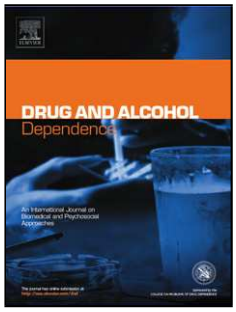

Title: Prescription Opioid Abuse in Prison Settings: A Systematic Review of Prevalence, Practice and Treatment Responses

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PII: S0376-8716(16)31047-X
DOI: http://dx.doi.org/doi:10.1016/j.drugalcdep.2016.11.032
Reference: DAD 6288

To appear in: *Drug and Alcohol Dependence*

Received date: 23-5-2016
Revised date: 8-11-2016
Accepted date: 10-11-2016

Please cite this article as: Bi-Mohammed, Zanib, Wright, Nat M, Hearty, Philippa, King, Nigel, Gavin, Helen, Prescription Opioid Abuse in Prison Settings: A Systematic Review of Prevalence, Practice and Treatment Responses.Drug and Alcohol Dependence http://dx.doi.org/10.1016/j.drugalcdep.2016.11.032

Prescription Opioid Abuse in Prison Settings: A Systematic Review of Prevalence, Practice and Treatment Responses

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Highlights

- Abuse of prescription opioids is widespread within prisons.
- There is significant variation internationally in the type of opioid abused.
- Further research is needed regarding how to effectively respond to such abuse.
- Assertiveness and safer prescribing training for prescribing staff is needed.
- More research is required on the development of less abuseable preparations.

Abstract

Background

To systematically review the quantitative and qualitative evidence base pertaining to the prevalence, practice of, and treatment response to the diversion of prescribed opiates in the prison setting.

Methods

Medline, Embase, CINAHL, PsycINFO, Google Scholar, ASSIA and Science Direct databases were searched for papers from 1995 to the present relevant to the abuse of prescribed opiate medication. Identified journals and their reference lists were hand searched for other relevant articles. Of the abstracts identified as relevant, full text papers were retrieved and critiqued against the inclusion criteria for the review.

Results

Three hundred and fifty-five abstracts were identified, leading to 42 full-text articles being retrieved. Of those, 10 papers were included in the review. Significant differences in abuse behaviours between different countries were reported. However, a key theme emerged from the data regarding a culture of nasal administration of prescribed sublingual buprenorphine within some prisons due to

both reduced prevalence of injection within prison and reduced supplies of illicit drugs within prison. The buprenorphine/naloxone preparation appears to be less amenable to abuse. The review highlighted a paucity of empirical research pertaining to both prevalence of the phenomenon and treatment responses.

Clinical and research implications

Healthcare providers within prisons need to prescribe opioids in the least abuseable preparation since the risk of abuse is significant, despite widespread processes of supervised dispensing. Prescription medication abuse is not limited to opioids and the predominant drug of abuse in an individual prison can rapidly change according to availability.

Keywords

Abuse of prescribed medication, Opioid, Buprenorphine, Buprenorphine/Naloxone, Oxycodone, OxyContin, Methadone, diversion, prison, prisoner, abuse, misuse.

1.0. Introduction

Recent estimates suggest there are between 15 and 39 million problem opioid users worldwide (Degenhardt and Hall, 2012). This is part of a much larger estimated number of between 162 million and 324 million people who, in 2012, had used any illicit drug (World Drug Report, 2014). Such users are disproportionately represented in the criminal justice system (Dolan et al., 2007; Fazel, 2006). For example, in America, over 200,000 opioid dependent prisoners pass through the correctional facilities annually, and it is estimated that more than 50% of prisoners in the USA have a history of substance misuse (Mumola and Karberg, 2006; Nunn, 2012). It is

also widely accepted that prison is a high-risk environment, which makes some prisoners vulnerable to initiation of drug use, including heroin (Boys et al., 2002). However, upon entering prisons, many opiate users cease injecting and, due to security processes that disrupt trafficking into prisons, resort to obtaining supplies through other means, including opiates prescribed in the prison setting. Such a practice makes these prisoners vulnerable to harassment (Wright et al., 2015).

Whilst historically, prisoners have been denied opiate substitution treatment (National Quality Forum, 2007), recently in the UK there has been a significant increase in the prescribing of opiate substitution treatment in prison settings (Wright et al., 2014a). Typically, opioid substitution treatments are either methadone or buprenorphine (Nunn et al., 2009). In addition to the trend of increased prescribing of opioid substitution therapy in prison settings, many prisoners present with co-morbid physical health problems resulting in pressure for prison-based clinicians to prescribe opioids and there has been increasing concern amongst both clinicians and policy leads regarding the abuse of such prescribed opioids in prison settings (Public Health England, 2013).

