

# Evaluation of a Statewide Policy to Improve Post-Overdose Care in Emergency Departments and Subsequent Treatment Engagement

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## ABSTRACT

**OBJECTIVE:** To evaluate the impact of a statewide treatment standards policy for post-overdose emergency department (ED) care on services provided and subsequent treatment engagement.

**METHODS:** This pre-/post-study used electronic health record data and surveillance data from Rhode Island. Outcomes were compared for patients attending EDs for opioid overdose before (03/1/2015–02/28/2017) and after (04/01/2017–03/31/2021) policy release.

**RESULTS:** Overall, 2,134 patients attended 2,891 ED visits for opioid overdose. Compared to pre-policy, visits post-policy more often included initiation of buprenorphine in or from the ED (<1% vs. 3%,  $p<0.01$ ), provision of a take-home naloxone kit or prescription (41% vs. 58%,  $p<0.01$ ), and referral to treatment (0% vs. 34%,  $p<0.01$ ). Provision of behavioral counseling in the ED and initiation of treatment within 30 days of the visit were similar during the two periods.

**CONCLUSIONS:** Statewide post-overdose treatment standards may improve provision of some ED services. Additional strategies are needed to improve subsequent treatment engagement.

**KEYWORDS:** Overdose, opioid use disorder, emergency medicine, health policy, naloxone

## INTRODUCTION

In response to the ongoing opioid overdose crisis, state and system-level organizations have implemented policies and programs to improve the quality of care delivered to patients with opioid use disorders (OUDs). Examples include quality improvement initiatives,<sup>1-3</sup> financial incentives for development of OUD clinical pathways,<sup>4</sup> and city or state supported or mandated provision of OUD services.<sup>5-10</sup> Many of these policies focus on emergency department (ED) visits related to an opioid overdose, a clinical setting that provides an opportunity to prevent future overdose and promote treatment engagement.

Rhode Island has one of highest rates of overdose death in the United States (US),<sup>11</sup> and has been a leader in developing innovative strategies to address the overdose crisis.

In March 2017, the Rhode Island Department of Health (RIDOH) released a targeted policy on OUD care: Levels of Care for Rhode Island Emergency Departments and Hospitals for Treating Overdose and Opioid Use Disorder.<sup>12</sup> This policy standardized the approach to post-overdose care in EDs and was centered around four key components based on evidence and expert consensus: take-home naloxone, behavioral counseling at the time of overdose (including peer recovery support), referral to addiction treatment, and offering medications for OUD (specifically buprenorphine).<sup>13</sup> The policy was the first of its kind, and 13 other states now have treatment mandates with varying scope.<sup>5</sup> Published quality data demonstrated a promising increase in OUD services following the release of the policy, particularly among institutions without previously established opioid overdose services.<sup>14</sup> However, this study relied on the institutions' self-reported data, and a more rigorous analysis utilizing patient-level objective data is warranted to fully assess policy impact.

The purpose of this current study was to utilize electronic health record (EHR) and state administrative treatment databases to estimate the effectiveness of the policy on improving provision of the four key components of post-overdose ED care: (1) take-home naloxone, (2) behavioral counseling, (3) buprenorphine prescribing, and (4) referral to OUD treatment. The impact on post-overdose treatment engagement in the six months following an opioid overdose ED visit was also examined, as increasing treatment engagement is one of the goals of ED OUD care.

## METHODS

### Study sample, design, and data sources

This was a retrospective pre-/post-study of ED patients admitted for an opioid overdose between May 1, 2015, and March 31, 2021. Data were utilized from three EDs (an academic, tertiary care Level 1 trauma center; an academic affiliated community hospital; and a community hospital) within the state's largest health system, which provides care for over half of patients presenting to ED visits for opioid overdose annually in Rhode Island.<sup>15</sup> Cases were identified using the US Centers for Disease Control and Prevention (CDC) opioid overdose case definition.<sup>16</sup> EHR data were deterministically linked to RIDOH's Prescription Drug

