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## Implementation of a clinical pathway to screen and treat medical inpatients for opioid withdrawal

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### Abstract

**Background:** Opioid-related inpatient hospital stays are increasing at alarming rates.

Unidentified and poorly treated opioid withdrawal may be associated with inpatients leaving against medical advice and increased health care utilization. To address these concerns, we developed and implemented a clinical pathway to screen and treat medical service inpatients for opioid withdrawal.

**Methods:** The pathway process included a two-item universal screening instrument to identify opioid withdrawal risk (Opioid Withdrawal Risk Assessment [OWRA]), use of the validated Clinical Opiate Withdrawal Scale (COWS) to monitor opioid withdrawal symptoms and severity, and a 72-h buprenorphine/naloxone-based treatment protocol. Implementation outcomes including adoption, fidelity, and sustainability of this new pathway model were measured. To assess if there were changes in nursing staff acceptability, appropriateness, and adoption of the new pathway process, a cross-sectional survey was administered to pilot four hospital medical units before and after pathway implementation.

**Results:** Between 2016 and 2018, 72.4% (77,483/107,071) of admitted patients received the OWRA screening tool. Of those, 3.0% (2,347/77,483) were identified at risk for opioid withdrawal. Of those 2,347 patients, 2,178 (92.8%) were assessed with the COWS and 29.6% (645/2,178) were found to be in active withdrawal. A total of 49.5% (319/645) patients were

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treated with buprenorphine/naloxone. Fifty-seven percent (83/145) of nurses completed both the pre- and post-pathway implementation surveys. Analysis of the pre/post survey data revealed that nurse respondents were more confident in their ability to determine which patients were at risk for withdrawal ( $p = .01$ ) and identify patients currently experiencing withdrawal ( $p < .01$ ). However, they cited difficulty working with the patient population and coordinating care with physicians.

**Conclusions:** Our study demonstrates a process for successfully implementing and sustaining a clinical pathway to screen and treat medical service inpatients for opioid withdrawal.

Standardizing care delivery for patients in opioid withdrawal can also improve nursing confidence when working with this complex population.

### Plain Language Summary:

Opioid-related hospital stays are increasing at alarming rates. Unidentified and poorly treated opioid withdrawal may be associated with patients leaving the hospital against medical advice and increased health care utilization. To address the concerns surrounding an increase in admissions associated with unidentified or poorly treated opioid withdrawal, we developed and implemented a clinical pathway process to consistently screen and treat hospitalized patients for opioid withdrawal. We found that opioid withdrawal screening was successfully implemented and sustained over a 24-month evaluation period. We also found that standardizing care delivery for patients in opioid withdrawal improved nursing confidence when working with this patient population. A robust and ongoing education and training process is important for current staff to ensure knowledge does not erode over time and that training for new staff is embedded in the pathway process to maintain training consistency.

### Keywords

opioid withdrawal; opioid use disorder; Clinical Opiate Withdrawal Scale; inpatient medicine; addiction medicine; clinical pathway

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### Introduction

We are currently experiencing an unprecedented public health crisis with rates of opioid overdose increasing across the United States (Centers for Disease Control and Prevention National Center for Health Statistics, 2021; Hedegaard et al., 2016; Rudd et al., 2016; Seth et al., 2018). An increase in the use of synthetic opioids such as fentanyl have primarily contributed to an exponential rise in overdose deaths representing a 10-fold increase (1.0 to 11.4 per 100,000) between 2013 and 2019 (Mattson et al., 2021). National rates of opioid-related hospital visits have also continued to increase. Between 2005 and 2014, opioid-related emergency department (ED) visits increased by approximately 99% and opioid-related hospital admissions increased by 64% (Weiss et al., 2017) with reported rates for each continuing to increase through 2017 (Agency for Healthcare Research and Quality, 2021). However, opioid use disorder (OUD) is often not identified at admission leaving patients at risk for opioid withdrawal during hospitalization (Theisen-Toupal et al., 2017; Winetsky et al., 2018).

Patients whose opioid withdrawal is not addressed or inadequately treated by health care providers may decide to leave the hospital against medical advice (AMA) which can lead to an increased risk of hospital readmissions, morbidity, and 30-day mortality (Hwang et al., 2003; Southern et al., 2012; Ti et al., 2015). Rapid identification and treatment of withdrawal might reverse these adverse outcomes and serve as an initial step toward engaging opioid-dependent inpatients to receive medication for OUD including buprenorphine, methadone, or naltrexone following discharge (Liebschutz et al., 2014; O'Toole et al., 2008; Shanahan et al., 2010; Winetsky et al., 2018). This requires a provider workforce with the requisite knowledge and confidence to identify and care for this patient population. Increasing competency and comfort in working with individuals who misuse drugs necessitates addressing provider concerns, misunderstandings, or instances of stigmatization through direct education and ongoing consultation (Van Boekel et al., 2013).

Standardizing care through clinical process guidelines that identify and treat opioid withdrawal can potentially reduce system-based barriers to providing adequate treatment for this population and address both their admitting medical concerns and withdrawal. In 2010, Shanahan et al. identified that hospitalization can serve as a “reachable moment” to engage patients in treatment for opioid dependency following discharge (Shanahan et al., 2010). Wei and colleagues developed a protocol to screen and treat hospitalized patients for alcohol dependency resulting in increased rates of substance use disorder treatment and decreased all-cause 30-day readmissions and ED visits (Wei et al., 2015). Standardized methods for identifying and treating opioid withdrawal in general hospital settings have not been described, though the Clinical Opiate Withdrawal Scale (COWS) or variations of this tool are validated and widely used in a range of clinical settings in order to measure and monitor the withdrawal severity (Tompkins et al., 2009; Wesson & Ling, 2003).

