Dosing and Misuse of Buprenorphine in the New Jersey Department of Corrections

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Opioid use disorder is common in incarcerated persons, and concern about the diversion of buprenorphine is a barrier to treatment. We conducted a retrospective chart review of incarcerated persons in the New Jersey Department of Corrections who received charges for misuse of medication, including buprenorphine, hypothesizing that the prescription of buprenorphine monoproduct, multiple tabs or films of buprenorphine, or higher doses of buprenorphine would be associated with more diversion incidents. Within the dosing range of 2 to 12 mg, there were more incidents of diversion of buprenorphine monoproduct (24.3%) compared with buprenorphine-naloxone (10.7%, $p = .004$). More incidents of diversion were seen when multiple films or tabs of buprenorphine product were prescribed (21.7%, comparison 12.7%, $p = .01$). This observation held when considering multiple buprenorphine-naloxone films, but not multiple buprenorphine tablets. No statistically significant association was found for institutional diversion charges related to higher doses of buprenorphine products. These results suggest that, within the dosing range of buprenorphine used in the New Jersey Department of Corrections, misuse charges were not associated with higher doses although were associated with prescribing buprenorphine monoproduct and multiple films of buprenorphine-naloxone.

J Am Acad Psychiatry Law 52(4) online, 2024. DOI:10.29158/JAAPL.240071-24

Key words: addiction; buprenorphine; correctional psychiatry; diversion; dosing; opioid use disorder

Opioid-related deaths are an ongoing public health emergency in the United States.[1] While medication for opioid use disorder (MOUD) is the gold standard for the treatment of opioid use disorder (OUD), little more than 11 percent of people with OUD receive it in the community.[2] The top reasons cited for not receiving treatment in the community include unaffordability, unavailability of treatment, and stigma, especially for nonwhite persons and those in urban communities.[2]

Although certainly not the preferred setting for treatment, OUD concentrates in carceral settings. A 2015–2016 study of opioid users in the United States showed that, as the intensity of opioid use increases, so does the likelihood of legal entanglements. Of study respondents, people who had used heroin were more than twice as likely as those using prescription opioids alone to have been recently involved with the criminal justice system.[3] Though research suggests that about 15 percent of incarcerated persons carry a history of OUD,[4] in the New Jersey Department of Corrections (NJDOC), the setting for this research, the percentage of individuals with a diagnosis of OUD is about 20 percent. While the medical literature is lacking in reports of opioid overdoses in jail and prison settings, 76 fatal overdoses in carceral settings involving fentanyl were reported in the lay press between 2013 and 2021, with the annual numbers trending upward.[5] The California Department of Corrections & Rehabilitation reported 51 overdose deaths per 100,000 incarcerated persons in 2019, most of which were thought to be caused by opioids.[6] Over 95 percent of prisoners will return to the community,[7] with a notoriously high risk of opioid relapse and overdose death within weeks of reentry.[8,9]

Published online September 12, 2024.

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Disclosures of financial or other potential conflicts of interest: None.

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OUD in carceral settings is both a complex challenge and an opportunity. Incarcerated persons have a right to adequate health care services.[10,11] Legal precedents, most notably the 2018 case of *Smith v. Aroostook County* in Maine,[12] are supporting MOUD as a component of adequate health care in carceral settings. The First Circuit held that MOUD must be provided under the Americans with Disabilities Act and the Eighth Amendment, underscoring the constitutional rights of incarcerated individuals to receive appropriate medical treatment for OUD.[12,13] The Federal First Step Act, a landmark reform in the federal criminal justice system, mandated the expansion of access to MOUD within the Federal Bureau of Prisons.[14] Therefore, jails and prisons should be a place where individuals with OUD can access MOUD, regardless of their race, social background, or economic circumstances. A recent review of the literature found strong support for initiating or continuing MOUD during incarceration for the reduction of opioid overdoses after release.[15]

