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Paul Duffy & Adam John Mackridge

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ORIGINAL ARTICLE

Use and diversion of illicit methadone – under what circumstances does it occur, and potential risks associated with continued use of other substances

Paul Duffy¹ and Adam John Mackridge²

¹Centre for Public Health, Liverpool John Moores University, Liverpool, UK, and ²School of Pharmacy and Biomolecular Sciences, Liverpool John Moores University, Liverpool, UK

Abstract

Background: Concerns about prescribed methadone diversion are ongoing. This research investigated motivations for methadone diversion and continued use of street-sourced substances. **Methods:** Questionnaires completed with 886 past year users of methadone recruited in and out of prescribing agencies. Topics covered included current prescribing, obtaining/providing methadone, reasons for using illicit methadone and other substance use. **Results:** Missing appointments (prescription pick-up or reviews) were the most common reasons for use of diverted methadone but the most common course of action in these circumstances was to use other street-sourced substances. Topping up dosage levels was also a common reason for obtaining illicit methadone. The most common reason diverting methadone was to “help another substance user out”. Concurrent and simultaneous use of a variety of substances whilst prescribed methadone was common. **Conclusion:** Reasons for using diverted methadone are primarily related to service use and provision. Treatment services will need to consider their role in reducing demand for diverted methadone. Unlike previous work the diversion of prescribed methadone appears to be most often motivated by altruism. Simultaneous and concurrent polysubstance use increases health risks, and with the extent of these risks not fully understood, individuals are “gambling” with their usage patterns.

Keywords

Methadone, diversion, treatment, risks

History

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Background

Methadone diversion

Although methadone maintenance treatment is recognised as an effective treatment for opiate addiction (Farre et al., 2002; Gossop et al., 2003; King et al., 2002; Risser et al., 2001; Van Ameijden et al., 1999), the diversion of prescribed methadone has been recognised as a problem (Heinemann et al., 2000; Neale, 1999, 2000; Weinrich & Stuart, 2000) and has been associated with fatal and nonfatal methadone poisonings (Corkery et al., 2004; Graham et al., 2008; Madden & Shapiro, 2011; Seymour et al., 2003;). The market for illicit methadone has also been suggested to be more active than that for other prescription opioids (Winstock et al., 2008). Research suggests illicit methadone is generally used to reduce negative physical or mental states (Fountain et al., 2000) often among drug users not engaging in treatment to manage opiate withdrawal symptoms (Roche et al., 2008; Vlahov et al., 2007). Opiate users may also look to “top-up” their methadone prescription or find a substitute when they have failed to collect it (Best et al., 2000; Fountain et al., 1999; Roche et al., 2008). The use of money raised from selling prescribed methadone to buy other substances has also been identified as a driver for diver-

sion (Fountain et al., 2000), although motivations are not always reported to be commercial (Duffy & Baldwin, 2012).

The intentions of some clients to divert their methadone can be facilitated by poor prescribing and dispensing practices, e.g. large “take-home” prescriptions (Edmunds et al., 1996; Neale, 1999). Drug treatment providers in the United Kingdom are required to take steps to minimise diversion (Department of Health (England) and the devolved administrations, 2007; National Institute for Health and Clinical Excellence, 2007) such as ensuring that new clients remain on supervised consumption for an initial period, but there is still a large degree of variation in prescribing protocols (Matheson et al., 1999; Strang & Sheridan, 2001; Strang et al., 2005) often not in keeping with official guidelines (Bell, 2010).

