

# Impact of an Educational Intervention on Hospital Pharmacists' Knowledge and Application of Substance Withdrawal Management

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## ABSTRACT

**BACKGROUND:** Patients with substance use disorders are often encountered in an acute care setting and withdrawal management is important. Available literature reveals inadequate acute management of substance withdrawal due to lack of experience and knowledge of medications.

**METHODS:** A quality improvement project was implemented to improve hospital pharmacists' knowledge, application, and practice of inpatient opioid and alcohol withdrawal management through provision of didactic and case-based education and implementation of practice based prospective drug utilization review (PDUR). Pharmacists' knowledge of the management of alcohol and opioid withdrawal was assessed by a 10-item survey pre-and post-intervention.

**RESULTS:** Twenty-one pharmacists completed the education and pre- and post-surveys. Scores for the 21 pharmacists improved significantly, with pre- and post-intervention scores of  $7.33 \pm 1.98$  and  $8.86 \pm 0.91$ , respectively ( $P = .0035$ ). Most pharmacists completed their required PDUR submission, and several pharmacist interventions were made and accepted post-education. Pharmacists indicated that the education increased their confidence and enabled them to learn new information that could be directly applied to their pharmacy practice.

**CONCLUSION:** Providing education and requiring a PDUR improved pharmacists' knowledge, application, and practice of inpatient opioid and alcohol withdrawal management. Re-education or expanded education may be warranted to further increase pharmacists' competence.

**KEYWORDS:** Pharmacist education, pharmacist knowledge, substance withdrawal management, prospective drug utilization review

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## Background

Alcohol use disorder (AUD) and opioid use disorder (OUD) are both substance use disorders defined by The Diagnostic and Statistical Manual of Mental Disorders (DSM-5).<sup>1</sup> According to the 2021 U.S. Department of Health and Human Services (HHS) Substance Abuse and Mental Health Services Administration (SAMHSA) National Survey on Drug Use and Health, 46.3 million people (16.5% of the population) had a substance use disorder (SUD) in the past year.<sup>2</sup> Patients with substance use disorders are often encountered in an acute care setting and withdrawal management is important.<sup>3</sup> Available literature reveals inadequate acute management of substance withdrawal due to lack of experience and knowledge of medications. For example, a cross-sectional study of general internists revealed that the majority did not feel prepared to screen, diagnose, refer to treatment, or discuss treatment options with patients with substance use disorders.<sup>4</sup> In another cross-sectional study of internal medicine residents, 74% reported no

formal buprenorphine prescribing training with limited knowledge of OUD being the most significant barrier.<sup>5</sup> Furthermore, a mixed-methods study of emergency medicine physicians, resident physicians, and advanced practice clinicians showed that only 20.9% indicated their readiness to initiating buprenorphine for OUD treatment in the emergency department as a 7 or more on a visual analog scale of 0–10.<sup>6</sup> The barriers identified by these providers included lack of formal training, absence of protocols, and minimal knowledge of local treatment resources.<sup>6</sup> Prescribers of AUD medications report similar barriers including lack of confidence, optimism, and knowledge.<sup>7</sup> Pharmacists' knowledge about medication use and safety make them well-positioned to assist in the management of SUD.<sup>8</sup> However, it has been shown that pharmacists without specialized psychiatric training experience barriers to providing such patient care, due to lack of knowledge about psychiatric disorders, lack of training with patients with psychiatric disorders, and lack of coordination of care with prescribers.<sup>9</sup>



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Pharmacists are expected to demonstrate knowledge and skills to provide person-centered care and optimize the medication-use process.<sup>10,11</sup> At Jersey City Medical Center (JCMC), a 348-bed, not-for-profit, urban teaching hospital, both Pharmacy Specialists and Pharmacy Generalists are responsible for the preparation, dispensing, and monitoring of prescribing and effectiveness of pharmacotherapy. They conduct prospective drug utilization reviews (PDURs) and evaluate a patient's medication record and prescription orders prior to medication dispensing. The site's Pharmacy Specialists are further responsible for the provision of pharmaceutical care and clinical pharmacy services within their assigned specialty area (eg, critical care, infectious diseases, internal medicine, and psychiatric pharmacy) through attending medical rounds and developing comprehensive clinical services. The hospital does not have a "detox unit" or specialized SUD program.