Despite the opportunity to address the problem of OUD in settings where it is concentrated, treatment within carceral systems remains woefully inadequate. Even in states with a high prevalence of opioid-related deaths, only seven percent of surveyed prison facilities had comprehensive MOUD programs, defined as offering all three of the available U.S. Food and Drug Administration (FDA)-approved forms of MOUD: naltrexone, buprenorphine, and methadone.[16] As of 2023, some departments of corrections offer long-acting injectable naltrexone only or no MOUD at all, with information on most states' programs being difficult to find.[6]

Barriers to implementing MOUD in carceral settings include cost, regulatory requirements, the need for operational accommodations, connecting patients with aftercare in the community, and the reluctance of correctional, administrative, and health care staff.[17] The risk of diversion of agonist MOUD is a particular concern. A 2021 study of those recently released from incarceration revealed that 81 percent reported that nonprescribed buprenorphine was at least "somewhat" easy to obtain, 39 percent reported using nonprescribed buprenorphine while incarcerated, and 53 percent of these reported that their motivation for use was "to get high" or "[to] alter my mood."[18] Diversion may promote the underground economy in jails and prisons, increase the activities of security threat groups, cause health-related emergencies, and may promote the development of new-onset OUD.[17,19] Although deaths because of buprenorphine are also possible, particularly when mixed with benzodiazepines, the safety profile of buprenorphine is considered superior to methadone.[20] Managing diversion of buprenorphine in carceral settings is challenging. Diversion may be addressed by switching to liquid methadone, crushing buprenorphine tablets, administering long-acting injectable forms of buprenorphine, or offering a naltrexone product, although regulatory concerns, nursing time, expense, and poor treatment retention limit these options.[17]

The New Jersey Department of Corrections (NJDOC), and their health care vendor Rutgers University Correctional Health Care (UCHC), was an early adopter of MOUD and began offering buprenorphine in 2017. Since 2019, all three FDA-approved medications for OUD have been available to incarcerated persons in the NJDOC, although buprenorphine is the most often requested and the most often prescribed MOUD. Although patients with OUD expressing interest in MOUD are proactively offered it several months prior to release, it is also available as maintenance treatment for persons who have moderate to severe OUD and who would clinically benefit from treatment. This work has been aided by an internal practice guideline that began even before MOUD was an option in the NJDOC and has evolved over time. The guideline is an unpublished internal document that addresses matters relevant to MOUD prescribing, including clinical assessment, patient selection, referrals to qualified prescribers, and dosing, among others.[21]

Some of the recommendations of the UCHC guideline related to prevention of diversion are based on the clinical experience of prescribers and the advice of outside consultants but, to our knowledge, are based on little or no research findings. Extant evidence supports that films of buprenorphine-naloxone are less prone to diversion than tablet forms of buprenorphine products, because films adhere to the mucosa and are thus more difficult to remove from the mouth.[22] Larance and colleagues noted some diversion of buprenorphine-naloxone films although they speculated that the stacking of three or more doses, a common practice in the clinics in the study, allowed some diversion by reducing the adhesion of the medicine to the mucosa.[22] Earlier versions of the UCHC guideline recommended a target dose of eight milligrams of buprenorphine, and this was changed to a

"cap" daily dose of 12 mg in 2019. The cap dose of 12 mg was selected as it is the highest dose available in a single strip.[23] Higher doses are permitted but only under exceptional circumstances, like the adjustment of a particularly high dose prescribed prior to intake. In the community, doses of buprenorphine are typically higher, with the product information calling for a "target" daily dose of 16 mg.[23] Some experts are calling for an update to the recommended target daily dose to 32 mg based on the prevalence of high-potency opioids like fentanyl and related overdose deaths.[24,25]

Much of the reluctance to use higher doses of buprenorphine by UCHC prescribers and supervisors is the suspicion that higher doses would mean higher risk for diversion. The logic behind this is that, if someone needs less buprenorphine than prescribed, the person can use part of it and divert the remainder. In the unusual case of total (rather than partial) diversion, a higher dose will obviously have more value in the underground market. Despite this reasoning and a widely held belief that there is a correlation between dosing of buprenorphine and diversion, there is very little in the literature regarding this question. One study in Australia found higher daily doses of buprenorphine in cases of diversion compared with a general sample of buprenorphine treatment, but not if the dose was administered every other day.[26]

With the intent to promote support for the NJDOC and UCHC MOUD program from all facility staff by minimizing diversion, we initiated this work as a performance improvement (PI) project to determine whether these beliefs about dosing and forms of buprenorphine were valid. We hypothesized that buprenorphine monoproduct tabs, higher doses of buprenorphine, and prescribing multiple films or strips would each be associated with a greater incidence of diversion.