The US National Institute of Drug Abuse (NIDA) defines Prescription Drug Abuse as "the use of a medication without a prescription, in a way other than as prescribed, or for the experience or feelings elicited" (2014). This definition concurs with the WHO definition of Psychoactive Substance Misuse as the "use of a substance for a purpose not consistent with legal or medical guidelines, as in the non-medical use of prescription medications". The term is preferred by some in reference to abuse in the belief that it is less judgemental (World Health Organisation, 2015). Therefore, our

review considered “abuse” of prescription opioids as defined by administering legally prescribed medication through unlicensed routes such as injecting, smoking or intranasal administration (commonly referred to in the literature as snorting or sniffing); or diversion which is defined as the transfer of medication from a lawful to an unlawful channel of distribution (NIDA, 2014). Diversion of prescribed opioids, particularly methadone, is a global public health problem due to increased risk of overdose fatalities (Madden and Shapiro, 2011). It has also led to an increase in the incidence of opioid dependence (particularly in regions where, or periods when, heroin availability is scarce) and therefore has compromised the public acceptance of long-term opioid prescription (Bell et al., 2009).

Diversion of prescription opioid methadone, or buprenorphine, maintenance medication is common. In community populations, self-report estimates range from 16 to 60% (Davis and Johnson, 2008; Gwin Mitchell et al., 2009; Winstock et al., 2008). Almost 20% of individuals inject opioid maintenance medication that is prescribed for either oral, or sublingual, consumption (Winstock et al., 2008).
A variety of motivations have been cited for buying illicit prescription opioids: a desire for a euphoric experience, to ameliorate symptoms of opiate withdrawal, or to control symptoms of pain. In highlighting different motivations, the authors reported that the group who used prescribed medication for euphoria were also more likely to divert such medication. They suggested concentrating criminal justice efforts on these groups rather than on users who tended to use illicit prescribed medication for amelioration of either withdrawal or pain symptoms (Davis and Johnson, 2008).

However, prescription medication abuse is not limited to community settings and has been highlighted as a major concern amongst prison populations (Hendrich et al., 2011; Singleton et al., 2003). A descriptive survey commissioned by the UK Ministry of Justice (MOJ) found that of 139 prisons in England and Wales surveyed between February and April 2007, 87 of these prisons detected buprenorphine in random and/or targeted Mandatory Drug Tests (Ministry of Justice, 2007). Buprenorphine misuse was far more widespread across the country and across prison categories than anticipated. It was identified to be the most misused drug in eleven prisons, and the third most misused drug overall (Ministry of Justice, 2007).

Commonly prescribed opioids in UK prison settings include methadone and buprenorphine. Methadone is currently prescribed in UK prisons in the liquid preparation as it is seen as less amenable to diversion than tablet preparations. Buprenorphine is currently prescribed in sublingual preparation either as the mono-buprenorphine product or as the combination buprenorphine/naloxone product (Wright et al., 2012). Internationally, there have been reports of abuse of both prescriptions in the prison and community setting. Gordon et al. (2011) report in their paper that buprenorphine prisoner patients are more likely to be terminated from their treatment in prison for potential diversion of the medication. The criminal justice system in the USA is, therefore, reluctant to prescribe opioid treatment (Kinlock et al., 2009; Nunn et al., 2009), with a strong preference of having drug-free prisons (Schwartz et al., 2011).

Therefore, in light of the growing problem relating to prescription opioid abuse in prison settings, it felt timely to undertake a review of prevalence, risk factors, and interventions for prescription medication abuse.

2.0. Methods

MEDLINE, CINAHL, The Cochrane Library, PsychINFO, EMBASE, ASSIA and Science Direct databases were searched in ATHENS from the period of January 1995 through October 2015 using internationally accepted MeSH headings outlined in Table 1. The date range reflects the fact that prescription opioid abuse in prisons is a relatively recent problem. Therefore, little empirical evidence had been collected before 1995. Full text articles were also hand searched by examining the reference list for other studies of relevance not identified through the electronic searches. Google Scholar was accessed to search for empirical grey literature.

2.1. Inclusion and Exclusion Criteria

Quantitative or qualitative empirical research studies either exploring or evaluating the risk of abuse of prescribed opioids in prison settings met the inclusion criteria. The search was limited to human studies published in the English language. Studies that considered the following were excluded:

- Abuse of non-opioid drugs
- Opinion pieces or discussion papers
- Pharmacokinetic or pharmacodynamic studies
- Papers exploring diversion in the community (i.e., non-prison) settings

2.2. Study Selection

Abstracts of identified papers were independently assessed against the inclusion and exclusion criteria by ZM and NW. Discrepancies were resolved by consensus meetings between ZM, NW and PH. Following this process, full papers were retrieved for review by ZM.

2.3. Quality Assessment

The quality of quantitative papers was assessed using a checklist (see Table 2) devised from the UK National Institute for Health and Care Excellence (NICE) guidelines manual and the Cochrane Handbook for Systematic Reviews (NICE, 2012; Higgins and Green, 2011).

