The Journal of Emergency Medicine, Vol. ■, No. ■, pp. 1–6, 2019

0736-4679/$ - see front matter

https://doi.org/10.1016/j.jemermed.2019.03.029

Selected Topics: Toxicology

RETROSPECTIVE REVIEW OF A NOVEL APPROACH TO BUPRENORPHINE INDUCTION IN THE EMERGENCY DEPARTMENT

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☐ **Abstract—Background: The Emergency Department (ED) frequently treats patients with drug overdoses and is an important resource for individuals with opioid use disorder who are seeking treatment. Initiating medication-assisted treatment (MAT) in the ED seems to be an effective way to link patients with opioid use disorder (OUD) to treatment programs. There is ongoing discussion on the best approach to MAT in the ED setting. Objective: Describe a new model for managing OUD in the ED. Method: Information was obtained retrospectively from the electronic medical records of patients seen in a large county tertiary care center's Clinical Decision Unit (CDU) for OUD between September 1, 2017 and February 6, 2018. Data were summarized descriptively. Results: There were 18 different patients placed in the CDU during the study period. Ninety-five percent were induced with buprenorphine-naloxone in the CDU. The median initial Clinical Opioid Withdrawal Scale score at the time of induction was 10. The median total dose of buprenorphine-naloxone that was administered was 8/2 mg. The median amount of time spent in the CDU and ED combined was 23 h. Approximately (12/19) 63% of subjects went to their initial follow-up appointment in clinic. Nine were still active in clinic at 30 days and 4 were active at 6 months. Conclusions: This retrospective chart review shows promising preliminary data for managing OUD in an ED CDU. Such strategies have the potential to increase access to care in a vulnerable patient population.** © 2019 Elsevier Inc. All rights reserved.

☐ **Keywords—buprenorphine; opioids; emergency department**

INTRODUCTION

Emergency Departments (EDs) frequently care for patients after opioid overdoses and serve as an access point for individuals seeking treatment for opioid use disorder (OUD) (1). In 2017, opioids were implicated in approximately 70,000 deaths, and according to the National Institute of Drug Abuse, around 90 Americans die every day due to opioid overdose (2,3).

To address this epidemic, we piloted a novel in-hospital buprenorphine induction strategy, using the Emergency Department's Clinical Decision Unit (ED-CDU). Even though home buprenorphine inductions have been proven to be successful, we felt that an in-hospital induction would be the best option for our population because a large proportion of our patients have myriad socioeconomic difficulties making them less favorable candidates for home buprenorphine induction (4–8).

The associated medication-assisted treatment (MAT) clinic for the hospital was started in July 2017 by attending physicians from the Department of Emergency Medicine, Section of Medical Toxicology, in conjunction with colleagues in the adult outpatient psychiatry clinic. The clinic provides intensive outpatient treatment, which includes physician visits for buprenorphine induction and dose management, individual and group counseling, peer coaching, assistance with social services, and additional

RECEIVED: 11 October 2018; FINAL SUBMISSION RECEIVED: 8 March 2019;
ACCEPTED: 16 March 2019

psychiatric care, when indicated. All prescribers have completed a Substance Abuse and Mental Health Services Administration-approved DATA 2000 waiver course and are licensed to prescribe and dispense buprenorphine.

The hospital is a large, tertiary-care public hospital. When a patient with suspected OUD arrives in the ED, the on-call medical toxicology fellow is notified in one of three ways: 1) direct contact from the ED provider; 2) indirect contact from the ED provider via the state Poison Center; or 3) through direct contact with a chemical dependency counselor who is available in our ED during most daytime hours. The medical toxicology fellow then performs an initial bedside assessment, formally evaluating the patient for OUD based on the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-V), calculating withdrawal severity using the Clinical Opioid Withdrawal Scale (COWS) (Appendix 1), and providing information about buprenorphine therapy, the MAT clinic, and alternative treatment options (9–12).

If a patient meets criteria for a diagnosis of moderate or severe OUD and expresses an interest in the MAT clinic but does not have a COWS score of at least 10, then he or she is transferred from the traditional ED to ED-CDU to wait until their withdrawal symptoms become severe enough to facilitate a safe induction. During this interval, patients are provided nonopioid medications to treat withdrawal symptoms (as detailed in Table 1) and reassessed with serial COWS scores until they progress to COWS of 10 or more. The ED-CDU at this facility has a 20-bed capacity and the maximum time allotted for each patient is 24 h. It is managed by physicians, residents, nurse practitioners, and physician assistants from the ED.

