Substance Abuse and Rehabilitation

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ORIGINAL RESEARCH

Patient Satisfaction and Resource Utilization Following Introduction of Long-Acting Injectable Buprenorphine (LAIB) in Scottish Prisons

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Purpose: To examine patient satisfaction with long-acting injectable buprenorphine (LAIB) as opioid agonist therapy (OAT) during custody, the effect on prisoner behavior and illicit drug use in custody, and the impact on healthcare utilization within OAT programs in Scottish prisons.

Patients and Methods: This observational, service evaluation included 134 adult patients (≥18 years) with opioid dependence. Clinically appropriate patients were stabilized on monthly LAIB. The following outcomes were evaluated at 12, 24, and 52 weeks: patient satisfaction using the Treatment Satisfaction Questionnaire for Medication (TSQM), patient-reported craving using a 100 mm visual analog scale (VAS), and opioid withdrawal using the Clinical Opiate Withdrawal Scale (COWS). Patient-reported illicit drug use and disciplinary actions were recorded.

Results: Retention on LAIB for 12 months or until release/transfer was 93.8%. Patient satisfaction with LAIB was high, with median global TSQM scores >80 at all timepoints in the whole population and in those transferred after reduction from high-dose methadone (>30 mg/day). Compared with the first 4 weeks, craving significantly decreased at Weeks 12 and 24; the decrease at Week 52 was not statistically significant. COWS scores were also significantly lower at all timepoints. Levels of illicit drug use and disciplinary actions were low throughout. Healthcare worker contact time saved with LAIB versus methadone was estimated at ~100 minutes per patient monthly. As of June 30, 2024, ~228 hours in total are estimated to have been saved per month across the Forth Valley prison estate.

Conclusion: This service evaluation demonstrates high levels of patient satisfaction with LAIB in the prison setting, with minimal disruption to patient comfort or behavior even during treatment transition. Provision of LAIB has reduced healthcare hours required to deliver OAT medication in the Forth Valley prison estate, allowing the reprioritization of some healthcare resources toward other health-promoting goals.

Keywords: opioid dependence, extended-release buprenorphine, custodial setting, patient satisfaction, opioid agonist therapy

Introduction

People with opioid dependence (OD) have a mortality rate up to 20 times higher over their lifetime than that of the general population.[1] In Scotland, the estimated prevalence of OD during 2019–2020 was 1.3% in 15–65-year-olds,[2] approximately three fifths of whom received opioid agonist therapy (OAT).[3] By contrast, about 30% of the entire Scottish prison population was receiving OAT in July 2021.[4] Provision of OAT to prisoners has been shown to reduce all-cause mortality during custody and in the first 4 weeks after prison release.[5]

In the UK, the National Institute for Health and Care Excellence recommends methadone or transmucosal forms of buprenorphine for OAT as part of a program of supportive care.[6] In custodial settings, methadone has been the standard of care for OAT due to concerns around the potential for diversion of transmucosal formulations of buprenorphine,[7,8] although this is not the case in every country and use of transmucosal buprenorphine in prisons varies by jurisdiction. A randomized clinical trial conducted within the prison population of Maryland, USA, in 2015 reported that diversion of transmucosal buprenorphine was the most frequent reason for treatment

Received: 10 December 2024
Accepted: 29 March 2025
Published: 15 April 2025

discontinuation, accounting for nearly half of discontinuation in that study group.[9] The ease of concealing and storing transmucosal buprenorphine makes diversion and misuse more likely with this form of OAT, even in jurisdictions that have introduced formulations intended to mitigate this practice.[10]

Long-acting injectable buprenorphine (LAIB) formulations have been approved in Europe for the treatment of OD.[11] Patients receive weekly or monthly injections of LAIB administered by a healthcare professional rather than daily supervised doses required with methadone or transmucosal buprenorphine. Clinical trials of LAIB show a non-inferior efficacy and a similar tolerability profile compared with transmucosal buprenorphine, with the exception of the presence of injection-site reactions.[12,13] In a long-term safety study of LAIB, 20.3% of participants had an injection-site reaction, with most (97.8%) reported as mild to moderate.[13] Qualitative studies of patients receiving LAIB have broadly shown benefits in terms of treatment burden, treatment outcomes (eg, reduced illicit drug use, reduced cravings), quality of life, and employment in the majority of patients. However, disrupted connections with healthcare and other social or practical support systems could be a concern. A lack of control over their own dosing and mixed experiences of efficacy have been reported in some patients.[14,15]

