emphasizing **realism, engagement,** and the **opportunity to practice** challenging conversations in a low-risk environment. Negative feedback represented a smaller share and focused primarily on technical issues, time burden, or personal preference for traditional learning formats.

Tone	What Learners Emphasize	Sample Learner Feedback (anonymized)
POSITIVE **62.5%**	Realistic practice + immediate feedback:	"I TRULY BELIEVE THIS IS IMPRESSIVE AND A TOOL LIKE THIS SHOULD BE USED MORE OFTEN"
	Real-time guidance	"It was valuable to receive feedback in real time."
	Evaluation quality	"The feedback and evaluation is very useful... immediate feedback on your thinking. Good experience."
	Engagement	"This was fun and non-judgmental. Thanks."
	Novelty + attention	"Lots of fun and [a] novel way to interact."
	Believability	"I'm impressed! The responses are surprisingly life-like."
	Better than passive learning	"Helpful, more so than just reading words on a screen."
	Transfer to real life	"Real-life experience. The feedback is really helpful."
NEUTRAL **24.4%**	Useful after learning curve	"Effective, once I got the hang of it."
	Mixed but acceptable	"Weird, but fine."
NEGATIVE **13.2%**	Realism constraints	"It is artificial, and harder to slip into a 'real scenario."
	Performance friction	"Some lag in response time was unlike natural conversation"

3 Discussion

This case study shows that an AI-powered virtual patient helps clinicians improve what they know, feel more confident, and practice real-world skills related to OUD. These findings are especially relevant given long-standing gaps in clinician training and the growing emphasis on structured, accredited opioid education through mechanisms such as the FDA REMS program.[5-8, 12-14]

Knowledge and Confidence Improve Together

After completing the activity, learners showed strong overall improvement in knowledge. When all knowledge questions were combined, correct responses increased from 58.4% before the activity to 90.7% after, an absolute increase of 32.3%. This indicates that learners gained a clearer understanding of how to screen for OUD, diagnose it, and choose appropriate next steps in care—areas that have historically received limited emphasis in formal training.[5,6,8]

Confidence Increased in Parallel with Knowledge

When averaged across all three confidence questions, mean confidence rose from 2.66 to 3.60 on a 5-point scale, a +0.94 increase, representing an 18.8% gain across the full confidence scale. This pattern is consistent with prior evidence that interactive, **practice-oriented education is more likely than didactic-only approaches to improve clinician confidence and performance.**[15,16]

Looking specifically at high confidence, the percentage of learners who rated themselves as Very or Extremely confident across all skills increased from 8.0% before the activity to 37.1% after, an absolute increase of 29.1%. This shift is notable given that lack of confidence and perceived barriers to prescribing medications for opioid use disorder—particularly buprenorphine—have been repeatedly identified as obstacles to expanding access to care.[7,24]

Learners gained a clearer understanding of how to screen for OUD, diagnose it, and choose appropriate next steps in care—**areas that have historically received limited emphasis in formal training.**

What Learners Were Able to do in the Simulation

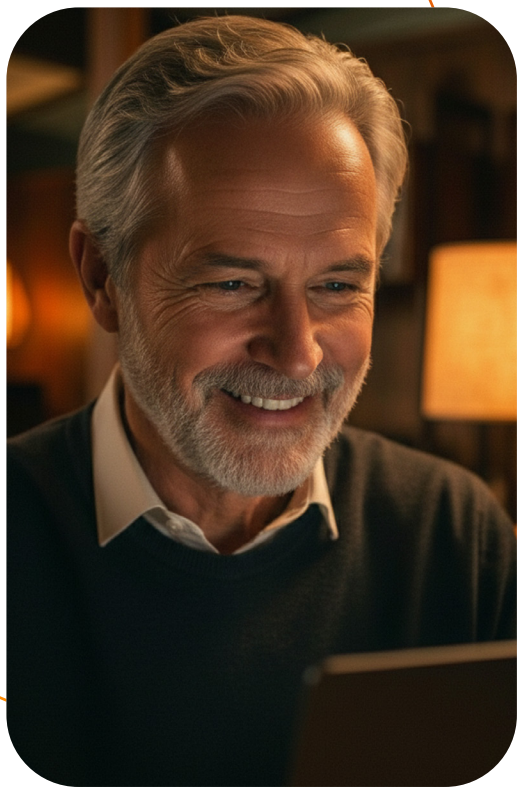
The simulation made it possible to observe how learners applied knowledge and confidence during a realistic patient conversation. This outcome is often challenging to capture with traditional CME assessment approaches.[15-17]

Overall performance across all steps averaged 2.8 out of 5, with clear differences depending on the type of task. **Learners performed best when the task was structured and rule-based, such as diagnosing OUD using DSM-5 criteria.** This aligns with broader findings from virtual patient research suggesting stronger effects on structured clinical reasoning tasks than on higher-variance communication behaviors.[19,20]