Methods

After determining that other correctional systems may stand to benefit from the results of our PI project, we obtained approvals to convert this to research from the Rutgers-Robert Wood Johnson Medical School Institutional Review Board and the NJDOC Departmental Research Review Board. The NJDOC uses iTAG (i is for institutional, TAG is not an acronym) software for the management of incarcerated persons, including tracking disciplinary matters. As part of our PI project, we used an iTAG report to generate a list of all misuse of authorized medication (*.205) institutional charges between December 10, 2019 and October 7, 2022. Incarcerated persons are expected to take directly observed medications at the time of administration following the ordering instructions (e.g., sublingual). Any variation in this when observed by custody could result in a *.205 charge. The beginning date of December 10, 2019 is when the UCHC Substance Use Disorder guideline allowing a 12 mg dose of buprenorphine was disseminated. This guidance has not changed. The ending date was the date that the PI project began. This report generated 321 records. Other data collected from the iTAG report included the date of the institutional charge and the disposition of the institutional charge (guilty, not guilty, etc.).

Persons in the custody of the NJDOC with serious institutional infractions are notified of the charge by correctional officers and receive a medical and mental health assessment prior to movement to disciplinary housing pending an administrative hearing. Additional assessments may be made based on the results of this screening, and persons on the mental health special needs roster (a designation for incarcerated persons with a mental disorder that impairs their functioning in prison) are evaluated by an independent psychologist to determine capacity to participate in the proceedings and whether their mental health had an impact on their responsibility for their alleged conduct. UCHC clinicians document clinical care using the Athenahealth Centricity Electronic Medical Record (EMR). From the EMR, we reviewed nursing, medical, and mental health notes contemporaneous with the misuse of medication charge. We collected the names of current psychotropics prescribed, the name of the misused medication(s) (if identified), the form and dose of buprenorphine prescribed (if applicable), whether prescribed multiple films or pills of buprenorphine (if applicable), whether on the mental health special needs roster, whether diagnosed with antisocial personality disorder (ASPD), and whether the dose of buprenorphine (if applicable) was changed (specifying if it was increased or decreased) within one month of the charge. Prescribing of multiple strips can be inferred from the dosage if the dose is unavailable in a single strip (e.g., 6-1.5 mg of buprenorphine-naloxone requires either three 2-.5 mg films, or a combination of a 2-.5 mg film with a 4-1 mg film). Sometimes the instructions of the prescription

explicitly called for multiple strips (e.g., for an 8-2 mg dose, "give four 2-.5 mg strips").

For comparison, an EMR report was created identifying all patients to date prescribed buprenorphine in the NJDOC. This report generated 4,523 records. Identification numbers of these records were randomized using an Excel-generated random number, and the related charts were reviewed in more detail on an Excel-generated random date between December 10, 2019 and October 7, 2022. If buprenorphine was not prescribed on that randomly selected date or if the case was also found on the iTAG report above (i.e., overlapping with the study group), the record was not used as a comparison. Based on an analysis to achieve 80 percent power, 894 records were reviewed to find 134 records sufficient for comparison.

Any subject incarcerated in the NJDOC who received a *.205 charge during the study time frame was included. If the disposition was "not guilty," if the record did not indicate buprenorphine prescribed at the time of the *.205 charge, or if the subject was prescribed long-acting injectable buprenorphine (which cannot practically be diverted), the case was excluded. For controls, cases were excluded if not prescribed buprenorphine on the randomly selected date within the study time frame, if found within the included group above, or if prescribed long-acting injectable buprenorphine.