Monitoring Program (PDMP) data and the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities, and Hospitals Behavioral Health On-line Database (BHOLD). PDMP data were used to identify prescriptions for FDA-approved buprenorphine medications for OUD from April 1, 2016, to January 31, 2022. BHOLD data were used to obtain engagement in treatment, including methadone, detoxification, intensive outpatient, outpatient, and residential treatment, from January 1, 2014, to January 31, 2022. ED patients who were out-of-state residents were excluded from all analyses, as they were unlikely to receive follow-up care in Rhode Island (10% of opioid overdose ED visits during the study period). This study was approved by the clinical sites' and RIDOH Institutional Review Boards.

### Key measures

Four primary outcomes of post-overdose care in the ED and one primary outcome of post-overdose OUD treatment initiation were assessed. Post-overdose ED care outcome measures included (1) provision of behavioral counseling during the ED visit, (2) administration of buprenorphine during the ED visit or provision of a prescription at discharge, (3) provision of take-home naloxone kit or prescription at discharge, and (4) provision of a referral to OUD treatment. These four types of post-overdose ED care services were the primary focus of the statewide treatment standards policy in Rhode Island. Behavioral counseling included psychiatry, social work, and/or peer recovery specialist consultations. Provision of services, prescriptions, and referrals were defined based on electronic orders placed in the EHR. All post-overdose ED care variables were defined using EHR data. Our primary outcome of subsequent OUD treatment engagement was initiation of any OUD treatment within (1) 30 days or (2) 180 days of the ED visit, among patients not engaged in OUD treatment at the time of ED admission. OUD treatment initiation was defined as any buprenorphine dispensed per the PDMP data or any new entry to an OUD treatment program (methadone, detoxification, intensive outpatient, outpatient, and residential) per the BHOLD data within the specified timeframes. Naltrexone prescriptions dispensed per the PDMP data were not included in the definition of OUD treatment engagement because prescriptions provided for OUD could not be differentiated from those for alcohol use disorder, and a review of the diagnoses associated with recent naltrexone prescriptions suggests that most are for alcohol use disorder. Patients who initiated OUD treatment during their ED visit but did not subsequently engage in OUD treatment outside of the ED did not meet our outcome definition.

Baseline measures defined at the time of ED admission included patient age, race, ethnicity, sex, health insurance type, active engagement in OUD treatment at the time of overdose, discontinuation of OUD treatment in the 30 days prior to overdose, mode of arrival to the ED, and mode of

discharge from the ED. Patients were classified as actively engaged in OUD treatment at the time of overdose if PDMP records indicated that they had been dispensed a buprenorphine prescription prior to the day of overdose and still had enough days' supply on the day of overdose, or if BHOLD records indicated that they had initiated any OUD treatment (i.e., methadone, detoxification, intensive outpatient, outpatient, or residential treatment) prior to the day of overdose and were still in care. Patients were classified as discontinuing treatment in the 30 days prior to overdose if PDMP records indicated they were dispensed a buprenorphine prescription and the days' supply covered any of the 30 days prior to but excluding the day of the ED admission, or BHOLD records indicated that they were in treatment at some point during the 30-day period but had been discharged from OUD treatment prior to the day of the ED admission.

### Statistical analyses

For this analysis, the pre-policy period was defined as May 1, 2015, through February 28, 2017, and the post-policy period as April 1, 2017, through March 31, 2021. The pre-period start date was selected based on the timing of an EHR data system change, and the post-period end date was selected based on data availability when the analysis dataset was created. Visits from March 2017 were excluded from these analyses because the policy was released that month. Analyses were conducted using SAS version 9.4 (SAS Institute; Cary, North Carolina) and significance-level  $\alpha=0.05$ .

Baseline sociodemographic and clinical characteristics of patients admitted during the pre- and post-policy periods were compared using Chi-squared tests. Additionally, Chi-squared tests were used to compare the percentage of ED visits with each primary outcome by policy period (pre- vs. post-policy). Buprenorphine treatment initiation and any OUD treatment initiation were limited to visits occurring after April 30, 2016, to ensure complete data on treatment at the time of admission were available for all visits.