It is acknowledged that whilst there is no consensus regarding the application of quality criteria to qualitative research papers, many accept the need for clear and transparent approaches for judging the quality of such research (York University Centre for Reviews and Dissemination, 2009). To this end, quality of qualitative research was assessed using the CASP framework (see Table 3)(Casp,2013). Such use of checklists at the stage of synthesising the data facilitated assigning greater prominence to findings from papers that had more methodological rigour.

3.0. Results

Three hundred and fifty-five abstracts were identified from the electronic databases. Two hundred and eighty-one were excluded because they did not meet the inclusion criteria and 32 duplicate abstracts were excluded, leaving 42 abstracts for which full texts were obtained for review (see figure 1). A total of ten papers met the criteria for inclusion (see table 4).

The limited research findings highlighted differing practices of opioid abuse in prison settings. Such practices are outlined below. We did not retrieve any prevalence studies pertaining to prescription opioid abuse. Also, we did not retrieve any studies pertaining to treatment interventions aimed at reducing the risk of prescription opioid abuse. Therefore, the findings reported below relate to themes emerging from the data regarding differing practices of prescription opioid abuse and how factors external to the individual (e.g., the prison environment itself) impact upon such practices. The themes were derived from applying the checklists highlighted in Tables 2 and 3 to the included paper

3.1. Heterogeneity of Prescription Opioid Abuse Practice

The review highlighted prescription opioid abuse in prisons as an international phenomenon, as evidenced by data reported in the USA, Canada, UK and Australia. However, significant differences in abuse behaviours between different countries were reported.

The Horyniak et al. (2011) Australian study highlighted the practice of unlicensed inhaling buprenorphine, which was more common amongst individuals who had a history of imprisonment. Inhaling buprenorphine was typically practiced as “chasing” off foil. However, none of the other studies included in this review highlighted such a practice. Also, the authors highlighted regional differences between different jurisdictions in Australia. Therefore, such a practice is possibly confined to certain regions within the Australian subcontinent.

The theme of regional variation of abuse of prescription opioids is supported by the findings of the Johnson et al. (2012) Canadian research that surveyed over 1200 male prisoners who were being prescribed methadone for maintenance. They found significant regional differences in the prevalence of both morphine/hydromorphone and oxycontin unlicensed use. The study by Wunsch et al., which was conducted in the USA in the context of widespread media publicity regarding unlicensed oxycontin use, highlighted both age and gender variations in the unlicensed use of prescribed oxycontin. Females and those under the age of 30 were more likely to abuse oxycontin. Oxycontin abuse was also associated with wider poly-drug misuse of prescribed medication.

Oxycontin abuse was not reported in either UK or Australian cohorts. Rather, buprenorphine abuse appeared to be a phenomenon reported amongst UK and Australian cohorts and the unlicensed nasal route of administration appeared to be almost exclusive to the prison setting. It would appear that the reduced prevalence of injection and the reduced supply of drugs contribute to a culture of unlicensed nasal administration of buprenorphine within some prisons (George and Moreira, 2008; Horyniak et al., 2011; Tompkins et al., 2009; Wright et al., 2015).

3.2. Impact of the Prison Setting upon Prescription Opioid Abuse

In their 1998 UK survey, Swann and James found that 10% of the sample stopped using all opioids in prison as they had “reached their time” (1998). For those who continued, most reduced due to the cost and limited availability of drugs and there was a tendency to switch drugs according to whatever was available. Only a small minority used prescription opioids inside the prison, namely diverted methadone.

This finding of a small proportion of the prison population using diverted methadone is supported by the data from Marriott et al., in which one participant reported such use (2008). This was a study conducted in 2002-03, which was before the implementation of prescribed methadone treatment into the study site.

However, in later UK based qualitative research conducted by Tompkins et al. (2009), during which, male ex-prisoners were interviewed between 2006 and 2008, a significant theme of unlicensed intranasal use of buprenorphine emerged. Crucially, this form of prescription medication abuse was not limited to prisons in which the medication was prescribed; i.e., there is diversion into prison of buprenorphine prescribed in community settings. That said, the primary source was diversion of prison prescribed opioids and participants described a variety of techniques used to divert buprenorphine administered via the sublingual route. Such techniques involved seeking to evade the monitoring process of supervised consumption (also referred to as directly observed therapy) by concealing the medication in an area of the mouth other than the sublingual area, substituting sublingual buprenorphine with a different tablet (typically paracetamol), or removing the tablet when the gaze of observing discipline or nursing staff was distracted. Prisoners reported variability between professionals in the stringency of observing administered buprenorphine medication. The widespread unlicensed use of buprenorphine was primarily linked to availability, although cost of diverted prescribed buprenorphine varied between establishments; i.e., as would be expected, the cost was higher in prisons where the medication was not prescribed. However, a relative loss of tolerance to opioids on account of reduced prison supply meant that users experienced a heightened euphoric effect due to occasional use. They also reported a long duration of euphoric

action through nasal administration of buprenorphine (i.e., up to 24 hours) and therefore, it was expedient to use such medication in prisons. They reported that the nasal route of administration intensified the euphoric effect. Additional motivators for such use were described as an escape from the monotony of prison life. For some, they reported that using buprenorphine was less likely to lead to formal sanctions if caught by prison authorities, as it is an opioid that has licensed medicinal use. However, for others, this was a disincentive, since the risk of getting caught heightened the pleasure of illicit opioid use. Despite small sample sizes, the data possibly highlights a trend away from small-scale use of diverted methadone abuse in UK prisons to widespread unlicensed use of diverted buprenorphine.