Once the project was approved as research, the names and identification numbers were permanently removed from the dataset. Separate analyses were done if misuse was possible because a buprenorphine product was prescribed at the time of the charge (whether this was cited as the misused medication or not), and if misuse of a buprenorphine product was specifically mentioned in the EMR at the time of the incident. An unpaired t test was used to compare the average dose of subjects prescribed buprenorphine who received a *.205 charge and those who did not. Comparisons of categorical variables, including whether subjects were prescribed multiple films or pills, whether they were on the mental health special needs roster, whether diagnosed with ASPD, and whether the dose was changed within one month (either increased or decreased) were made using the Fisher's exact test. Statistical significance for all tests was set *a priori* at $p < .05$.

Results

Out of 316 misuse of medication charges during the study period, in 161 records (50.9%), a buprenorphine product was prescribed at the time, and in 103 records (32.6%), a buprenorphine product was specified in the EMR as a medication that was misused. There were 134 unique subjects prescribed buprenorphine while receiving a misuse of medication charge, 121 (90.3%) of whom were prescribed buprenorphine-naloxone (BNX) and the remainder the buprenorphine monoproduct (BUP). Out of the 161 misuse of medication charges when buprenorphine was an active medication per the EMR, BNX was specified 78 times (48%) and BUP was specified 25 times (16%). In the remainder of charges, the misused medication could not be discerned from the EMR. For the comparison group of 134 records, 121 (90.3%) were prescribed BNX and 13 (9.7%) were prescribed BUP. Given that 38 cases were excluded from the control group because of being in the misuse group, an estimated risk of 22.1 percent (38 of 172 cases) for getting a misuse charge can be inferred. There was a higher percentage of subjects with a misuse charge for a buprenorphine product who were prescribed the buprenorphine monoproduct (24.3%, BNX 10.7%, $p = .004$, Fisher's exact test).

Data on mean dosages as well as categorical variables (whether prescribed multiple strips or tabs, if the dose was changed within one month, if the subject was on the special needs roster, and if diagnosed with antisocial personality disorder) are summarized in Table 1 and Figure 1. There were no statistically significant differences in terms of dosage for any comparison, although the dose of the BUP when identified as being misused (10.2 mg, comparison 9.4 mg, $p = .09$, Fisher's exact test) approached statistical significance.

For buprenorphine products in general, multiple strips or tabs were associated with misuse if such misuse was possible (21.7%, comparison 12.7%, $p < .05$, Fisher's exact test) or specified (26.2%, comparison 12.7%, $p = .01$, Fisher's exact test). When misuse of a buprenorphine product was specified, higher rates of multiples were observed when BUP is specified than when BNX is specified (80.0%, 9.0%, $p < .001$, Fisher's exact test). In the comparison group, multiples were prescribed 69.2 percent of the time for BUP (not significant (NS)) and not at all for BNX ($p = .001$, Fisher's exact test).

Subjects with a misuse charge were more likely to be on the special needs roster than those without

Table 1 Dosing, Changes in Dosing, and Clinical Characteristics

	Misuse Possible	Misuse Specified	Misuse: BNX	Misuse: BUP	No Misuse	No Misuse: BNX	No Misuse: BUP
n	161	103	78	25	134	121	13
Mean dose (mg)	9.50	9.48	9.23	10.24	9.18	9.16	9.38
Multiple strips or tabs? (%)	35 (21.7%)[a]	27 (26.2%)[b]	7 (9.0%)[c]	20 (80.0%)[c]	17 (12.7%)[a,b]	0 (0%)[d]	9 (69.2%)[d]
Change? (%)	53 (32.9%)	46 (44.7%)	34 (43.6%)	12 (48.0%)	22 (16.4%)	17 (14.0%)	6 (46.2%)
Increase? (%)	12 (7.5%)	6 (5.8%)	6 (7.7%)	0 (0%)[b]	13 (9.7%)	9 (7.4%)	4 (30.8%)[b]
Decrease? (%)	41 (25.5%)[c]	40 (38.8%)	28 (35.9%)	12 (48.0%)	9 (6.7%)[c]	8 (6.6%)	2 (15.4%)
SNR? (%)	100 (74.6%)	69 (67.0%)[a]	57 (73.1%)[e]	12 (48.0%)	67 (50%)[a]	62 (51.2%)[e]	5 (38.5%)
ASPD (%)	45 (33.6%)	33 (32.0%)	27 (34.6%)[f]	6 (24.0%)	26 (19.4%)	23 (19.0%)[f]	3 (23.1%)