The use of LAIB in secure settings mitigates the risk of coercion to divert or misuse medication. The safety and tolerability of LAIB in a custodial setting were found to be favorable in an open-label, non-randomized study conducted in New South Wales, Australia.[16] The prevalence of non-prescribed opioid use in the LAIB population decreased significantly from 97% at baseline to 61% at Week 4 (p=0.0001). In addition, treatment retention was high (92.3%), there were no treatment discontinuations owing to injection-site adverse events, and no reports of medication diversion. While some discontinuation due to adverse events with LAIB has been reported in other studies, the rate is low.[17] A randomized open-label study of 52 incarcerated adults in New York, USA, showed that introduction of LAIB ahead of release and continuation after release led to reduced in-prison clinic visits, reduced opioid-positive urine drug screens, and a nearly two-fold higher retention in treatment in the community compared with sublingual buprenorphine.[18] In a survey of healthcare and correctional staff working in the custodial system of New South Wales, the introduction of LAIB was given almost universal support, with respondents indicating that LAIB could increase patient safety, improve staff and patient relations, advance patient health, and lead to healthcare efficiencies.[10] Notably, patients previously receiving transmucosal buprenorphine for OD have reported high levels of treatment satisfaction when transferred to LAIB.[19]

In May 2020, the Scottish Government recommended that all patients who were on prescribed OAT and serving custodial sentences of 6 months or longer should have their treatment transferred to LAIB where clinically appropriate. The recommendation was made to facilitate the management of OAT in prisons during the COVID-19 pandemic, particularly in terms of reducing the amount of person-to-person contact required compared with daily OAT medications.[20] This recommendation led to the rollout of LAIB across Scottish prisons, providing an opportunity to examine patient satisfaction with LAIB as OAT during custody, the effect on prisoner behavior and illicit drug use in custody, and the impact on healthcare utilization within OAT programs in Scottish prisons.

Materials and Methods

Design and Setting

This single-arm, observational service evaluation reviewed the introduction of LAIB to three prisons in the Forth Valley area of Scotland between May 2020 and December 2021. The evaluation included participants from HMP Cornton Vale (an all-female prison), HMP & YOI Polmont (a prison for young people aged 16–21 years, and adult females over the age of 21 years), and HMP Glenochil (a prison for convicted adult males). This service evaluation was conducted in accordance with the Declaration of Helsinki, and the evaluation protocol was reviewed by the NHS Forth Valley Research and Development team. This review confirmed that, as this was a service evaluation rather than a clinical study, separate approval by NHS Ethics was not required. In line with standard clinical practice, all patients gave consent for any change in their treatment.

Participants

Adults with OD aged ≥18 years in custody and not on remand were eligible to receive LAIB and be included in the service evaluation. Participants also needed to have at least 6 months of their sentence remaining to be considered for the evaluation, as agreed by the Scottish Government and prisons implementing LAIB during the COVID-19 pandemic. This was to allow time for community availability and therefore help with continuity of care on release. Exclusion criteria included any known hypersensitivity to buprenorphine, severe respiratory insufficiency, severe hepatic impairment, and acute alcoholism or *delirium tremens*.

Treatment Procedures

LAIB (Buvidal® prolonged-release solution for injection, Camurus AB) was initiated in line with recommendations of the Scottish Government. Participants who were already receiving sublingual buprenorphine were switched directly to LAIB monthly according to dose conversions recommended in the product information, starting on the day after the previous sublingual buprenorphine dose. Participants receiving ≤30 mg methadone were initiated on to 64 mg monthly LAIB via an initial dose of weekly LAIB, with their first dose at least 24 hours after their most recent methadone dose. For those who had also not previously been exposed to buprenorphine, an initial 4 mg dose of sublingual buprenorphine was administered, and patients were monitored for 1 hour to ensure tolerability and lack of precipitated withdrawal. They then received a single 16 mg weekly LAIB dose. One week later, patients commenced monthly LAIB at 64 mg. Participants receiving >30 mg methadone at baseline followed a participant-centered and agreed dosage reduction regimen (usually 5 mg/week) to a dose of ≤30 mg methadone. Once this reduction was achieved, these participants followed the same initiation procedure as those receiving ≤30 mg methadone daily at baseline, but with a first monthly LAIB dose of 96 mg to account for their higher opioid tolerance.

Both methadone groups were offered up to two weekly LAIB 8 mg top-up doses during the first week of treatment and then up to one weekly LAIB 8 mg dose per 4-week period once stabilized on the monthly formulation. Monthly dose increases up to 128 mg every 4 weeks were available to any patients who felt inadequately covered once established on monthly LAIB (usually deemed as receiving two administrations of the same monthly dose).