Our review highlighted a paucity of international data exploring this trend. Indeed, the only relevant international data that we identified was that of descriptive data pertaining to secondary outcomes in the USA, a randomised controlled trial conducted by Magura et al. (2009). The authors reported that six buprenorphine patients and one methadone patient had their medication stopped due to attempted diversion (comparative statistics were not provided).

Woodall highlighted staff constraints as a significant factor in controlling illicit opioid use within prisons; i.e., staff shortages due to either budgetary constraints or long-term staff sickness (2011). Woodall's findings confirm Tompkins et al.'s findings of boredom as a motivator to use such medication (2011; 2009). Woodall also highlighted one case report suggesting regional variation, in that establishments in the South of England did not have a problem with buprenorphine misuse (2011). However, the theme of buprenorphine misuse in prison was confirmed in the

research undertaken by George and Moreira, who, in interviewing patients recently released from prison attending a community drug service, found that intranasal administration of buprenorphine was a practice almost exclusive to the prison setting (2008). Participants stated the following motivators for such a behaviour: it is safer than injecting, the ease of procurement in prisons, and the rapid and intense onset of action. Published in 2008 (the date of recruitment was not stated), participants at that time were unaware prior to imprisonment that buprenorphine could be administered intranasally.

3.3. Abuse Potential of Buprenorphine/Naloxone Compared to Mono-Buprenorphine

A theme emerged that mono-buprenorphine was more likely to be abused than the buprenorphine-naloxone preparation. This theme is evidenced by price differentials between the two preparations highlighted in the Wright et al. UK based study (2014b). Further evidence is found in the Horyniak et al. study, which explored the finding that across three Australian jurisdictions, compared to inhaling buprenorphine-naloxone, there were higher rates of inhaling mono-buprenorphine (2011). Similarly, compared to snorting buprenorphine-naloxone, there were higher rates of snorting mono-buprenorphine. Whilst participants were recruited from a community sample, the findings are relevant to this review since the sample that report having ever inhaled buprenorphine, were statistically significantly more likely to have had a prior history of imprisonment.

4.0. Discussion

4.1. Summary of Key Findings

In summary, our review found that, internationally, there were differing practices of prescription opioid abuse. Intranasal administration of buprenorphine sublingual tablets was reported in UK studies and, for some participants, they were unaware of this route of abuse prior to entering prison. The source of prescribed opiates in prison drug markets is not limited to prison based prescribers, although diversion of prison prescribed opiates is common. Financial and organisational constraints upon discipline staff quotas can severely restrict security responses to reducing both the trafficking of prescribed drugs into the prison and diversion of prison prescribed medication. There appears to be a paucity of robust treatment responses to the risk of prescription opioid abuse in prison settings, although there is survey evidence that suggests that buprenorphine/naloxone preparation is less amenable to abuse than the mono-buprenorphine preparation. Crucially, prisoners have developed sophisticated behavioural techniques to evade the monitoring process of supervised consumption of medication.

The strength of our research is that insofar as we are aware this is the first systematic review of the prevalence, practice and treatment responses to prescribed opiate abuse in prison settings. The lack of quality empirical research is disappointing given the high prevalence of opiate abuse, co-morbid health conditions and associated risk taking behaviours by prisoners (Milloy et al., 2008). In particular, we did not retrieve any research pertaining to treatment responses to minimise the risk of prescription medication abuse. In the absence of such evidence, current practices include crushing tablets, opening capsules, and mixing the content with jam in an attempt to reduce diversion, with little evidence to support the value of such practices (Pilkinton and Pilkinton, 2014). Therefore, more research is needed in

this area to evaluate interventions to support safer use of prescribed medications in prisons. The findings of the review did not retrieve any research pertaining to which prisoner subgroups are particularly vulnerable to either harassment or bullying attempts to divert medication. It is possible that some prisoners, due to age, co-morbid mental health problems, or learning disabilities, will be particularly vulnerable and this illustrates an additional area that merits further research activity.