To describe trends in our primary outcomes over time, the monthly percentage of visits with each primary outcome was plotted. However, an interrupted time series analysis was not conducted because, although the policy was released in March 2017, the study EDs had implemented components of the policy standards between 2014 and 2017, specifically take-home naloxone and consultations with a community-based peer recovery specialists.<sup>17,18</sup> It was known that EDs started ramping up services in anticipation of the policy roll-out.

## RESULTS

### Characteristics of ED visits

Between May 1, 2015, and March 31, 2021, 2,134 unique Rhode Island residents attended 2,891 ED visits for opioid overdose, excluding 254 visits from March 2017 (Table 1).

**Table 1.** Sociodemographic and clinical characteristics among Rhode Island residents attending ED visits for opioid overdose within the state's largest health system, overall and by time-period\*

	Overall n=2,891 n (%)	Pre-policy n=956 n (%)	Post-policy n=1,935 n (%)	P-value†
<b>Age group (years)</b>				
<18	9 (<1)	3 (<1)	6 (<1)	0.09
18–24	345 (12)	119 (12)	226 (12)	
25–34	989 (34)	332 (35)	657 (34)	
35–44	679 (23)	194 (20)	485 (25)	
45–54	482 (17)	179 (19)	303 (16)	
55–64	272 (9)	87 (9)	185 (10)	
≥65	115 (4)	42 (4)	73 (4)	
<b>Race and ethnicity</b>				
Hispanic (any race)	440 (15)	139 (15)	301 (16)	0.25
Non-Hispanic Black	230 (8)	78 (8)	152 (8)	
Non-Hispanic White	2,151 (74)	723 (76)	1,428 (74)	
Non-Hispanic other	70 (2)	16 (2)	54 (3)	
<b>Sex</b>				
Female	870 (30)	270 (28)	600 (31)	0.13
Male	2,021 (70)	686 (72)	1,335 (69)	
<b>Health insurance type</b>				
Medicaid	1,124 (39)	309 (32)	815 (42)	<0.01
Medicare	342 (12)	148 (15)	194 (10)	
Private	1,074 (37)	367 (38)	707 (37)	
Other	42 (2)	10 (1)	32 (2)	
None	309 (11)	122 (13)	187 (10)	
<b>In any OUD treatment at the time of overdose‡</b>				
Yes	557 (24)	78 (19)	479 (25)	0.01
No	1,792 (76)	336 (81)	1,456 (75)	
<b>Discontinued OUD treatment in the 30 days before overdose§</b>				
Yes	204 (9)	28 (7)	176 (9)	0.30
No	2,107 (91)	348 (93)	1,759 (91)	
<b>Mode of arrival to ED</b>				
Emergency medical services	2,650 (92)	872 (91)	1,778 (92)	0.82
Walk-in	219 (8)	76 (8)	143 (7)	
Other	22 (1)	8 (1)	14 (1)	
<b>Mode of discharge from ED</b>				
Admitted to hospital	369 (13)	154 (16)	215 (11)	<0.01
Discharged home	1,992 (69)	655 (69)	1,337 (69)	
Left against medical advice	270 (9)	56 (6)	214 (11)	
Left without being seen	91 (3)	27 (3)	64 (3)	
Transferred to another facility	53 (2)	14 (1)	39 (2)	
Other	116 (4)	50 (5)	66 (3)	

Abbreviations: ED, emergency department; OUD, opioid use disorder.

\* Pre-policy period included visits between May 1, 2015, and February 28, 2017. Post-policy period included visits between April 1, 2017, and March 31, 2021. Analysis excluded n=254 visits from March 2017.

† Chi-squared test.

‡ Limited to people who were admitted after April 30, 2016.

§ Limited to people who were admitted after May 31, 2016.

