A statewide evaluation of the implementation and effectiveness of medications for opioid use disorder in Vermont correctional facilities and the impact of COVID-19

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Abstract

Introduction: Individuals with opioid use disorder (OUD) are overrepresented in US correctional facilities and experience a disproportionately high risk for overdose after release from incarceration. Medications for OUD (MOUD; buprenorphine, methadone, and naltrexone) are the only empirically based treatments for OUD but not available to most incarcerated individuals in the United States. In 2018, Vermont passed Act 176 to become the second state to offer all three Food and Drug Administration approved MOUDs to all incarcerated individuals who meet medical necessity in Vermont. Subsequently, the COVID-19 pandemic began, and a state of emergency was declared in March 2020. This report summarizes findings from an evaluation of the implementation and effectiveness of the Vermont Department of Corrections (DOC) MOUD program and the impact of COVID-19.

Methodology: This evaluation utilized administrative data from 07/01/2017 to 03/31/2021 including VT DOC data from individuals while they were incarcerated as well as Medicaid claims and Vermont Department of Health data following release from incarceration. We described changes in treatment characteristics and clinical outcomes including MOUD utilization while incarcerated, MOUD prescriptions after release from incarceration, opioid-related non-fatal overdose within 30 days of release, and opioid-related fatal overdose within 1 year of release from incarceration. We compare the time-periods A) before the VT DOC implemented MOUD and before COVID-19; B) after MOUD implementation but before COVID-19; and C) after MOUD implementation and after the onset of COVID-19 using chi-square and multi-level logistic regressions.

Results: The proportion of individuals who were prescribed MOUD while incarcerated increased substantially after Act 176 (0.8% to 33.9%; OR=67.4, 95% CI=49.0, 92.9) and subsequently decreased with the onset of COVID-19 (26.6%; OR=0.7, 95% CI=0.6, 0.8). After Act 176, most individuals who received an MOUD were prescribed buprenorphine (82.6% before and 84.0% during COVID-19). After Act 176 most incarcerated individuals who received an MOUD were not receiving an MOUD prior to incarceration (63.1% before and 53.9% during COVID-19). Among individuals with OUD before Act 176, 33.9% of releases from incarceration received an MOUD prescription within 30 days after release. This significantly increased to 41.0% after Act 176 (OR=1.4, 95% CI=1.3, 1.7) and then reduced to 35.6% with the onset of COVID-19 (OR=0.8, 95% CI=0.6, 0.9). Finally, opioid-related overdoses post incarceration decreased from before (non-fatal=1.2%; fatal=1.1%) to after (non-fatal=0.8%; fatal=<0.03%) Act 176. Though 2021 fatal overdose data were unavailable at the time of this report, non-fatal overdoses increased to 1.9% with the onset of COVID-19.

Conclusions: Findings from this evaluation support the intentions of Act 176 and the effectiveness of the VT DOC MOUD program. Act 176 was associated with an increase in MOUD engagement and a decrease in opioid-related overdoses after release from incarceration. However, these improvements were somewhat attenuated with the onset of COVID-19. Combined, findings demonstrate the benefits from Act 176 as well as a need to

improve continuation of care for incarcerated individuals with OUD who reenter Vermont communities in the context of the ongoing COVID-19 pandemic.

1. Introduction

Opioid use has reached epidemic proportions in the United States[1,2] and involvement in the criminal justice system is common among those with an opioid use disorder (OUD).[3] Overdose is the leading cause of death after release from incarceration,[4] with overdose deaths over 10 times more likely within the first two weeks of reentry from prison to the community than age-matched controls.[5,6] Previously referred to as medication assisted treatment (MAT), medications for opioid use disorder (MOUD) are the only empirically based treatments for OUD[7,8] and substantially reduce the risk of overdose and death.[9] Importantly, counseling alone is not an effective treatment for OUD[10] but MOUD without counseling is empirically supported[11-14] and could reduce barriers to treatment.[10] There is a large body of literature demonstrating the positive effects of MOUD use in correctional facilities including reductions in illicit opioid use,[15,16] reductions in fatal and non-fatal overdose,[17,18] and other reductions in harm.[19] However, MOUDs are not available to individuals who are incarcerated in most US states.[20]

The Vermont legislature signed Act 176[21] in May of 2018 to become the second state after Rhode Island[22] to offer all three Food and Drug Administration (FDA) approved MOUDs (buprenorphine, methadone, and naltrexone) to all incarcerated individuals who meet medical necessity for an MOUD. The Vermont Department of Corrections (VT DOC) is one of six unified (prison and jail) state-run correctional systems in the US. Thus, the implementation of MOUDs, which began in July 2018, affects all pretrial and convicted residents of the six correctional facilities within the state of Vermont. Act 176 is based on the guiding principles that 1) addiction is a chronic condition, 2) there is parity between physical health, addiction, and mental health treatment, and 3) medical care should be a decision between a qualified provider and patient. As such, Act 176 directs the VT DOC to provide all three FDA approved MOUDs for all incarcerated individuals who meet medical necessity and who want treatment as soon as possible and for as long as medically necessary. Specifically, the Act states that the VT DOC

should continue all verified MOUDs for individuals who enter the correctional facility currently receiving an MOUD and induct incarcerated individuals for whom it is medically necessary. Only a qualified medical provider can modify or discontinue an individual's MOUD.

This report summarizes findings from an evaluation of the implementation and effectiveness of the VT DOC's MOUD program. The VT DOC sought an external evaluator to increase transparency and rigor of the evaluation and to comply with the requirement in Act 176, which states that the VT DOC shall present an evaluation on the effectiveness of the MOUD program facilitated by Correctional facilities to the House Committee on Corrections and Institutions and the Senate Committee on Institutions. This evaluation was funded by the NIH Justice Community Opioid Innovation Network (JCOIN: https://heal.nih.gov/research/research-to-practice/jcoin) and led by an independent investigator at the University of Vermont, in collaboration with co-authors from the VT DOC and VT Blueprint for Health. The evaluation used statewide data from the Vermont Department of Corrections (DOC), Vermont Blueprint for Health, and the Vermont Department of Health to examine the implementation of MOUD in all correctional facilities within the state of Vermont.

