Drug and Alcohol REVIEW

APSAD

Drug and Alcohol Review (May 2022), 41, 841–850
DOI: 10.1111/dar.13437

Examining the cost and impact of dosing fees among clients in opioid agonist treatment: Results from a cross-sectional survey of Australian treatment clients

EMMA ZAHRA[1], RORY CHEN[1], SUZANNE NIELSEN[2], ANH DAM TRAN[1], THOMAS SANTO JR[1], LOUISA DEGENHARDT[1], MICHAEL FARRELL[1], JUDE BYRNE[3], ROBERT ALI[1,4] & BRIONY LARANCE[1,5,6]

[1]*National Drug and Alcohol Research Centre, UNSW Sydney, Sydney, Australia,* [2]*Monash Addiction Research Centre, Monash University, Melbourne, Australia,* [3]*Australian Injecting and Illicit Drug Users League, Canberra, Australia,* [4]*Faculty of Health and Medical Sciences, University of Adelaide, Adelaide, Australia,* [5]*School of Psychology, University of Wollongong, Wollongong, Australia, and* [6]*Illawarra Health and Medical Research Institute, University of Wollongong, Wollongong, Australia*

Abstract

Introduction. *Opioid agonist treatment (OAT) clients frequently bear costs associated with their treatment, including dosing fees. This study aimed to explore the financial and social impact of dosing fees upon clients.* ***Methods.*** *Cross-sectional survey of people who use opioids regularly (*N *= 402) between December 2017 and March 2018, conducted in Australia. Dosing fees were calculated and expressed as percentage of income, by OAT type. Consequences and strategies for difficulties making payments were examined as proportions.* ***Results.*** *A total of* N *= 360 participants had ever been in OAT and* N *= 245 participants currently engaged in OAT reported data on dosing fees, of them 53% (*n *= 129) reported paying dosing fees. Compared to clients with high levels of dosing supervision, those with moderate or low levels of supervision were more likely to pay dosing fees. The median 28-day dosing fee was AUD$110 (interquartile range AUD$80); median 28-day income was AUD$1520 (interquartile range AUD$700). For those who paid dosing fees, the fee comprised <10% of total monthly income for 70% of participants; however, 23% of participants paid fees comprising 10% to <20%, and 7% of participants paid fees comprising 20% or more of monthly income. Among those that had ever been in OAT, 72% experienced difficulties in paying treatment costs; 36% left treatment earlier than intended and 25% had been excluded due to payment difficulties.* ***Discussion and Conclusions.*** *Negative consequences of treatment costs to clients, particularly dosing fees, are evident. These costs impact treatment access and retention that may negatively impact clients' physical health, mental health and social wellbeing.* [Zahra E, Chen R, Nielsen S, Tran AD, Santo T Jr, Degenhardt L, Farrell M, Byrne J, Ali R, Larance B. Examining the cost and impact of dosing fees among clients in opioid agonist treatment: Results from a cross-sectional survey of Australian treatment clients. *Drug Alcohol Rev* 2022;41:841–850]

Key words: opioid use disorder, opiate substitution treatment, opioid medication-assisted treatment, buprenorphine, methadone.

Introduction

Opioid agonist treatment (OAT) including methadone and buprenorphine is the gold standard treatment for opioid dependence [1]. OAT is effective in reducing the extra-medical use of opioids and the associated consequences of dependence such as risk of human immunodeficiency viruses (HIV) and hepatitis C transmission, overdose and criminal activity [1,2]. Methadone and buprenorphine have been listed as essential medicines by the World Health Organization since 2005 [3].

In Australia, methadone and buprenorphine are listed on the Australian Government's Pharmaceutical Benefits

Emma Zahra MIPH, Research Officer, Rory Chen MStat, Research Assistant, Suzanne Nielsen PhD, Deputy Director, Anh Dam Tran PhD, Senior Research Fellow, Thomas Santo Jr MPH, Master of Research Candidate, Louisa Degenhardt PhD, UNSW Scientia Professor and Deputy Director, Michael Farrell FRCP MD, Director, Jude Byrne, National Project Coordinator, Robert Ali FAChAM, Associate Professor, Briony Larance PhD, Senior Research Fellow. Correspondence to: Mrs Emma Zahra, National Drug and Alcohol Research Centre, UNSW Sydney, 22-32 King St, Randwick, NSW 2031, Australia. Tel: +61 2 9385 0333; E-mail: emma.zahra@unsw.edu.au

Received 5 March 2021; accepted for publication 8 January 2022.

Scheme under the 'S100' highly specialised drug program. Under this scheme, the costs of the medications (methadone and buprenorphine) are funded by the federal Australian Government; however, the costs associated with dosing of these medications is not [4]. Historically, the first methadone treatment programs were fully subsidised, with no costs to the client. However, in order to increase OAT capacity in Australia, the treatment settings have expanded to include both public (receive government funding) and private providers (where some or all costs of care are borne by the client). State governments fund public treatment settings including public clinics, public hospitals and correctional facilities, from which OAT is typically prescribed and dispensed at no cost to the client [4]. However, many OAT clients access treatment in private settings, where OAT is typically prescribed by general practitioners and then dispensed from community pharmacies. In some cases, general practitioner prescribing costs can be partly covered by federally funded Medicare arrangements, with some costs borne by the client. In New South Wales (NSW), some clients may be treated by prescribers in a public clinic at no cost to the client but may be dosed in community pharmacy settings. Pharmacies and private clinics do not receive government funding for dosing-related costs, so this cost is fully borne by the client [4]. As the dosing fee is set by the individual private clinic or community pharmacy, this fee can vary greatly (ranging between AUD$1.43 and AUD$10.00 per dose) [5]. These fees are charged to cover the provision of service including such things as time to prepare and provide dosing and maintaining medication stock and registry. On a snapshot day in 2019, over 70% of clients receiving OAT in Australia received their dose from a pharmacy [6].