[a] $p < .05$.
[b] $p = .01$.
[c] $p < .001$.
[d] $p = .001$.
[e] $p = .003$.
[f] $p = .02$.
Abbreviations: ASPD = antisocial personality disorder; BNX = buprenorphine-naloxone strips; BUP = buprenorphine tabs; misuse possible = prescribed a buprenorphine product at the time of the misuse of medication charge; misuse specified = both prescribed a buprenorphine product and clinical documentation supports misuse at the time of the misuse of medication charge; SNR = special needs roster.

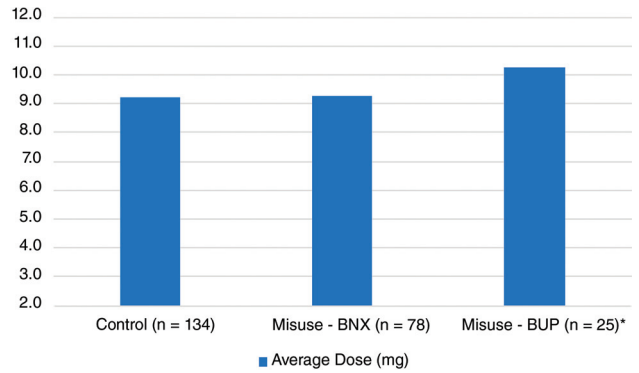

Figure 1. Average Dose Upon Receipt of Charge for Misuse.
*$p = .09$ (NS).
Abbreviations: BNX = buprenorphine-naloxone films; BUP = buprenorphine tablets.

(67%, comparison 50%, $p < .05$, Fisher's exact test), with a stronger association observed when BNX was specified (73.1%, comparison 51.2%, $p = .003$, Fisher's exact test) and not observed when BUP was specified (48.0%, comparison 38.5%, NS). Subjects with a misuse charge were more likely to have a diagnosis of ASPD only if BNX was specifically mentioned (34.6%, comparison 19.0%, $p = .02$, Fisher's exact test). Unless prescribed BUP specifically, subjects with a misuse of medication charge were more likely to have a decrease in their medication dose (25.5%, comparison 6.7%, $p < .001$, Fisher's exact test). Notably, if specifically prescribed BUP, control subjects were more likely to have a dose increase compared with subjects who received a misuse of medication charge (0%, comparison 30.8%, $p = .01$, Fisher's exact test). Put another way, if prescribed BUP and receiving a charge for misuse of medication, subjects were less likely to have their dose increased within a month.

The medications observed most often coprescribed with a buprenorphine product are listed in Table 2. Among subjects with a misuse of medication charge, these most often included bupropion (9.9%), diphenhydramine (6.2%), gabapentin (6.2%), clonidine (6.2%), pregabalin (5.0%), hydroxyzine (5.0%), buspirone (5.0%), duloxetine (4.3%), levetiracetam (3.7%), and olanzapine (3.7%). All of these were observed as often, although usually more often, in subjects prescribed buprenorphine and receiving a misuse of medication charge compared with those without, but none of these comparisons were statistically significant.

Discussion

We found no difference between the mean doses of buprenorphine products prescribed to incarcerated persons who received a misuse of medication institutional charge and those who did not, which is inconsistent with the hypothesis that higher doses of buprenorphine are related to misuse thereof. We did find a statistically significant difference in the likelihood of misuse charges when prescribed multiple films of BNX. In fact, in our comparison group of persons without misuse charges, none were prescribed multiple films. Although misuse of the BUP monoproduct was more likely than misuse of BNX overall, no difference was observed in terms of multiple tabs of BNX prescribed in terms of receiving misuse charges.

