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Journal

Journal of Emergency Medicine, 64(2)

ISSN

0736-4679

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Publication Date

2023-02-01

DOI

10.1016/j.jemermed.2022.12.004

Peer reviewed

The Journal of Emergency Medicine, Vol. 64, No. 2, pp. 129–135, 2023

0736-4679/$ - see front matter

https://doi.org/10.1016/j.jemermed.2022.12.004

Original Contributions

Emergency Department-Initiated Buprenorphine Treatment in a Population with a High Rate of Homelessness: An Observational Study

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□ **Abstract—Background: Buprenorphine is an effective treatment for opioid use disorders. A previous randomized trial comparing emergency department (ED)-initiated buprenorphine to standard care showed dramatic improvement in follow-up. This is encouraging, but must be replicated to understand the generalizability of buprenorphine treatment. Objectives: Evaluate the efficacy of an ED-initiated buprenorphine protocol similar to a previous randomized trial in a different population. Methods: This ED-based descriptive study described the results of a project implementing an opioid use disorder treatment protocol that included buprenorphine. Patients with opioid use disorder were offered treatment with buprenorphine, a buprenorphine prescription whenever possible, and a follow-up visit to a clinic providing addiction treatment. The primary outcome was engagement in formal addiction treatment 30 days after the index visit. Results: Of the 210 patients who accepted referral for outpatient medication-assisted treatment, 95 (45.2%) achieved the primary outcome. Two-thirds of these patients received a buprenorphine prescription at discharge; 40% were homeless. A regression analysis revealed one statistically significant predictor of the primary outcome: patients who were housed were 2.49 times more likely to engage in opioid use disorder treatment than patients who were homeless ($p = 0.02$). Conclusions: In this descriptive study of an ED-initiated buprenorphine protocol, follow-up was less than that reported in a previous randomized controlled trial. Two important differences between our study and the randomized trial are the high rate of homelessness and the fact that not every patient received a prescription for buprenorphine. The efficacy of ED-initiated treatment may depend on certain population characteristics.**

□ **Keywords—buprenorphine; homelessness; opioid use disorder**

Meetings: Preliminary results were reported at the 2022 American College of Emergency Physicians meeting in New Orleans.

Introduction

The opioid epidemic is a significant source of morbidity and mortality in the United States. Poor outcomes have steadily increased over the last two decades and have recently accelerated during the COVID epidemic (1–4). Medication-assisted treatment (MAT) is a safe and effective treatment option for opioid use disorder (OUD) (5–8). Emergency departments (EDs) are an important setting in which to engage at-risk populations, so models were developed to incorporate MAT in that setting.

One of these models was tested during an important trial. Opioid-dependent patients were randomized into three groups: referral to treatment; counseling and referral; and buprenorphine, counseling, and referral. The primary outcome was engagement in treatment 30 days

RECEIVED: 6 August 2022; FINAL SUBMISSION RECEIVED: 20 November 2022;
ACCEPTED: 12 December 2022

after randomization. The buprenorphine intervention was successful: 78% of patients in the buprenorphine group were engaged in addiction treatment 30 days after the intervention, an approximate 40% absolute increase compared with the other groups (9).

This dramatic improvement is encouraging but must be replicated in varied settings to understand the true effect size and generalizability of buprenorphine treatment. We attempted to replicate the results of the buprenorphine treatment group in a different ED population.

Methods

Treatment Model

Our hospital, located in San Diego, California, was one of 52 hospitals selected to participate in the California Bridge Program. As described in detail in a previous work, this model features a low-threshold buprenorphine treatment approach, active patient navigation from ED care to outpatient addiction treatment, and harm-reduction interventions like naloxone (10). This study presents data from a single hospital subset of the Bridge Program.

Emergency physicians were encouraged to obtain their x-waivers, which allowed for the prescription of buprenorphine outside the hospital. Buprenorphine dosing was flexible and was based on clinical judgment. We refer to buprenorphine in this work as it is the most used term, but providers utilized combination products containing buprenorphine and naloxone. If no x-waivered provider was available to provide an outpatient buprenorphine prescription, patients were encouraged to return to the ED the following day for re-dosing. A substance abuse navigator (SUN), stationed in the ED during working hours, coordinated connection to outpatient care. With patients for whom a referral was placed during off hours, the SUN contacted them the next day to facilitate follow-up.