The three study hospitals were each certified as “Level 1” after release of the policy, indicating provision of comprehensive care for overdose and OUD.<sup>12</sup> Most visits were for patients aged 25 to 44 years (58%) and of non-Hispanic White race/ethnicity (74%) and male sex (70%). Overall, 39% of visits were among patients with Medicaid insurance, while 37% were for among those with private insurance. Approximately 24% of visits were among patients actively engaged in OUD treatment at the time of opioid overdose, while 9% discontinued OUD treatment in the 30 days prior to overdose. Most visits (92%) were for patients transported to the ED by emergency medical services. The patient was discharged home at the conclusion of most ED visits (69%); however, 13% of visits resulted in admission to the hospital, and 9% concluded with the patient leaving against medical advice.

Patients' health insurance type (p<0.01), active engagement in OUD treatment at the time of opioid overdose (p=0.01), and mode of discharge from the ED (p<0.01) differed pre- and post-policy. Compared to visits during the pre-policy period, those during the post-policy period were more likely to be among patients with Medicaid insurance (42% vs. 32%), actively engaged in OUD treatment at the time of opioid overdose (25% vs. 19%), and who left the ED visit against medical advice (11% vs. 6%). In contrast, compared to pre-policy, visits post-policy were less likely to result in hospital admission (11% vs. 16%).

### Primary outcomes

Overall, based on orders placed in their EHR, patients received behavioral counseling during just under half of ED visits (47%) (Table 2). Buprenorphine was administered during the ED visit, or a buprenorphine prescription was provided at discharge, for patients at 2% of ED visits. At discharge, patients at 52% of visits were either given a naloxone kit or a naloxone prescription (of whom 93% received a kit), while patients at 23% of visits were referred to OUD treatment. Among patients not engaged in OUD treatment at the time of the ED visit, 17% initiated treatment within 0–30 days, and 21% initiated treatment within 31–180 days.

After policy release, provision of buprenorphine increased (3% post vs. <1% pre, p<0.01), as did provision of a naloxone kit or prescription at discharge (58% post vs. 41% pre, p<0.01), and referral to OUD treatment (34% vs. 0%, p<0.01). Provision of behavioral counseling during the ED visit (p=0.17) and initiation of OUD treatment within 180 days of the ED visit (p=0.38) were not significantly different during the two periods. Monthly trends in

the percentage of ED visits with each primary outcome are provided in **Figure 1**.

Overall, among 1,356 ED visits where any type of behavioral counseling was provided, 352 patients (26%) received a psychiatry consultation, 628 (46%) received a social work

consultation, and 851 (63%) received a peer support consultation. The percentage of patients with psychiatry (p=0.66) and peer support (p=0.63) consultations during the ED visit were similar pre- and post-policy release. However, visits post-policy were more likely to involve a social work consultation (30% post vs. 6% pre, p<0.01).

Among 686 visits for patients who were not engaged in OUD treatment at the time of their ED visit and subsequently initiated treatment within 180 days, 378 initiated buprenorphine (55%), 306 initiated methadone (45%), 138 initiated detoxification (20%), 47 initiated intensive outpatient (7%), 66 initiated outpatient (10%), and 146 initiated residential (21%) treatment. The type(s) of treatment initiated were similar during the pre- and post-policy periods (p>0.05 for each type), except for detoxification which decreased from 28% to 18% (p=0.02).

**Table 2.** Primary outcomes among Rhode Island residents attending ED visits for opioid overdose within the state's largest health system, overall and by time-period\*

	Overall n=2,891 n (%)	Pre-policy n=956 n (%)	Post-policy n=1,935 n (%)	P-value†
<b>Behavioral counseling provided in ED</b>				
Yes	1,356 (47)	431 (45)	925 (48)	0.17
No	1,535 (53)	525 (55)	1,010 (52)	
<b>Buprenorphine administered during ED visit or prescription provided at discharge</b>				
Yes	59 (2)	2 (<1)	57 (3)	<0.01
No	2,832 (98)	954 (>99)	1,878 (97)	
<b>Naloxone kit or prescription provided at discharge</b>				
Yes	1,512 (52)	396 (41)	1,116 (58)	<0.01
No	1,379 (48)	560 (59)	819 (42)	
<b>Referral to OUD treatment provided at discharge</b>				
Yes	667 (23)	0 (0)	667 (34)	<0.01
No	2,224 (77)	956 (100)	1,268 (66)	
<b>Newly initiated OUD treatment within 180 days of discharge‡</b>				
Yes, within 0–30 days	309 (17)	51 (15)	258 (18)	0.38
Yes, within 31–180 days	377 (21)	67 (20)	310 (21)	
No	1,106 (62)	218 (65)	888 (61)	