In addition, this report includes results from our evaluation of the impact of COVID-19 on OUD treatment and related outcomes. Harms from OUD and the need for treatment among people who are incarcerated appear to be compounded by the COVID-19 pandemic throughout the United States.[23-26] Correctional facilities' common responses to COVID-19 include restricting residents' activity, changing prison protocols, and granting rapid release for non-violent offenders to reduce risks of infection.[23-25] In the community, treatment centers across the country have adjusted to reduce in-person care,[27] including increasing telehealth and buprenorphine take-home doses per the new SAMHSA guidelines.[28] In Vermont, a state of emergency was declared in March 2020, approximately 20 months after statewide implementation of MOUD began. The VT DOC subsequently adopted a variety of policies

including social distancing, mandatory masking, decreased in-person group counseling, mandatory isolation for symptomatic or COVID-19 positive individuals, and mandatory quarantines for new intakes to limit the spread of COVID-19 infection.[29] This evaluation includes an assessment of the impact of the ongoing COVID-19 pandemic in order to provide context for changes that occurred after Act 176.

As previously noted, the present evaluation is funded by an NIH JCOIN Rapid Innovation Grant awarded to Elias Klemperer, PhD at the University of Vermont in February 2021. The evaluation is ongoing at the time of this report and will conclude in January 2023. In addition, two qualitative studies will be conducted in 2022 to evaluate the implementation and effectiveness of the VT DOC MOUD program. The first is also funded by JCOIN and will include interviews with six VT DOC administrators and six DOC healthcare providers. The second is funded by the University of Vermont's Center on Rural Addiction (CORA) and will interview 28 incarcerated individuals who are receiving MOUD while incarcerated. The present report provides preliminary findings regarding the impact of 1) the Act 176 statewide implementation of MOUD in Vermont's correctional facilities and 2) the onset of COVID-19 on people with OUD who are incarcerated or recently released in Vermont.

2. Methodology

This evaluation utilized de-identified longitudinal data from 07/01/2017 to 03/31/2021 from the VT DOC, Medicaid claims from Vermont Blueprint for Health, and the Vermont Department of Health (Figure 1). We describe and compare VT DOC data from individuals while they were incarcerated as well as Medicaid claims and Vermont Department of Health data during the year following release from incarceration.

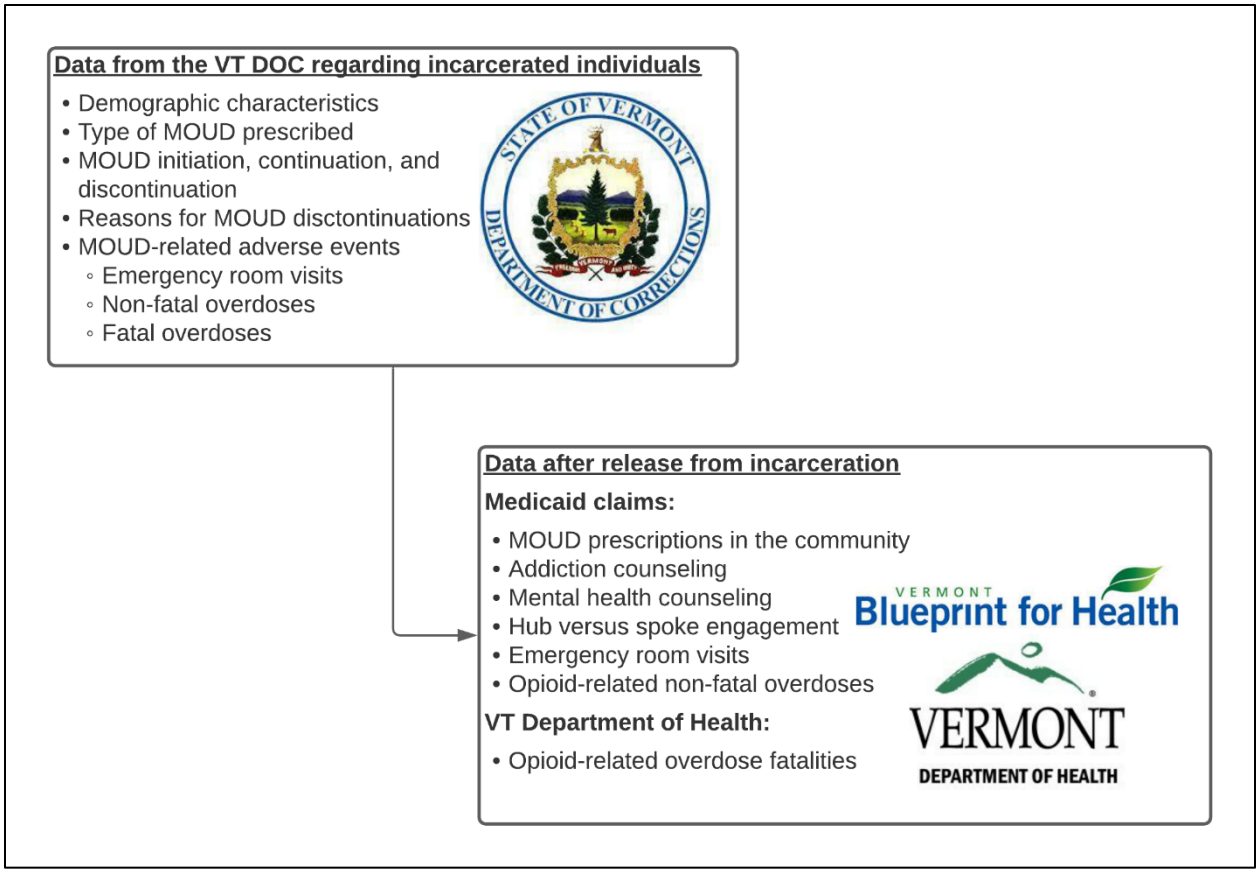

Figure 1. Sources of data for the evaluation of the implementation and effectiveness of medication for opioid use disorder (MOUD) and the onset of COVID-19.