Patient Satisfaction Measures

At 4, 12, 24, and 52 weeks following the switch from methadone to LAIB, patient satisfaction using the Treatment Satisfaction Questionnaire for Medication (TSQM) version 2.0 was recorded.[21] The TSQM is a validated patient-reported outcomes (PRO) scale with good psychometric properties that has been previously used to assess treatment satisfaction in patients with opioid dependence.[19] It consists of 11 items across four domains; effectiveness, side effects, convenience, and global satisfaction. All items are scored on a 5- or 7-point Likert scale, with the exception of one side effects item (a binary yes/no response). The scores for each TSQM domain are generated by adding the item scores and transforming the composite score into a value ranging from 0 to 100, with a higher score indicating greater satisfaction.[21] At 4 and 12 weeks, patients who had transferred to LAIB from other OAT medications were also asked to rate their satisfaction with LAIB compared with their previous medication on a 5-point Likert scale.

Other Outcome Measures

At 4, 12, 24, and 52 weeks following the switch from methadone to LAIB, patient-reported craving using a 100 mm visual analog scale (VAS) and opioid withdrawal using the Clinical Opiate Withdrawal Scale (COWS)[22] were recorded. Patient-reported illicit drug use and disciplinary actions were also recorded as they occurred. Retention in treatment and reasons for any discontinuation of LAIB were calculated at the end of the evaluation period. Treatment retention was defined as patients remaining on LAIB throughout their initial 12-month period of monitoring. Patients who chose to stop LAIB, return to their previous OAT, or were stopped for medical reasons were deemed not to have been retained in treatment. Patients who were transferred or liberated prior to completing 12 months of treatment were considered retained in treatment if they remained on LAIB for the period that they were within the Forth Valley prison estate.

Resource Utilization

Resource utilization for methadone and LAIB was assessed at the beginning of the evaluation period. An additional healthcare professional was present during the methadone dispensing rounds and noted the start and end time for the round. The time required per patient was calculated using the number of patients recorded in the controlled drug administration book. This measurement was carried out over 5 days to determine the average methadone administration time. The same process was carried out to determine the average administration time for LAIB but, because this was not administered daily, 5 measures were taken over a 2-week period.

Statistical Analysis

Due to the nature of the population in a custodial setting, many participants would be expected to have missing data. This could be for a range of reasons, including refusal to complete patient forms at some contact points, release from prison, or transfer to another prison. The timing of release does not necessarily align with length of original sentence and transfers to other prisons are often arbitrary from the point of view of the healthcare teams. For prisoners that were transferred to other prisons, it was sometimes possible for them to continue LAIB at their new prison. However, there was no feasible mechanism to facilitate continued data collection in the context of the COVID-19 pandemic. Transferred prisoners may therefore have been retained in treatment but still have missing data following transfer. For all these reasons, it was not possible to predict the amount of missing data in advance. Sample sizes would be expected to decrease as the evaluation period progressed, potentially below the level that would allow for parametric testing, which requires the verification of the normal distribution of the data. Non-parametric significance tests were therefore used when analyzing the data. Outcomes were analyzed using the Wilcoxon rank sum test. All statistical tests were post hoc. Analysis was carried out using R version 4.3.2.

Results

Between May 1, 2020, and August 31, 2021, 134 patients initiated treatment with LAIB (Table 1). Excluding three patients who involuntarily stopped LAIB due to prison transfer, the retention rate on LAIB was 93.9% (Figure 1). The reasons for discontinuation of LAIB are listed in Table 2.

Patient Satisfaction

TSQM global satisfaction scores were consistently high throughout the evaluation period (Figure 2). Mean scores were similar across the evaluation period, ranging from 82.9 at Weeks 2–4 to a peak of 85.9 at Week 24. Although the median global

Table 1 Demographic and Baseline Characteristics

Characteristic	N=134
Men, n (%)	101 (75)
Mean age, years (range)	37.0 (20–59)
Young offenders,[a] n (%)	2 (1.5)
Previous treatment	
Methadone, n (%) High dose >30 mg Low dose ≤30 mg	90 (67) 61 (68)[b] 29 (32)[b]
Transmucosal buprenorphine, n (%)	13 (10)
None	31 (23)

Notes: [a]Young offenders were aged 16–21 years. [b]Percentages are of the number of patients previously receiving methadone (n=90).