In response to this need, we created a clinical pathway model to standardize processes and reduce variation in care for hospitalized patients at risk for opioid withdrawal. In doing so, we aimed to better understand the prevalence of opioid withdrawal while improving clinical care for this population. This report outlines the development and implementation of an opioid withdrawal clinical pathway to serve as a guide for hospitals to adapt this process for their own settings. An in-depth analysis of patient outcomes and the accuracy of an in-house designed Opioid Withdrawal Risk Assessment (OWRA) tool developed for this pathway will be reported separately. Our current objective was to describe the implementation outcomes that assessed the adoption, fidelity, and sustainability of our pathway and the results of a pre- and post-implementation survey on participating nursing staff in terms of acceptability, adoption, and appropriateness of utilizing the pathway process with hospitalized patients.

## Methods

### Setting

This program was conceived and implemented at a 1,100-bed tertiary care medical center located in northern Delaware with two hospital campuses in Newark and Wilmington, respectively. Between July 2016 and June 2017, the health system reported 196,656 ED visits and 52,928 general medical admissions. As of 2016, our total health system discharges represented approximately 53% of the market share for the state overall (Delaware Health

& Social Services, 2016). Delaware has seen a persistent and exponential increase in fatal opioid overdoses over the past decade. By 2019, the state ranked first in the nation in the rate of age-adjusted opioid overdose deaths at 43.0 per 100,000 (Kaiser Family Foundation, 2021). Given these alarming statistics, our health system committed to make a meaningful impact on addressing the local opioid epidemic. In 2009, we demonstrated notable success with the development of an alcohol withdrawal screening and treatment protocol utilizing the validated Clinical Institute for Withdrawal Assessment for Alcohol (CIWA-Ar) (Melson et al., 2015; Sullivan et al., 1989). Building off the success of this initiative, we created an enhanced version of this process addressing inpatient opioid withdrawal.

### Opioid withdrawal pathway process

**Pathway planning**—In 2015, we formed a multi-disciplinary team to develop a pathway process to screen and treat admitted medical patients who presented with opioid withdrawal symptoms. Stakeholders from multiple clinical departments served as representatives on our team including Behavioral Health, Internal Medicine, Emergency Medicine, Women and Children’s Health, Nursing, and Pharmacy. We also worked with Information Technology (IT) for coordination and automation of the pathway process through the electronic health record (EHR) system. To ensure a patient-centered approach, we incorporated a patient representative into the process. This involved the inclusion of a peer recovery specialist who served as a patient advocate on our planning committee. As a member of the planning committee, this patient advocate attended meetings to provide feedback on the development of the overall program processes, ensure patient-centered wording was incorporated into our OWRA tool, and that language used in the hospital discharge instructions met patient needs when transitioning back into the community. Once the team was established, we drafted and submitted a program proposal to leadership to elicit buy-in and confirm agreement with the proposed pathway process. The ChristianaCare Institutional Review Board exempted this pathway program effort from ethics board approval as it was considered a quality improvement project with the goal of changing the standard of care.

Development of the pathway involved IT programming changes to the inpatient EHR and physician order entry systems. This included embedding the OWRA and COWS instruments in the EHR to ensure provider access and the ability to perform ongoing pathway surveillance and reporting. IT team members were integrated into all phases of pathway development including beta testing of the electronic order entry system. A pharmacy representative reviewed the final buprenorphine/naloxone protocol, confirmed buy-in with Pharmacy leadership, and obtained approval from our Pharmacy & Therapeutics Committee. Our team conducted a thorough review of relevant federal regulations regarding provider certification required for buprenorphine/naloxone prescribing (21 U.S.C. Section 823(g)(1) and 21 U.S.C. Section 823(g)(2)) (Narcotic Addiction Treatment Act, 1974). Specifically, the Drug Enforcement Administration (DEA) exception that defined the “three-day rule.” This allows non-waivered providers to administer but not prescribe narcotic substances, including buprenorphine/naloxone, to treat opioid withdrawal for a maximum of 72 h while making arrangements for long-term treatment services (Drug Enforcement Administration, n.d.; Title 21, Code of Federal Regulations, Part 1306.07(B), 1974).

**Pathway process**—Figure 1 presents the care process model of our pathway. It involves the screening and identification of admitted patients at risk for opioid withdrawal, identification of patients currently experiencing withdrawal, administration of treatment to manage withdrawal symptoms, and referral to community-based treatment upon hospital discharge to maintain the continuum of care.

Development of the pathway began with the in-house creation of an OWRA tool to enable rapid universal screening of patients admitted to medical units. The two-item tool includes instructions stating: “Inform the patient we have a new pathway to address opioid and heroin withdrawal” and a preamble statement for the clinician to repeat with the patient stating: “I am now going to ask questions to assess your possible risk of withdrawal.” The OWRA questions include:

1. Have you used heroin or prescription pain medicines other than prescribed in the last week?
2. Do you get sick if you can’t use heroin, methadone, or prescription pain medications?