This report examines administrative data from the year prior to MOUD implementation (i.e., Period A: 07/01/2017 to 06/30/2018), the period between MOUD implementation and the COVID-19 state of emergency (i.e., Period B: 11/01/2018 to 02/29/2020), and the year following the COVID-19 state of emergency (i.e., Period C: 04/01/2020 to 03/31/2021; Figure 2). Implementation of MOUD occurred within the VT DOC between 07/01/2018 and 10/31/2018 and implementation of COVID-19 safety procedures occurred between 03/01/2020 to 03/31/2021. This report describes Periods A, B, and C. Analyses exploring the implementation periods are ongoing.

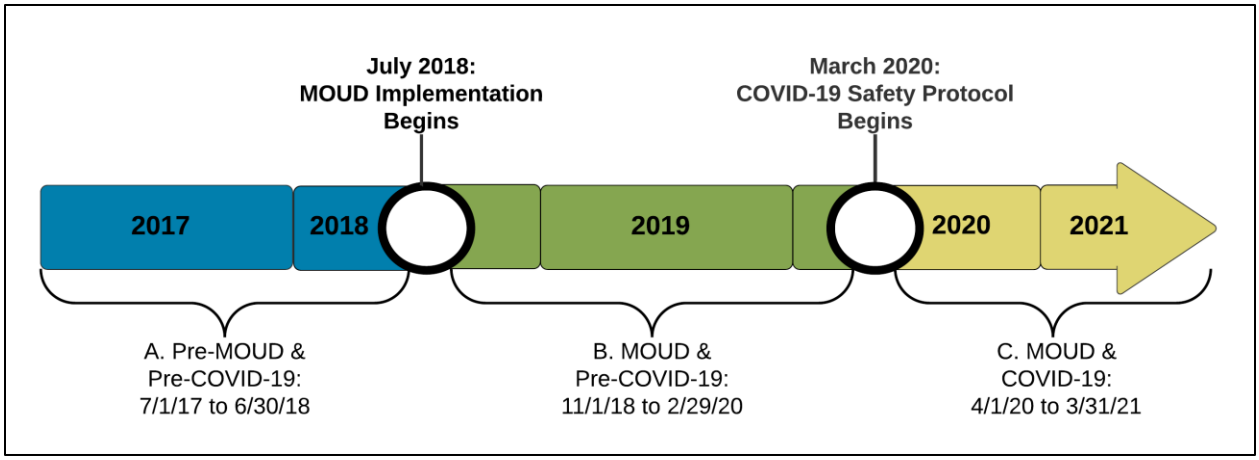

Figure 2. Timeline for the implementation of medication for opioid use disorder (MOUD) and the onset of COVID-19.

2.1 Department of corrections data from incarcerated individuals

2.1.1 Demographic characteristics among incarcerated individuals

Demographic information and crime history data are from the VT DOC Jail Tracker Offender Management System. Of note, race and ethnicity data should be interpreted with caution given that, in some circumstances prior to guideline updates in August 2020, this information was documented by corrections officers based on their own visual assessment and not as standardized questions posed to incarcerated individuals.

2.1.2 Medications for opioid use disorder (OUD) among incarcerated individuals

Healthcare was provided by Centurion (https://www.centurionmanagedcare.com/) until June 30, 2020, at which point VitalCore (https://vitalcorehs.com/) began providing all medical and psychiatric healthcare. Data on OUD assessments were not available from Centurion prior to Act 176 and data on the proportion of incarcerated individuals with an OUD were not available from Centurion prior to July 2020. Given the lack of available data on OUD diagnoses, we report the proportion of the entire incarcerated population who received an MOUD across the three time periods, regardless of OUD status. Importantly, this means that any changes in MOUD utilization could be due to changes in OUD assessment procedures, prescriptions, or

both. Data on MOUD prescriptions while incarcerated are from the VT DOC CorrecTek electronic health record system. We report the proportion of people incarcerated during each time-period who were prescribed buprenorphine, methadone, or naltrexone. Individuals could have been prescribed more than one MOUD while incarcerated and thus findings regarding use of buprenorphine, methadone, and naltrexone are not mutually exclusive. Individuals who were not receiving MOUD in the community at the time of their incarceration and then began MOUD while incarcerated in Vermont were categorized as having initiated MOUD while incarcerated. Individuals who were receiving MOUD in the community at the time of incarceration and continued receiving MOUD while incarcerated were categorized as having continued MOUD while incarcerated.

Individuals who were prescribed an MOUD while incarcerated and later discontinued their MOUD prescription while incarcerated were categorized as having discontinued MOUD while incarcerated. Reasons for discontinuation were documented by healthcare providers within the correctional facility using categorical and/or open-ended responses in the VT DOC CorrecTek electronic health record system. Reasons for discontinuation were categorized as 1) diversion, defined as stockpiling or concealing the medication for transfer to another; 2) patient request, defined as personal choice to discontinue the medication; 3) medical, defined as discontinuation due to medical necessity; 4) non-compliance, defined as interpersonal misconduct or failure to abide by the treatment contract; or 5) not reported or missing.

2.1.3 MOUD-related adverse events including emergency room visits and non-fatal and fatal overdoses among incarcerated individuals

Data on non-fatal adverse events related to MOUD utilization during incarceration were unavailable prior to July 2020 due to the change in healthcare providers within the VT DOC. Thus, we report the number of MOUD-related adverse events that occurred after July 1, 2020 but were unable to assess change in non-fatal adverse events between the time periods in this

evaluation. Data on fatalities during incarceration were available for all time periods included in this evaluation.