Unfortunately, dosing fees can be a deterrent to people engaging in treatment [7]. Pharmacy fees have been identified as a significant barrier to treatment commencement and retention [4,8]. Furthermore, clients who pay these costs experience difficulties that impact on other facets of their lives, and this has been a long-standing issue [8]. Often people seek to commence OAT when their situation has deteriorated dramatically such as relationship pressures or breakdowns, issues with the law, or they have accrued significant amounts of debt and/or are financially insecure [7]. Therefore, this work was undertaken to further explore the financial and social impacts of dosing fees.

The specific aims of this study were to examine:

1. The percentage of people reporting current OAT who paid dosing fees and factors associated with paying dosing fees;
2. The cost of dosing fees as a percentage of clients' total income; and
3. Whether people had difficulties paying treatment costs and, if so, the consequences of those difficulties.

This report adopts two key terms: dosing fee and treatment cost. Dosing fee is the cost paid by the client to receive a dose of medication at the dosing site. This fee is not the cost of the medication but the price the dosing site (community pharmacy or private clinic) charges the client to dispense the dose of medication. Treatment costs refer to OAT prescriber consultation fees (the gap between Medicare scheduled fee and the fee charged by the prescriber) and dosing fees.

Methods

Study design

This study draws on data collected from a cross-sectional survey evaluating the characteristics, experiences and perceptions of people who regularly use opioids. The primary focus of the questionnaire was to examine participants' perceptions of extended-release buprenorphine injections [9], but the survey additionally explored treatment costs and the impacts of these costs on clients. A total of 402 participants for the broader study were enrolled from three locations across Australia between December 2017 and March 2018. The locations were Sydney, New South Wales (55%, $n = 223$), Melbourne, Victoria (25%, $n = 101$) and Hobart, Tasmania (19%, $n = 78$). The selected jurisdictions reflect the broader Australian health-care system that includes a mix of public and private primary care providers such as general practitioners, pharmacies and clinics. The Strengthening and Reporting of Observational studies in Epidemiology checklist are available in Appendix S1 (Supporting Information).

Participants

Participant eligibility criteria for the broader study included: aged 18 years and over; able to provide voluntary informed consent; currently engaged in treatment for opioid use disorder; and/or regularly using extra-medical opioids. The definition of regular use was the use of extra-medical opioids on at least 21 of the past 28 days. Extra-medical opioid use includes the use of illicit opioids such as heroin and/or the misuse of pharmaceutical opioids. Only those participants who reported ever receiving OAT (methadone or buprenorphine ± naloxone; $N = 360$) were included in the present study.

Ethical approval

Ethical approval was obtained from the South Eastern Sydney Local Health District Human Research Ethics Committee 17/224 (HREC/17/POWH/486), the Alfred Hospital (515/17) and Tasmania Health and Medical Human Research Ethics Committee (H0017051).

Procedure

The study was advertised via posters, fliers, snowballing and word-of-mouth. Service settings for recruitment included needle and syringe programs and OAT providers. The service staff were not directly involved in recruitment; people interested in participating in the study contacted the research team directly. Eligibility screening was conducted via telephone before a trained interviewer would meet with the participant in person to complete the consent and interview. All interviewers received training in responding to adverse events or safety risks (i.e. suicidality and distress) as a minimum requirement. Computer-assisted structured interviews were conducted using tablets and took approximately 1 hour to complete. A reimbursement of AUD$50 was given to participants for their time and any expenses.

Measures

The questionnaire covered demographic and clinical characteristics, substance use, treatment history, service utilisation and costs. In addition, the questionnaire explored the consequences and impact of costs borne by the client associated with OAT.

Demographic information included, age, gender, location, level of education, employment status, income, government health-care card holder status and living conditions. In Australia, the government health-care card is a concession provided to individuals receiving income payments from the government. This concession enables a larger government subsidy for some medications and health services [10]. For this study, 'homelessness' includes primary, secondary and tertiary homelessness encompassing sleeping rough, couch-surfing, hostels, caravans and other forms of insecure accommodation [11].

The Alcohol Use Disorder Identification Test Version C was utilised to assess 'hazardous drinking' with the cut-point scores for males and females at 4 and 3, respectively [12]. Substance treatment history was explored and participants who had previously or were currently engaged in OAT treatment were asked additional questions in relation to these services. These included treatment type, dosage, missed doses, time in treatment, location of last dispensed dose, prescriber setting, main opioid of concern at treatment entry, dose adherence and whether they received unsupervised (take-home) doses.

Participants who had ever received OAT were asked about treatment costs and whether they had experienced difficulties paying the costs. Suggested responses to the item '*What strategies have you used to continue to pay treatment costs at times money was tight?*' were based on the outcomes of a previous Victorian survey of OAT clients [7] (Figure 1). The percentage of participants reporting difficulties paying costs associated with treatment and consequences of these costs were assessed using the dichotomous items, *'Have you ever been unable to pay a dispensing fee to the dosing site or pharmacy?', 'Have you ever been unable to pay the gap in consultation fees for your prescriber?', 'Have you ever opted to leave a treatment episode earlier than you had originally planned because of payment difficulties?' and 'Have you ever been excluded from a treatment service due to payment difficulties (i.e. involuntary exclusion)?'* (Appendix S2).