Once an EHR order is placed admitting patients to a designated unit, a task is assigned and pushed electronically for a nurse to administer the OWRA as part of onboarding procedures. Patients who answer “Yes” to one or both OWRA questions are considered a positive screen generating a COWS assessment tool as the first step of the pathway. COWS monitoring automatically re-fires four times every eight hours (Q8Hx4) covering a 32-h period, which provides a timeframe likely to capture the onset of withdrawal from most short and long-acting opioid agonists (Substance Abuse and Mental Health Services Administration, 2020). If the COWS score is  $\geq 8$  at any time, nursing staff notify the admitting hospitalist to further assess and order treatment. An alert is also electronically sent to the hospitalist stating that the patient is experiencing withdrawal. Answering “Yes” to one or both OWRA questions automatically generates an electronic order for a urine pregnancy test when appropriate and a urine drug screen (UDS) panel testing for methadone, amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, opiates, and phencyclidine. Testing for synthetic opioids including fentanyl was not part of our original UDS panel when the pathway was developed. In response to rising rates of illicit fentanyl use (Rudd et al., 2016; Seth et al., 2018), our health system added this test to our standard UDS panel in August 2019.

Given the known efficacy and safety of utilizing buprenorphine to treat opioid dependency in hospitalized patients (Lieschutz et al., 2014; Sordo et al., 2017), we incorporated a 72-h buprenorphine/naloxone treatment protocol into our pathway. An addiction medicine consult phone line was added to assist providers with 24–7 decision support. Additionally, in-house Addiction Medicine Consult Liaison (AMCL) service members are available for bedside consultation. Providers determine if COWS-positive patients are eligible for treatment using the pathway’s 72-h buprenorphine/naloxone protocol that is embedded within our electronic ordering system. The custom EHR order set becomes available for providers to initiate the treatment protocol only when a COWS score is  $\geq 8$  preventing premature administration of buprenorphine and its risk of precipitated withdrawal. The 72-h buprenorphine/naloxone protocol provides a rapid induction using 4 mg sublingual (SL) film buprenorphine/naloxone

× 1 dose followed by an 8 mg dose one hour later totaling 12 mg. The patient receives four additional timed doses of 4 mg SL film every 12 h. The buprenorphine dosing recommendations for treating opioid withdrawal were determined in accordance with the American Society of Addiction Medicine's National Practice Guidelines (American Society of Addiction Medicine, 2015). As detoxification is associated with rapid relapse and a risk of fatal overdose (American Society of Addiction Medicine, 2005; Seaman et al., 1998; Volkow & McLellan, 2016; Wines et al., 2007), the AMCL service is available to continue daily buprenorphine/naloxone treatment for hospitalized patients and provide bridging prescriptions to cover until appointments with community-based treatment providers can occur.

To facilitate linkage to community-based treatment following discharge, staff members on our peer counseling team known as Project Engage assist with discharge planning. Consisting of peer specialist and social worker teams embedded throughout the hospital system, Project Engage staff conduct brief interventions, assess readiness to change and barriers to care, facilitate referrals and arrange logistical support including transportation to facilitate patient transitions to community-based treatment upon discharge (Pecoraro et al., 2012). The Project Engage team's response is triggered by an email notification for every patient with a COWS score ≥ 8. This team works closely with patients and providers to develop integrated discharge plans.

**Exclusion criteria**—We developed exclusion criteria for patients that may need individualized treatment outside of the pathway process. Exclusion criteria for the pathway (Figure 1) include evidence for concomitant sedative-hypnotic withdrawal risk or those who require ongoing methadone use, both of which complicate the use of buprenorphine/naloxone. Patients are excluded if they likely require opioid analgesia, surgery, or intensive care admission within 24 h. Pregnant patients are treated using another pathway that utilizes the mono-product buprenorphine and limits exposure to naloxone. Patients being treated for chronic pain with opioids are excluded as they are not appropriate for buprenorphine. Lastly, as many patients are admitted with painful sequela of intravenous (IV) opioid use including endocarditis, deep tissue, bone and joint infections, the hospital team, and the AMCL service can elect to stabilize patients' withdrawal symptoms and treat pain with various oral or IV opioids. After clinical stabilization, interested patients can be transitioned to buprenorphine or methadone treatment.

**Staff education**—A selection of implementation strategies as identified by Powell and colleagues were incorporated into the development of this program (Powell et al., 2015). Prior to implementation of the pathway, attending physicians and residents received education sessions about the pathway process and opioid withdrawal symptoms. Education sessions were delivered by an addiction medicine specialist using a multi-modal strategy including multiple 30-min presentations at monthly hospitalist meetings, 30-min presentations at advanced placement provider meetings, medical and family medical resident tutorials, brief morning report sessions, an internet-based onboarding orientation module, and one-to-one detailing sessions with individuals. The addiction medicine specialist served



as a clinical champion and provided ongoing clinical supervision for physicians and nursing staff throughout the implementation of the program.

We also developed and distributed educational materials about the pathway process to nursing staff by integrating these materials into existing nursing education curricula. Nurses on participating units also received education about withdrawal signs and symptoms and received training on administration of the OWRA and COWS tools. Nurses in the pathway pilot units received initial in-person training by a nursing education specialist who served as a clinical champion. Upon scaling-up the pathway to the remaining units, we utilized a train-the-trainer strategy with nurse champions identified on each unit who were responsible for training all nurses on their respective units. Online education modules became part of the on-boarding process for new nurses. We also incorporated online education about the signs and symptoms of opioid addiction and withdrawal into the on-boarding process for ancillary staff including patient escorts, unlicensed assistive personnel, and respiratory therapists.