2.2 Medicaid claims data after release from incarceration

Findings from Medicaid claims data were provided by the Vermont Blueprint for Health. We used data from Medicaid insurance claims to identify treatment utilization and related outcomes after release from incarceration and thus analyses of outcomes after release from incarceration are limited to the subset of Medicaid recipients. Most, but not all, people released from incarceration in Vermont receive Medicaid. In this evaluation, 79.0% of individuals in Period A, 76.1% in Period B, and 79.2% in Period C had Medicaid after release from incarceration. As described in section 2.1.2, data on OUD diagnoses during incarceration were not available from Centurion (the VT DOC healthcare provider). Thus, we analyzed outcomes after release from incarceration in three separate Medicaid populations: 1) The entire population of people released from incarceration (findings reported in the supplemental document), 2) Individuals who received an OUD diagnosis in the community within 3 years prior to their release from incarceration (findings reported in sections 3.2.1 and 3.2.2), and 3) Individuals who were prescribed an MOUD while incarcerated (findings reported in section 3.2.3). We chose to focus on individuals with an OUD diagnosis in the main text of this report because this is the population most likely to be affected by Act 176 and because doing so reduces the likelihood that observed changes in treatment outcomes could be due to changes in the prevalence of OUD. We elected to use a three-year cutoff for OUD diagnoses to allow for an evaluation of outcomes proximal to ongoing or recent OUD and because this has been the standard used in prior research.[30]

2.2.1 Opioid use disorder and mental health treatment after release from incarceration

We report the proportion of releases from incarceration during each time-period during which the individual had one or more Medicaid claims for 1) MOUD, 2) substance use disorder

(SUD) counseling, and/or 3) mental health counseling within 30 days of their release. We chose a 30-day window because the first month after release from incarceration is the period of highest risk for relapse and overdose among individuals with OUD.[5,6] The VT DOC reported that incarcerated individuals who were prescribed MOUD in the correctional facility were also prescribed a "bridge prescription" consisting of ≤2 weeks of MOUD doses upon release from incarceration. However, complete data on bridge prescriptions were not available for the time-periods reported in this analysis and thus the influence of bridge prescriptions is not captured in this report. Prescriptions for MOUD and counseling after exit from VT DOC settings are provided via Vermont's hub and spoke treatment system, which consists of nine regional hubs that offer daily intensive treatment and support for patients with complex addictions and >75 treatment spokes that offer ongoing treatment integrated with general healthcare services in the community.[31-33]

2.2.2 Non-fatal overdoses and emergency room visits after release from incarceration

Medicaid claims data were used to assess non-fatal overdose and emergency room visits after release from incarceration. We report the proportion of releases from incarceration that resulted in a non-fatal overdose and emergency room visits within 30 days after release from incarceration. All overdoses reported in this analysis involved opioid use but could have also included other drug use. Emergency room visits could have been for any reason and are reported as an indication of emergency service utilization, but do not account for whether changes are associated with need versus access to emergency services.

2.3 Overdose fatalities after release from incarceration

Overdose fatality data were provided by the Vermont Department of Health and cross-referenced with VT DOC data to determine fatalities among people who were released from incarceration during each time-period. Similar to data on non-fatal overdoses, all overdoses involved opioid use but could have also included other drug use. The absolute number of

overdose fatalities in Vermont was small and thus we report overdose fatalities within 1 year after release from incarceration in order to have a sufficient sample size to assess change over time. We censored sample sizes with 10 or fewer individuals to maintain confidentiality. Fatality data for 2021 were not available at the time of this report and thus overdose fatality findings are limited to time periods A and B.

2.4 Analysis

Throughout the results sections (e.g., Tables 2, 3, 5, 6, and 7) we present findings in terms of odds ratios (OR) and 95% confidence intervals (CI). We use ORs to communicate the size of the effect when comparing two time periods with a binary outcome. For example, an OR of 1.0 would indicate no difference, an OR of 1.5 would indicate a 50% increase, and an OR of 0.5 would indicate a 50% decrease in the odds of the event occurring in the time-period in question compared to the "*Reference*" time-period. The 95% CI indicates the range in which we can conclude, with 95% confidence, the true effect size falls. For ORs in this report, a 95% CI that overlaps with one indicates the effect is not statistically significant while a 95% confidence interval that does not overlap with one is considered statistically significant.

2.4.1 Department of Corrections data analysis

All analysis of VT DOC data used individuals who were incarcerated for at least one night as the unit of analysis. Individuals who were incarcerated during more than one time-period were included in each time period during which they were incarcerated for one or more nights. Descriptive statistical techniques were employed to describe target population characteristics for each of the three time periods (Period A: 07/01/2017 to 06/30/2018; Period B: 11/01/2018 to 02/29/2020; and Period C: 04/01/2020 to 03/31/2021). Categorical variables (e.g., use of any MOUD and type or MOUD used) were described using frequencies and percentages. Continuous variables were described using means and standard deviations or the median and inter-quartile range, depending on distribution shape. Chi-square analyses were used to identify

relationships between outcomes and time-period. In addition, logistic regressions were used to compare treatment utilization in the correctional facility and characteristics of engagement across time periods, detailing the odds of an event/outcome as a function of time.

2.4.2 Medicaid claims and fatality data analysis

Data from the VT DOC were linked to Medicaid claims to compare individuals' healthcare utilization across time periods. We tracked the number of individuals who were released from a correctional facility and went on to receive treatment in the community using data on prescriptions for MOUD to identify treatment at spokes and procedure codes to identify services at regional hubs. We also examined the proportion of newly released individuals with Medicaid claims for behavioral health treatment (i.e., counseling) and Medicaid claims for non-fatal overdoses in the community. Finally, we linked the VT DOC data to the Department of Health's opioid fatality data, in order to identify individuals who had an opioid-related fatal overdose within a year after their release.

Initially, we examined the linked dataset using descriptive statistics. Next, we performed longitudinal analyses in order to better understand the relationships between healthcare utilization and the treatment periods. To do this, we took advantage of the repeated observations of individuals across time periods and performed multi-level logistic regressions. We used logistic regression for the fatality data given the lack of repeated observations. We analyzed time-period as the predictor and conducted a separate model for each healthcare utilization outcome to understand differences between time-periods.