Continued substance use whilst receiving methadone maintenance treatment (MMT)

Evidence that clients divert methadone to buy other substances may be supported by the relatively high rates of continued illicit substance use among individuals receiving MMT. In a variety of international samples, ongoing use of both heroin and other substances (including alcohol) is noted via urinalysis or self-report in proportions of clients ranging from 20% to 93% (Backmund et al., 2005; Best et al., 2000; Dobler-Mikola et al., 2005; Epstein et al., 2009; Fountain et al., 1999; Gelkopf et al., 1999; Lin et al., 2011; Musshoff et al., 2010;

Correspondence: Paul Duffy, Centre for Public Health, Liverpool John Moores University, 2nd Floor, Henry Cotton Building, 15-21 Webster Street, Liverpool L3 2ET, UK. E-mail: p.duffy1@ljmu.ac.uk

Nyamathi et al., 2009; Raffa et al., 2007; Ryder et al., 2009; Stastny & Potter, 1991; Stitzer et al., 1981; Vigezzi et al., 2006). In addition to the continued use of other opiates, these articles have identified illicit use of benzodiazepines, cannabis, cocaine and alcohol as ongoing issues for MMT clients. In fact illicit methadone use has been shown to be associated with recent heroin use (Davis & Johnson, 2008; Lauzon et al., 1994; Vlahov et al., 2007).

Polysubstance use is common among substance users (Brache et al., 2011; Pennings & Leccese, 2002) owing to a range of factors including variability in availability, attempts to enhance the psychotropic effects, and management of undesired effects of substances of abuse. Where the use is simultaneous – i.e. the pharmacological actions of the substance overlap – there is considerably increased risk to the user. In an examination of deaths related to methadone in Paris, all but one case was found to involve other substances as well, with opiates and benzodiazepines particularly implicated (Pirnay et al., 2004). In individuals receiving methadone, the most significant risk from simultaneous polysubstance use arises where multiple CNS depressants, such as benzodiazepines, ketamine, alcohol, cannabis and other opioids, are used, as these effects are additive and substantially increase the risk of respiratory depression (Bourke et al., 1987; Elsayem & Bruera, 2005; Johnstone et al., 1975; Laberke & Bartsch, 2010; Simonsen et al., 2011; Wolf et al., 2005) and death (Caplehorn, 1996; Cousins et al., 2011; Darke et al., 1999; Grab et al., 2003). Overall risk of overdose is also increased with polysubstance use (Chan et al., 2006; Man et al., 2004), and management of these individuals creates additional challenges, particularly where it is not clear what substances have been used. In cases where “take home” naloxone might be used following overdose relating to polysubstance use, it is important that appropriate training on management of effects of all the substances has also been given along with the naloxone (Strang et al., 2008). In addition to additive CNS depression, simultaneous use of opioids with mixed agonist and antagonist properties (e.g. buprenorphine) could precipitate withdrawal (Smith & Guly, 2004), prompting chaotic substance-seeking behaviour. Also, alcohol and benzodiazepines have been linked with increased withdrawal symptoms (Corkery et al., 2004), greater likelihood of presentation at A & E (Ryder et al., 2009), and higher likelihood of relapse (Stenbacka et al., 2007).

Cocaine is commonly used in combination with opioids in an activity known as speedballing. This not only enhances the psychotropic effects of the individual substances, but is also associated with increased tachycardia and diastolic blood pressure (Foltin et al., 1995). Coadministration with methadone poses additional risks since both methadone and cocaine are both potassium channel blockers and effect the QT interval of the heart, with combined administration considerably increasing the risk of torsade de pointes (Krantz et al., 2005). A similar issue with QT interval prolongation has also been reported with methylenedioxymethamphetamine (MDMA; Ecstasy) (Drake, & Broadhurst, 1996).

As clients progress through treatment, they may continue to use a range of substances simultaneously or concurrently, posing a continued risk to these individuals, even where methadone is no longer used. For example, combination of

cocaine and alcohol leads to increased plasma levels of cocaine itself and cocaethylene, a potent metabolite with a considerably longer half life, leading to potentially dangerous increases in heart rate (Farre et al., 1997). In addition, combinations of cocaine and amphetamines or MDMA have been associated with ischaemic stroke (Strupp et al., 2000) and general deleterious effects on CNS functioning (Parrott et al., 2007).