**Pathway pilot**—To scale-up implementation and determine the feasibility of the pathway, we first conducted a brief pilot study as an additional implementation strategy that was incorporated into our program (Powell et al., 2015). Specifically, we piloted the new pathway process on four units across both hospital campuses for five months from June through November 2016. This included testing utilization of the OWRA and COWS instruments within the EHR. Since nursing staff were the providers designated to administer the OWRA and COWS instruments directly to patients, nurses who worked on the pilot units received a survey to assess their experiences with the new process and their experiences working with this patient population. In December 2016, the pathway was scaled-up to 16 additional units within our health system. Throughout this process, the addiction medicine specialist was continually available for consultations to promote effective implementation of the new procedures and processes.

### Implementation outcomes

**Pathway measures**—Primary implementation outcomes for our pathway included adoption, fidelity, and sustainability (Proctor et al., 2011). As defined by Proctor et al. (2011), *adoption* is commonly referred to as “uptake” of an intervention practice and is represented by an “intention, initial decision, or action” to attempt this practice within a target setting. *Fidelity* is considered one of the most frequently assessed outcomes in implementation research and is defined as the extent to which the intervention practice being studied is implemented as intended (Proctor et al., 2011). *Sustainability* has received less attention as an implementation research outcome in the past, but has gained traction among experts in recent years (Shelton et al., 2018). The outcome of *sustainability* refers to the act of maintaining an intervention practice over time at a level that meets the goals set by the target setting (Proctor et al., 2011; Shelton et al., 2018). Our pathway implementation outcomes are aligned with the AIM portion of Glasgow’s RE-AIM evaluation framework representing adoption, implementation (i.e., fidelity), and maintenance (i.e., sustainability) of an intervention (Glasgow et al., 2019).

To assess the adoption of, fidelity to, and sustainability of our pathway process we created a dashboard that reports monthly OWRA screening rates among patients admitted to designated units. This served to measure our three outcomes of adoption, fidelity to the pathway model, and sustainability. Of the patients who received an OWRA screening, we calculated the monthly number of patients identified as at risk for opioid withdrawal with an OWRA score = 1, which denoted whether a patient answered “yes” to either or both instrument questions. We calculated the monthly number of patients who were then assessed using the COWS. These two metrics served to measure adoption of and fidelity to our pathway model. Of the patients assessed with the COWS, we calculated how many were in active withdrawal as measured by a COWS score = 8. We tracked the monthly rate of eligible patients treated with standard pathway order set of buprenorphine/naloxone to manage their withdrawal symptoms and measure fidelity to the pathway model.

**Nursing survey measures**—As part of the pathway process, nurses were designated to administer the OWRA and COWS directly to with patients. Thus, they served as the clinical providers who first interacted with and identified patients at risk for withdrawal. This survey intended to assess the level of diffusion that the nursing education and training provided regarding the new pathway process. In keeping with Roger’s diffusion of innovation theory, we focused on evaluating the perceived level of complexity, trialability, and compatibility by measuring the nurses’ acceptability, perceived appropriateness, and adoption of the new pathway procedures (Dearing & Cox, 2018; Rogers, 2003). To assess the impact of the standardized electronic opioid withdrawal screening and treatment protocol on nursing experiences caring for this population, we administered a survey to nurses on four pilot units across the two hospital campuses before and after pathway implementation. The survey contained 15 closed-ended multiple choice and Likert scale questions, one open-ended response item, and two demographic items determining hospital location and years of experience (see Supplemental Material 1). Study data were collected via email and managed using Research Electronic Data Capture (REDCap) software hosted at ChristianaCare (Harris et al., 2009, 2019). REDCap is a secure, web-based software platform designed to support data capture for research studies. The ChristianaCare Institutional Review Board reviewed and approved this as a separate study as data collection ran concurrently with the pathway roll-out. Informed consent was obtained from all nursing survey participants. Participants also provided informed consent for the publication of findings from this survey study.

**Data analysis**—Calculated means, medians, and percentages were used to describe the implementation outcome measures and evaluate the pathway. Monthly rates were calculated and averaged over 24 months from 2016 to 2018. We used the Fisher’s exact test with a significance set at  $p < .05$  to compare quantitative data in the pre- and post-implementation survey results. Thematic analysis of the qualitative data in the open-ended item of the pre- and post-implementation surveys was conducted by the lead author and an additional qualitative analyst. Each analyst independently coded all transcribed responses to identify recurring themes. The analysts then collectively resolved all coding discrepancies of the identified themes through discussion until consensus was achieved. Quantitative data were analyzed using IBM SPSS Statistics Version 25 (IBM Corp, 2017) and Stata SE version



16 (StataCorp LLC, 2019). Qualitative data were analyzed using Microsoft Office Excel Version 14 (Microsoft Corp, 2010).

## Results

Table 1 presents the process measure rates and their corresponding implementation outcomes. Between December 2016 and December 2018, we sustained a universal OWRA screening rate averaging 72.4% representing adoption of and fidelity to the new pathway model. Among patients who received an OWRA screening, we found that 2,347 had a positive OWRA representing a monthly average of 3%. Of patients that screened positive on the OWRA with a score = 1 and received a COWS to confirm their withdrawal status, we maintained a COWS screening rate average of 92.8% demonstrating adoption of and fidelity to the pathway. A total of 645 patients were in active opioid withdrawal representing a monthly average of almost 30%. Of patients with a positive COWS screening where the score was = 8, we demonstrated fidelity to the pathway with an average treatment rate of 49.5% for patients receiving buprenorphine/naloxone. Since not all patients were eligible to receive this treatment protocol, we observed moderate variations across our two-year evaluation period with monthly treatment rates for buprenorphine/naloxone ranging from 33.3% to 71.4%.