A gap in care related to alcohol and opioid withdrawal management was identified through assessment of mandatory and voluntary medication-safety reporting at the institution. Adverse medication-related events and errors, such as over-sedation, and increased length of hospital stay, discharge against medical advice, poor regulatory compliance, erroneous withdrawal assessments, and improper medication administration have occurred. Various phases in the medication use process (ordering/prescribing, documenting, verifying, dispensing, administering, and monitoring) have been implicated in these events. Analyzing these medication safety trends identified knowledge gaps and areas where pharmacists could improve their knowledge and skills related to substance withdrawal management. Pharmacy educational outcomes and standards and continuing pharmacy education standards recommend designing programs that address knowledge gaps and allow for knowledge attainment, skills application, and continuing assessment.<sup>10-13</sup> Therefore, this quality improvement project was designed to improve pharmacists' knowledge, application, and practice of inpatient opioid and alcohol withdrawal management through provision of education and implementation of PDUR.

## Methods

This was a single-center, IRB-reviewed, quality improvement project from December 2021 through April 2022. The objectives of the project were to improve pharmacists' knowledge and application of inpatient opioid and alcohol withdrawal management through delivery of an educational intervention and implementation of practice-based PDUR. Pharmacists' knowledge of the management of alcohol and opioid withdrawal was assessed by survey (Appendix) pre- and post-intervention. Educational content was developed and provided to all full-time practicing pharmacists by the site's Postgraduate Year 1 (PGY1) Pharmacy Resident. The educational materials reviewed diagnosis, assessment, pharmacotherapy management, site-specific policies, and incorporated interactive case-based application questions. Several small group, 30-minute sessions were held during December 2021 to train the pharmacists. The 10-item survey was

administered immediately before and after the education and contained questions about the site's Clinical Institute Withdrawal Assessment for Alcohol (CIWA) policy, Opioid Withdrawal Management (OWM) policy, drug-drug interactions, CIWA labs and assessment, Clinical Opiate Withdrawal Scale (COWS) labs and assessment, and general labs and assessment. Resources were not permitted to be used while pharmacists were answering the survey and all responses were anonymous.

Additionally, a practice-based PDUR requirement for diazepam, lorazepam, buprenorphine, and/or methadone inpatient medication order verification was implemented. Pharmacists were educated on how to evaluate a patient's drug therapy before verification of these medication orders and were provided guidance documents for future reference. A guidance document was provided for each medication; an example for methadone is given in Figure 1. Pharmacists were advised to review the patient's chart to collect and assess pertinent data (eg, labs and assessment) to ensure safe and appropriate use of the ordered medication(s). For example, the pharmacists were instructed to review the patient's COWS score to determine withdrawal status before verifying buprenorphine or methadone for use in opioid withdrawal. Each Pharmacy Generalist was required to perform and document at least 1 PDUR. Periodic audits were conducted by the Pharmacy Resident to ensure compliance. Beyond the PDUR requirement, pharmacists were expected to apply the knowledge learned during routine medication order verification, identify relevant problems in the medication use process, contact the provider to intervene (if applicable), and document intervention activities in the electronic medical record.

The primary endpoint was the change in pharmacist knowledge. Mean ( $\pm$  SD) pre- and post-survey scores were compared with a paired Student's *t* test to measure knowledge attainment. Pre- and post-intervention survey questions were also compared both individually and within assessment categories using a Chi square or Fisher exact test. The secondary endpoints were to quantify completion of PDUR activity, pharmacist interventions, and pharmacist perception of impact of the education. To capture pharmacist interventions for relevant medications, the Pharmacy Resident checked for pharmacist documentation notes in electronic medical records for a sample of patients admitted to the hospital pre- and post-intervention. Pharmacist information, demographics, pre- and post-survey responses, and perceptions were collected using online survey software (Qualtrics™, Provo, UT). A *P*-value less than .05 was considered statistically significant.