Pending such developments, several strategies have shown promise, including prescribing forms of medication, which are less amenable to abuse (for example; liquid rather than tablet preparations). Also, the practice of crushing buprenorphine tablets prior to administration has been suggested as an effective practice to reduce the risk of buprenorphine diversion whilst not altering the bioavailability of the medication (Simojoki et al., 2010; Strain et al., 2004). However, crushing of prescribed tablets is unlikely to be a long-term solution to the problem of buprenorphine diversion in prison settings. Rather, development and implementation of new buprenorphine preparations have the potential to minimize the risks of illicit diversion. Safety, efficacy and pharmacokinetic data from an open label trial of a buprenorphine implant showed promise, albeit with the significant limitation of the sample size being just twelve participants (White et al., 2009). Also, a phase II trial of a buprenorphine depot monthly injection is currently ongoing with Reckitt Benckiser Pharmaceuticals Inc. (ClinicalTrials.gov, 2014). If trials of such products demonstrate efficacy and effectiveness comparable with buprenorphine sublingual tablets, then it is probable that they will become the first line buprenorphine preparation prescribed in prison settings, since implant/depot preparations are, by their very nature, less easy to divert than tablet preparations.

In addition to new product developments, more research is required regarding the potential of wider developments in service delivery and organisation to reduce the risk of prescription opioid abuse. Such developments could entail training for staff in protocols for medicines management and assertiveness training for prescribing, dispensing and administering clinicians.

4.2. Changing Trends of Prescription Medication Abuse in Prisons

Our review highlighted changing trends in prescription medication abuse in prisons, with early studies highlighting a practice of methadone diversion (albeit very low prevalence of such practice), whereas latter studies concurred regarding the high prevalence of buprenorphine diversion.

However, there have been recent anecdotal reports regarding possible trends towards non-opioid analgesic abuse. In particular, tramadol, pregabalin, and gabapentin have been highlighted in UK guidance to prison doctors as medications with significant abuse potential in prison settings (Centre for Social Justice, 2015; Royal College of General Practitioners and Royal Pharmaceutical Society, 2011). The typical presentation is that of patients with a history of drug dependence presenting with symptoms of musculoskeletal pain. Assessing whether the presentation of pain is credible or in fact a hidden agenda to obtain prescription drugs for subsequent diversion can be difficult. It is possible that future organisation and delivery of healthcare in prisons will benefit from integrated working between addiction services and pain management services.

There are also anecdotal reports of sedative antidepressant and psychotropic abuse in prisons (Pilkinton and Pilkinton, 2014). The popularity of such non-opioid prescribed medications appears to be either in the euphoric feeling or the sedative action, which helps with troubling symptoms of insomnia (Wright et al., 2012). Prescribing practitioners believe that such attempts to divert prescribed medication threaten client stability of an already vulnerable population and impede effective care planning and treatment (Baldwin and Duffy, 2013).

5.0. Conclusion

In conclusion, prisons are settings susceptible where individuals are vulnerable to the effects of diversion of prescription opioid abuse. Pending new product developments that have lower abuse potential than existing medications, we would suggest that opioid drugs are prescribed in the least abuseable form, particularly since current evidence would suggest that prisoners have developed sophisticated behaviours to divert prescribed opioids, despite apparently stringent supervised dispensing regimes. Prescribing of opioids in prison will require a balance between not under-dosing (as such a practice will potentially trigger patients to seek illicit opioids to reach a steady state), whilst also avoiding excessive prescribing, since such prescribing practices would increase the volume of medication available for diversion. The type of medication abused in prisons varies widely between countries. Also, such abuse is not limited to opioids, and the predominant drug of abuse in an individual prison can rapidly change according to availability. Some prisoners, on account of age or co-morbid mental health problems, will be particularly vulnerable to harassment or bullying attempts for them to divert medication.

Zanib Mohammed (ZM) wrote the first draft of the article following her work around diversion of illicit prescribed medication in the prison setting. She is the corresponding author and can be contacted at Z.BiMohammed@leeds.ac.uk. Dr. Nat Wright (NW) later edited and revised the manuscript. Pip Hearty (PH) helped to prepare the manuscript, the table of characteristics, and edit the manuscript. Abstracts of identified papers were independently assessed against the inclusion and exclusion criteria by ZM and NW. Discrepancies were resolved by consensus meetings between ZM, NW, and PH.

Professor Nigel King and Dr. Helen Gavin offered academic support and advice around the final draft of the manuscript.

All authors have approved the final article.