The pre-pathway implementation survey was administered to nurses ( $N = 250$ ) in February 2016 and the post-implementation survey was administered in December 2016. Overall, 145 nurses completed the pre-implementation survey. This included 64 (44.1%) nurses at the Newark, DE, campus, 71 (49.0%) nurses at the Wilmington, DE campus, and 10 (6.9%) nurses in the per diem pool. Among these respondents, 15 (10.3%) had less than 1 year of experience, 36 (24.8%) had 1–5 years of experience, 29 (20.0%) had 6–10 years of experience, 35 (24.1%) had 11–20 years of experience, 27 (18.6%) had 21–30 years of experience, and 3 (2.1%) reported over 30 years of experience. Fifty-seven percent (83/145) of nurses completed both the pre- and post-implementation surveys in February and December 2016, respectively. Table 2 presents the nursing characteristics of the 83 respondents in terms of work location and years of experience.

Table 3 reports the quantitative pre/post nursing survey responses and their corresponding implementation outcomes. There were significant differences between the pre/post survey responses among all metrics for nursing acceptability of the new pathway. This included a 55.6% increase in nurses being *Extremely or Highly Confident* identifying patients *at risk for* opioid withdrawal (32.9% [27/83] to 51.2% [42/83],  $p = .01$ ) and a 48.3% increase in being *Extremely or Highly Confident* identifying patients *currently experiencing* opioid withdrawal (36.6% [30/83] to 54.3% [44/83],  $p < .01$ ). Nurses reported an 18.1% increase in being *Extremely or Highly Confident* in identifying patients who were misusing illicit opioids (39.8% [33/83] to 47.0% [39/83],  $p < .01$ ) and a 31.9% increase in being *Extremely or Highly Confident* in identifying patients who were misusing prescription opioids (35.1% [30/83] to 46.3% [38/83],  $p = .01$ ). We observed a 12.5% decrease in nurses who reported feeling frustrated with patients who misuse opioids as *Extremely or Very Much* (48.8% [40/83] to 42.7% [35/83],  $p < .001$ ) and a 26.7% decrease in nurses who reported feeling

that caring for patients who misuse opioids negatively affects their job satisfaction as *Extremely* or *Very Much* (37.8% [31/83] to 27.7% [23/83],  $p < .001$ ).

In terms of adoption of the pathway processes, there was a 33.3% increase in nurses reporting that they *Usually* or *Always* ordered a UDS (54.2% [45/83] to 72.3% [60/83],  $p < .001$ ). This was expected since it was built into the pathway as an automated order set task. We also observed a 5.7% increase in nurses who *Usually* or *Always* reported speaking with a physician (81.9% [68/83] to 86.6% [71/83],  $p < .001$ ) and a 30.6% increase in nurses who *Usually* or *Always* reported requesting a psychiatric consultation (38.3% [31/83] to 50.0% [40/83],  $p < .01$ ).

The only significant difference found among the appropriateness measures was an 8.2% decrease in nurses who *Strongly Agree* or *Agree* that patients can recover from opioid addiction (86.6% [71/83] to 79.5% [66/84],  $p < .01$ ). There were no significant differences between the pre/post responses for the remaining survey items (Table 3).

A total of 32 nurses provided open-ended responses in the pre-implementation survey and 15 nurses responded to the open-ended item in the post-implementation survey. Thematic analysis of qualitative data in the pre-implementation survey demonstrated support for an opioid withdrawal pathway. Other key themes included nurses citing frustration with patients perceived to be “drug seeking” and difficulty working with this patient population. Thematic analysis of the post-implementation survey data revealed continued frustration with patients perceived to be “drug seeking” and difficulty working with this population. Another theme that persisted between the pre- and post-surveys was nurses noting a perceived lack of comfort by physicians to address opioid misuse with patients. In the post-implementation survey, some nurses noted feeling that physicians were reluctant to prescribe opioids when necessary or address nursing concerns about patients potentially in withdrawal. The concept of “compassion fatigue” among nurses was more explicit in the post-implementation survey.

## Discussion

Our study demonstrates a process for successfully implementing and sustaining a clinical pathway to screen and treat medical service inpatients for opioid withdrawal. We observed this achievement through the low variability in monthly screening rates for the OWRA and COWS instruments, which were sustained over 24 consecutive months. Our survey with the pathway pilot units identified increased confidence in nurses ability to identify withdrawal symptoms through this standardized care delivery process. Qualitative survey data detailed some adverse experiences and perceptions among nursing respondents. Key themes include an expressed difficulty working with patients in withdrawal and frustration with patients whom nurses perceived as “drug seeking.” Nurses also reported that physicians exhibited a reluctance to address opioid misuse with patients and were reportedly hesitant to prescribe opioids to treat patient withdrawal symptoms.

To our knowledge, we are the first health system to attempt to universally screen and treat inpatients for opioid withdrawal. Following development and implementation of this

pathway, valuable lessons regarding system-wide changes deserve mentioning. Before working on the structural changes needed to develop and implement the pathway, we focused on promoting culture change and fostering a system-wide appreciation for the importance of addressing opioid withdrawal among hospital patients. This necessitated recruiting clinical and administrative champions to effectively make the case and acquiring buy-in from institutional leadership to proceed. This enabled us to access to requisite resources including IT, pharmacy, and staff education services. Our partnership with IT was essential to buildout and tests the OWRA tool embedded within our EHR system.