Analyses

The demographic characteristics and substance use history of participants that had ever received OAT treatment and those who were currently receiving OAT were explored descriptively. Frequencies and percentages have been reported. For normally distributed variables the mean and SD are presented, for non-normally distributed variables, the median and interquartile range (IQR) are displayed. Missing cases are noted within or below tables and figures.

The costs to clients associated with being dosed in private settings such as community pharmacies or private clinics (dosing fees) were examined using responses to the following questions: *"In the last 28 days, on how many days did you have an appointment with your dosing point?"* and *"How much did you pay out-of-pocket for each appointment with your dosing point?"*. Self-reported dosing fees were calculated by multiplying the number of visits to the dosing site in past 28 days and the self-reported cost for each visit. Only fees where doses were collected were considered, that is, where doses were missed, these were not factored into the monthly cost of dosing fees. For those who were in treatment for less than 28 days, a pro-rata cost was calculated. This amount was estimated by multiplying the number of doses reported in the treatment length by the proportion of the 28 days that the individual was in treatment. Sixteen participants were excluded due to missing data and five outliers were excluded ($n = 4$ reported dosing fees greater than AUD

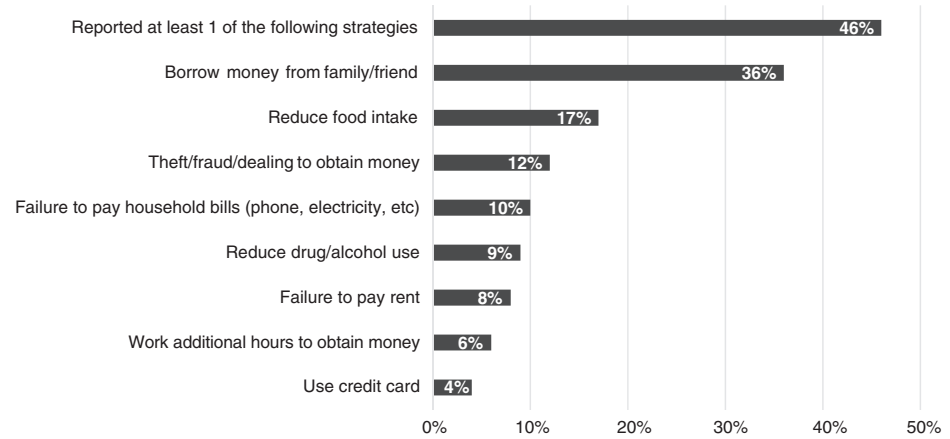

Figure 1. *Strategies for paying treatment costs 'when money was tight' among those participants who reported ever paying costs associated with opioid agonist treatment (multiple responses were allowed)* (n = *360)*.

$560 in the past 28 days, and $n = 1$ had inconsistent/unreliable responses to questions about appointments and dosing). The final sample size for calculating the dosing fee was $n = 245$ participants.

Participants were grouped according to whether or not they paid dosing fees in the past 28 days. These groups were compared on a range of sociodemographic and current OAT episode characteristics using unadjusted logistic regression models to generate odds ratios (OR), 95% confidence intervals and *P*-values. Significant comparisons are conservatively defined as *P*-value <0.01, to adjust for multiple comparisons. Predictors of total dosing fees paid in the past 28 days (in AUD) among those who paid them were examined using a multiple linear regression model. All variables included in the multiple linear regression model met the assumptions of independence of observations, linearity of relationships between dependent and independent variables, homoscedasticity and normality of residuals, and inspection of correlation coefficients and tolerance/variance inflation factors indicated no multicollinearity. Four possible outliers were identified on the dosing fee variable, but these were deemed unlikely to be influential in the model and these cases were retained in the analyses.

Participants who reported zero dosing costs ($n = 116$) were excluded from the calculation of average dosing fees. Participants' income were examined using responses to '*What is the total of all wages/salaries, government benefits, allowances and other income that you usually receive per year legally (before tax), per week or per year?*". The 28-day income estimates were calculated by multiplying weekly income by 4. For participants who reported only yearly income these were converted to weekly by dividing by 52 ($n = 4$), outliers ≥ AUD $12 000 per week were removed from analysis ($n = 2$). Dosing fees were expressed as a proportion of the participants' total 28-day income. Differences between dosing fees, income and dosing fees as a proportion of income by treatment type were assessed using Kruskal–Wallis test and χ^2-test, with *P*-value <0.05 representing significant differences. Detailed analysis of prescriber fees and travel costs has been explored in a separate report (Tran, A *et al.*, 2021 unpublished data).

The proportions of participants who had ever experienced difficulties paying treatment costs associated with OAT who: (i) reported consequences; and (ii) reported strategies for making payments 'when money was tight' are presented in text and graphically. Participants' free-text responses to the 'other' categories were examined for frequency and recoded as existing variables as appropriate.

All analyses were performed using STATA software version 16 [13] and SAS software version 9.4 [14].