Setting and Participants

This study was conducted at a large urban teaching hospital with an annual ED census of approximately 45,000, and 381 inpatient beds. This was a convenience sample. Physicians, nurses, and Emergency Medical Services personnel identified patients for screening. Opioid overdose, opioid withdrawal, or patient self-identification of opioid use triggered inclusion. Providers then entered a SUN consult order in the electronic medical record. Although some patients were identified separately by the SUN while reviewing charts during working hours, most patients who declined a referral were not tracked. Our local institutional review board approved our study, and the requirement for consent was waived. We included inpatients and patients discharged from the ED.

Measurements and Outcomes

The senior author or the SUN prospectively collected data. Follow-up data were obtained through chart review, confirmation of contact by a community clinic, or by calling the patient. As in the D'Onofrio study, the primary outcome was engagement in formal addiction treatment on the 30th day after enrollment (9). We defined formal addiction treatment as attending an outpatient treatment program, office-based practice, inpatient or residential services, or engaging in MAT through another outpatient service, such as their primary care provider. If after reviewing the chart, calling the patient, and calling their outpatient clinic, there was no evidence of follow-up, we coded the patient as not meeting the primary outcome.

Data Analysis

We report descriptive characteristics for all patients approached, for those who accepted referral for MAT, and for those who were engaged in addiction treatment at 30 days. Predictive factors for the primary outcome were assessed using unadjusted (single predictor) and adjusted (multi-predictor) logistic regression. We included only patients who accepted referrals for outpatient treatment. Analyses were performed using SPSS for Mac version 26 (IBM Corp., Armonk, NY).

Results

Between April 1, 2019 and July 31, 2020, 260 patients were approached to undergo MAT. The descriptive characteristics of the patients, including demographics, housing and insurance status, and buprenorphine utilization, are shown in Table 1. Of the 210 patients who accepted referral for outpatient MAT, 95 (45.2%) achieved the primary outcome.

The goal of the program was to offer all patients a buprenorphine prescription at discharge, but this was achieved in only 68% of the patients who accepted a MAT referral. Among those who did not receive a prescription at discharge, two-thirds of the time there was no x-waivered provider available; the other third had next-day follow-up with a prescriber and declined ED prescription. Patients who did not receive an ED prescription for buprenorphine had a 30-day follow-up rate of 37.5%, compared with 47.5% for those with a prescription. Most patients (80.8%) received buprenorphine in the ED. Among those who did not, 75% were ineligible due to intoxication or altered mental status; the rest declined.

The most common reason for ED visits in these subjects was opioid withdrawal at 38%; 21% were opioid-related visits, 13% were overdose visits, and 11% were

Table 1. Patient Characteristics

	All Patients Approached (n = 260)	Patients who Accepted Referral for MAT Treatment (n = 210)	Engaged in Addiction Treatment at 30 Days (n = 95)	Not Engaged in Addition Treatment at 30 Days (n = 115)
Median age (IQR)	35.0 (17)	35.0 (17)	34.0 (17)	37.0 (17)
Female (%)	84 (32.3)	73 (34.8)	38 (40.0)	35 (30.4)
Ethnicity/race (%)				
White	176 (67.7)	143 (68.1)	56 (58.9)	87 (75.7)
Hispanic	59 (22.7)	47 (22.4)	27 (28.4)	20 (17.4)
Black	6 (2.3)	4 (1.9)	3 (3.2)	1 (0.9)
Other	11 (4.2)	11 (5.2)	6 (6.3)	5 (4.3)
Housing (%)				
Homeless	102 (39.2)	83 (39.5)	24 (25.3)	59 (51.3)
Incarcerated	10 (3.8)	1 (0.5)	1 (1.1)	0 (0.0)
Other	5 (1.9)	2 (1.0)	1 (1.1)	1 (0.9)
Stably housed	133 (51.2)	118 (56.2)	67 (70.5)	51 (44.3)
Co-existing mental health disorder (%)*	20 (7.7)	19 (9.0)	5 (5.3)	14 (12.2)
Received buprenorphine at index visit	210 (80.8)	176 (83.8)	83 (87.4)	93 (80.9)
Buprenorphine prescription at discharge (%)	152 (58.5)	142 (67.6)	66 (69.5)	76 (66.1)
Insurance status (%)				
Medicare	13 (5.0)	9 (4.3)	5 (5.3)	4 (3.5)
No insurance	17 (6.5)	11 (5.2)	5 (5.3)	6 (5.2)
Private	41 (15.8)	37 (17.6)	16 (16.8)	21 (18.3)
Medicaid	173 (66.5)	147 (70.0)	65 (68.4)	82 (71.3)