Once the above criteria are met, and at the discretion of the treating physician, patients are given a first dose of buprenorphine-naloxone 2–0.5 mg, as recommended by the American Society of Addiction Medicine practice guidelines induction protocol (12). Afterward, they are monitored for 1 h for persistent or precipitated withdrawal symptoms. If their withdrawal symptoms have improved, but not resolved, patients receive a second dose of buprenorphine-naloxone, with the maximum total induction day dose of buprenorphine-naloxone 8/2 mg. Patients are then discharged with a short-term buprenorphine-naloxone prescription and an appointment for MAT clinic within 1–3 days of discharge.

There is a small subset of patients, generally those who use long-acting opioids, who do not develop withdrawal severe enough to warrant induction in the CDU (COWS score < 10). These patients are discharged at the end of the 24-h observation period with an appointment for MAT clinic and prescriptions for nonopioid medications to manage withdrawal. A distinguishing feature of our model is that the same physicians who initiate medications in the ED-CDU are the same providers who see the patient for longitudinal care in the MAT clinic. Thus, the patient–provider relationship begins at a particularly salient moment in the patient's journey toward recovery.

MATERIALS AND METHODS

This is a retrospective cohort study of patients that were seen at our ED-CDU for OUD between September 1, 2017 and February 6, 2018. The data were retrieved and coded from the electronic medical records by trained medical toxicology fellows and maintained on a Health Insurance Portability and Accountability Act-compliant Web-based cloud. Prior to data retrieval, a prespecified abstraction form was developed. Information was coded and reviewed by two separate abstractors. The study was reviewed and approved by the Institutional Review Board.

Study Setting

The study was conducted at a large, tertiary public hospital in a metropolitan area. The hospital has an 89-bed ED, a 20-bed CDU (also known as an observation unit), and 953 licensed inpatient beds. In 2017, there were 141,693 ED visits. The hospital is the city's only Level I trauma center and primarily serves a socioeconomically vulnerable population. The associated MAT clinic is located approximately 4 blocks from the main hospital building and shares physical space with the Department of Psychiatry. This permits access to support staff including administrative staff, clerks, registered nurses, social workers, and substance abuse counselors.

Criteria for inclusion were as follows: all patients with OUD who received a medical toxicology consultation and were placed in the ED-CDU during the study period. Patients were excluded if they did not meet criteria for OUD as determined during medical toxicology consultation, or if they met OUD criteria but were not admitted to the ED-CDU. A diagnosis of OUD was made based on the presence or absence of specific items in the DSM-V criteria for OUD; severity of illness was determined by the total number of DSM-V criteria met (mild, 2–3 criteria; moderate, 4–5 criteria; severe, 6 or more criteria). Medical toxicology fellows received pertinent training in OUD recognition and diagnosis from a board-certified addiction medicine physician prior to initiation of the pilot program.

For each subject, the authors retrieved and coded from the electronic medical records, if available: the total length of stay in hours (ED triage to discharge); age (years); sex; pregnancy status; housing status (e.g.,

Table 1. Adjunctive, Non-opioid-based Medications to Treat Withdrawal

Clonidine 0.1 mg Q4, PRN for irritability and anxiety
Hydroxyzine 50 mg Q6, PRN for anxiety
Diazepam 10 mg PO for sleep (once)
Ondansetron 4 mg Q6, PRN for nausea and vomiting
Acetaminophen and ketorolac, PRN for pain management (avoid opioids)
Dicyclomine 10 mg Q6, PRN for cramping
Loperamide, PRN for loose stool
i.v. fluids, PRN for hydration

PO = by mouth; PRN = as needed; Q4 = every 4 h; Q6 = every 6 h.

homeless); employment status (unemployed, part-time, or full-time); support system as determined by the patient ("good" vs. "poor"); severity of opioid use disorder (as defined by DSM-V criteria); duration of opioid use in months (total overall time since initial use, including periods of sobriety and relapses); primary route of use (as reported by the patient); history of inpatient OUD treatment; history of outpatient OUD treatment; prior buprenorphine, methadone, or naloxone prescription; longest prior length of sobriety; concurrent substance use; medical complications during admission; initial COWS score; total dose of buprenorphine-naloxone received during admission (milligrams); length of time in the CDU (hours); initial reason for visit; if naloxone was administered; follow-up in clinic; and the number of clinic visits. The data were summarized using descriptive methods.