Results

Sample characteristics

Three hundred and sixty participants reported that they had ever been in OAT, and 266 participants were currently receiving OAT. Among those currently in treatment ($n = 266$), the mean age was 41.4 years (SD 8.7) and 58% were males. The majority had completed 10 years or more of school education (72%) and held government health care cards (91%) (Table 1). Over a fourth of this group were homeless (27%). Past month use of tobacco was very common (86%), followed by heroin (63%) and methamphetamine (49%). Under 10% reported that their main source of income was paid employment and the median 28-day legal income (before tax) was AUD $1520 (IQR AUD$700) (Table 3). Those receiving buprenorphine (with/without naloxone) had a lower median income of AUD$1080 (IQR AUD$336)

Table 1. *Participant characteristics and characteristics of current treatment episode (N = 360)*

Demographic characteristics	Ever received OAT $N = 360$ *n* (%)	Currently receiving OAT[a] $n = 266$ *n* (%)
Age, years (mean, SD)	41.8, 8.8	41.4, 8.7
≤35	91 (25%)	71 (27%)
36–45	150 (42%)	109 (41%)
>45	119 (33%)	86 (32%)
Gender		
Male	222 (62%)	155 (58%)
Location		
New South Wales	209 (58%)	169 (64%)
Victoria	88 (24%)	55 (21%)
Tasmania	63 (18%)	42 (16%)
Education		
Completed ≥10 years school education	245 (68%)	191 (72%)
Completed <10 years school education	115 (32%)	75 (28%)
Main source of income		
Paid employment[b]	32 (9%)	25 (9%)
Temporary benefit (sickness, unemployment)	140 (39%)	106 (40%)
Pension (aged, disability, etc)	167 (46%)	120 (45%)
Currently supported by someone else's income (e.g. family, partner, etc)	2 (1%)	2 (1%)
No income	9 (3%)	8 (3%)
Other	10 (3%)	5 (2%)
Government health-care card holder	331 (92%)	242 (91%)
Ever had to pay fees for treatment	278 (80%)	213 (81%)
Homeless[a]	106 (29%)	71 (27%)
Substance use and use disorders		
Past month tobacco use	311 (86%)	228 (86%)
Past month cocaine use	32 (9%)	26 (10%)
Past month (meth)amphetamine use	180 (50%)	129 (49%)
Past month heroin use	235 (65%)	167 (63%)
Past month morphine use	51 (14%)	25 (9%)
Past month oxycodone use	68 (19%)	35 (13%)
Hazardous drinking (AUDIT-C)[c]	108 (30%)	77 (29%)

[a]Homeless includes primary, secondary and tertiary homelessness encompassing sleeping rough, couch-surfing, hostels, caravans and other forms of insecure accommodation [11]. [b]Paid employment includes full-time, part-time and casual employment. [c]The Alcohol Use Disorder Identification Test Version C (AUDIT-C) was utilised to assess 'hazardous drinking' with the cut points for males and females at 4 and 3, respectively [12]. OAT, opioid agonist treatment (methadone or buprenorphine ± naloxone).

compared to those receiving methadone AUD$1600 (IQR AUD$680) $P \leq 0.01$.

Factors associated with dosing fees

A total of $n = 245$ participants currently engaged in OAT reported data on dosing fees ($n = 16$ cases missing data and $n = 5$ outliers removed). The majority were receiving methadone (85%; 95% confidence interval [CI] 80%, 89%) and had been in treatment for two or more years (64%; 95% CI 58%, 69%; Table 2). Over half of those currently engaged in OAT (53%, $n = 129$) reported paying dosing fees associated with their current treatment episode, and all of these participants (100%, $n = 129$) were dosed in private settings (either community pharmacy or private clinics) (Table 2). Participants who paid dosing fees reported higher odds of receiving unsupervised (take-home) doses (Table 2). Unsupervised doses were more common among participants dosed in

Table 2. *Association between having paid dosing fees and characteristics of current treatment episode*

	Total, $N = 245$ *n* (%)	Paid dosing fees for current opioid agonist treatment[a]		Odds ratio (95% CI)	*P*-value
		Yes, $n = 129$ (53%) *n* (%)	No, $n = 116$ (47%) *n* (%)		
Main source of income (n = 240)					
Other (referent group)	220 (92%)	113 (51%)	107 (49%)	—	—
Paid employment	20 (8%)	12 (60%)	8 (40%)	1.42 (0.56, 3.61)	0.46
Concession card holder (n = 245)					
No (referent group)	20 (8%)	11 (55%)	9 (45%)	—	—
Yes	225 (92%)	118 (53%)	107 (48%)	0.90 (0.36, 2.26)	0.83
Currently receiving (n = 245)					
Methadone (referent group)	209 (85%)	114 (55%)	95 (45%)	—	—
Buprenorphine ± naloxone	36 (15%)	15 (42%)	21 (58%)	0.60 (0.29, 1.22)	0.16
Time in current treatment episode (n = 244)					
< 1 year (referent group)	63 (26%)	31 (49%)	32 (51%)	—	—
1–2 years	26 (11%)	15 (58%)	11 (42%)	1.41 (0.56, 3.54)	0.47
>2 years	155 (64%)	82 (53%)	73 (47%)	1.16 (0.65, 2.08)	0.62
Location received last dose (n = 208)					
NSW/TAS—public clinic/hospital	100 (48%)	0 (0%)	100 (100%)	Not reported[b]	
NSW—private clinic	14 (7%)	14 (100%)	0 (0%)		
NSW—community pharmacy	23 (11%)	23 (100%)	0 (0%)		
TAS—community pharmacy	35 (17%)	35 (100%)	0 (0%)		
VIC—community pharmacy	36 (17%)	36 (100%)	0 (0%)		
Dose adherence (n = 245)					
Missed a scheduled dose in past 28 days (referent group)	98 (40%)	55 (56%)	43 (44%)	—	—
Took all doses as directed in past 28 days	147 (60%)	74 (50%)	73 (50%)	0.79 (0.47, 1.32)	0.38
Level of dosing supervision (take home) doses[c] *(n = 234)*					
High (0–1 takeaways/month) (referent group)	128 (55%)	29 (23%)	99 (77%)	—	—
Medium (2–8 takeaways/month)	33 (14%)	29 (88%)	4 (12%)	**24.75 (8.04, 76.18)**	**<0.001**
Low (9+ takeaways/month)	73 (31%)	64 (88%)	9 (12%)	**24.28 (10.79, 54.64)**	**<0.001**