Table 2 Medications Most Often Coprescribed with Buprenorphine Products

	Misuse Charge ($n = 161$)	Comparison ($n = 134$)
Bupropion (%)	16 (9.9%)	9 (6.7%)
Diphenhydramine (%)	10 (6.2%)	5 (3.7%)
Gabapentin (%)	10 (6.2%)	2 (1.5%)
Clonidine (%)	10 (6.2%)	5 (3.7%)
Pregabalin (%)	8 (5.0%)	3 (2.2%)
Hydroxyzine (%)	8 (5.0%)	5 (3.7%)
Buspirone (%)	8 (5.0%)	3 (2.2%)
Duloxetine (%)	7 (4.3%)	3 (2.2%)
Levetiracetam (%)	6 (3.7%)	5 (3.7%)
Olanzapine (%)	6 (3.7%)	2 (1.5%)

Note. All comparisons are nonsignificant.

These results support an increased risk of buprenorphine diversion when BUP (monoproduct) is prescribed and when multiple strips of BNX are prescribed but argue against higher doses within the range (2 to 12 mg) typically used in the NJDOC leading to a higher incidence of diversion. It is an empirical question as to whether less diversion would be observed if higher doses of buprenorphine products were made available in singular forms (e.g., one film of a dose higher than currently available). Given that the product information for BNX recommends a target dose of 16-4 mg once a day, it is curious why this strength is not available.[23] Whether institutional misuse charges would correlate with doses higher than the 12 mg upper limit of buprenorphine used in the NJDOC is also an empiric question, especially as higher doses of BNX would require multiple films. Research from the community suggests that higher doses of buprenorphine (e.g., 24 mg) are associated with better retention in treatment,[27] leading some, as above, to suggest that even the recommended dose of buprenorphine (16 mg) is too low,[24,25] considering greater exposure in the community to higher risk opioids like fentanyl. More research directly addressing the most effective dosing of buprenorphine both in community and correctional settings would be helpful.

Although BUP was more likely to be specifically mentioned as a misused medication in institutional charges, the concern about multiple tabs did not seem to factor into this. A provider may offer BUP (instead of BNX) for medical reasons, but BUP is also sometimes used as a risk management strategy for persons with both a serious OUD and a serious risk for diversion, because it can be ordered crushed.[28] Simojoki and colleagues found that crushed buprenorphine tablets retained similar pharmokinetic properties and clinical features as whole buprenorphine tablets.[28] Thus, crushing would mitigate the risk of diversion and obviate concerns about multiple tabs. BUP tablets prescribed in the NJDOC are only available in two strengths: two milligrams and eight milligrams. Thus, there are fewer dosing options for BUP compared with BNX (two mg, four mg, eight mg, and 12 mg of the buprenorphine component), and single tab prescribing was more the exception than the rule. In the comparison group, 30.8 percent were prescribed a single tab of BUP (compared with only 20.0% of the misuse of medication group, NS). A limitation to this study is that it was underpowered to detect differences related to BUP prescribing, which was a small minority of both the study and comparison groups.

Being on the mental health special needs roster and having a diagnosis of ASPD were each associated with an institutional charge for the misuse of BNX. Nearly three-quarters (73.1%) of those clinically identified as misusing BNX were on the special needs roster, and over one-third (34.6%) had a diagnosis of ASPD. This replicates findings from Tamburello and colleagues'[29] review of the characteristics of incarcerated persons with institutional charges for misuse of medications before the implementation of MOUD within the NJDOC, which found rates of 43.6 percent on the roster and 39.0 percent with any history of ASPD. Tamburello and colleagues'[21] study on the general practice patterns of prescribing buprenorphine within the NJDOC also found that being on the mental health special needs roster was more likely for those prescribed a buprenorphine product (48.4%, comparison 16.1%, $p < .001$). It is possible that persons with intent to misuse buprenorphine seek to get mental health treatment because they perceive mental health staff to be more likely to prescribe it. This interpretation should be taken with great caution, as OUD is well known to be highly comorbid with both serious and common mental disorders.[30] Neither a comorbid mental health problem nor comorbid character pathology should exclude a patient from an indicated medical treatment.