* Data for co-existing mental health disorders and insurance status were missing for 19% and 6% of patients, respectively. Missing data for all other categories were < 4%.
MAT = medication-assisted treatment; IQR = interquartile range.

non-opioid-related visits. Providers were encouraged to engage patients who were interested in treatment even if they were not in withdrawal; 11% of the enrolled patients met this criterion.

In the multivariable logistic regression analysis, only housing status had a statistically significant association with the 30-day follow-up (Table 2). Housed patients were more likely to be followed up, with an odds ratio of 2.5 (1.2–5.2). Age, sex, race, co-existing mental health disorder, buprenorphine prescription at discharge, and insurance status were not associated with the primary outcome.

Discussion

In this observational study, an OUD treatment program that included buprenorphine, 45% of patients were followed up at 30 days; this is less than the 78% reported

Table 2. Logistic Regression Analyzing Predictive Factors for Engagement In Opioid Use Disorder Treatment 30 Days After Initial Encounter

Predictor	Univariable OR (95% CI)	*p*-Value	Multivariable OR (95% CI)	*p*-Value
Age (per year)	1.00 (0.98–1.02)	0.97	1.00 (0.97–1.03)	0.81
Female	1.50 (0.84–2.65)	0.14	1.70 (0.83–3.41)	0.15
Race				
Non-white	2.15 (1.17–3.94)	0.013	1.80 (0.87–3.75)	0.12
Housing				
Housed	2.79 (1.57–4.95)	< 0.001	2.49 (1.20–5.20)	0.02
Co-existing mental health disorder	0.35 (0.11–0.93)	0.04	0.37 (0.12–1.18)	0.37
Buprenorphine given in ED	1.56 (0.72–3.37)	0.26	1.66 (0.62–4.45)	0.31
Buprenorphine prescription at discharge	1.14 (0.64–2.04)	0.67	0.79 (0.36–1.70)	0.54
Insurance status	Overall	0.85		0.84
Medicare	1.58 (0.41–6.1)	0.51	1.62 (0.33–7.90)	0.55
No insurance	1.05 (0.31–3.60)	0.94	1.69 (0.35–8.09)	0.51
Private health insurance	0.96 (0.46–2.00)	0.92	0.98 (0.38–2.51)	0.97
Medicaid	Reference			

OR = odds ratio; CI = confidence interval; ED = emergency department.

in the randomized D'Onofrio trial (9). Other observational studies implementing buprenorphine protocols in EDs have had similar follow-up rates. Hu et al. reported 49 patients who screened positive for OUD in Canadian EDs (11). The majority (88%) received buprenorphine in the ED; these patients were referred to an addiction clinic where they could receive a buprenorphine prescription. One-month follow-up was not recorded, but 6-month follow-up was 37% (11).

LeSaint published a chart review of 77 patients who were administered buprenorphine for opioid withdrawal in a California academic center in 2017–2018; 1-week follow-up was 30% (12). Two papers reported on the experience in South Carolina of an ED buprenorphine program. In one retrospective review, 231 patients were administered buprenorphine in the ED; of these, 46% were followed up in 30 days (13). In the second study, an analysis of prospectively collected data, among 522 patients who received buprenorphine in the ED, the 30-day follow-up was 43% (14).