RESULTS

From September 1, 2017 to February 6, 2018, 18 different patients were placed in the CDU for OUD and evaluated by the medical toxicology service under this pilot program. One of the patients was evaluated in the CDU on two separate occasions, so our results have 19 data points. There were no patients admitted to the CDU that did not meet criteria for diagnosis of OUD during the study period; this is a reflection of the fact that, during these first 5 months of the pilot program, patients were placed in the CDU only after the ED provider had conferred with a medical toxicology fellow and confirmed that the patient had an OUD diagnosis.

The median age of all subjects was 36 years (interquartile range [IQR] 29–52 years); no patient was younger than 20 years, and 32% (6/19) were older than 50 years. Seventy-four percent were male (14/19), 16% (3/19) were employed (either part-time or full-time), and 47% (9/19) were homeless (Table 2). The most common substance used was heroin (84%, 16/19) and the primary method of use was intravenous (56%). Cocaine was the most common co-occurring substance of use (53%, 10/19), followed by benzodiazepines and alcohol equally (42%, 8/19), and marijuana (31%, 6/19) (Table 3); the sum of these percentages exceeds 100%, as some of the patients used three or more substances concurrently. The mean number of DSM-V criteria for OUD was 9, indicating severe disease, and the mean number of months of opioid use was 140 (range 9–564).

In this cohort, 16% (3/19) had previously received inpatient treatment and 32% (6/19) had received outpatient treatment. Forty-two percent (8/19) had previously received a prescription for buprenorphine-naloxone or methadone. Half of the subjects answered questions about prior periods of sobriety, and the mean length of sobriety in this subset was 25 months (range 0–144).

Twenty-six percent (5/19) of patients placed in the CDU had initially presented to the ED after an acute opioid overdose, and almost 58% (11/19) were seeking treatment as their primary reason for presenting to the ED (Table 4). Two patients were placed in the CDU for drug-related medical complications—one with a retained foreign body and one with multiple abscesses. The median initial COWS score at the time of induction was

Table 2. Patient Demographics

Characteristics	n or (%)	IQR or 95% CI
Age (M)	36	29–52
% Male	14 (74)	51–89
Homeless	9 (47)	27–68
Employed	3 (16)	5–38
Family support	9 (47)	27–68

CI = confidence interval; IQR = interquartile range.

Table 3. Patient Substance Use

Substances	n (%)	95% CI
Alcohol	8 (42)	23–64
Amphetamines	1 (5)	0–26
Benzodiazepines	8 (42)	23–64
Buprenorphine	4 (21)	8–44
Cocaine	10 (53)	32–73
Heroin	16 (84)	62–95
Methadone	0 (0)	0–17
Miscellaneous	0 (0)	0–17
Opioid pills	8 (42)	23–64
THC	6 (31)	15–54

CI = confidence interval; THC = tetrahydrocannabinol.

Table 4. Presentation Data

Reason for Visit	n (%)	95% CI
Overdose	5 (26)	11–49
Withdrawal	7 (37)	19–59
Seeking treatment	11 (58)	36–77
Medical complications	2 (11)	2–33
Naloxone administered	11 (58)	36–77
Induced in hospital	18 (95)	74–100
Followed up in clinic	12 (63)	41–81

CI = confidence interval.

10 (IQR 0–14) and the median total dose of buprenorphine-naloxone that was administered was 8/2 mg (IQR 8–12). Twenty-three hours was the median amount of time spent in the CDU and ED combined (IQR 17–25) (Table 5). One subject did not develop severe enough withdrawal symptoms to be safely induced on buprenorphine-naloxone, because he left the CDU against medical advice after only 9 h. Prior to leaving the CDU, he was given an appointment for MAT clinic, but he did not follow up.

Approximately 63% (12/19) of the patients kept their initial follow-up appointment in MAT clinic. Nine were still active in clinic at 30 days, and 4 were active at 6 months. Patients that went to clinic initially but eventually were lost to follow-up attended six clinic appointments on average. Two patients were discharged from clinic for concerns for buprenorphine diversion or continued heavy illicit substance use.