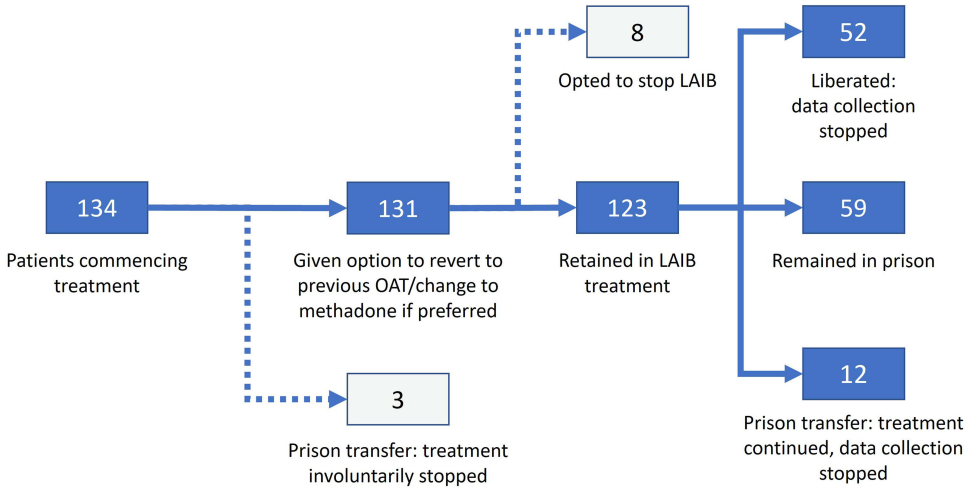

Figure 1 Retention of patients on LAIB following initiation of treatment.

satisfaction score increased from 83.3 at Weeks 2–4 to 100 at Week 52, the differences were not statistically significant. However, significant improvements compared with Weeks 2–4 were identified in the TSQM dimensions of effectiveness (p=0.028 at Week 12, p=0.031 at Week 24) and side effects (p=0.031 at Week 12, p=0.004 at Week 24). Scores for both were also higher at Week 52, but the differences were not statistically significant compared with Weeks 2–4. Patient satisfaction with LAIB treatment compared with their previous treatment, as assessed by a 5-point Likert scale, was high throughout the evaluation period, with a mean score of 4.6 at Weeks 2–4 and 4.8 at Week 12. The proportions of patients rating LAIB as better or much better than their previous treatment were 87% at Weeks 2–4 and 96% at Week 12 (Figure 3).

In the subpopulation of patients who were receiving methadone prior to starting on LAIB, global TSQM scores were higher at all timepoints for those who transferred from low-dose methadone (≤30 mg/day) than for those who were transferred to LAIB following reduction from a high dose of methadone (>30 mg/day; Figure 4). Nevertheless, global TSQM scores for all patients previously receiving methadone were above 80 at all timepoints, indicating high treatment satisfaction.[23]

Other Outcome Measures

Mean craving on a 100 mm VAS was 21.5 at Weeks 2–4, and was significantly lower at Week 12 (12.2, p=0.037) and Week 24 (6.1, p<0.001). At Week 52, craving remained lower (11.7) but the difference compared with Weeks 2–4 was not

Table 2 Reasons for Discontinuation of LAIB

Number of Patients	Notes	Time Discontinued
1	Increased anxiety, reverted to methadone	3 months
1	Repeated intoxication (stopped for safety), declined further OAT	4 months
1	Urinary retention presumed secondary to LAIB, reverted to methadone	9 months
1	Changed to sublingual buprenorphine for release	2 months
1	Headaches, declined further OAT	5 months
1	Struggled with clarity, requested return to methadone	2 months
1	Felt that they no longer needed treatment, declined further OAT	2 months
1	Stopped at patient request (no reason given), initially declined OAT but requested restart of LAIB 4 months later	1 month