Research aims

Further empirical data on the reasons for the diversion of prescription opioids are needed to inform clinical decisions (Hall & Degenhardt, 2007; Inciardi et al., 2007). Little recent published work has investigated the circumstances under which diversion occurs in England or the nature of continued substance use among individuals receiving MMT. This article examines why diversion takes place and reports on ongoing substance use among a large sample of opiate users in Merseyside, UK. Merseyside (population 1 353 400 in 2010 (Office for National Statistics, 2011) is a mixed rural and urban, affluent and deprived, county in the northwest of England, and it has been identified as a diverse area with relatively high problematic substance use in some parts and not in others (Hay et al., 2009). Merseyside has a large active treatment system (7392 individual substance users accessed general practitioner or specialist prescribing in 2009–2010) (C. Gibbons, pers. Commun., February 23, 2011). Methadone diversion from this system has been noted as a concern in the past (Parker & Kirby, 1996) and is still occurring with reports of substance users coming into contact with drugs workers in custody suites reporting illicit methadone use via national monitoring systems.

Findings will provide insight as to the motivation behind the market for illicit methadone and gain a clearer understanding of the risks taken by clients in continued substance use (simultaneous and concurrent polysubstance use) to better inform clinical decisions and harm reduction provision. Findings from other aspects of this research have previously been reported in Duffy & Baldwin (2012).

Methodology

Participants

Recruitment took place at 28 sites (primary prescribing services, agencies providing treatment specifically for offenders, service user forums and accommodation providers) between November 2008 and September 2010. In advance of recruitment periods advertisements were distributed by practitioners or displayed in waiting rooms indicating when the research team would visit the service. Advertisements advised clients that the study was looking to interview them about their use of methadone. On recruitment days, the research team approached individuals within communal areas or practitioners directed participants to interview rooms. Researcher's had all received an appropriate level of training, a full briefing on the topic, and shadowed research leads on initial recruitment days. Any individual over 18 and who had used methadone (licit or illicit) in the previous year was eligible.

Materials

A 28-item questionnaire with a mixture of closed and open questions was developed after an extensive examination of previous literature and with input from a number of drug treatment practitioners. Topics covered included:

- Current prescribing – closed checklist or dichotomous questions examining reasons for using prescribed methadone, current dose, format of dose, pick-up frequency and supervision. For most checklist questions, an open “other” option was provided.
- Obtaining and providing methadone – closed checklist questions examining who exchanges of illicit methadone had taken place with (including an open “other person” option), in what context (sale, exchange, given), with what frequency and level of payment (if any).
- Reasons for use or provision of methadone – closed checklist questions examining motivation for providing own prescription to others, closed checklist questions examining circumstances under which participants had found it necessary to use street-bought methadone (including open “other” option) and a closed checklist question asking what actions had been taken when pharmacy pick-ups had been missed (including an open “something else” option).
- Other substance use – A full list of drugs was provided to participants to indicate their use in the past year and past four weeks (an open “other” option was provided). This provided information on concurrent polysubstance use. Using this list, participants were asked to indicate up to four different combinations of drugs they use at the same time (i.e. one used whilst under the influence of the other) in the past year. This provided information regarding simultaneous polysubstance use. Finally, a specific question was asked about which drugs had been used to alter the effect of methadone (past year and past 4 weeks).

Where there were large numbers of options on checklists, show cards were provided to participants and if necessary the list of options was repeated more than once by interviewers. An initial period of data collection (five days in one site) acted as a pilot period but only very minor changes to the questionnaire were necessary (question order, additional items on checklists).

Analysis for this article was concerned with items covering reasons for using illicit methadone and other substance use. No personal details aside from age and gender were collected to ensure confidentiality and reassure participants in an attempt to promote full disclosure.

Procedure

Potential participants received a full explanation of the project (verbal and written), were assured of confidentiality, and provided written consent for participation. Before commencing the interview, all participants were asked to confirm that they had not taken part in the interview previously. Questionnaires were completed by the researcher in an interview format (lasting approximately 15 minutes). Travel vouchers worth £4 were provided as reimbursement for time.