Abbreviations: ED, emergency department; OUD, opioid use disorder.  
 \* Pre-policy period included visits between May 1, 2015, and February 28, 2017. Post-policy period included visits between April 1, 2017, and March 31, 2021. Analysis excluded n=254 visits from March 2017.  
 † Chi-squared test.  
 ‡ Limited to people who were admitted after April 30, 2016, and were not actively engaged in OUD treatment at the time of the ED visit.

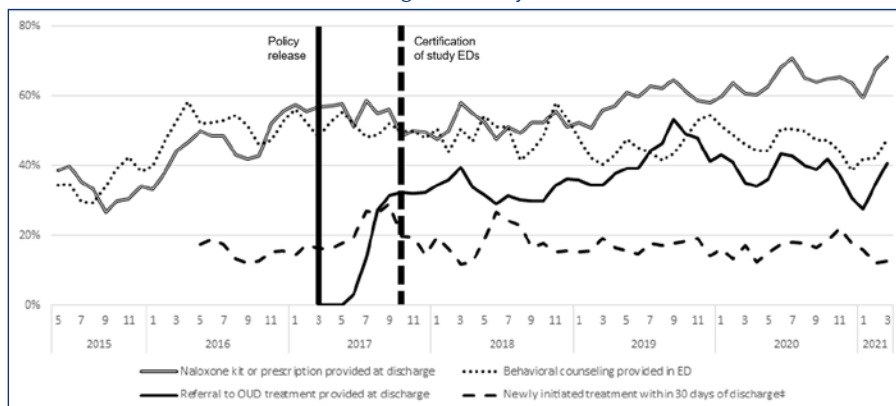
**DISCUSSION**

In this retrospective pre-/post-study of the impact of a statewide post-overdose treatment standards policy on post-overdose care in the ED, release of the policy was associated with increased initiation of buprenorphine in or from the ED (from <1% to 3%) and increased provision of referrals to OUD treatment at discharge (from 0% to 34%) and take-home naloxone kits or prescriptions at discharge (from 41% to 58%). During both policy periods, approximately half of all ED visits for opioid overdose received a behavioral intervention; however, the percentage of patients receiving a social work consultation increased post-policy. The large increase in treatment referrals at discharge is likely attributable to the introduction of order sets that was purposefully introduced with the policy roll-

out in order to help implement the changes. While orders for treatment referral increased, the percentage of patients who subsequently engaged in any OUD treatment within 30 days of the ED visit was similar during the pre- and post-policy periods (about 15–18%), suggesting that an electronic referral alone is insufficient to improve engagement.

Although release of the policy was associated with increased provision of some post-overdose ED services, the policy was not associated with increased treatment engagement in the 30 or 180 days following the ED visit. Future studies to evaluate whether specific post-overdose ED services are

**Figure 1.** Monthly percentage of ED visits for opioid overdose with each primary outcome, among Rhode Island residents within the state's largest health system.



Abbreviations: ED, emergency department; OUD, opioid use disorder.  
 ‡ Limited to people who were admitted after April 30, 2016, and were not actively engaged in OUD treatment at the time of the ED visit.

associated with subsequent engagement in OUD treatment would be useful. A prior study of the general population suggested that treatment initiation with pharmacotherapy (alone or in combination with psychosocial therapy) was associated with continued treatment engagement and that patients with painful health conditions may require additional supports to initiate and sustain treatment.<sup>19</sup> Additionally, in a safety-net primary care setting, patients reporting unstable housing and recent criminal justice involvement had lower odds of initiating behavioral treatment for substance use,<sup>20</sup> suggesting that incorporation of or linkage to social services and supports may be critical for enhancing treatment initiation.