https://doi.org/10.2147/SAR.S510467

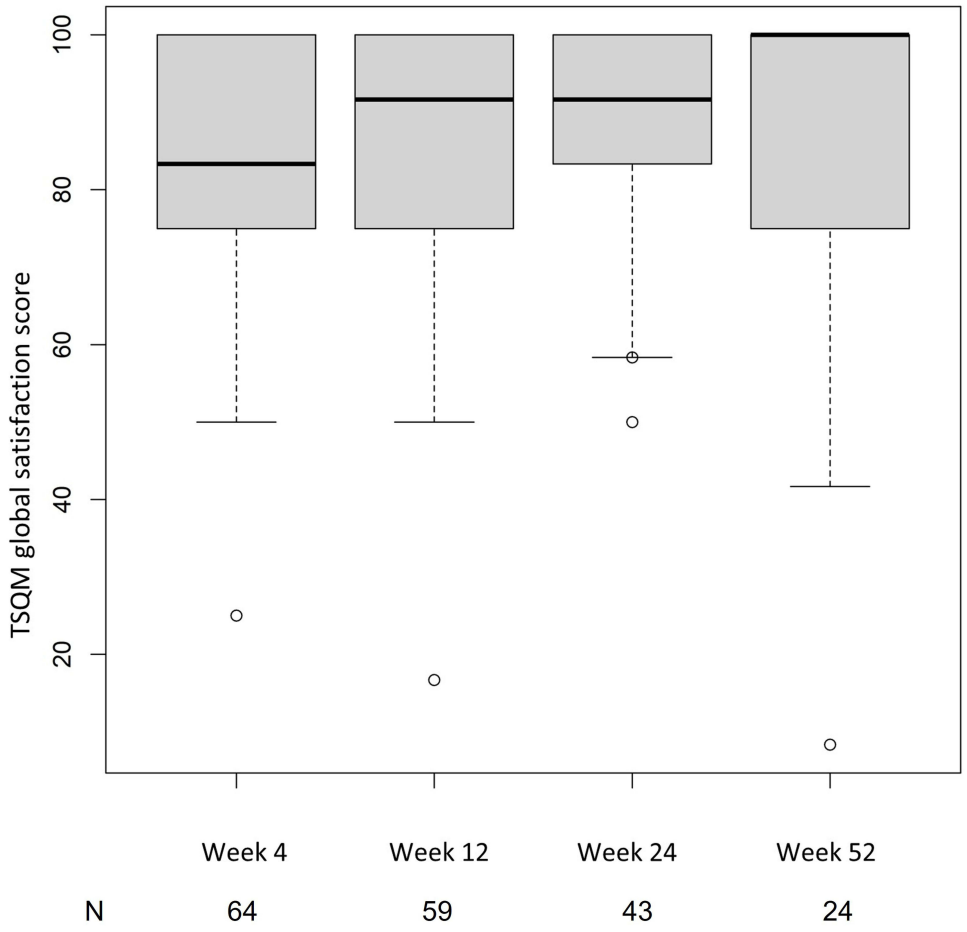

Figure 2 Global satisfaction score as measured by the Treatment Satisfaction Questionnaire for Medication at Weeks 4, 12, 24, and 52. The solid line indicates the median value. Open circles indicate outlier values.

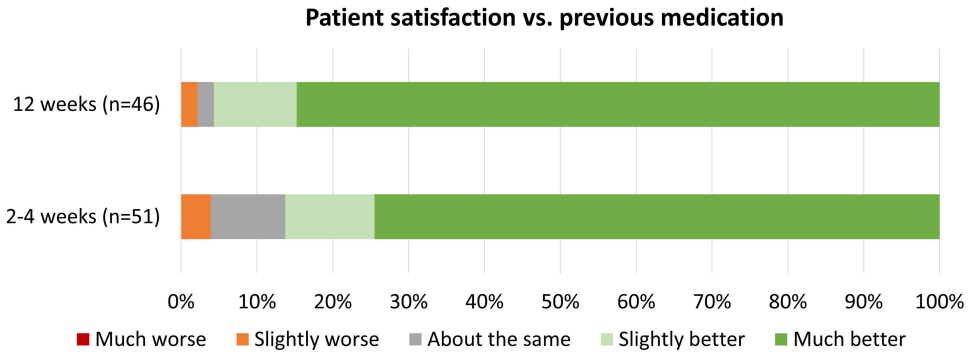

Figure 3 Patient satisfaction with LAIB compared with previous medication assessed on a 5-point Likert scale.

statistically significant. These results were consistent when patients new to OAT were excluded, with mean craving significantly lower at Weeks 12 (p=0.015) and 24 (p=0.03). Of note, the median VAS was 0 for all timepoints after Week 4 (Figure 5), with less than 40% of respondents reporting any craving at all. Patient-reported withdrawal symptoms also decreased significantly during the evaluation period. The mean COWS scores were 1.2 at Weeks 2–4, 0.3 (p=0.041) at Week 12, 0.1 (p=0.008) at Week 24, and 0.2 (p=0.022) at Week 52.