3. Results

3.1 Outcomes during incarceration

There were 5,177 individuals incarcerated in Vermont correctional facilities for a minimum of 1 night during Period A (pre-Act 176 and pre-COVID-19), 5,665 during Period B (post-Act 176 and pre-COVID-19) and 2,926 during Period C (post Act 176 and during COVID-

19). Most people who were incarcerated during the three time periods were White, non-Hispanic, male, in their mid- to late-thirties, and unmarried (see Table 1).

Table 1. Incarcerated population characteristics

	A) Pre-Act 176 & Pre-COVID-19 (n=5,177)	**B) Post-Act 176 & Pre-COVID-19 (n=5,665)**	**C) Post-Act 176 & During COVID-19 (n=2,926)**
Demographics			
Mean (SD) Age	36.3 (11.5)	36.8 (11.5)	38.0 (11.4)
Gender, n (%)			
Female	852 (16.5)	975 (17.2)	368 (12.6)
Male	4,299 (83.0)	4,651 (82.1)	2,516 (86.0)
Transgender	22 (0.4)	24 (0.	24 (0.8)
Missing or not reported	4 (0.1)	15 (0.3)	18 (0.6)
[a]**Race, n (%)**			
Black or AA	497 (9.6)	544 (9.6)	270 (9.2)
White	4,267 (82.4)	4,623 (81.6)	2,490 (85.1)
Other	74 (1.4)	93 (1.6)	92 (3.1)
Missing or not reported	339 (6.6)	405 (7.2)	74 (2.5)
[a]**Ethnicity, n (%)**			
Hispanic	441 (8.5)	553 (9.8)	270 (9.2)
Non-Hispanic	4,735 (91.5)	5,111 (90.2)	2,655 (90.7)
Missing or not reported	1 (0.02)	1 (0.02)	1 (0.03)
Marital status, n (%)			
Married/Civil Union	574 (11.1)	643 (11.4)	313 (10.7)
Divorced/Separated	682 (13.2)	753 (13.3)	378 (12.9)
Single	2,885 (55.7)	3,041 (53.7)	1,656 (56.6)
Widowed	44 (0.9)	57 (1.0)	30 (1.0)
Missing or not reported	992 (19.2)	1,171 (20.7)	549 (18.8)

[a]In some circumstances prior to August 2020 Race and Ethnicity data were reported by correctional officers during booking and not by the individual who was incarcerated.
AA=African American; MOUD=Medication for opioid user disorder; SD=Standard deviation.

3.1.1 MOUD in Vermont's correctional facilities

During Period A (pre-Act 176 and pre-COVID-19), less than one percent of individuals were prescribed an MOUD while incarcerated (Table 2). After Act 176 (Period B), this proportion increased to over one third (33.9%) of incarcerated individuals who received an MOUD prescription. With the onset of COVID-19 (Period C), the proportion of incarcerated individuals receiving an MOUD decreased to 26.6%.

Table 2. Medication for opioid use disorder (MOUD) prescriptions among people incarcerated in Vermont.

	A) Pre-Act 176 & Pre-COVID-19 (n=5,177)	**B) Post-Act 176 & Pre-COVID-19 (n=5,665)**	**C) Post-Act 176 & During COVID-19 (n=2,926)**
Any MOUD, *n* (%)	39 (0.8)	1,918 (33.9)	779 (26.6)
Any vs No MOUD OR (95% CI)	*Reference*	***67.4 (49.0, 92.9)***	***47.8 (34.5, 66.2)***
	-	*Reference*	***0.7 (0.6, 0.8)***

Bolded text=statistically significant (p<.05); CI=Confidence interval; MOUD=Medication for opioid use disorder; OR=Odds ratio; *Reference*=comparison time-period.

Among individuals who received MOUD while incarcerated, the majority (66.7% to 84.0%) were prescribed buprenorphine during each time-period (Table 3, Panel A). Interpretation of the proportion of individuals who received a prescription for buprenorphine, methadone, or naltrexone in Period A is limited due to the small (n=39) number of individuals who received any MOUD prior to Act 176. The proportion who received buprenorphine versus methadone or naltrexone did not differ between Periods B and C. After Act 176, most (53.9% to 63.1%) individuals who were prescribed MOUD while incarcerated initiated their MOUD upon incarceration (Table 3, Panel B). However, the proportion who initiated MOUD upon incarceration decreased by nearly 10% from Periods B to C with the onset of COVID-19. In Period B, 16% of people who received MOUD while incarcerated later discontinued their MOUD and discontinuation significantly decreased to 8% in Period C.

Table 3. Medication for opioid use disorder (MOUD) characteristics among individuals who were prescribed an MOUD while incarcerated in Vermont.

	A) Pre-act 176 & Pre-COVID-19 (n=39)	**B) Post-Act 176 & Pre-COVID-19 (n=1,918)**	**C) Post-Act 176 & During COVID-19 (n=779)**
A. MOUD type			
Buprenorphine, *n* (%)	26 (66.7)	1,585 (82.6)	654 (84.0)
Methadone, *n* (%)	13 (33.3)	268 (14.0)	112 (14.4)
Naltrexone, *n* (%)	0 (0)	65 (3.4)	13 (1.7)
Buprenorphine vs Other MOUD OR (95% CI)	*Reference*	***2.3 (1.2, 4.6)***	***2.6 (1.3, 3.9)***
	-	*Reference*	*1.1 (0.9, 1.4)*
B. MOUD initiation, continuation, or discontinuation			
Initiated any MOUD, *n* (%)	16 (41.0)	1,210 (63.1)	420 (53.9)
Continued any MOUD, *n* (%)	23 (59.0)	708 (36.9)	359 (46.1)
Initiation vs Continuation OR (95% CI)	*Reference*	***2.5 (1.3, 4.7)***	*1.7 (0.9, 3.2)*
	-	*Reference*	***0.7 (0.6, 0.8)***
Discontinued any MOUD, *n* (%)	0 (0)	307 (16.0)	62 (8.0)
Discontinued vs Did not discontinue OR (95% CI)	-	*Reference*	***0.5 (0.3, 0.6)***

Bolded text=statistically significant (p<.05); CI=Confidence interval; MOUD=Medication for opioid use disorder; OR=Odds ratio; *Reference*=comparison time-period.