[a]If the response to the items were zero the participant was categorised as no dosing fee for current treatment, if the response was greater than zero the participant was categorised as paying dosing fees for current treatment. [b]Odds ratios were unable to be generated for dosing location due to zero value. [c]These categories were selected as they are consistent with other Australian studies [15]. CI, confidence interval; NSW, New South Wales; TAS, Tasmania; VIC, Victoria. Bold, significant findings as *P*-value <0.001.

private settings (including community pharmacy or private clinics) compared to public clinics ($\chi^2 = 117.6139$, $P < 0.001$; Appendix S3). Among those who paid dosing fees, being dosed in NSW private clinic settings (vs. NSW community pharmacy) was independently associated with paying higher dosing fees after adjusting for a range of sociodemographic and current OAT episode characteristics (Table 3).

Dosing fees as a proportion of income

Among the 53% who reported dosing fees, the median cost per 28 days was AUD$110 (IQR AUD $80; range AUD$1–504) (Table 4). The median 28-day income before tax was AUD$1520 (IQR AUD$700; range AUD$0–10 000). The cost of 28 days of dosing fees expressed as a proportion of total 28-day income was a median of 7% (IQR 8; range 0.1–39%). For those who paid dosing fees, the fee comprised <10% of total monthly income for 70% of participants; however, 23% of participants paid fees comprising 10% to < 20% of income and 7% of participants paid fees comprising 20% or more of income.

Impacts of payment difficulties

Among those participants who had ever been in OAT ($n = 360$), the most common strategies for paying

Table 3. *Linear regression of dosing fees in Australian dollars and characteristics of participants and current treatment episode*

Predictors	Coefficient	95% CI	*P*-value
Age in years	−0.04	−1.87, 1.80	0.97
Gender			
Female (referent group)	—	—	—
Male	17.75	−11.00, 46.51	0.22
Main source of income			
Other (referent group)	—	—	—
Paid employment	−27.79	−79.97, 24.40	0.29
Education			
Completed <10 years school education (referent group)	—	—	—
Completed ≥10 years school education	−13.38	−46.29, 19.54	0.42
Currently receiving			
Methadone (referent group)	—	—	—
Buprenorphine ± naloxone	−3.58	−46.51, 39.35	0.87
Time in current treatment episode			
<1 year (referent group)	—	—	—
1–2 years	−51.24	−102.35, −0.12	<0.05
>2 years	−31.53	−75.43, 12.37	0.16
Location received last dose			
NSW—community pharmacy (referent group)	—	—	—
NSW—private clinic	**96.91**	**46.43, 147.39**	**<0.001**
TAS—community pharmacy	17.04	−22.44, 56.52	0.39
VIC—community pharmacy	1.56	−39.55, 42.66	0.94
Level of dosing supervision (take home) doses[a]			
High (0–1 takeaways/month) (referent group)	—	—	—
Medium (2–8 takeaways/month)	−13.46	−55.69, 28.77	0.53
Low (9+ takeaways/month)	−23.91	−63.51, 15.70	0.23
Observations	$n = 98$		
R^2/R^2 adjusted	0.28/0.17		

[a]These categories were selected as they are consistent with other Australian studies [15]. CI, confidence interval; NSW, New South Wales; TAS, Tasmania; VIC, Victoria.

treatment costs 'when money was tight' was to borrow money from family and/or friends (36%), reduce food intake (17%), theft/fraud/dealing (12%), failure to pay household bills (phone, electricity, gas, etc) (10%) and reduce drug/alcohol use (9%) (Figure 1). Thirty-eight percent reported incurring at least one form of debt as a strategy to make payments. In addition, 10% reported 'Other' strategies. From the free-text responses, this category included sex work, selling take-away doses, begging, sale of belongings or recyclables and changing treatment provider. Almost three-quarters ($n = 200$, 72%; 95% CI 67%, 77%) of the participants who had ever paid to receive OAT (N = 277) had experienced difficulties in paying the costs associated with treatment. Of these, 73% (95% CI 66%, 78%) reported that they had been unable to pay a fee to the dosing site or pharmacy, and 19% (95% CI 14%, 25%) had been unable to pay the gap in prescriber consultation fees. Over one-third (36%; 95% CI 30%, 43%) had opted to leave a treatment episode earlier than they had originally planned because of payment difficulties, and a quarter (25%, 95% CI 19%, 32%) had been involuntarily excluded from a treatment service due to payment difficulties.