## Results

In December 2021 there were 21 full-time inpatient pharmacists practicing at the institution. All 21 pharmacists (14 Pharmacy Generalists and 7 Pharmacy Specialists) completed the educational intervention and pre- and post-intervention surveys, representing a 100% response rate. Pharmacist demographics are reported in Table 1. Overall, 13 (62%) graduated

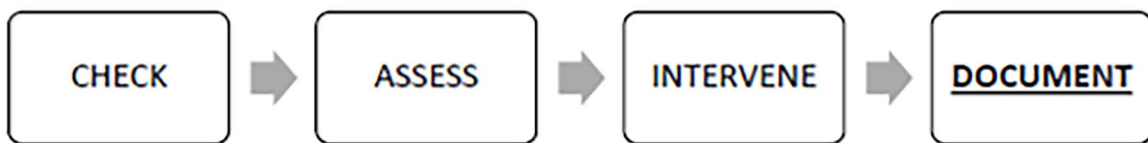
## **Pharmacy Phacts**

An Informational Service provided by the Pharmacy Department of Jersey City Medical Center  
Created by PGY-1 Pharmacy Resident

### Prospective Drug Utilization Review on Substance Use Withdrawals

**Background:** Optimization of substance use withdrawal management in patients is not met, leading to medication errors and compromised patient safety. Pharmacists are positioned to reduce medication errors through clinical assessments and direct communication with providers.

**Prospective Drug Utilization (PDUR):** Pharmacists will be expected to evaluate a patient’s planned drug therapy to ensure appropriate, safe, and effective use for lorazepam, diazepam, buprenorphine, and methadone. Documentation in Medication Manager as a pharmacy intervention is required.



**TIP:** Assess orders based on length of stay and typical withdrawal timeline for ETOH (last box) and acute opioid withdrawal(not in MAT boxes)

#### **Methadone – Enrolled in Medication-Assisted Treatment (MAT) Program**

1. Check and assess COWS score(s)
2. Check vitals, LFTs, EKG, drug-drug interactions (CYP and concomitant opioids)
3. Confirm inpatient treatment provider called methadone program to verify the following information:
  - a. Patient is active in program
  - b. Current dose and last time patient received methadone
  - c. Document clinic name, address, and contact phone number
4. Document in Medication Manager as Pharmacy Intervention

#### **Methadone – **\*\*NOT\*\*** Enrolled in MAT Program**

1. Check urine toxicology screen, vitals, LFTs, drug-drug interactions (CYP and concomitant opioids)
2. Check baseline EKG if ordering methadone
  - a. If not ordered, contact provider to order a baseline EKG
3. Patient is a candidate for MAT program if they meet the following criteria:
  - a. Clear documentation/suspicion of current heroin/opioid use **AND**
  - b. Clinically in opioid withdrawal with COWS score  $\geq 8$  **AND**
  - c. Admitted for a primary medical or surgical conditions and opioid withdrawal is **NOT** the primary reason for admission
4. Document in Medication Manager as Pharmacy Intervention

**Figure 1.** Example of prospective drug utilization review (PDUR) guidance document for methadone.

from pharmacy school in 2010 or later, and the 21 pharmacists had a mean ( $\pm$  SD) of  $9.5 \pm 9.6$  years of hospital pharmacy practice experience. Compared to the Pharmacy Generalists, significantly more Pharmacy Specialists had completed PGY1 Pharmacy Residency training (28.6% vs 85.7%, respectively,  $P = .024$ ). No other comparisons were significant.

The number of correct pre- and post-intervention survey responses are given in Table 2. Overall, scores for the 21 pharmacists improved significantly, with pre- and post-intervention mean ( $\pm$  SD) scores of  $7.33 \pm 1.98$  and  $8.86 \pm 0.91$ , respectively ( $P = .0035$ ). Performance for the 14 Pharmacy Generalists also improved significantly, with scores of  $6.93 \pm 2.30$  and



**Table 1.** Demographic characteristics of the 21 survey respondents.

CATEGORY	TOTAL (N=21)	PHARMACY GENERALISTS (N=14)	PHARMACY SPECIALISTS (N=7)	P VALUE
Year of pharmacy school graduation [no. (%)]				
1980-1999	3 (14)	3 (21.4)	0	NS*
2000-2009	5 (24)	2 (14.3)	3 (42.9)	NS*
2010 or later	13 (62)	9 (64.3)	4 (57.1)	NS*
Years of hospital pharmacy practice experience (Mean ± SD)	9.5 ± 9.6	10 ± 11.5	9 ± 4.3	NS**
PGY1 pharmacy residency training [no. (%)]				
Yes	10 (48)	4 (28.6)	6 (85.7)	.024*
No	11 (52)	10 (71.4)	1 (14.3)	
PGY2 pharmacy residency training [no. (%)]				
Yes	1 (5)	0 (0)	1 (14.3)	NS*
No	20 (95)	14 (100)	6 (85.7)	

Abbreviations: PGY1, Postgraduate Year 1; PGY2, Postgraduate Year 2; SD, standard deviation.