In Period B there were a total of 372 MOUD discontinuations among 307 individuals: 248 individuals discontinued MOUD once, 54 individuals discontinued twice, four discontinued three times, and one individual discontinued MOUD four times. In Period C there were a total of 85 MOUD discontinuations among 62 individuals: 43 individuals discontinued MOUD once, 15 individuals discontinued twice, and four individuals discontinued MOUD three times. The majority of discontinuations in both time periods were attributed to diversion (Table 4). The next most common documented reason for discontinuation was per the patient's request. Importantly, interpretation of changes in reasons for discontinuation between Periods B and C are limited due to the fact that 25.5% of reasons for MOUD discontinuation in Period B were missing or not reported in the VT DOC CorrecTek electronic health record system.

Table 4. Reasons for discontinuing medication for opioid use disorder (MOUD) among the MOUD discontinuations that occurred for people incarcerated in Vermont.

	B) Post-Act 176 & Pre-COVID-19 (n discontinuations=372)	**C) Post-Act 176 & During COVID-19 (n discontinuations=85)**
Diversion, *n* (%)	221 (59.4)	61 (71.8)
Patient request, *n* (%)	48 (12.9)	17 (20.0)
Non-compliance, *n* (%)	6 (1.6)	5 (5.9)
Medical, *n* (%)	2 (0.5)	0
Missing or not reported, *n* (%)	95 (25.5)	2 (2.3)

Diversion=stockpiling or concealing the medication for transfer to another; Patient request= personal choice to discontinue the medication; Medical=discontinuation due to medical necessity; Non-compliance=interpersonal misconduct or failure to abide by the treatment contract.

3.1.2 MOUD-related adverse events while incarcerated

Due to the change in VT DOC healthcare providers, data on non-fatal adverse events related to MOUD use prior to July 2020 were not available and thus comparisons across time periods were not possible. After July 2020, there were two adverse events related to MOUD use that required emergency room care. Data on fatalities were available for all three time periods. There were no fatalities related to MOUD use during the time periods included in this evaluation.

3.2 Outcomes after release from incarceration

We report findings from the sample of Medicaid recipients who had an OUD diagnosis within three years prior to their release from incarceration below. Findings from the entire Medicaid population of incarcerated individuals are reported in the supplemental document. In total, 39.5% (n=1,552) of individuals released from incarceration in Period A (pre-Act 176 and pre-COVID-19), 40.9% (n=1,851) in Period B (post-Act 176 and pre-COVID-19), and 44.6% (n=735) in Period C (post-Act1 176 and during COVID-19) had a Medicaid claim indicating an OUD diagnosis within three years prior to their release from incarceration. Individuals were commonly incarcerated and released more than one time during the time periods in this evaluation. During Period A, individuals with an OUD diagnosis contributed to 2,456 releases from incarceration (mean=1.6 [SD=1.2] per individual). During Period B there were 3,253

releases (mean=1.8 [SD=1.3] per individual) and there were 956 releases from incarceration (mean=1.3 [SD=0.7] per individual) during Period C.

3.2.1 Treatment utilization in the community

Approximately one third (33.9%) of releases among individuals with an OUD diagnosis received an MOUD prescription in the community within 30 days after release from incarceration during Period A (Table 5). This increased to 41.0% after Act 176 (i.e., in Period B) and then reduced with the onset of COVID-19 (35.6% in Period C) to a level that did not significantly differ from before Act 176 (i.e., Period A). Among release episodes that resulted in an MOUD prescription, the proportion that had first contact with a treatment hub within 30 days after release in Vermont declined across the three time periods (Period A=64.0%, Period B=55.1%, and Period C=37.4%; all p<.05). Conversely, the proportion that had first contact with a treatment spoke increased over time (Period A=36.0%, Period B=44.9%, and Period 62.7%; all p<.05). With regard to behavioral treatment, 15.6% of release episodes with a history of OUD resulted in engagement in substance use disorder counseling during Period A and this consistently decreased during subsequent periods. Use of mental health counseling did not significantly change before versus after Act 176 but did decrease after the onset of COVID-19 (Table 5).

Table 5. Treatment utilization within 30 days after release from incarceration.

	A) Pre-Act 176 & Pre-COVID-19 (n releases=2,456)	**B) Post-Act 176 & Pre-COVID-19 (n releases=3,253)**	**C) Post-Act 176 & During COVID-19 (n releases=956)**
% Prescribed MOUD	33.9	41.0	35.6
OR (95% CI)	*Reference*	***1.4 (1.3, 1.7)***	*1.1 (0.9, 1.4)*
	-	*Reference*	***0.8 (0.6, 0.9)***
% Attended SUD Counseling	15.6	10.0	5.6
OR (95% CI)	*Reference*	***0.5 (0.3, 0.6)***	***0.2 (0.1, 0.3)***
	-	*Reference*	***0.3 (0.2, 0.5)***

% Attended MH Counseling	16.9	15.1	10.7
OR (95% CI)	*Reference*	*0.9 (0.7, 1.1)*	***0.5 (0.3, 0.7)***
	-	*Reference*	***0.6 (0.4, 0.9)***

All release episodes are from individuals with a Medicaid claim indicating a diagnosis of opioid use disorder.
Bolded text=statistically significant (p<.05); CI=Confidence interval; MH=Mental health; MOUD=Medication for opioid use disorder; OR=Odds ratio; *Reference*=comparison time-period; SUD=Substance use disorder.

3.2.2 Emergency room visits, non-fatal overdoses, and fatal overdoses after release from incarceration

Less than 15% of releases among individuals with an OUD diagnosis resulted in one or more trips to the emergency room within 30 days after release from incarceration. This did not significantly differ before versus after Act 176 (i.e., Periods A vs B), but emergency room trips significantly reduced after the onset of COVID-19 (i.e., Period C; Table 6). Though absolute numbers were small, the proportion of releases that resulted in a non-fatal overdose significantly reduced from Period A to Period B when Act 176 was implemented. Though a statistical test was not possible, non-fatal overdoses increased numerically in Period C, after the onset of COVID-19. Finally, though absolute numbers were too small for data analysis, fatal overdoses during the year following release from incarceration decreased from approximately 1% before to nearly none after Act 176. The specific number of fatal overdoses in Period B is ≤10 individuals and thus censored to maintain confidentiality.