Analysis

Paper questionnaires were entered by the researchers who had completed them into a pre-designed spreadsheet in PASW Statistics 17.0 (formerly SPSS). All analysis was conducted in this programme. Chi-Square tests were used to test for associations between demographics (age, gender, whether recruited at a criminal justice related agency), circumstances under which diversion had taken place or clients had used diverted methadone, and concurrent/simultaneous polysubstance use. Only statistically significant associations have been reported. Whilst most data reported in this article were in the form of closed checklist responses, in some cases it was necessary to categorise responses received in open “other” options. This recoding was conducted by an experienced researcher, and the coding structure was verified for accuracy by another experienced individual.

Ethics

The design and procedure of the project, including the questionnaires, were reviewed and approved by both the authors’ university ethics committee and a National Health Service Research Ethics Committee.

Results

Sample characteristics

Eight hundred and eighty six participants were recruited – the majority of whom were male (71%) with a mean age across the sample of 38 (SD 7.03). The samples’ characteristics are similar to those for all clients engaged in general practitioner or agency-based prescribing in Merseyside in 2009–2010 (mean age 41, SD 7.32, 70% male). In 2009–2010, the total number of individuals receiving general practitioner or agency-based prescribing in Merseyside was 7392. The sample represents 12% of this population or 7% of the estimated opiate using population within the geography (latest available estimate for 2008–2009) (Hay et al., 2009). The majority of participants (86%) were prescribed methadone at the time of their interview, with all but 29 of the sample prescribed methadone within the past year (all of these clients had used diverted methadone, hence their inclusion in the study). The majority of those currently prescribed methadone (85%) were receiving doses of 80 mg a day or less (28% of participants were receiving less than 40 mg a day). Frequent prescription pick-ups were the norm with 72% of participants obtaining their methadone on a daily basis.

Circumstances under which client reported using diverted methadone

Five hundred thirty-one (60%) participants of the sample reported that they had obtained methadone outside of prescription in the year before their interview (Table 1). The most common circumstance under which this had taken place was due to a failure to pick up a prescription from the pharmacist (50% of those who had obtained illicit methadone). Three in ten clients (28%) had obtained methadone when they had missed appointments with an agency or doctor with a similar proportion suggesting that had done so at some point to top up their

Table 1. Circumstances under which participants obtained illicit methadone ($n = 531$).

Circumstance	n (%)
Missed Appointment with agency/doctor (CI)	150 (28%)
Missed pharmacy pick-up (CI)	263 (50%)
Top-up prescription (CI)	141 (27%)
Needed methadone but not in treatment (RD)	64 (12%)
Other (CI)	199 (37%)

Notes: CI, Item included in checklist on questionnaire; RD, Item recoded from responses in 'other' option.

prescribed dose (27%). In addition, 12% of clients said they had self-medicated with diverted methadone when not in treatment. A wide variety of other circumstances under which methadone had been illicitly obtained were indicated, but each was only reported by small number of respondents (fewer than 5% for each circumstance). Individuals reported a number of different circumstances under which they had needed to obtain illicit methadone; 38% of participants who reported obtaining methadone illicitly in the past year gave more than one different circumstance under which they had done so. There was a significant association between participants' age and using diverted methadone due to missing an appointment with an agency or doctor ($\chi^2 = 10.357$, $p < 0.001$). Participants under the group mean of 38 were more likely than those over the group mean to have used diverted methadone in these circumstances.

Missing prescription pick-ups

Further questioning regarding client actions when they missed a pick-up revealed that the common reaction was to use street-sourced substances (reported by 41% of the overall sample). The next most commonly reported recourse was to obtain methadone from elsewhere (32%) followed by going without any substances, prescribed or otherwise (16%). Very few participants reported using methadone they had already saved (9%) or contacting their prescriber to rearrange their prescribed supply (3%). There was a significant association between the type of agency clients were recruited at and obtaining methadone as a response to missing a pick-up ($\chi^2 = 6.698$, $p < 0.01$). Participants recruited in criminal justice related agencies were more likely than their counterparts from other agency types to take this action.