\*Fisher's exact test comparing Pharmacy Generalists and Pharmacy Specialists.

\*\*Paired Student's *t*-test comparing Pharmacy Generalists and Pharmacy Specialists.

**Table 2.** A comparison of pre- and post-intervention survey results (correct responses) in 7 Pharmacy Specialists and 14 Pharmacy Generalists.

COHORT	PRE (MEAN ± SD)	POST (MEAN ± SD)	P VALUE*
Pharmacy specialists (n=14)	8.14 ± 0.69	8.71 ± 0.95	NS*
Pharmacy generalists (n=7)	6.93 ± 2.30	8.93 ± 0.92	.007*
	NS**	NS**	
Total (n=21)	7.33 ± 1.98	8.86 ± 0.91	.0035*

Abbreviation: NS, not significant.

\*Paired Student's *t*-test (pre- vs post-test).

\*\*Unpaired Student's *t*-test (Specialists vs Generalists).

8.93 ± 0.92, respectively, on the pre- and post-intervention surveys ( $P=.007$ ). There was no significant difference in the pre- and post-intervention scores for the 7 Pharmacy Specialists.

A pre- and post-intervention comparison of individual survey questions, and knowledge categories, is given in Table 3 and Figure 2. Pharmacy Generalist knowledge about CIWA Policies (Questions 1 and 2) improved significantly, as the number of correct responses increased from 19 to 26 on the respective pre- and post-intervention surveys ( $P=.04$ ). Knowledge about CIWA Labs and Assessment (Questions 6 and 7) increased significantly among both Pharmacy Generalists and Pharmacy Specialists ( $P=.005$ ). The number of Pharmacy Generalists who correctly answered Question 7 (If a CIWA score remains  $<8 \times$  \_\_\_ hours, the CIWA assessment can be discontinued. Pharmacy can recommend to discontinue the CIWA assessment.) improved from 7 to 13 on the respective pre- and post-intervention surveys ( $P=.033$ ), while the number of Pharmacy Specialists who correctly answered Question 7 improved from 0 to 5, respectively

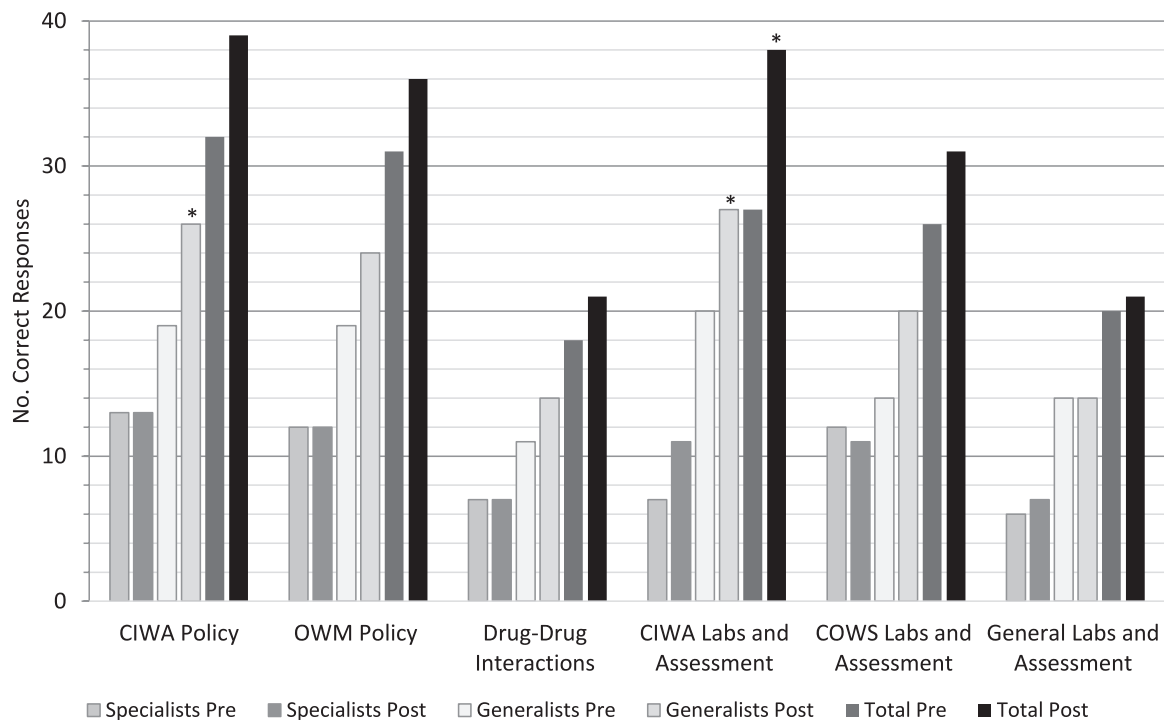
( $P=.01$ ). The number of Pharmacy Generalists who collectively answered both CIWA Labs and Assessment category questions correctly also improved significantly, with respective pre- and post-intervention totals of 20 and 27 ( $P=.025$ ). No other differences were significant.