The difference between D'Onofrio's randomized trial and the follow-on observational studies is not surprising: randomized clinical trials tend to evaluate interventions under ideal conditions among highly selected populations, whereas observational studies examine effects in "real-world" settings. All patients in the randomized trial left the department with a supply of buprenorphine until the outpatient follow-up, whereas in the observational studies, patients left with, at best, a prescription. However, this was not universal; in the Jennings study, only 2% left with a prescription, and in this analysis, 68% of those who accepted a referral for MAT did (14). This might have hindered follow-up rates, although in our regression analysis, it was not associated with the primary outcome.

The lack of an x-waivered provider was the main reason that patients did not receive a buprenorphine prescription in our study. Despite aggressively encouraging providers to get the x-waiver, it is understandable why some providers did not take the required 8-h training sessions. The x-waiver requirement has been identified as a key barrier to prescribing (15). We agree that this requirement should be reconsidered (16).

Another difference between our study and the original trial is the high rate of homelessness in our study population. San Diego is ranked 10th nationally in homelessness per capita (17). The rate of homelessness in our study was 41%, compared with 9% in the D'Onofrio study and 14% in the Hu analysis (the homelessness rate was not reported in other studies) (9,11). Homeless patients have numerous barriers to access, which likely decreases the probability of follow-up (18,19). This variable was the only predictor that was a statistically significant predictor of follow-up in our regression analysis.

Lastly, D'Onofrio study subjects had a more formal intervention. Patients in the study underwent a formal "Brief Negotiation Interview" by a trained research as-

sociate (9). This interview includes a total of 27 critical actions designed to tailor intervention feedback to an individual patient. In our study, it was a brief process where we simply ascertained interest, provided buprenorphine, Narcan, brief counseling, and connected them to outpatient follow-up. This may have contributed to decreased follow-up, but likely provides a more realistic picture of what most EDs can replicate. Grant funding for our project provided only for a SUN; thus, EDs that can afford a SUN could likely replicate our process.

We used 30-day follow-up as our primary outcome, as this has been a common outcome among other studies and allows for comparing effectiveness. However, it should be noted that although the D'Onofrio study showed a benefit of buprenorphine at 30 days, there was no difference in the follow-up at 6 and 12 months (20). It is unrealistic for a single ED intervention of a chronic disease to effect patient-oriented outcomes at 6 and 12 months; however, ideally, ED interventions lead to outpatient interventions that cause more durable effects.

Limitations

It is important to note that although this single-center observational study did not perform as well as the original randomized controlled trial, the results of the D'Onofrio study were not invalidated. There was no comparison group in our study; therefore, follow-up may have been worse if buprenorphine was not available. This study illustrates what happens in a real-world setting in a population with unique characteristics when a protocol that was successful in a single-center randomized controlled trial was implemented in a new setting.

Conclusions

In a population with a high rate of homelessness treated for OUD with ED-initiated buprenorphine, the 30-day follow-up was 45%. This was less than that in a previously published randomized controlled trial, but similar to other observational trials of ED-initiated buprenorphine. The protocol studied aimed to provide all patients with a prescription for buprenorphine at discharge, but this was achieved in only 68% of the patients. Lack of an x-waivered provider was the most common reason for not providing patients with a prescription.

Acknowledgment

This research was funded by a California Bridge Grant sponsored by the Public Health Institute (PHI.org) and funded through the Substance Abuse Mental Health Services Administration (SAMHSA.gov).

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ARTICLE SUMMARY

1. Why is this topic important?

A previous randomized trial testing an emergency department (ED)-initiated buprenorphine treatment program for opioid use disorder dramatically improved 30-day follow-up. It is important to replicate these findings in different settings.

2. What does this study attempt to show?

This study attempts to implement the ED-initiated buprenorphine treatment program that was so successful in the randomized trial.

3. What are the key findings?

Thirty-day follow-up was 45%; this was less than in the randomized trial, but similar to other observational studies. Our population had a high rate of homelessness, which was associated with decreased follow-up in regression analysis. The X-waiver requirement was a barrier to giving patients a buprenorphine prescription at discharge.

4. How is patient care impacted?

The best available evidence still supports including buprenorphine in ED-based opioid use disorder treatment; however, other important patient and facility characteristics will also affect follow-up rates.