Of note, after release of the policy, the percentage of ED visits at which patients received some key post-overdose services remained relatively low, suggesting the need for enhanced implementation to increase delivery and uptake. Patients post-policy received treatment referrals, take-home naloxone, and behavioral counseling at 24%, 58%, and 48% of ED visits, respectively, and only 3% of patients were provided buprenorphine in or from the ED. This low provision is likely due to a combination of factors, including regulatory barriers to prescribing buprenorphine during the study period (i.e., X-waiver). Other contributing factors to low uptake not assessed in this study may include adequacy and quality of staff training, provider perceptions and comfort prescribing buprenorphine, stigma, and patients' perceptions and readiness to initiate treatment.<sup>21-23</sup> Additionally, some services may not be indicated for all patients. For example, not all patients who experience an opioid overdose have OUD, and the percentage without OUD may be increasing as fentanyl is increasingly present in the illicit stimulant drug supply<sup>24</sup> and may lead to overdoses among people not intending to use opioids. Some other patients for whom services are indicated may prefer not to receive them. Nonetheless, these findings highlight potential opportunities for improving utilization of some services. For example, additional policy requirements focused on clinician training and support engaging patients with OUD and prescribing buprenorphine or additional prompts within the EHR<sup>25</sup> may help ensure that all eligible patients are offered key services. Additionally, inclusion of low-barrier patient navigation services may provide additional support to eligible patients and contribute to their receptiveness to some services. Finally, just over 1-in-10 patients in the post-policy period left the ED against medical advice; though the reasons for this are uncertain, the finding highlights an important missed opportunity for engagement in key services. Additional research is needed to determine how to best support these patients.

Our analysis had important limitations. As noted previously, the roll out of some post-overdose services within EDs occurred prior to and in anticipation of the release of the policy.<sup>14</sup> Had roll-out of services exclusively happened after the policy, we theorize that larger differences in

pre-/post-services would have been observed. However, guidelines and policies can also play an important role in not just jumpstarting, but sustaining clinical practice and ED services over time.<sup>26</sup> Additionally, our primary ED outcomes were defined based on orders placed in the EHR. Although provision of services generally aligns with placement of orders, it is a proxy outcome and does not assess actual receipt of services or quality of services delivered; thus, our estimates are optimistic. This study does also not address which factors influenced the observed changes in ED services (e.g., provider education, use of order sets); therefore, further work is needed to understand not only the barriers to service provision but the facilitators. Lastly, the relationship between time and our primary endpoints could have been confounded by other time-variant factors such as quality initiatives, media attention, and ongoing research studies. In the absence of a temporal control group, it is uncertain whether observed differences are attributable to the policy or may have been driven by other factors. However, our study was strengthened by the robust statewide surveillance systems and improved upon prior evaluations of the policy that have relied upon potentially biased hospital self-reporting systems.

In conclusion, our study suggests that statewide treatment standards for post-overdose care in EDs had a positive impact on provision of key post-overdose services within the ED in Rhode Island, including referral to treatment for OUD, provision of naloxone, initiation of buprenorphine treatment for OUD, and facilitation of social work consultations. However, the policy did not appear to impact subsequent OUD treatment initiation among patients who were not engaged in treatment at the time of the overdose. Similar statewide post-overdose treatment standards policies may improve receipt of key evidence-based overdose prevention interventions in EDs in other states, although additional research is needed to understand the impact of the policy on subsequent recurrent opioid overdose. Additional implementation strategies within EDs and/or the broader community are needed to improve engagement in treatment for OUD in the 180 days following opioid overdose.

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## Disclosures

All authors declare that they have no conflicts of interest. The views expressed herein are those of the authors and do not necessarily reflect the views of Brown University, the Rhode Island Department of Health or the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities, and Hospitals.

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