Discussion

The principal findings of this study were that among current Australian OAT clients, over half reported paying dosing fees and for those that paid fees, dosing fees comprised a considerable amount of their total legal monthly income. Among those who had ever paid for OAT, almost three out of four had experienced difficulties in paying treatment costs, over one in three left treatment earlier than intended due to these costs, and one in four had been excluded from OAT due to payment difficulties.

The people in this study represent a financially vulnerable group. Fewer than one in 10 reported employment as the main source of income; the majority reported government income such as a pension or temporary benefits, and held a concessionary government health-care card, and a substantial minority were homeless. In addition, concomitant tobacco use was common, adding another significant competing expense. Despite this, 53% reported paying dosing fees comprising around 7% of their monthly income.

These findings confirm that difficulties paying dosing fees have resulted in unplanned cessation of OAT.

Table 4. *Dosing fees as a proportion of income among people currently in OAT, by medication type* (N = 245)[a]

	Total[a] $N = 245$	Currently receiving methadone $n = 209$	Currently receiving buprenorphine ± naloxone $n = 36$	*P*-value	Statistical test
Dosing fees (at dosing point)[b] *(n = 245)*					
None *n* (%)	116 (47%)	95 (45%)	21 (58%)	0.15	χ^2-test
Median per 28 days (among those who paid a fee) $AUD (IQR) ($n = 129$)	$110.00 (80.00)	$104.00 (80.00)	$132.00 (88.00)	0.54	Kruskal–Wallis test
Range of cost in $AUD ($n = 129$)	$1.00 – $504.00	$1.00–$504.00	$5.00–$210.00		
Estimated 28-day legal income (before tax)[c] *(n = 241)*					
Median $AUD (IQR)	$1520.00 ($700.00)	$1600.00 ($680.00)	$1080.00 ($336.00)	**<0.01**	Kruskal–Wallis test
Range $AUD	$0.00–$10, 000	$0.00–$10 000	$0.00–$3740		
Dosing fees as proportion of income (n = 125)					
Median (IQR)	7% (8%)	7% (7%)	10% (12%)	0.19	Kruskal–Wallis test
Range	0.07–39%	0.07–39%	0.4–23%		
Dosing fees as proportion of income by ranges (n = 125), n (%)				0.31	χ^2-test
Under 5%	42 (34%)	39 (35%)	3 (21%)		
5% to <10%	45 (36%)	41 (37%)	4 (29%)		
10% to <20%	29 (23%)	23 (21%)	6 (43%)		
20% or more	9 (7%)	8 (7%)	1 (7%)		

[a]$N = 245$ participants reported currently receiving methadone or buprenorphine ± naloxone. [b]$N = 245$ responded to items detailing cost at dosing point in the last 28 days in dollars, outliers >$560.00 were removed from analysis ($n = 4$). [c]$N = 241$ responded to the item '*What is the total of all wages/salaries, government benefits, allowances and other income that you usually receive per year legally (before tax) or per week?*', outliers ≥$12 000 per week were removed from analysis ($n = 2$). IQR, interquartile range.

More than one in three opted to cease treatment completely, and one-quarter reported involuntary cessation of treatment due to payment difficulties. Unplanned treatment cessation (regardless of whether cessation was voluntary or involuntary) may confer increased risk of adverse outcomes. Abrupt cessation can lead to withdrawal and subsequent recommencement of illicit opioid use, which may in turn result in elevated overdose risk [16].

A substantial minority of participants (38%) went into some form of debt as a strategy to continue treatment, including borrowing from family or friends, failure to pay bills, failure to pay rent and credit card use. Debt impacts financial security, but at a population-level, debt also places people at a three-fold risk of common mental disorders compared to those with no debt [17]. This risk is amplified when those in debt are also experiencing alcohol dependence, drug dependence or problem gambling [17]. Although reported less commonly, strategies such as sex work, selling take-away doses, begging, sale of belongings or collecting recyclables to meet treatment-related costs were also reported. These strategies are risky and have associated stigma [7,18]. Consistent with other literature, this study found that some participants had engaged in illegal activity to fund treatment costs [7]. This included theft, fraud, dealing and selling takeaway medications.

The challenge of collecting dosing fees may also deter community pharmacies from participating in the OAT program [19]. Others have suggested that public funding of dosing fees would encourage more pharmacies to provide this service and improve treatment coverage [7]. It would also minimise the potential for conflict between the client and the provider arising from payment difficulties and could assist with promoting positive rapport and engagement in OAT. Improved relationships could also help reduce the stigma surrounding OAT [20].

This study's findings agree with international findings that low affordability of OAT may result in suboptimal treatment uptake and coverage (e.g. [21]), and Australian studies indicating that reimbursement of dosing fees by the Australian Government may improve access to and retention in OAT for some clients [7,22,23]. Our study highlights potential disparities in the amounts people paid in dosing fees; among those who paid dosing fees, participants dosed in NSW private

clinics were more likely to pay higher fees (compared to those dosed in NSW pharmacies). Given the large and growing evidence base confirming the cost-effectiveness of OAT in many international settings (e.g. [24–27]), government subsidy of all treatment-related costs (including dosing fees) may also be a cost saving. As demonstrated by a system dynamics model of dosing fee subsidies for methadone maintenance programs, the positive health and social outcomes would counterbalance the outgoing cost from the government [22]. Countries looking to rapidly expand OAT, such as the United States, are looking to community pharmacy models in Australia and the United Kingdom [28,29]. In expanding OAT in these settings, it is important to consider costs to OAT clients. There are international examples of supervised dosing in community pharmacies being publicly-funded [e.g. 30].