Pharmacists' perceptions on the impact of the educational program are presented in Table 4. Approximately 95% "somewhat-strongly agreed" that the education increased their confidence and enabled them to learn information that could be directly applied to their pharmacy practice. Additionally, 11 (78.6%) Pharmacy Generalists completed their required PDUR submission; most were for methadone or lorazepam orders. Some PDURs helped the pharmacist to identify potential problems. For example, upon receipt of a methadone order the pharmacist assessed the medication indication, the patient's COWS score, and other relevant patient data. The pharmacist determined the patient was not receiving maintenance methadone as part of a medication assisted treatment program nor was the patient exhibiting symptoms of opioid

**Table 3.** A comparison of individual pre- and post-educational intervention survey responses in 7 Pharmacy Specialists and 14 Pharmacy Generalists.

QUESTION	TOTAL			PHARMACY SPECIALISTS			PHARMACY GENERALISTS		
	PRE [NO. (%) CORRECT]	POST [NO. (%) CORRECT]	P VALUE	PRE [NO. (%) CORRECT]	POST [NO. (%) CORRECT]	P VALUE	PRE [NO. (%) CORRECT]	POST [NO. (%) CORRECT]	P VALUE
CIWA policy									
Question 1	18 (85.7)	21 (100)	NS*	7 (100)	7 (100)	NS*	11 (78.6)	14 (100)	NS*
Question 2	14 (66.7)	18 (85.7)	NS*	6 (85.7)	6 (85.7)	NS*	8 (57.1)	12 (85.7)	NS*
Subtotal	32 (76.2)	39 (92.9)	NS*	13 (92.9)	13 (92.9)	NS*	19 (67.9)	26 (92.9)	.04*
OWM policy									
Question 3	16 (76.2)	18 (85.7)	NS*	6 (85.7)	7 (100)	NS*	10 (71.4)	11 (78.6)	NS*
Question 4	15 (71.4)	18 (85.7)	NS*	6 (85.7)	5 (71.4)	NS*	9 (64.3)	13 (92.9)	NS*
Subtotal	31 (73.8)	36 (85.7)	NS*	12 (85.7)	12 (85.7)	NS*	19 (67.9)	24 (85.7)	NS*
Drug-drug interactions									
Question 5	18 (85.7)	21 (100)	NS*	7 (100)	7 (100)	NS*	11 (78.6)	14 (100)	NS*
CIWA labs and assessment									
Question 6	20 (95.2)	20 (95.2)	NS*	7 (100)	6 (85.7)	NS*	13 (92.9)	14 (100)	NS*
Question 7	7 (33.3)	18 (85.7)	.0013*	0	5 (71.4)	.01*	7 (50)	13 (92.9)	.033*
Subtotal	27 (64.3)	38 (90.5)	.005*	7 (50)	11 (78.6)	NS*	20 (71.4)	27 (96.4)	.025*
COWS labs and assessment									
Question 8	14 (66.7)	16 (76.2)	NS*	7 (100)	6 (85.7)	NS*	7 (50)	10 (71.4)	NS*
Question 9	12 (57.1)	15 (71.4)	NS*	5 (71.4)	5 (71.4)	NS*	7 (50)	10 (71.4)	NS*
Subtotal	26 (61.9)	31 (73.8)	NS*	12 (85.7)	11 (78.6)	NS*	14 (50)	20 (71.4)	NS*
General labs and assessment									
Question 10	20 (95.2)	21 (100)	NS*	6 (85.7)	7 (100)	NS*	14 (100)	14 (100)	NS*

Abbreviations: CIWA, Clinical Institute Withdrawal Assessment for Alcohol; COWS, Clinical Opiate Withdrawal Scale; NS, not significant; OWM, Opioid Withdrawal Management Policy.  
\*Fisher's exact test.