Early in the process, we realized the importance of developing a buprenorphine-based withdrawal protocol for use by our hospitalist service. This treatment protocol enabled providers to rapidly prescribe an evidenced-based modality and effectively address withdrawal in admitted patients. Previous concerns that only providers with a federal waiver (DEA “X” number) could prescribe buprenorphine had been a perceived barrier to implementation. However, a review of federal regulations confirmed that the “three-day rule” allows providers without a waiver to treat hospitalized patients in withdrawal using narcotic substances for 72 h while arranging for long-term OUD treatment services (*Title 21, Code of Federal Regulations, Part 1306.07(B)*, 1974). Our 72-h treatment protocol includes an induction and extended taper that was modified from one previously implemented at Johns Hopkins (personal communication with Anika Alvanzo, MD of Johns Hopkins University School of Medicine).

An important lesson learned was the need to ensure fidelity to the pathway steps. Of particular importance was the requirement that patients be in opioid withdrawal prior to initiation onto buprenorphine/naloxone to prevent precipitated withdrawal. Based on existing standards of practice, a COWS score of 8 was identified as the threshold to begin the buprenorphine/naloxone induction. As an additional safety precaution, we modified the EHR order system to require inputting a COWS value of at least 8 to activate the pathway treatment order set.

Our committee worked extensively to develop robust education for physicians and nurses about administering the OWRA and COWS as well as improving general knowledge about opioid withdrawal and addiction. We discovered that delivering such education on an ad hoc basis was not sufficient. High provider turnover rates adversely affected fidelity to the pathway process requiring us to develop and administer onboarding education modules and individualized strategies for newly hired staff members.

The creation of an AMCL service was a key component to provide the support necessary to address complex cases including patients that were excluded from the standard pathway process but still required opioid withdrawal treatment. The presence of peer specialists and social worker teams was also essential to the success of this program. They helped to forge therapeutic alliances between the patients and providers and provided discharging planning support to ensure timely referral and continuity to community-based treatment. To that end, it was crucial to establish partnerships with community-based treatment providers to ensure timely access to ongoing OUD treatment.

## Limitations

Our results are limited by the fact that this pathway was implemented in a single institution and therefore may not be generalizable to other systems or settings. While we are not able to attest to the external validity of this process, we hope that our findings encourage other systems to develop and evaluate an adapted version of this program to proactively identify and treat opioid withdrawal.

This component of our program focused exclusively on development and implementation of this pathway. Therefore, we focused on the implementation outcomes to assess adoption of and fidelity to the pathway program and document sustainability of the clinical processes. As the OWRA tool was developed for this pathway, we initiated a parallel retrospective cohort study to validate this tool. Because the current report focuses strictly on the implementation outcomes of the program, we will separately publish our analysis reporting the internal validity of the OWRA tool along with pathway effectiveness outcomes from this study.

The pragmatic nature of collecting research data within a real-world clinical setting presented some notable limitations. Though we were able to maintain an average screening rate of 72.4% for 24 months, we did not possess a mechanism to capture data on the 27.6% of patients who were not screened. Based on the clinical judgement and first-hand experience of our addiction medicine specialist, factors that contributed to not being screened may include admissions to non-medical floors including intensive care units that did not trigger OWRA tool administration in the EHR; patients who were non-responsive or chose not to participate in the assessment upon admission; and nursing staff who may have deterred from the pathway processes due to workflow constraints or a need for clinical prioritization. Future studies evaluating this pathway would benefit from collecting data on this sub-group to better understand potential barriers to fidelity.

We were unable to track pathway program referrals to community-based treatment organizations external to the health system. This is an additional limitation of collecting data in a real-world clinical setting. Further research evaluating this type of program should incorporate controlled measures to follow-up with patients and track their contact with community-based services.

Other study limitations include the exclusion of health care providers other than nursing staff in the pilot survey. While we intentionally focused on nurses as they were the providers designated to administer both the OWRA and COWS instruments with patients, this excluded the unique perspectives and experiences of other providers such as physicians and residents. It is recommended that future studies evaluate the experiences of all health care providers involved in the pathway process and patient perspectives to ensure that a comprehensive assessment is obtained. The pilot survey is also limited by the 57% response rate with 83 out of 145 nurses completing both the pre- and post-implementation surveys. Though this is an optimistic response rate for active providers in the clinical setting, this moderately low rate increases the risk of non-response bias in our findings.

Lastly, we recognize that language used in the nursing survey, specifically usage of the term “substance abuse,” was inadvertently stigmatizing towards individuals who misuse substances and can contribute to societal misperceptions that addiction is a “moral failing.” At the time the survey was developed and administered, we did not fully appreciate the negative effects that such terms can have on individuals or societal impressions of addiction. We acknowledge this error in judgment, are thankful for our increased awareness on the harmful impact of stigmatizing terms, and commit to using language that is more appropriate and inclusive. For other systems looking to recreate this nursing survey in their own settings, we recommend using less stigmatizing terms such as substance “use” or “misuse” instead of “abuse.”