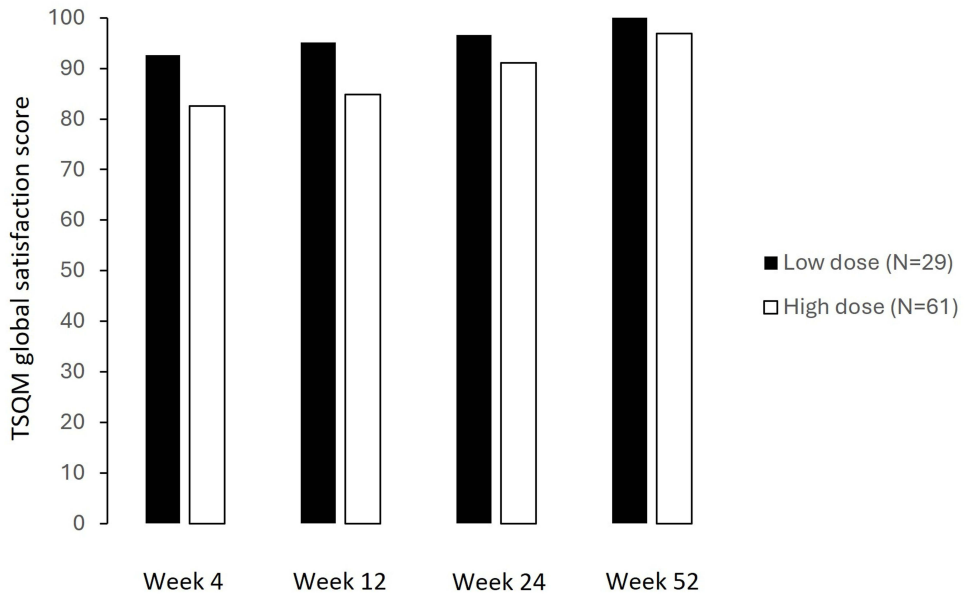

Figure 4 Global TSQM scores for patients transferring to LAIB from low-dose methadone (≤30 mg/day) or high-dose methadone (>30 mg/day).

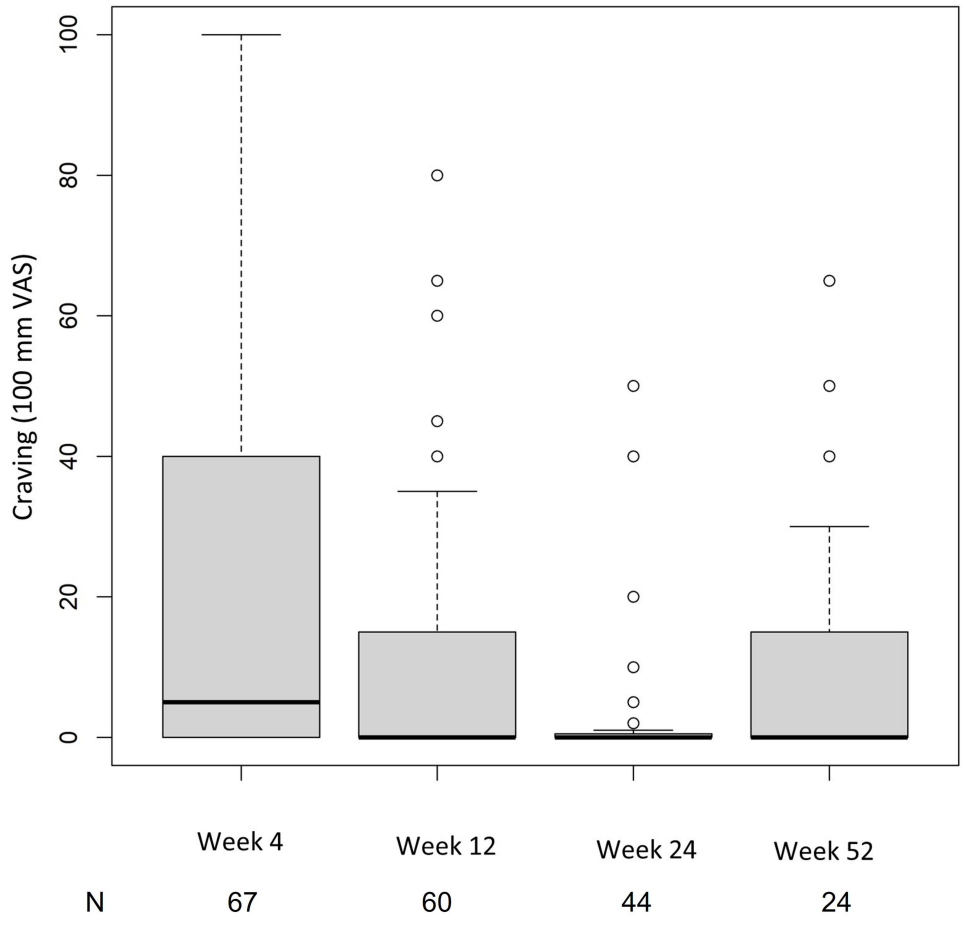

Figure 5 Craving as measured by a 100 mm VAS at Weeks 4, 12, 24, and 52. The solid line indicates the median value. Open circles indicate outlier values.