Table 6. Emergency room visits, non-fatal overdoses, and fatal overdoses after release from incarceration.

	A) Pre-Act 176 & Pre-COVID-19 (n releases=2,456)	**B) Post-Act 176 & Pre-COVID-19 (n releases=3,253)**	**C) Post-Act 176 & During COVID-19 (n releases=956)**
% Emergency room visit within 30 days of release	13.5	14.5	12.2
OR (95% CI)	*Reference*	*1.1 (0.9, 1.4)*	*0.7 (0.5, 1.0)*
	-	*Reference*	***0.4 (0.3, 0.7)***

% Non-fatal overdose within 30 days of release	1.2	0.8[a]	1.9[a]
OR (95% CI)	*Reference*	***0.3 (0.1, 0.8)***	*1.5 (0.5, 4.2)*
% Fatal overdose within one year of release	1.1[a]	<0.03[a,b]	Data unavailable

[a]Analysis comparing these proportions were not possible due to an inadequate number of events in one or more time periods.
[b]≤10 events occurred and thus data were censored to protect confidentiality.
All release episodes are from individuals with a Medicaid claim indicating a diagnosis of opioid use disorder.
Bolded text=statistically significant (p<.05); CI=Confidence interval; MOUD=Medication for opioid use disorder; OR=Odds ratio; *Reference*=comparison time-period.

3.2.3 Treatment utilization, emergency room visits, non-fatal overdoses, and fatal overdoses after release from incarceration among individuals who received MOUD while incarcerated

The following findings are reported only among individuals who were receiving MOUD from the VT DOC healthcare provider within 30 days prior to their release from incarceration. Given that MOUD was rarely prescribed to incarcerated individuals prior to Act 176 (Period A; e.g., see Table 2), analyses are limited to individuals who received an MOUD while incarcerated during Period B (n individuals=793; n releases=1,017) and Period C (n individuals=571; n releases=697). Most release episodes were from individuals who were prescribed buprenorphine while incarcerated (Period B=79.5% and Period C=85.4%) and from individuals who initiated MOUD when they were incarcerated (Period B=78.0% and Period C=85.4%). When collapsed across time, individuals who initiated MOUD while incarcerated were less likely to receive MOUD within 30 days after release from incarceration than those who were receiving MOUD prior to incarceration and continued MOUD while incarcerated (OR=0.4, 95% CI=0.3, 0.5). Receiving a prescription for buprenorphine versus methadone was also associated with a decreased likelihood of receiving an MOUD within 30 days of release from incarceration (OR=0.5, 95% CI=0.3, 0.6), but this was highly conflated with initiating versus continuing MOUD

while incarcerated. For example, the vast majority (89.3% in Period B and 89.4% in Period C) who received methadone or naltrexone while incarcerated were continued on their MOUD from the community while incarcerated. In a subsequent analysis we examined the influence of initiating versus continuing only among those who received buprenorphine while incarcerated and found initiating buprenorphine while incarcerated was associated with a decreased likelihood of receiving MOUD within 30 days after release (OR=0.5, 95% CI=0.4, 0.6).

Most changes in treatment utilization, emergency room visits, and overdoses in this subsample were similar to the full sample of individuals with an OUD diagnosis. Specifically, in this subsample of individuals who were receiving MOUD while incarcerated, counseling and emergency room visits within 30 days after release from incarceration decreased with the onset of COVID-19 (i.e., Periods B vs C; Table 7). In contrast, the decrease in MOUD engagement and increase in non-fatal overdoses after release from incarceration were not significant in this subsample.

Table 7. Treatment utilization, emergency room visits, non-fatal overdose, and fatal overdose after release from incarceration among Medicaid recipients who received an MOUD while incarcerated.

	B) Post-Act 176 & Pre-COVID-19 (n releases=1,017)	**C) Post-Act 176 & During COVID-19 (n releases=697)**
% MOUD within 30 days of release	47.8	41.3
OR (95% CI)	*Reference*	*0.9 (0.7, 1.2)*
% SUD counseling within 30 days of release	10.3	5.1
OR (95% CI)	*Reference*	***0.5 (0.3, 0.7)***
% MH counseling within 30 days of release	14.7	8.7
OR (95% CI)	*Reference*	***0.6 (0.4, 0.8)***
% Emergency room visit within 30 days of release	9.1	7.6
OR (95% CI)	*Reference*	***0.5 (0.3, 0.7)***
% Non-fatal overdose within 30 days of release	<1.0[a]	1.4
OR (95% CI)	*Reference*	*1.4 (0.8, 2.4)*

% Fatal overdose within one year of release	<1.0[a]	Data not yet available

[a]≤10 events occurred and thus data were censored to protect confidentiality.
Bolded text=statistically significant (p<.05); CI=Confidence interval; MH=Mental health; MOUD=Medication for opioid use disorder; OR=Odds ratio; *Reference*=comparison time-period; SUD=Substance use disorder.