## Conclusions

As the opioid epidemic continues to impose a tremendous burden on the health and well-being of our communities, identifying opportunities where we can engage and treat individuals for OUD is essential. The hospital inpatient setting can serve as one such opportunity to engage individuals at the point of care. This study demonstrates a sustainable clinical pathway to screen and treat medical service inpatients for opioid withdrawal upon hospital admission. Direct education about withdrawal symptoms and standardizing care for patients experiencing withdrawal can increase nursing confidence in working with this complex and high-need population. Opportunities remain to further explore challenging nursing experiences caring for this patient population including compassion fatigue, stigma, and care coordination difficulties with physicians. Critical lessons learned from pathway development and implementation include: (1) the importance of multi-disciplinary engagement throughout process development, (2) securing leadership buy-in and support prior to implementation, (3) allotting adequate time for IT systems testing in the EHR, (4) disseminating robust and automated education and training for new staff onboarding, (5) maintaining an AMCL service to assist in individualized treatment for patients excluded from the pathway and to initiate opioid agonist therapy after three days of opioid withdrawal treatment in the hospital, and (6) offering peer specialist and social worker support to facilitate transitions from the hospital to community-based treatment.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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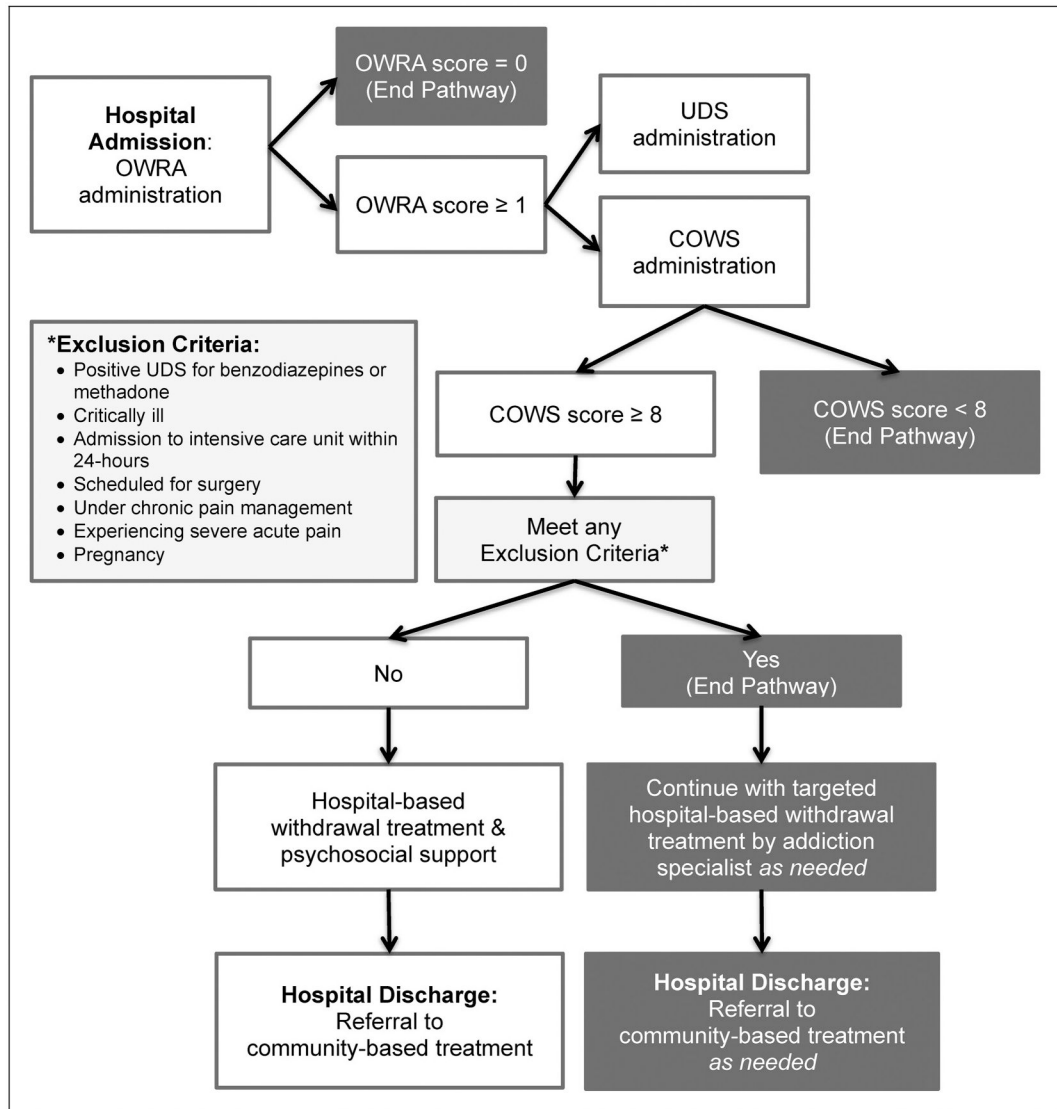
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**Figure 1.** Care process model of the opioid withdrawal clinical pathway. *Note.* OWRA = Opioid Withdrawal Risk Assessment; COWS = Clinical Opiate Withdrawal Scale; UDS = Urine Drug Screen.

Opioid withdrawal clinical pathway monthly rates from December 2016 to December 2018.

Table 1.

	<i>N</i>	Average of monthly rates (%)	Standard deviation (%)	Range of monthly rates (%)	Corresponding implementation outcomes
Total patients admitted to eligible medical units	107,071	–	–	–	
Received OWRA screening tool ( <i>den.</i> = 107,071)	77,483	72.4	1.3	68.6–74.4	Adoption, fidelity, sustainability
Identified at risk for opioid withdrawal per OWRA score 1 ( <i>den.</i> = 77,483)	2,347	3.0	0.5	2.1–4.0	
Received COWS tool ( <i>den.</i> = 2,347)	2,178	92.8	3.0	86.2–97.4	Adoption, fidelity
Active opioid withdrawal per COWS score 8 ( <i>den.</i> = 2,178)	645	29.6	7.2	17.0–43.5	
Received buprenorphine/naloxone treatment for withdrawal symptom management ( <i>den.</i> = 645)	319	49.5	10.4	33.3–71.4	Fidelity

Note. *den.* = denominator; COWS = Clinical Opiate Withdrawal Scale; OWRA = Opioid Withdrawal Risk Assessment.