Reasons why clients had diverted methadone

One hundred and twenty-three participants (14%) of the sample reported having provided their prescribed methadone to others in the past year (Table 2). Among this group the most common motivation for doing so was to help another substance user (80%). Obtaining money to buy other substances was the second most common reason reported by 25% of the subgroup with 13% reporting they had at some point traded their methadone for other street-sourced substances. A small proportion of the subgroup (8%) reported using the money from selling their methadone to buy items other than drugs. Participants' responses indicated that their reasons for diverting methadone were not always consistent with 24% of those who indicated

Table 2. Reasons why participants diverted methadone ($n = 123$).

Reason	n (%)
Buy other drugs (CI)	31 (25%)
Buy other items (not drugs) (CI)	10 (8%)
Trade methadone for other drugs (CI)	16 (13%)
To help someone (CI)	98 (80%)
Other (CI)	7 (6%)

Notes: CI, Item included in checklist on questionnaire; RD, Item recoded from responses in 'other' option.

diversion in the past year indicating two or more different reasons for doing so.

Regular arrangements for the repeated provision of methadone to another individual were relatively rare, and only 25% of clients who had diverted their methadone in the past year reported this. In addition, very few clients reported diluting their methadone, just 10% of clients who had diverted in the past year.

Concurrent polysubstance use

Concurrent polysubstance use whilst prescribed was common among the sample with 92% of the sample who reported use of substances (including alcohol) in the 4 weeks prior to their interview (85% of the sample had used substances other than alcohol) (Table 3). There was a significant association between gender and concurrent polysubstance use ($\chi^2 = 6.698$, $p < 0.01$) with males more likely to report the use of substances (including alcohol) than females. However, this association was not present when use excluding alcohol was examined. Two thirds (66%) of those prescribed indicated heroin use, with alcohol (58%), crack (47%) and benzodiazepines (34%) also commonly reported.

Simultaneous polysubstance use (including use of substances to alter the effect of methadone)

Participants were also asked what combinations of substances they had used in the past year, i.e. substances administered whilst under the influence of other substances. Over three quarters of the overall sample (77%) said that they had engaged in simultaneous polysubstance use in the past year. There was a large range of combinations with participants reporting up to nine different substances used at the same time. Responses were

Table 3. Substances used in past 4 weeks by participants prescribed at time of interview ($n = 765$).

Substance	n (%)
Alcohol	444 (58%)
Amphetamines	19 (3%)
Benzodiazepines	258 (34%)
Cannabis	308 (40%)
Cocaine	111 (15%)
Crack	362 (47%)
MDMA (Ecstasy)	15 (2%)
Heroin	505 (66%)
Ketamine	6 (1%)
Buprenorphine (Subutex)	9 (1%)
Other	18 (2.4%)

recoded to extract the more common combinations or those with greater potential for negative physical or mental health impact. Over half the sample (56%) had used other opiates (including heroin) in combination with methadone. A slightly lower proportion (46%) had used alcohol at the same time as being under the influence of opiates. Simultaneous opiate and benzodiazepine use was reported by over a quarter of the sample (26%) with 22% indicating the use of alcohol and cocaine at the same time. The consumption of alcohol and benzodiazepines together was reported by 13% of the sample.

A substantial minority of the sample (8%) reported using other substances in the past 4 weeks specifically to alter the effect of their methadone. The most commonly identified substances were heroin (57% of this subgroup), alcohol (29%), cocaine/crack (28%) and benzodiazepines (26%).

Discussion

Findings regarding the circumstances under which individuals divert their prescribed methadone reaffirm older findings on the subject in other populations in the United Kingdom and internationally (Best et al., 2000; Fountain et al., 1999; Roche et al., 2008). The missing of prescription pick-ups from pharmacists is identified as the most common reason for clients resorting to obtaining illicit methadone contributing to the demand for illicit methadone. Due to the often chaotic nature of opiate user's lifestyles, missed pick-ups are always likely to occur. Work to prevent clients turning to the illicit methadone market needs to focus on what recourse is available to clients when they miss a pick-up especially as participants very rarely contacted their prescriber when this happened, suggesting lines of communication may not be clear. However, the Misuse of Drugs Act 1971 leaves very little flexibility for pharmacists as it requires that where a collection date has been specified, the supply can only be made on that date (even where there is a multiday pick-up and the client comes in the following day, part supplies are not allowed). There is one exception to this, where the prescriber has included a very particular wording on the prescription, part supplies can be made if someone turns up a day late for a multiday pick-up, they can have the remaining days. In the circumstances outlined earlier, the presence of methadone on the illicit market could be viewed as protective (clients are able to obtain their dose from elsewhere). However, as seeking out street-sourced substances other than methadone was indicated as participants' most likely response to missing a pick-up, the potential protective factor of illicit methadone is diminished (despite this being the second most common reaction to missing a pick-up). Also with such a large proportion of our sample still using street-sourced substances the degree of protection would have to be questioned. In addition, the potential, if unlikely, criminal justice implications of being in possession of someone else's prescribed medication should not be ignored.