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Table 3 Self-Reported Incidents of Illicit Drug Use and Disciplinary Actions

Incident	Number of Patients Reporting an Incident at Each Follow-up Meeting			
	Weeks 2–4	Week 12	Week 24	Week 52
Illicit drug use	12	4	3	1
Disciplinary action	7	5	5	3

Self-reported illicit drug use reduced over the 52 weeks and the number of patients with self-reported prison disciplinary actions remained low throughout (Table 3). Both measures were highest during the stabilization period in the first 4 weeks.

Resource Utilization

For LAIB, the healthcare worker contact time over a 28-day period was one contact of ~12 minutes with two staff, resulting in a per-patient utilization of ~24 minutes over 28 days once patients had been stabilized on monthly LAIB. For methadone, the healthcare worker contact time was 28 contacts of ~2 minutes each with two staff, resulting in a per-patient utilization of ~112 minutes over 28 days. Since the data collection for this service evaluation, OAT in the form of LAIB is now delivered across the Forth Valley prison estate by one member of staff, reducing contact time further to ~12 minutes over 28 days for patients stabilized on LAIB. Over the evaluation period, administration of LAIB required ~100 fewer minutes of healthcare worker time per patient every 28 days compared with administration of methadone.

Discussion

Access to OAT medication in prison for people with OD has previously been shown to provide many benefits, especially after release, including a reduction in continued illicit opioid use, reductions in the risk of overdose and mortality, and increased treatment engagement.[24–26] However, delivering OAT in prisons presents specific challenges, particularly security concerns around diversion of medication and the additional supervision required to prevent this.[7] Data from this service evaluation adds to a growing body of evidence supporting the use of LAIB in prisons as an option for delivering OAT that is both acceptable to the patient and, owing to the injectable nature of delivery, less vulnerable to diversion, misuse, and associated peer coercion.[10,16,27,28] The monthly dosing modality may also provide patients with more time to engage with treatment in the community after release, compared with needing to do so before the next daily dose is due.

The treatment retention rate was high at 93.8%, which is comparable with other studies in correctional settings.[16,27] Patient satisfaction with LAIB as assessed by the TSQM global satisfaction score was also consistently high. This was the case even for patients who were transitioned to LAIB from a daily methadone dose of >30 mg, and who would have needed to undergo a tapering to ≤30 mg, before transfer. Although TSQM scores for this group were lower than for those transferring directly from <30 mg methadone daily, both groups had scores above the 80-point cutoff (considered to represent high satisfaction) at all evaluations.[23] In addition, improvements were seen in the TSQM subdimensions of effectiveness and side effects, indicating that any side effects reported at the early stages of transition resolved over a longer duration of treatment.

The recommendation to switch clinically appropriate patients within the Scottish prison system to LAIB was initiated in response to the COVID-19 pandemic. It might be expected that some patients may have found moving from a sedative medication such as methadone to buprenorphine, which is associated with less prominent sedation and more "clear-headedness", to be uncomfortable during the added security and stringency of COVID-19 procedures. However, the high retention rates and patient-reported satisfaction indicate that this was largely not the case. Patient satisfaction with LAIB compared with previous treatment, as assessed by 5-point Likert, was consistently high. Even during the 4-week stabilization phase, over 85% of respondents scored LAIB as slightly or much better than their previous treatment. By Week 12, 96% of patients were scoring LAIB as slightly or much better than their previous treatment. Craving and withdrawal symptoms were also consistently low, as were instances of illicit drug use or disciplinary incidents. Indeed, illicit drug use decreased from 12 reports during the stabilization period to a single report at 52 weeks. These results mirror an open-label study in 67 individuals in correctional settings in Australia; 78% of participants in that study had

reported hearing threats of coercion or intimidation related to daily OAT medications at baseline, but <10% reported this during follow-up, after LAIB had been introduced.[16]