**Table 2.**

Nursing staff characteristics of pre- and post-pathway implementation survey respondents.

<b>Respondents N = 83</b>	
Location, <i>n</i> (%)	
Newark, DE campus	42 (50.60)
Wilmington, DE campus	36 (43.37)
Nurse Per Diem pool	3 (3.61)
Moved to new unit	2 (2.41)
Years of Experience, <i>n</i> (%)	
< 1 year	1 (1.20)
1–5 years	24 (28.92)
6–10 years	16 (19.28)
11–20 years	25 (30.12)
21–30 years	15 (18.07)
Over 30 years	2 (2.41)

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**Table 3.**

Nursing staff responses of pre- and post-pathway implementation survey.

Survey items	Pre-implementation N = 83	Post-implementation N = 83	p-value	Corresponding implementation outcomes
Confidence determining which patients <i>at risk for</i> opioid withdrawal, N (%)			.01	Acceptability
Not at all confident	3 (3.66)	1 (1.22)		
Somewhat confident/sometimes confident, sometimes not	52 (63.41)	39 (47.56)		
Extremely confident/highly confident	27 (32.93)	42 (51.22)		
Confidence determining which patients <i>currently experiencing</i> opioid withdrawal, N (%)			<.01	Acceptability
Not at all confident	1 (1.22)	0 (0)		
Somewhat confident/sometimes confident, sometimes not	51 (62.20)	37 (45.68)		
Extremely confident/highly confident	30 (36.59)	44 (54.32)		
Confidence determining which patients abusing illicit opioids (e.g. heroin), N (%)			<.01	Acceptability
Not at all confident	3 (3.61)	0 (0)		
Somewhat confident/sometimes confident, sometimes not	47 (56.63)	44 (53.01)		
Extremely confident/highly confident	33 (39.76)	39 (46.99)		
Confidence determining which patients abusing prescription opioids (e.g. oxycodone), N (%)			.01	Acceptability
Not at all confident	3 (3.61)	1 (1.22)		
Somewhat confident/sometimes confident, sometimes not	50 (60.24)	43 (52.44)		
Extremely confident/highly confident	30 (35.14)	38 (46.34)		
Overall frustration with patients who abuse opioids, N (%)			<.001	Acceptability
Not at all	8 (9.76)	18 (21.95)		
Very little/somewhat	34 (41.46)	29 (35.37)		
Extremely/very much	40 (48.78)	35 (42.68)		
Extent caring for patients who abuse opioids negatively affects job satisfaction, N (%)			<.001	Acceptability
Not at all	22 (26.83)	22 (26.51)		
Very little/somewhat	29 (35.37)	38 (45.78)		
Extremely/very much	31 (37.80)	23 (27.71)		
Success identifying when patients at risk for opioid withdrawal, N (%)			.64	Adoption
Not tried	1 (1.20)	2 (2.41)		
Very unsuccessful/somewhat unsuccessful	15 (18.07)	14 (16.87)		



Survey items	Pre-implementation N = 83	Post-implementation N = 83	p-value	Corresponding implementation outcomes
Not sure	18 (21.69)	12 (14.46)		
Very successful/somewhat successful	49 (59.04)	55 (66.27)		
If determined that patient at risk for opioid withdrawal, how often do you order Urine Drug Screen, N (%)			<.001	Adoption
Never	8 (9.64)	4 (4.82)		
Sometimes/about half the time	30 (36.14)	19 (22.89)		
Always/usually	45 (54.22)	60 (72.29)		
If determined that patient at risk for opioid withdrawal, how often do you speak with Physician, N (%)			<.001	Adoption
Never	0 (0)	0 (0)		
Sometimes/about half the time	15 (18.07)	11 (13.41)		
Always/usually	68 (81.93)	71 (86.59)		
If determined that patient at risk for opioid withdrawal, how often do you request Psychiatric Consult, N (%)			<.01	Adoption
Never	7 (8.64)	8 (10.00)		
Sometimes/about half the time	43 (53.09)	32 (40.00)		
Always/usually	31 (38.27)	40 (50.00)		
Agree it is their responsibility to ask patients about potential opioid abuse, N (%)			.20	Appropriateness
Strong disagree/disagree	10 (12.05)	6 (7.23)		
Not sure	7 (8.43)	5 (6.02)		
Strongly agree/agree	66 (79.52)	72 (86.75)		
Agree they are uncomfortable working with patients who abuse opioids, N (%)			.38	Appropriateness
Strong disagree/disagree	66 (79.52)	60 (72.29)		
Not sure	6 (7.23)	3 (3.61)		
Strongly agree/agree	11 (13.25)	20 (24.10)		
Agree that patients can recover from opioid addiction, N (%)			<.01	Appropriateness
Strong disagree/disagree	4 (4.88)	4 (4.82)		
Not sure	7 (8.54)	13 (15.66)		
Strongly agree/agree	71 (86.59)	66 (79.52)		
Agree that addressing opioid withdrawal is critical part of caring for patients on medical floor, N (%)			.05	Appropriateness
Strong disagree/disagree	3 (3.66)	2 (2.44)		

Survey items	Pre-implementation N = 83	Post-implementation N = 83	p-value
Not sure	3 (3.66)	6 (7.32)	
Strongly agree/agree	76 (92.68)	74 (90.24)	

Corresponding implementation outcomes

Note. Fisher's exact test with significance set at  $p < .05$  assessed differences between the frequency pre- and post-survey responses.