**Figure 2.** Pre- and post-intervention comparison of knowledge categories in the 21 survey respondents.

Abbreviations: CIWA, Clinical Institute Withdrawal Assessment for Alcohol; COWS, Clinical Opiate Withdrawal Scale; OWM, Opioid Withdrawal Management Policy. \* $P < .05$  (Fisher's exact test).

**Table 4.** Satisfaction with the educational intervention among the 14 Pharmacy Generalists and 7 Pharmacy Specialists.

QUESTION	RESPONSE	PHARMACY GENERALISTS [NO. (%)]	PHARMACY SPECIALISTS [NO. (%)]
This education has increased my confidence level for providing care to patients with substance use withdrawal.	Strongly agree	10 (71.4)	6 (85.7)
	Somewhat agree	3 (21.4)	1 (14.3)
	Neither agree nor disagree	1 (7.1)	0
	Somewhat disagree	0	0
	Strongly disagree	0	0
I learned something from this education session that I can directly apply to my clinical setting.	Strongly agree	10 (71.4)	7 (100)
	Somewhat agree	3 (21.4)	0
	Neither agree nor disagree	1 (7.1)	0
	Somewhat disagree	0	0
	Strongly disagree	0	0

withdrawal based on the COWS score. The pharmacist intervened and advised the provider to discontinue the methadone order. In another PDUR submission, upon receipt of a lorazepam order from the site's alcohol withdrawal order set, the pharmacist identified omission of a CIWA score and an outdated alcohol use social history. The pharmacist advised the provider to discontinue the alcohol withdrawal order set and clarify alcohol use history with the patient. In addition to these required PDUR submissions, pharmacist interventions made for relevant medications pre- and post-education are quantified in Table 5.

## Discussion

The authors hoped that a didactic and case-based educational intervention focused on alcohol and opioid withdrawal management would improve pharmacists' knowledge and ability to complete a PDUR for associated medications; thereby, improving medication safety at order verification. The 10-item survey results showed a significant increase in hospital pharmacists' knowledge of the inpatient management of opioid and alcohol withdrawal, likely driven by the improvement in Pharmacy Generalists' scores. Although the increase in pre- to post-intervention survey scores for Pharmacy Specialists was not

**Table 5.** Quantification of pre- and post-educational pharmacist interventions.

DRUG	PRE-EDUCATION		POST-EDUCATION	
	ELECTRONIC MEDICAL RECORD REVIEW (DECEMBER 2020-FEBRUARY 2021) N = 70		ELECTRONIC MEDICAL RECORD REVIEW (DECEMBER 2021-APRIL 2022) N = 62	
	INTERVENTIONS MADE [NO. (%)]	INTERVENTIONS ACCEPTED [NO. (%)]	INTERVENTIONS MADE [NO. (%)]	INTERVENTIONS ACCEPTED [NO. (%)]
Diazepam	0	0	1	1 (100)
Lorazepam	0	0	3	3 (100)
Buprenorphine	0	0	5	5 (100)
Methadone	2	2 (100)	12	9 (75)

statistically significant, the authors expected strong baseline knowledge of the content considering these pharmacists' clinical practice experiences in critical care, internal medicine, and psychiatric pharmacy where opioid and alcohol withdrawal is commonly encountered. Pharmacy Generalists became more familiar with the site's CIWA policy, particularly as it relates to front-loading of benzodiazepines and patient exclusions to CIWA monitoring. Additionally, a significant improvement in knowledge of when to discontinue the CIWA protocol was observed, and pharmacists were made aware of this opportunity for intervention. Pharmacy Generalists and Specialists scored lowest in the COWS Labs and Assessment question category, suggesting an opportunity for re-education focusing on criteria for the initiation of buprenorphine for opioid withdrawal management and labs/tests that are recommended to be obtained prior to initiating buprenorphine or methadone. Pharmacists indicated an increased level of confidence in providing care to patients with substance use withdrawal after receiving the education. Despite varied job responsibilities and clinical services provided, both Pharmacy Generalists and Specialists "learned new information that could be directly applied to their practice."