Author Disclosures

Role of Funding

Nothing declared

Conflicts of Interest

No conflict declared

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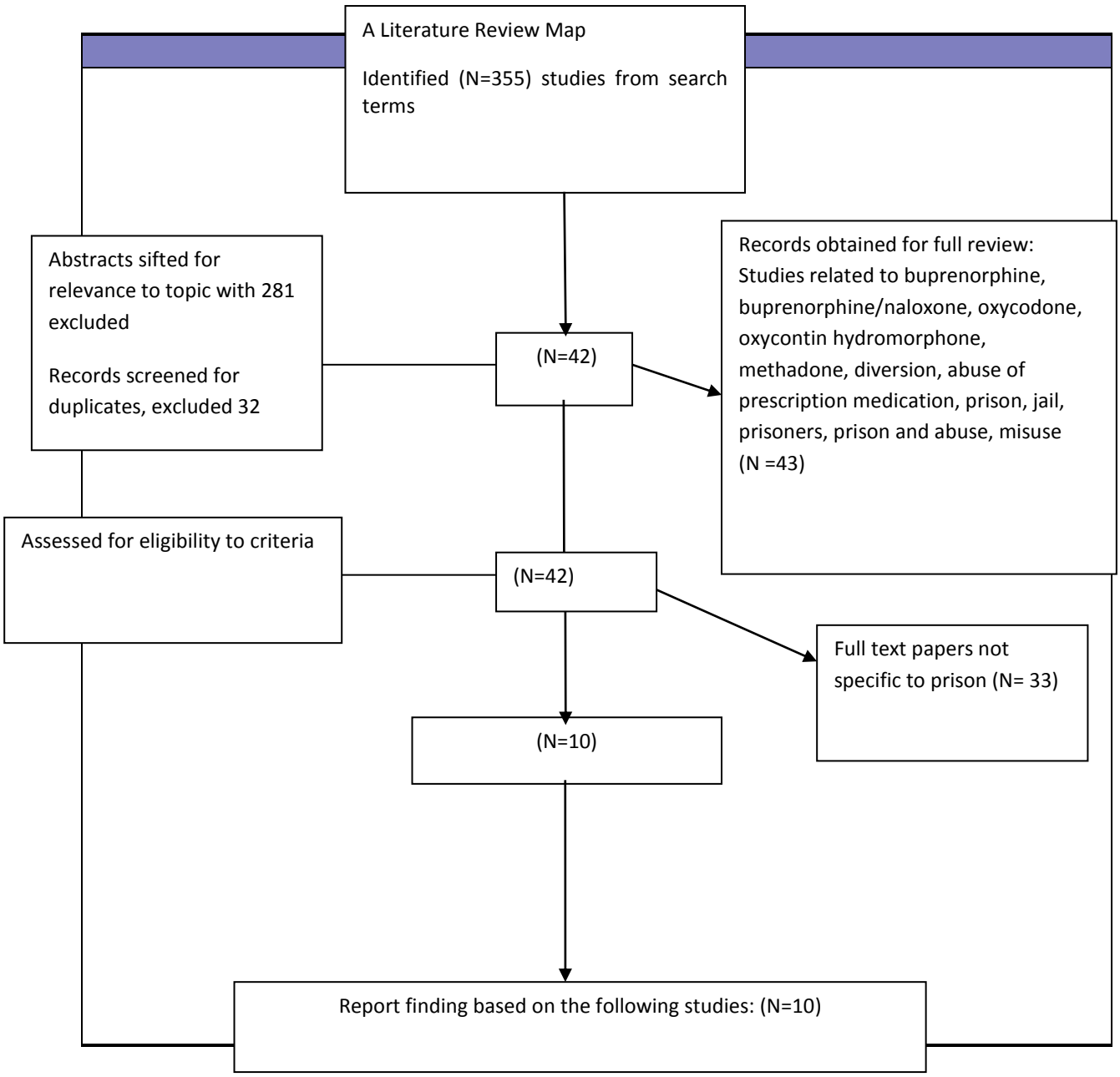

Figure 1.

Figure 1. The PRISMA 'Literature Search' map.

Following review, ten studies met the inclusion criteria and the demographic details, methodologies, outcomes and results are summarised in Table 4.

Table 1: Search words related to the study

Word group 1	Word group 2	Word group 3
opioid	**abuse**	**prison**
opioids	**diversion**	**prisoners**
buprenorphine	**misuse**	**correctional services**
buprenorphine/naloxone	**sale**	**penitentiary**
morphine		**jail**
methadone		
dihydrocodeine		
codeine		
oxycodone		
diamorphine		
opiate alkaloids/or opiate substitution treatment		
substance abuse detection/ or opioid related disorders		
behaviour, addictive/ or drug prescriptions/ or drug and narcotic control		
Notes: Boolean operators words within groups combined with OR. Groups combined with AND.	Notes: words within groups combined with OR. Groups combined with AND.	Notes: words within groups combined with OR. Groups combined with AND.

Table 2: Criteria used to Assess the Quality of Quantitative Studies

Randomised Controlled Studies

- Process of randomisation clearly described and whether open, single blind, or double blind
- Process of concealment clearly described
- Steps taken to avoid contamination
- Steps taken to ensure independence of data analysis from the clinical intervention
- Clear explanation of how missing data was accounted for e.g., use of intention to treat analysis or multiple imputation methods

Quasi-experimental studies

- Baseline data reported
- Potential for selection bias described and accounted for in the analysis
- Potential for confounders described and accounted for in the analysis
- Steps taken to ensure independence of data analysis from the clinical intervention

Observational cohort studies

- Use of a control group
- Potential confounders described with an attempt made to quantify the effect either by study design or by statistical analysis
- Potential for loss to follow up bias described and accounted for in the analysis

Table 3: (Tools and Checklist: CASP, 2013)

1. Is a qualitative methodology appropriate?
2. Is there a clear statement of the aims of the research?
3. Was the research design appropriate to address the aims of

the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Was there a clear statement of findings?
10. How valuable is the research?