The Scottish Prison Service has been recognized as adopting a progressive and innovative approach to healthcare in prisons.[29,30] Adoption of LAIB as a mainstream option for OAT in prisons could provide healthcare benefits beyond the OAT program. In this service evaluation, the administration of LAIB required nine times less healthcare professional time than methadone. As of June 30, 2024, 141 patients were receiving methadone and 137 patients were receiving LAIB across the Forth Valley prison estate. This represents an estimated reduction in resource utilization of 228 hours of healthcare worker time per 28 days compared with the period before the evaluation, when all patients were receiving daily OAT. This is consistent with health economic analysis that indicates LAIB is a cost-effective solution to providing OAT in prisons.[31] A cost analysis study of OAT in a correctional facility in Canada also demonstrated the economic benefits of transferring patients from sublingual buprenorphine to LAIB, at least partly due to savings in staff resources and time.[32] It is important to acknowledge that not all patients may view this as a positive, with qualitative research indicating that some prefer the routine and reassurance of frequent contact with their healthcare team. In the Forth Valley prison system, healthcare resources that were used for daily OAT have been directed toward other healthcare objectives for prisoners, such as vaccination programs, mental health initiatives, or other forms of psychosocial and health-promoting support. Resource savings are thus not merely economic but have resulted in health benefits for patients overall, while patients also maintain contact with the healthcare team through other services.

Collectively, these data indicate that the use of LAIB in prison OAT programs could provide an important treatment option that is acceptable to patients, while demonstrating the potential for reducing illicit drug use, mitigating the risks of confrontation over diversion, and can lead to other health benefits through improved healthcare resource utilization. However, LAIB was introduced to the Forth Valley prison system in response to a public health emergency, so our implementation does not necessarily represent a model for all prison settings. Changes in OAT should be made for clinical reasons, accounting for the preferences and goals of patients and with their participation in the decision. Patients in prison settings may have strong individual preferences for certain OAT medications based on their priorities (eg, control of cravings, route of delivery, side effects), experiences, and the availability of treatment in the community upon release.[33] Shared decision-making and person-centered care are known to contribute to patient engagement and satisfaction in treatment, as well as patient outcomes.[34,35]

Limitations

The TSQM scale has not been specifically validated in a prison setting. However, to our knowledge, there are no PRO tools for opioid dependence that have been validated in this setting. The TSQM has been validated and used to assess PROs in multiple studies of people withOD.[19,36,37] The domains measured by the TSQM (eg, effectiveness or side effects) remain relevant to people with OD in prisons.

Both disciplinary incidents and illicit drug use were self-reported, which leaves the potential for both these occurrences being more frequent than was recorded. Due to the circumstances in which LAIB was introduced to the Forth Valley prison system, it was neither feasible nor ethical to include a comparator group. However, other studies in correctional settings have included a comparator group where participants received daily OAT medication; the results of those studies were consistent with our findings.[10] Another limitation associated with the nature of the setting is the difficulty of maintaining a consistent population while individuals are either transferred to other facilities or liberated, leading to a decreasing pool of participants over time and making parametric testing unfeasible. As such, all statistics were post hoc, as designing a study with a priori statistical power was not feasible. Due to participants being released or transferred to other prisons, the amount of missing data at Week 52 was high compared with other timepoints, making it more difficult to demonstrate statistically significant findings. The lack of ability to follow up with patients after release meant that we could not confirm the degree to which the high retention rate in prisons was maintained in the community. However, other studies comparing LAIB to sublingual buprenorphine have suggested a nearly two-fold advantage in retention for LAIB (69.2% vs 34.6%, respectively).[18] The lack of full demographic data on the patients in this service evaluation also limited our ability to contextualize any health disparities that may occur in this setting. Finally, our results are based on the implementation of only one formulation of LAIB, as this was the only one available in the UK at the time the evaluation began.

Conclusions

This service evaluation demonstrates high levels of patient satisfaction with LAIB for OD in the prison setting. Patients were successfully transferred from daily OAT medications with minimal disruption to their stability, even during the first month of transfer. Inclusion of LAIB as a treatment option has the potential to reduce the number of healthcare worker hours allocated to delivering treatment, allowing these resources to be directed to other health-promoting activities to improve overall patient health.

Abbreviations

COVID-19, coronavirus disease 2019; HMP, His Majesty's Prison; LAIB, long-acting injectable buprenorphine; NHS, National Health Service; OAT, opioid agonist therapy; OD, opioid dependence; PRO, patient-reported outcome; TSQM, Treatment Satisfaction Questionnaire for Medication; VAS, visual analog scale; YOI, young offender institution.

Acknowledgments

Medical writing support for this publication was provided by Jamil Bacha, PhD (RiSE Scientific), funded by Camurus Ltd.

Funding

This service evaluation formed part of a Joint Working Project between NHS Forth Valley and Camurus Ltd. It was designed jointly between NHS Forth Valley and Camurus. Camurus also provided support in the evaluation of treatment outcomes, statistical analysis, and medical writing.

Disclosure

Craig Sayers has previously received speaker fees from Camurus. Daniel Mogford is a Medical Director at Camurus Ltd. The authors report no other conflicts of interest in this work.

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