Direct application of knowledge attained was demonstrated and measured as most Pharmacy Generalists submitted documentation of a completed PDUR. Incorporating this requirement was a strength of the project and allowed the Pharmacy Resident to track pharmacy practice and provide feedback, when necessary. Application of knowledge led to an increased number and acceptance of pharmacist interventions, primarily for medications associated with opioid withdrawal management (buprenorphine and methadone). This is possibly because alcohol withdrawal-medications (diazepam and lorazepam) are frequently ordered to be administered "as needed" and have less opportunity or need for pharmacist intervention, whereas opioids are occasionally ordered as standing medications when used as opioid replacement therapy. Additionally, opioid replacement therapy has specific mandatory regulatory provisions required by Federal Government and may require more pharmacist intervention.

Substance use disorders continue to impact millions of Americans and remain a serious healthcare issue.<sup>2</sup> This is

complicated by barriers to treatment access and insufficient healthcare training in addiction medicine.<sup>14,15</sup> While pharmacists can serve patients in the mental health population, they often lack knowledge of how to manage hospitalized patients experiencing opioid and/or alcohol withdrawal. In general, psychiatric pharmacy education is lacking as was evidenced by a survey conducted by Thomas, et al.<sup>15</sup> The survey, which sampled U.S. pharmacy programs between 2014 and 2015, revealed the average number of hours dedicated to SUD didactic instruction was only 2.7 hours, which did not meet the 2010 American Association of Colleges of Pharmacy (AACP) guideline recommendation of  $\geq 4$  hours.<sup>15</sup> A more recent survey administered in 2021 by Nichols, et al<sup>16</sup> showed an increase in the number of hours dedicated to SUD instruction over time, with U.S.-based Doctor of Pharmacy programs delivering a median of 7 hours of OUD content in required coursework and 85.1% meeting AACP recommendations. Beyond pharmacy schooling, pharmacists with specialized psychiatric pharmacy training and/or experience have reported being more prepared to provide services to patients with psychiatric disorders.<sup>9</sup> Most pharmacists at our hospital graduated from pharmacy school in 2010 or later implying they had likely received some didactic instruction focused on SUD and only 1 Pharmacy Specialist had completed PGY2 training in psychiatric pharmacy. This supported the need for additional training and guidance for the site's pharmacists.

Continuing pharmacy education learning activities should be designed to address unmet educational needs. Although the education provided was not delivered through an accredited program, it met the knowledge-, application-, and practice-based needs of the pharmacists by allowing them to acquire knowledge, apply information during the education time frame, and practice through a post-activity PDUR. To the authors' knowledge, this is the first report to describe the impact of providing education and requiring a PDUR on hospital pharmacists' knowledge and application of substance withdrawal management. Medical and nursing education about the treatment of opioid and alcohol withdrawal is also lacking and prior studies describe efforts to address educational gaps. For example, an educational intervention on the management of inpatient opioid withdrawal

significantly increased internal medicine residents' knowledge and confidence.<sup>17</sup> Providing education on inpatient screening for alcohol withdrawal risk, assessment, and treatment improved nurses knowledge and comfort level to care for alcohol withdrawal patients.<sup>18</sup> It is important to note that education on alcohol withdrawal management was also provided to the site's providers and medical trainees through a 1-time, 1-hour, conference presented by the Pharmacy Resident. Learning objectives for the session were for attendees to describe the definition and onset of alcohol withdrawal, recognize and apply the alcohol withdrawal screening tool, and appropriately analyze patient cases. The impact of provider education was not assessed through this quality improvement project; however, it may have improved appropriate prescribing of associated medications. Informal in-services had also been provided to the site's critical care nurses to review the proper administration of CIWA and COWS assessment tools. Moving forward, education on alcohol and opioid withdrawal should continue to be provided to pharmacists and other healthcare professionals to address all nodes of the medication use process. Institutions can consider including such training in new hire onboarding, continuing education sessions, and annual competency assessments.

This was a quality improvement project with results limited by a small sample size and other factors. Detailed item analysis data to assess survey question quality was not conducted and optimization of question-type distribution was not performed. There were more select all that apply or multiple-choice items within certain question categories compared to others (eg, COWS Labs and Assessment). These are less susceptible to guessing than true/false questions, possibly increasing difficulty level and impacting score results. Nevertheless, these questions were intentionally designed to measure pharmacist competency in this area, where internal data revealed inappropriate medication assessment, verification, and administration in opioid withdrawal. Additionally, the pharmacists' pre- and post-intervention survey scores were anonymous and not matched, their perception of confidence was only assessed post-education, and specific descriptions of interventions made during the post-education chart review were not captured. Finally, improved medication safety and a decrease in adverse medication-related events cannot be inferred from these findings.