Table 4: A Table outlining Study Characteristics of Papers included

Authors	Demographics	Methodology	Outcomes	Results
Horyniak et al. (2011)	Australia: 372 opioid substitution treatment clients recruited through pharmacies and clinics across three jurisdictions in Australia. 238 male, 134 female. 175 over 35 years of age, 195 under 35 years of age or younger. Ethnic background not stated. Data collected March-June 2008.	Cross-sectional survey with subgroup analysis for history of imprisonment	• Prevalence of buprenorphine and buprenorphine-naloxone inhalation (typically "chased" on foil) • Multivariate analysis to identify key demographic and treatment characteristics correlated to buprenorphine inhalation	• Sixty-five participants self-reported to ever having inhaled buprenorphine. Of these, 77% reported smoking buprenorphine and 32% reported to smoking buprenorphine-naloxone. Snorting was less common with 6% reporting to ever have snorted buprenorphine and only 2% reporting to have ever snorted buprenorphine-naloxone • Key correlates of buprenorphine inhalation were 35 years of age or younger (OR 2.92, CI 1.77-5.44); history of imprisonment (OR 1.85, CI 1.02-3.35) and history of injecting buprenorphine (OR 2.4, CI 1.27-4.53). • Regional variation of buprenorphine inhaling practice (clients from Southern Australia jurisdiction significantly more likely to have ever inhaled buprenorphine than those from New South Wales and Victoria jurisdictions)
George and Moreira (2008)	UK: 6 heroin dependent patients from a NHS tier 3 community drug treatment clinic in Birmingham; identified from 30 patients recently released from prison and responding in the affirmative to if they had ever snorted subutex. 5 male, 1 female. Mean age of 32.7. All White	Case series: "semi-structured questionnaire with quantitative and qualitative components"	Establish reasons for and participant experiences of snorting buprenorphine	• Practice of snorting buprenorphine seemed almost exclusive to the prison setting • Participants snorted buprenorphine on average 4.8 times whilst in prison (mean duration of prison sentence when snorted was 0.9 years) • The reasons provided for snorting buprenorphine were; ease of obtaining the drug, safer than

	British. Dates of data collection not reported.			injecting intravenously, peer influence and only needing a small amount of the drug for a euphoric effect • The experiences of snorting buprenorhine included positive effects of a rapid onset euphoric feeling; negative effects of itchiness, unpleasant taste and burning sensation in the nose
Johnson et al. (2012)	Canada: 1272 male federal offenders admitted to the Correctional Service Canada's methadone maintenance treatment programme that had completed the Substance Abuse Assessment Questionnaire between 2003-08. 80.8% of sample Caucasian. Mean age of 33.8 at admission to prison.	Cross-sectional survey	• Prevalence levels of illicit substance misuse • Univariate analysis of temporal and regional patterns of illicit substance misuse • Risk factors associated with illicit substance misuse	• 70% of participants reported to using opioids during their current period of imprisonment • Significant regional differences existed for prescription opioid abuse, specifically for morphine/hydromorphone (range 83.2% in Atlantic region vs 17.9% Pacific region, X^2 305.7 p< 0.001, Cramer's V 0.49) and oxycodone use (range 25.4% in Atlantic region vs 4.2% Pacific region, X^2 100.0 p< 0.001, Cramer's V 0.28)
Tompkins et al. (2009)	UK: 30 males who were former prisoners and had history of injecting drugs. Mean age of 34. 24 White British, 2 Asian British, 2 White Other, 1 Black British, 1 Black Caribbean. Data collected August 2006-January 2008.	Qualitative interview	• Explore drug using practices in prison • Explore how buprenorphine is obtained in prison and the reasons for its use	• The snorting of buprenorphine in prison has become more widespread – participants indicated it was the opioid of choice • Buprenorphine was reported to be obtained through prisoners in receipt of the drug diverting it and also through those entering prison 'plugging' community prescriptions of the drug and bringing it into prison with them • Reasons provided for snorting buprenorphine in prison included; increased availability, the long-lasting euphoric effect the drug has and that it is cheaper than heroin