Whether or not to charge an incarcerated person with a violation of an institutional rule (like misuse of authorized medication) is a decision made by custody staff and is only a proxy, as in this study, for misuse of buprenorphine. Although health care staff

are typically involved in the process of medication administration, they are ethically bound to maintain confidentiality. As in most law enforcement situations, custody staff have discretion on how to manage potential violations. In our experience, suspected misuse of medication is usually addressed first with education or warnings, but these incidents are usually undocumented. We do not know whether or how often deference was given by custody because of perceived lack of understanding on the part of the incarcerated person or, if it was, whether such lack of understanding was clinically relevant. We partially addressed this by reporting changes to the buprenorphine dosing within a month of a misuse of medication charge, which is a marker of clinical decision-making. It is also possible that charges for misuse of authorized medication may not represent an actual incident of diversion. This concern was addressed in our study by excluding "not guilty" dispositions of the charge. All incarcerated persons in the NJDOC on the special needs roster get a psychological evaluation that considers whether a mental illness rendered them not responsible for their behavior.[31] Our protocol did not include reviewing these reports, but in our experience, a not guilty disposition of a misuse of medication charge based on such an opinion is exceedingly rare.

Although differences between subjects with a misuse charge and the comparison group regarding coprescribed medications were not statistically significant, it is interesting that each of the top four in this regard (gabapentin, bupropion, diphenhydramine, and clonidine) are cited in research on misuse of medication in correctional settings.[29,32,33] Our study was likely underpowered to detect differences for these subgroups, as these medications may have been sought out by opioid users who do not divert medication for opioid use disorder. Bupropion has stimulant properties that may counteract the sedating effects of buprenorphine.[34] Both gabapentinoids and clonidine[35,36] are known to augment the effects of opioids. It is possible that some subjects on these combinations were satisfied with the effects and had no need to divert their prescribed medication, although further research specific to this question would be needed. Replication of this study with a larger study group (i.e., in a larger state system offering medication for OUD) is encouraged.

Other limitations to this study include those common to retrospective chart reviews. Missing data may have affected the results. Most notably, in 36.0 percent of the charts reviewed, the EMR did not include information about the medication suspected of being misused. Our protocol adjusted for this by analyzing both if misuse of a buprenorphine product was specified and if it was possible based on the current medication list, and the findings between these groups rarely diverged. A *post hoc* comparison between the average dose when misuse of buprenorphine was specified in the clinical documentation was no different from when prescribed buprenorphine, but the misused medicine was unspecified (9.55 mg compared with 9.48 mg, $p = .86$, $t = .1714$, $df = 159$). What was observed and documented by health care staff may have been recorded in error or may have differed from what was observed by custody staff. As above, we corrected for this by excluding charges for which the disposition was not guilty, although this likely excluded several valid cases of misuse, as legal certainty requires a higher threshold than clinical certainty.[37]

Our results may not generalize to jails or other state prison systems with differing policies, available options for MOUD, practices regarding administration of these medications, and different conditions of confinement. The diagnoses of ASPD found in the record were clinical diagnoses not necessarily assisted by a psychometric instrument and were entered by clinicians with various qualifications (ranging from licensed clinical social workers to psychiatrists). The time frame of this study significantly overlaps with the COVID-19 pandemic, with related visitation restrictions that may have increased the demand for prescribed buprenorphine products by reducing opportunities to acquire outside illicit substances. This may have also increased the demand for diverted buprenorphine products for either recreational purposes or to mitigate withdrawal symptoms from illicit opioids. We did not exclude or do a separate analysis on the time frame inclusive of the pandemic-related restrictions, as this would have substantially reduced the study's power.

In summary, in this retrospective chart review of dosing and institutional charges for misuse of buprenorphine, we found no significant increase of infractions within the dosing range used in our system (up to 12 mg per day), although our results support other literature suggesting a higher risk for misuse charges with BUP monoproduct and when multiple films of BNX are prescribed. We recommend that the BUP

monoproduct be considered a second-line option for use in carceral settings when benefits exceed risks and that it should be crushed to promote access to care despite an established risk of diversion. We suggest that BNX dosing strategies involving multiple films be avoided or utilized as part of a short-term strategy to achieve higher or lower doses as clinically appropriate.

Acknowledgments

The authors acknowledge consultation on statistical methodology from Megan Cooke, PhD, Research Associate, Robert Wood Johnson Medical School Department of Psychiatry.

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