## Conclusion

To the authors' knowledge, this is the first study to assess the impact of providing education and requiring a PDUR on hospital pharmacists' knowledge, application, and practice of inpatient opioid and alcohol withdrawal management. Pharmacists' knowledge attainment improved and knowledge application was directly captured by a PDUR submission. Increased pharmacist interventions in the post-education period demonstrated continuing application of knowledge in pharmacist practice. Findings also showed a perceived increase in knowledge and confidence.

As the site's Pharmacy Department continues to hire new pharmacists with varying levels of clinical training beyond a Doctor of Pharmacy degree, continuing education is needed to maintain departmental competence. At the time of writing, federal regulation has eliminated the requirement for practitioners to submit a waiver to prescribe buprenorphine for the treatment of OUD, among other changes.<sup>19</sup> Institutional policy is actively being updated and education material revised to reflect these changes, including replacing the term "medication-assisted treatment" to "medication for addiction treatment" in efforts to destigmatize attitudes and language toward OUDs. In addition to reinforcing specific knowledge areas as a result of this study, future education can include the pharmacist's role in substance abuse prevention, education, and increasing access to treatment.

## Author Contributions

Lindsay A Brust-Sisti: study conception, analysis and interpretation of results, and manuscript preparation. Tiffany Khieu: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation. Slava Plotkin: study conception and design, analysis and interpretation of results, and manuscript preparation. Marc G Sturgill: analysis and interpretation of results and manuscript preparation. Sandy Moreau: study conception and design, analysis and interpretation of results, and manuscript preparation.

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## Appendix

Survey administered to 7 Pharmacy Specialists and 14 Pharmacy Generalists prior to and following an educational intervention on inpatient opioid and alcohol withdrawal management.

### CIWA Policy

1. Which of the following units is front-loading benzodiazepines allowed? Select the best answer.
  - a. Emergency Department only
  - b. Critical Care only
  - c. Emergency Department and Critical Care only
  - d. Emergency Department, Critical Care, and General/Medical floors only
2. Patients who are in alcohol withdrawal and nonverbal (ie, intubated, suffer from dementia) should be placed on a CIWA protocol.
  - a. True
  - b. False

### Opioid Withdrawal Management Policy

3. Per JCMC policy, the ordering provider must call the methadone program to verify the following information (select all that apply):
  - a. Patient is active in the program
  - b. Current dose and last time the patient received methadone
  - c. Document the clinic name, address, and contact phone number when ordering the medication
  - d. Interview the patient to confirm the dose only
4. In the event the information from a methadone program cannot be verified, the patient can be given methadone to prevent withdrawal at what maximum dose?
  - a. Methadone 20 mg/day
  - b. Methadone 40 mg/day
  - c. Methadone 60 mg/day

- d. Methadone cannot be given until information from a methadone clinic is verified

### Drug-Drug Interactions

5. Which of the following medications may further prolong the QT interval if administered with methadone?
  - a. Fluconazole
  - b. Aspirin
  - c. Lorazepam
  - d. Sertraline

### CIWA Labs and Assessment

6. At JCMC, if the initial CIWA score is  $\geq 8$ , the ordering provider may medicate the patient.
  - a. True
  - b. False
7. If a CIWA score remains  $< 8 \times$  \_\_\_ hours, the CIWA assessment can be discontinued. Pharmacy can recommend to discontinue the CIWA assessment.
  - a. 24 hours
  - b. 48 hours
  - c. 72 hours
  - d. 96 hours

### COWS Labs and Assessment

8. Patients should only be started on buprenorphine for withdrawal management if they meet the following criteria (select all that apply):
  - a. Clear documentation/suspicion of current heroin/opioid use
  - b. Clinically in opioid withdrawal with a COWS score  $> 8$
  - c. Admitted for a primary medical or surgical conditions and opioid withdrawal is NOT the primary reason for admission
  - d. Opioid withdrawal IS the primary reason for admission
9. Which labs and/or imaging should be obtained prior to initiating methadone or buprenorphine? Select all that apply.
  - a. LFTs
  - b. Urine HCG for women of childbearing age
  - c. EKG
  - d. CT Chest

### General Labs and Assessment

10. Where are the COWS and CIWA scores located in Cerner®? Choose the best answer.
  - a. Labs
  - b. Assessment
  - c. Vital Signs
  - d. MAR summary