Magura et al. (2009)	USA: 116 heroin dependent males within Rikers Island Correctional Facility. 61 Hispanic, 25 Black (full ethnic demographic not reported). Mean age of 39. Data collected August 2006-07.	Randomised controlled trial (post hoc data collection pertaining to attempted diversion of prescription interventions)	Compare the effectiveness of buprenorphine v methadone maintenance in custody • Primary outcomes; treatment completion in custody and reporting to designated treatment modality post-release • Secondary outcomes; intention to continue with treatment post-release, presentation at medication clinic post-release, re-imprisonment, re-arrest (and if so severity) and post-release use of illicit opioids	• Six buprenorphine patients and one methadone patient had their medication stopped due to attempted diversion (comparative statistics not provided)
Wunsch et al. (2007)	USA: 233 prisoners and probationers (proportions not described) within District 28, Radford, Virginia. 175 male and 58 female. Mean age 32 for males and 30 for females. Ethnic background not stated.	Retrospective review of routinely collected cross-sectional data from the addiction Severity Index 2000-2004.	Establish the abuse of prescription medications amongst participants with a criminal record in South-western Virginia, particularly the abuse of OxyContin due to the publicity in the USA regarding oxycontin abuse	• Females were more likely than males to abuse prescription opioids (62.1% v 33.7%, $p<0.001$) • Percocet was the most abused opioid (29.9% males and 46.6% females) • Those under 30 years or age were more likely to use OxyContin than those 30 years of age or over (38.4% v 25%, $p<0.005$) • OxyContin abusers were more likely than non-OxyContin abusers to abuse other prescription opioids (87.7% v 13.8%, $p<0.001$), methadone (24.7% v 2.6% $p<0.001$), benzodiazepines (37% v 10.7%, $p<0.001$) and cocaine (52.1% v 27%, $p<0.001$) • Individuals reporting non-medical use of oxycontin were more likely than those who had never used oxycontin non-medically to have committed shoplifting (36.8% vs 19.1% $p<0.01$)

				drug crime (60.0% vs 43.7 p<0.05) or forgery (40.0% vs 20.0% p<0.001) but less likely to have committed offences of disorderly conduct (41.5% vs 55.6% p<0.05) or driving whilst intoxicated (37.2% vs 51.1% p<0.05) . Differences regarding history of imprisonment were inconclusive
Swann and James (1998)	UK: 85 prisoners from one Category B prison in England. Gender, age and ethnic background of participants not stated. Dates of data collection not stated.	Cross-sectional survey of a random sample of 145 prisoners (61% response rate)	• Drug use prior to and during imprisonment • Prison response to drug use • Effect and potential of the prison environment on drug use	• The most frequently used drug prior to imprisonment was cannabis (90%). 30% and 15% of the sample used heroin and methadone respectively prior to imprisonment • 9 individuals were taking methadone prior to imprisonment (of whom 3 were in receipt of a prescription). During imprisonment none of the participants were prescribed methadone yet 2 individuals were using in the prison (descriptive data only presented)
Marriot et al. (2008)	UK: 102 male prisoners from two Category C prison establishments in the same geographical region in England. Mean age of 28.6. 88% White, 9% Black, 2% Asian, 1% Other. Data collected 2002-03.	Naturalistic study following cohorts of prisoners through two different treatment modalities	Establish factors affecting the completion of the two different treatment modalities;12-step programme and cognitive behavioural therapy programme (CBT)	• Post hoc finding of one participant taking Methadone medication (at a time before Methadone prescribing was introduced into prison settings)
Woodall (2011)	UK: prisoners and prison staff from three Category C training establishments accepting male sentenced prisoners in England. Gender, age and ethnic background of participants not stated. Dates	Focus groups and one-to-one interviews	Establish the social and environmental factors within the prison setting that influence prisoners' drug taking behaviour	• Drugs were reported by both prisoners and staff to be 'rife' within the prison system • The illicit supply of drugs in prison were suggested to come through the following routes; through visits, thrown over the prison wall from associates in the community and

	of data collection not stated.			through prisoners diverting their medication collected from the prison treatment hatches (subutex medication specifically mentioned as being diverted from the sublingual route of administration; one participant narrative that there was regional variation ie. Subutex abuse more likely in northern prisons) • Peer-pressure and boredom were found to be strong influences on drugs misuse in prison
Wright et al. (2015)	UK: 85 male prisoners receiving prescribed opioids for heroin dependence from a Category B prison establishment in the North of England. Mean age of 35. 71 White, 5 Asian-Pakistani, 3 other Asian background, 2 mixed – White and Asian, 2 other Black background, 1 other mixed background, 1 other ethnic group. Data collected July 2012-October 2013.	Cross-sectional survey	To explore the price differentials of diverted buprenorphine-naloxone, buprenorphine and methadone in the prison setting	• Methadone was reported to be significantly harder to sell in the prison setting than buprenorphine (X^2 35.1 $p<0.001$) and buprenorphine-naloxone (X^2 29.1 $p<0.001$) • Prisoners reported the cost of illicit buprenorphine to be more expensive than illicit buprenorphine-naloxone both inside ($z = -4.5$, $p<0.001$ and outside of prison ($z = -3.6$, $p<0.001$)