The caveats of this study should be considered, especially when extrapolating results to other scenarios. As this study was cross-sectional the findings are exploratory and descriptive, no formal sample size calculations were completed, and the study was not preregistered. We are unable to report the number of individuals that were screened and eligible for the study as this information was not collected by the sites. This dataset may over-represent the number of OAT clients attending public clinics/hospitals for dosing; 53% of this sample were dosed in private pharmacies or clinics, but according to national data collected on a snapshot day in 2019, over 70% of clients receiving OAT in Australia received their dose from a pharmacy [6]. A potential study limitation is that participants were recruited from urban locations (Sydney, Melbourne and Hobart), and as such may underestimate the economic impacts among people living in regional or remote communities. Clients living in remote or rural communities may report differences in costs, availability and access to providers, and may have less access to funded public clinics where fewer fees are typically charged. As with all survey data there is the possibility of recall bias, no reliability check was conducted against this self-reported data. We were unable to account for missed pharmacy dosing, as the responses to this item were invalid. The costs reported in this article may potentially underestimate the amounts an individual may need to pay per month if all doses were attended; furthermore, this is most likely to affect those individuals that are experiencing difficulties paying dosing fees. Some participants potentially misinterpreted the dosing cost question (question 50, Appendix S2) with $n = 5$ reporting paying less than AUD$30 per 28 days. This question does not consider if the individual went into debt with the pharmacy but presents what they paid at the last appointment. Lastly, 'other' reported strategies for making payments 'when money was tight' (such as sex work, selling take-away doses, begging, sale of belongings or collecting recyclables) were provided as free text responses rather than categorical options and therefore may underestimate the proportion of participants that have utilised these strategies.

Conclusions

In conclusion, these findings are consistent with previous literature that has highlighted the negative impacts on clients of dosing fees. This long-standing barrier is one that continues to impede access and ongoing engagement in treatment. Subsidising dosing fees could have major benefits for people who are opioid dependent.

Acknowledgements

This study was sponsored by UNSW and supported by an Externally Sponsored Collaborative Research grant from Indivior. Indivior contributed to the study design and analysis plan; Indivior had no role in collection, analysis and interpretation of data; in the writing of the manuscript; or in the decision to submit the manuscript for publication. Louisa Degenhardt (#1135991) and Suzanne Nielsen (#1163961) are supported by National Health and Medical Research Council research fellowships. Louisa Degenhardt is also supported by National Institutes of Health grant NIDA R01DA1104470. The National Drug and Alcohol Research Centre at UNSW Sydney is supported by funding from the Australian Government Department of Health under the Drug and Alcohol Program. The authors thank the study participants for generously sharing their views and experiences, Alexander Saeri and Sonja Memedovic who coordinated the project and Nima Dorkian, Rakin Rahman, Oliver de Angelis, Jessica Forward, Thomas Norman, Jane Akhurst, Luke Ney, Daisy Gibbs, Teleri Moore, Isaac Addo and Kelly Kershaw, who assisted with interviewing participants. Open access publishing facilitated by University of New South Wales, as part of the Wiley - University of New South Wales agreement via the Council of Australian University Librarians.

Author Contributions

EZ: Performed data analysis and wrote the manuscript, TS and RC: Assisted with data analysis and commented on the manuscript; AT, and JB: Commented on the manuscript; BL, SN, LD, MF and RA: Conceptualised and designed the study and commented on the manuscript.

Conflict of Interests

BL, LD and RA have received previous untied educational grants from Reckitt Benckiser for studies examining the diversion and injection of buprenorphine-naloxone. RA has received previous untied educational grants from Reckitt Benckiser for studies examining the pharmacogenetics of methadone and buprenorphine maintenance treatment and transfer to buprenorphine from high-dose methadone. BL, LD, MF and SN have received an untied educational grant from Indivior to examine opioid-related help-seeking among people with chronic non-cancer pain. SN has delivered training on opioid use disorder for Indivior for which honoraria were paid to her institution. SN has participated in an advisory board meeting Mundipharma relating to intranasal naloxone (sitting fee not taken). BL, LD, RA and MF have received an untied educational grant from Mundipharma Australia to examine the impacts of Reformulated OxyContin®. BL, LD and MF have received untied educational grants from Seqirus to conduct post-marketing surveillance of tapentadol. SN has received an untied educational grant from Seqirus to study harms related to pharmaceutical opioids.

References

[1] Degenhardt L, Grebely J, Stone J *et al*. Global patterns of opioid use and dependence: harms to populations, interventions, and future action. Lancet 2019;394:1560–79.

[2] Mattick RP, Breen C, Kimber J, Davoli M. Buprenorphine maintenance versus placebo or methadone maintenance for opioid dependence. Cochrane Database Syst Rev 2014;3:CD002207.

[3] World Health Organization. WHO Model List of Essential Medicine. Available at: http://whqlibdoc.who.int/cgi-bin/repository.pl?url=/hq/2005/a87017_eng.pdf; 2005.

[4] Ritter A, Chalmers J. Polygon: the many sides to the Australian opioid pharmacotherapy maintenance system. A report prepared for the Australian National Council on drugs, 2009. Sydney: University of New South Wales, Drug Policy Monitoring Program, 2009.