DISCUSSION

This study describes two new strategies for managing OUD patients in the ED. The first strategy was to utilize the CDU (observation unit) in the ED for buprenorphine inductions in a population that is less likely to complete home inductions. By allowing patients to progress through early withdrawal in a monitored setting with symptomatic treatment, we aimed to increase the number of patients successfully initiated on medication at their index medical visit, and thus to increase the number of patients who would follow up for outpatient care. The second strategy was to establish continuity of care between the ED and the MAT clinic, because the same doctors who evaluated the patients in the ED-observation unit were also those providing care in the clinic. Though we were unable to examine the effect of this latter strategy with objective data, many patients spontaneously verbalized relief and gratitude for this continuity of care, especially early in the course of treatment. Overall, this protocol-driven practice allows us to induce more patients on buprenorphine prior to leaving the ED than would be possible if we only induced patients who presented in moderate-to-severe withdrawal. Recent literature has shown that ED-initiated buprenorphine is not only cost effective but also increases the likelihood of follow-up and treatment involvement at 1 month when compared with ED referral-only strategies and motivational interviewing with a referral (7,13,14).

Table 5. CDU Data

CDU Data	Median	IQR
Initial COWS	10	0–14
Total buprenorphine received	8	8–12
Hours in unit	23	17–25

CDU = Clinical Decision Unit; COWS = Clinical Opioid Withdrawal Scale; IQR = interquartile range.

Our subjects were primarily male and in their 30s. Most of the patients in this cohort were unemployed (83%) and reported they did not have a “good” social support system, and nearly half were homeless. This is significant because unstable housing and unemployment decrease the odds of remaining in treatment when compared with individuals with housing, employment, and private insurance (15,16). Another factor that has been associated with decreased treatment retention is heroin use, when compared with prescription drug misuse; in this sample, more than 80% were heroin users and over 80% were polysubstance users (17).

In this population, approximately 63% (12/19) of patients went to their initial follow-up appointment in clinic. Forty-seven percent (9/19) were still attending clinic at 30 days, and 21% (4/19) were attending at 6 months. These percentages are lower than other studies that have analyzed clinic follow-up and treatment retention after ED-initiated buprenorphine, and this difference might be explained by small sample size, variance in study populations, and other barriers to follow-up that were not analyzed in this study.

Over 60% of subjects presented to the hospital in acute withdrawal or after an overdose, and more than 50% presented with the intention of seeking treatment. The median initial COWS score was 10, which correlates to mild withdrawal. This could indicate that several of the patients benefitted from the additional observation time in the CDU, because at least moderate withdrawal is recommended for buprenorphine induction to avoid precipitated withdrawal. The median total buprenorphine-naloxone dose was 8/2 mg, which is the maximum recommended dose in the first 24 h.

Limitations

The limitations of the study include small sample size and single-center data collection. This limited our analyses to descriptive statistics and decreased the generalizability of our results. Another limitation of the study is that it is a retrospective review, therefore we did not have a comparison group, so we cannot draw conclusions about how this ED-CDU protocol may compare with others.

CONCLUSIONS

As substance use-related ED visits continue to steadily increase, the medical community must continue to develop new ways to increase patients’ access to care. Utilizing the ED-CDU and making addiction providers available in the ED are two novel strategies to help

combat the opioid epidemic. Further studies are necessary to develop additional ways to identify and treat opioid use disorder in the ED, and to further solidify the benefits of ED-initiated buprenorphine.

SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jemermed.2019.03.029.

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ARTICLE SUMMARY

1. Why is this topic important?

With the severity of the opioid epidemic increasing, it is important that the medical community continues to develop innovative methods to combat the issue by increasing awareness and access to treatment.

2. What does this study attempt to show?

This study demonstrates an original procedure of utilizing the clinical decision unit/observation unit in the emergency department (ED) to start medication-assisted treatment for patients with opioid use disorder.

3. What are the key findings?

Two key findings are: over 60% of the patients went to their initial follow-up appointment after receiving buprenorphine in the clinical decision unit of the ED; and the median initial Clinical Opioid Withdrawal Scale score was 10, which correlates to mild withdrawal. This could indicate that several patients in this population benefitted from the additional observation time.

4. How is patient care impacted?

This novel protocol allows us to induce more patients on buprenorphine than would be possible if we only induced patients who presented in moderate-to-severe withdrawal. Also, patients have reported that the continuity of care between the ED and clinic has been favorable.