4. Discussion

This evaluation used data from the VT DOC, Medicaid claims, and Vermont Department of Health to assess the implementation and effectiveness of the MOUD program in Vermont's correctional facilities and the impact of COVID-19**.** We found MOUD utilization in the VT DOC changed from almost none prior to Act 176 to 33.9% of the incarcerated population after Act 176, reflecting the implementation of MOUD in Vermont correctional facilities. After the onset of COVID-19 the proportion of incarcerated individuals who were prescribed MOUD decreased to 26.6%. The reduction in MOUD utilization after the onset of COVID-19 could be due to changes in the incarcerated population[34,35] or changes in logistical considerations and barriers to OUD assessment and MOUD prescriptions.[23,36] Though national estimates of the prevalence of OUD in correctional facilities vary,[37,38] the prevalence of MOUD prescriptions in VT correctional facilities identified in this report is consistent with the fact that people with OUD are disproportionately overrepresented in US correctional facilities.[3,37]

Other characteristics of MOUD prescriptions in VT correctional facilities include that the majority of incarcerated individuals were prescribed buprenorphine. After Act 176, most (63% before and 54% after COVID-19) who received MOUD while incarcerated had not been receiving MOUD in the community prior to incarceration. This is especially noteworthy given that these individuals represent a group that VT DOC healthcare providers identified as requiring MOUD but did not access this medication in the community. The observed decline in MOUD initiations after the onset of COVID-19 could be due to changes in prescribing practices, a decline in the proportion of individuals with OUD who did not access MOUD prior to incarceration, or factors associated with COVID-19 precautions. For example, methadone

initiation requires face-to-face induction, which is limited by COVID-19. Finally, MOUD discontinuations decreased from 16% before to 8% after the onset of COVID-19. Future qualitative research will examine prescribing practices and MOUD discontinuation among VT DOC healthcare providers.

Utilization of MOUD within the month after release from incarceration increased after Act 176 in the full Medicaid population and among the subset with an OUD diagnosis. Given the elevated risk for illicit opioid use and overdose immediately after release from incarceration,[5,6] this increase in treatment engagement suggests a substantial positive effect associated with Act 176. Indeed, we observed decreases in non-fatal and fatal overdoses after the onset of Act 176, further supporting the effectiveness of the VT DOC MOUD program. However, MOUD engagement upon release from incarceration decreased among individuals with OUD after the onset of COVID-19. These findings are concerning given the elevated risks for continued illicit opioid use and overdose in the absence of MOUD after reentry.[15-18,39] We found that this reduction in engagement in MOUD was accompanied by a decrease in emergency room visits and a small numerical increase in non-fatal overdoses after release from incarceration. Importantly, these findings appear consistent with complications related to COVID-19 occurring throughout the United States. For example, recent research has identified decreases in all-cause emergency room visits,[40] increases in overdose,[41-43] and increases in barriers to MOUD[44-46] associated with COVID-19.

Compared to individuals who initiated MOUD while incarcerated, those who were using MOUD in the community and continued while incarcerated were more likely to engage with MOUD after release from incarceration. This finding could reflect a benefit to having experience with MOUD in the community prior to incarceration or a difficulty establishing new treatment connections after release from incarceration among individuals who initiated MOUD while incarcerated. Other outcomes of interest include a decline in engagement in substance use disorder counseling after release from incarceration over the course of the evaluation time-

period. Importantly, MOUD is, but counseling is not, an evidence-based treatment for OUD,[10,47] and counseling is not required for individuals receiving MOUD in Vermont.[48] Thus, the observed decline in substance use disorder counseling and increase in MOUD before versus after Act 176 could reflect a shift from engagement in less effective to more effective OUD treatment. In contrast, mental health counseling is empirically supported for individuals with OUD and co-occurring mental health disorders. Use of mental health counseling after release from incarceration did not significantly change after Act 176 but did decrease with the onset of COVID-19. Finally, we observed a shift from initiating care at treatment hubs to treatment spokes over the course of the evaluation time-period. The reasons for these changes are unclear from the available data, and thus future research is needed to identify the factors that influence these shifts and the impact on health outcomes for people with OUD and a history of incarceration in Vermont.

4.1 Ongoing and future research

Our group continues to work closely with the VT DOC and Blueprint for Health on a number of planned and ongoing analyses related to the evaluation of MOUD in Vermont's correctional facilities and COVID-19. With regard to VT DOC data, we plan to examine changes in 1) mental health treatment while incarcerated, 2) disciplinary reports, 3) urine toxicology data (i.e., illicit drug screens), and 4) return(s) to incarceration. With regard to Medicaid claims data, we plan to examine time to first overdose after release from incarceration as well as the influence of 1) socio-demographic characteristics and 2) length of incarceration on MOUD engagement in the community. Additionally, we will use data from the VT DOC, Medicaid claims, and the Vermont Department of Health to describe outcomes during the MOUD implementation period (07/01/2018-10/31/2018) and the period during which COVID-19 safety protocols were being implemented (03/01/2020-3/31/2020). Finally, we will begin two qualitative studies in January 2022. The first is funded by JCOIN to conduct 12 interviews (two at each of Vermont's six correctional facilities) with VT DOC healthcare providers and administrative

leadership. The second is funded by the University of Vermont Center on Rural Addictions (CORA) to conduct 28 interviews (four at each of Vermont's five male correctional facilities and eight in the single female facility) with individuals who are incarcerated and receiving MOUD. Findings from ongoing and future research will be disseminated via peer-reviewed publications and conference presentations.

4.2 Limitations

This evaluation utilized observational data and thus all findings are correlational. Additionally, a number of outcomes are limited by the available data. For example, data on OUD diagnoses made by healthcare providers within the correctional facilities were incomplete and thus not available for this evaluation. We report MOUD prescriptions within 30-days after release from incarceration, however the proportion of individuals who took the medication as prescribed is unclear. Data on the proportion of individuals who received up to two weeks of bridge-prescription MOUD upon release from incarceration were unavailable. However, bridge prescriptions could have resulted in more individuals receiving MOUD within 30 days after release from incarceration than estimated in this report. Finally, direct comparisons to published outcomes from studies of MOUD use in correctional facilities in other states were not feasible given differences in methodology and outcome measurement.

4.3 Conclusion

Findings from this evaluation support the intentions of Act 176 and provide evidence that the VT DOC is adhering to the intention of the law. Most notably, the VT DOC implementation of MOUD was associated with an increase in MOUD engagement in the community and a decrease in opioid-related overdoses after release from incarceration, which supports the effectiveness of the program. However, improvements after Act 176 were somewhat attenuated with the onset of COVID-19. Combined, findings demonstrate the benefits from Act 176 as well as a need to improve continuation of care for incarcerated individuals who reenter Vermont communities in the context of the ongoing COVID-19 pandemic.

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