In contrast to findings from previous work suggesting that methadone diversion is not linked to adequacy of dose (Best et al., 2000), for participants in the current work topping up a prescribed dose was one of the more common reasons for obtaining illicit methadone, suggesting they perceived their methadone dose at that point to be insufficient to prevent withdrawal. However, findings reported elsewhere for this sample

indicate a generally high level of satisfaction with efficacy of their prescribed methadone dose level (Duffy & Baldwin, 2012) despite reported doses generally being below or in the lower ranges of those recommended in the UK national guidelines (Department of Health (England) and the devolved administrations, 2007) The reason for this disconnect is unclear, although it may be that clients answered questions regarding methadone's efficacy in a general sense rather than in relation to their dose levels.

The provision of methadone to others would appear to be underpinned primarily by a sense of altruism as "helping other substance users out", presumably when they were suffering withdrawal, was the most common reason given for providing methadone to others. This is a departure from previous studies (Fountain et al., 2000) that have suggested the primary motivation to be obtaining other street substances, which was the case for a much smaller number of participants in our sample, but this is supported by previously reported findings from this research indicating that methadone is more likely to be provided for free than for monetary gain (Duffy & Baldwin, 2012). This lack of a strong commercial element is emphasised by the small proportion of participants providing methadone to others reporting that they had diluted the methadone they had given away (a way of maximising profits). There is the possibility that despite participants not seeing any obvious reimbursement for their provision of methadone immediately there may be a delayed or less tangible transaction. For example, methadone or other drugs may be returned at a later point in time without this being an agreed transaction or favour that could be gained with the individual the methadone is provided to. Further work is needed to examine this possibility.

High levels of concurrent polysubstance use among those clients prescribed at the time of their interview confirm findings from previous studies (Backmund et al., 2005; Best et al., 2000; Dobler-Mikola et al., 2005; Epstein et al., 2009; Gelkopf et al., 1999; Lin et al., 2011; Musshoff et al., 2010; Nyamathi et al., 2009; Raffa et al., 2007; Ryder et al., 2009; Stastny & Potter, 1991; Stitzer et al., 1981; Vigezzi et al., 2006). The purpose of this article was not to investigate the efficacy of methadone maintenance therapy, but the continued recent use of heroin does suggest that one of the key aims, eliminating the use of street-based opiates, had not yet been achieved by a large number of participants. However, a simple yes/no question regarding use might not be sensitive enough to identify improvements due to treatment, e.g. reduction in the number of days on which street-sourced substances had been used (Bloor et al., 2008). In addition, reductions in use may be seen for certain substances but not for others, e.g. for heroin and cocaine but not alcohol (Dobler-Mikola et al., 2005), while the variety of substances used may not change at all (Li et al., 2011).

The continued use of certain substances has been associated with less-positive individual outcomes for clients in MMT. In particular, poor treatment outcomes have been associated with benzodiazepine, cocaine and alcohol use (Eiroa-Orosa et al., 2010; Stapleton & Comiskey, 2010; Williamson et al., 2006), lower rates of treatment retention associated with continued heroin and benzodiazepine use (Schiff et al., 2007), relapse associated with alcohol use (Stenbacka et al., 2007), benzodiazepine use associated with risky substance taking behaviour and