[5] Feyer A, Mattick R, Schulman C, Jessop R, Soloman J, Pyper D. A national pharmacotherapy model for pharma-cotherapy treatment for opioid dependence in community pharmacy. Sydney: Australian Government Department of Health and Ageing, 2010.

[6] Australian Institute of Health and Welfare. National Opioid Pharmacotherapy Statistics Annual Data collection 2019. Canberra: Australian Institute of Health and Welfare, 2020.

[7] Rowe J. A Raw Deal? Impact on the health of consumers relative to the cost of pharmacotherapy. Melbourne: Salvation Army & RMIT, 2008 Available at: http://www.salvationarmy.org.au/salvwr/_ assets/main/documents/crisisservices/pdf/9591%20raw%20deal_book.pdf.

[8] Shepherd A, Perrella B, Hattingh HL. The impact of dispensing fees on compliance with opioid substitution therapy: a mixed methods study. Subst Abuse Treat Prev Policy 2014;9:32.

[9] Larance B, Degenhardt L, Grebely J *et al*. Perceptions of extended-release buprenorphine injections for opioid use disorder among people who regularly use opioids in Australia. Addiction 2020;115:1295–305.

[10] Australian Government Services Australia. Health care card services Australia. Australia: Australian Government Services Australia, 2018. Available at:. https://www.servicesaustralia.gov.au/individuals/services/centrelink/health-care-card.

[11] Chamberlain CMD. Counting the homeless 2006. Canberra: Australian Government, 2008.

[12] Reinert DF, Allen JP. The alcohol use disorders identification test: an update of research findings. Alcohol Clin Exp Res 2007;31:185–99.

[13] StataCorp. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC, 2019.

[14] SAS. Version 9.4. SAS Institute Inc. Cary, NC: SAS, 2014.

[15] Larance B, Mattick R, Ali R *et al*. Diversion and injection of buprenorphine–naloxone film two years post-introduction in Australia. Drug Alcohol Rev 2016;35:83–91.

[16] Darke S, Lappin J, Farrell M. The Clinician's guide to illicit drugs and health. London: Silverback, 2019.

[17] Meltzer H, Bebbington P, Brugha T, Farrell M, Jenkins R. The relationship between personal debt and specific common mental disorders. Eur J Public Health 2012;23:108–13.

[18] Lawrinson P, Roche A, Terao H, PP LE. Dispensing opioid substitution treatment: practices, attitudes and intentions of community-based pharmacists. Drug Alcohol Rev 2008;27:47–53.

[19] Clark N, Muhleisen P, Teo A, Brogan D, Dunlop A. Who should pay the costs of methadone treatment? Report for ANCD 2004.

[20] Chaar BB, Hanrahan JR, Day C. Provision of opioid substitution therapy services in Australian pharmacies. Australas Med J 2011;4:210–6.

[21] Mravčík V, Janíková B, Drbohlavová B, Popov P, Pirona A. The complex relation between access to opioid agonist therapy and diversion of opioid medications: a case example of large-scale misuse of buprenorphine in The Czech Republic. Harm Reduct J 2018;15:60.

[22] Chalmers J, Ritter A. Subsidising patient dispensing fees: the cost of injecting equity into the opioid pharmacotherapy maintenance system. Drug Alcohol Rev 2012;31:911–7.

[23] Lord S, Kelsall J, Kirwan A, King T. Opioid pharmacotherapy fees: a long-standing barrier to treatment entry and retention. Policy Brief 2014 Available at: https://creidu.edu.au/policy_briefs_and_submissions/10-opioid-pharmacotherapy-fees-a-long-standing-barrier-to-treatment-entry-and-retention.

[24] Barnett PG, Zaric GS, Brandeau ML. The cost–effectiveness of buprenorphine maintenance therapy for opiate addiction in the United States. Addiction 2001;96:1267–78.

[25] Doran CM, Shanahan M, Digiusto E, O'Brien S, Mattick RP. Cost-effectiveness analysis of maintenance agonist treatments in the NEPOD. Expert Rev Pharmacoecon Outcomes Res 2006;6:437–46.

[26] Gisev N, Shanahan M, Weatherburn DJ *et al*. A cost-effectiveness analysis of opioid substitution therapy upon prison release in reducing mortality among people with a history of opioid dependence. Addiction 2015;110:1975–84.

[27] Kenworthy J, Yi Y, Wright A, Brown J, Maria Madrigal A, Dunlop WCN. Use of opioid substitution therapies in the treatment of opioid use disorder: results of a UKcost-effectiveness modelling study. J Med Econ 2017;20:740–8.

[28] Joudrey PJ, Chadi N, Roy P *et al*. Pharmacy-based methadone dispensing and drive time to methadone treatment in five states within the United States: a cross-sectional study. Drug Alcohol Depend 2020;211:107968.

[29] Cochran G, Bruneau J, Cox N, Gordon AJ. Medication treatment for opioid use disorder and community pharmacy: expanding care during a national epidemic and global pandemic. Subst Abus 2020;41:269–74.

[30] Mackridge AJ, Gray NJ, Krska J. A cross-sectional study using freedom of information requests to evaluate variation in local authority commissioning of community pharmacy public health services in England. BMJ Open 2017;7:e015511.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix S1: Strengthening and reporting of observational studies in epidemiology statement.
Appendix S2: Questionnaire.
Appendix S3: Level of dosing supervision by dosing site (public vs. private) (N = 207).