Performance was moderate during earlier steps such as rapport building and screening. **Learners generally asked appropriate questions and used non-stigmatizing language but often focused more on completing required elements than on deeper relationship-building.** Similar patterns have been described in simulation-based substance use education, where learners demonstrate procedural completeness while showing variable consistency in patient-centered communication.[22,23]

The greatest challenges appeared in later steps that required more complex communication and judgment. These included discussing treatment options, addressing fears about medication, and creating clear follow-up and safety plans. Prior evidence suggests these skills are difficult to develop through lecture-only formats and benefit from repeated practice with feedback, particularly for motivational interviewing and brief intervention techniques.[15,16,22]

In simple terms, **learners did well when there was a clear right answer.** They found it harder when conversations required flexibility, shared decision-making, and time management. This helps explain why confidence improved overall while some practical skills still showed room for growth . This also highlights where repeated practice and feedback may offer the greatest benefit.



Confidence improved overall while some practical skills still show room for growth.

Learners rated the simulation favorably:

51.6%
Very or Extremely valuable

33.8%
Moderately valuable

35.6%
of learners reported they were **Likely or Very likely** to offer same-day buprenorphine treatment in their practice.

Knowledge alone is often insufficient to change practice.

How Learners Viewed the Experience

Most learners viewed the simulation positively. **Over half (51.6%) rated it as Very or Extremely valuable,** and another 33.8% rated it as Moderately valuable compared with other learning methods. After completing the activity, 35.6% reported being Likely or Very likely to offer same-day buprenorphine treatment, suggesting potential impact on clinical intent.

Written Feedback Supported These Findings

Most comments were positive (62.5%), emphasizing the realism of the virtual patient, the opportunity to practice difficult conversations, and the value of immediate feedback. These themes mirror prior findings from virtual patient and virtual standardized patient training, where learners often report high perceived relevance and engagement with practice-based formats.[19,22]

Negative feedback was less common (13.2%) and focused mainly on technical issues, time commitment, or a preference for traditional lectures. Neutral comments (24.4%) often reflected uncertainty from first-time users who were unfamiliar with this type of learning, This is an expected response noted in the virtual patient literature, where usability and learner comfort with the modality influence perceived value.[19]

Interpreting These Results in Context

These findings should be interpreted in light of two broader trends. First, **clinician education has become a central pillar of the national response to the opioid epidemic** through updated clinical guidance, REMS-aligned accredited education, and federal training requirements such as the MATE Act.[9-14] Second, there is **growing recognition that knowledge alone is often insufficient to change practice**, particularly in areas that require complex communication and judgment.[15-17]

Within this context, the results of this case study suggest that **AI-based simulation complements existing opioid education by providing what traditional CME often lacks:** a safe, scalable way to practice real conversations and receive feedback. While no single educational intervention addresses the opioid crisis on its own, tools that improve readiness, confidence, and applied skills may help close persistent gaps between guidelines and real-world care.

In short, these findings suggest that AI-based simulation improves overall knowledge, increases confidence, and gives clinicians a practical way to rehearse difficult conversations, supporting safer, more effective care in one of the most complex and high-risk areas of modern medicine.

4 Conclusions & Implications

This case study shows that an AI-powered virtual patient simulation can meaningfully support clinician learning in OUD care. After completing the activity, learners demonstrated strong overall gains in knowledge, higher confidence across key skills, and the ability to apply what they learned during a realistic patient encounter.

The simulation helped learners move beyond understanding concepts to practicing real conversations, including screening, diagnosis, treatment discussion, and follow-up planning. Performance data highlighted clear strengths, such as applying diagnostic criteria, as well as important gaps in areas like motivational interviewing, medication counseling, and harm reduction. These insights are valuable because they show not only what learners know, but how they use that knowledge when it matters most.

Learner feedback further supports the value of this approach. Most participants found the experience engaging and useful, particularly for practicing difficult conversations in a safe, low-risk environment. While some learners reported technical challenges or a preference for traditional formats, these concerns were outweighed by strong overall engagement and positive sentiment. This is especially notable given that this technology is new for many users.

Taken together, these findings suggest that AI-based simulation is a promising and scalable way to improve clinician readiness for complex, high-risk care scenarios like OUD. This bridges the gap between continuing education and real-world practice while providing actionable insights for continuous improvement.

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Boris Rozendfeld, MD
Chief Learning Officer at Xuron

Boris has over 11 years of experience in medical education and currently serves as Chief Learning Officer at Xuron, specializing in AI-powered conversational simulations for teaching interpersonal, communication, and clinical reasoning skills.

Ian Nott
CEO of Xuron

Ian has leveraged nearly a decade of experience in spatial computing and software development to lead innovations in AI-powered virtual human simulations formedical training.

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