use of a number of other substances (Bleich et al., 1999; Brands et al., 2008), alcohol and benzodiazepine use associated with continued injecting (Evans et al., 2009), and continued use of benzodiazepines, alcohol, cannabis and cocaine associated with higher occurrence of psychological disorders (Darke et al., 1993; Schreiber et al., 2008; Wedekind et al., 2010). In addition continued use of alcohol, cocaine and benzodiazepines may undermine the protective effect of prescribed methadone for fatal and nonfatal overdose (Caplehorn, 1996; Chan et al., 2006; Cousins et al., 2011; Kerr et al., 2007). Given how often alcohol is noted as a significant negative factor in the literature, findings in the present study indicating males were more likely to report concurrent alcohol use than females suggest heightened risk for this group.

The relationships identified previous paragraph are likely to reflect both the chaotic nature of those clients using addition substances whilst in MMT as well as direct interaction between the substances used – as discussed earlier. The high level of continued substance use and the variety of combinations used reflect a “take anything that is there” philosophy among a large proportion of clients. It is likely that the risks associated with this simultaneous polysubstance use are not appreciated by these individuals and that they operate under an assumption that use of multiple substances is no different to using higher doses of a single substance. In addition, contamination of street-sourced substances with pharmacologically active products (Long, 2010) and the substitution of fake products (Weschules et al., 2008) are well documented, further adding to the complexity of predicting risks. Little is known about the pharmaceutical and pharmacological interactions between many of these substances (Department of Health (England) and the devolved administrations, 2007; Weschules et al, 2008) and in the case of contaminants, identification of the substances involved is also fraught with problems. This not only makes it difficult to predict the risks involved but also hinders management of individuals suffering adverse effects arising from simultaneous polysubstance use. Continual development of new substances of abuse in response to changes in legal classification (Brandt et al., 2010) and new supply routes via the Internet (Forman et al., 2006) make it likely that this issue will continue to grow in scale and complexity. Better education around the additional harms associated with polysubstance use along with prescribed substitution therapy, where appropriate, may help to reduce these risks.

Conclusions

The market in illicit methadone would appear not to be primarily motivated by substance users desires to make money (by selling methadone) but by intermittent reactions to less than perfect engagement with treatment regimes (missed appointments or prescription pick-ups) and a desire to assist fellow substance users. The possibility of under-reporting of diversion, particularly among participants recruited within prescribing agencies, must be considered (Duffy & Baldwin, 2012). Clients who are diverting their methadone on a large, commercial scale are unlikely to agree to discuss this with a researcher who is asking about methadone diversion. Clients are also more likely to report a positive motivation for diverting their

methadone (to help others out) than one that would be perceived negatively (to make money to buy other drugs). This social desirability bias may have exaggerated somewhat the gap between motivators that could be negatively perceived and those that could be positively perceived. However, the very high proportions of participants reporting altruistic motivation, combined with the fact that this is a finding not seen in previous studies (Fountain et al., 2000) (one would assume the bias would be present in all self-report studies on this subject), should give confidence that this finding has validity. Widespread continuing concurrent and simultaneous use of other street-sourced substances in addition to prescribed methadone presents a substantial and to some degree unquantifiable health risk to individuals and is likely to reflect a “take anything that is available” approach among many participants. More detailed investigation is required to fully understand clients continued patterns of use whilst in MMT. In particular consideration of their motivations for continuing to use street drugs and their understanding or subjective experience of drug interactions, particularly when taking drugs specifically to alter the effect of their methadone, is warranted. It may be that the patterns of use seen in this study simply reflect the habitual use of a variety of substances rather than a pursuit of changing the pharmacology in order to alter subjective effects.

Study limitations

In addition to the social desirability issues highlighted earlier, the authors acknowledge potential issues with the questionnaire constructed for this work. Whilst the measure was constructed after an extensive search of the literature, with significant input from a number of treatment practitioners and a pilot process indicated no substantial problems with interpretation by participants, it should be noted that it has not been psychometrically assessed for validity or reliability.

Author's contributions

PD and AM were both responsible for the forming of the research concept. PD led on fieldwork and analysis. PD and AM shared responsibility for the construction of the manuscript including literature review.

Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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