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RESEARCH ARTICLE

Factors associated with prescription drug monitoring program utilisation: a cross-sectional survey of community pharmacists

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Abstract

Background Prescription drug monitoring programs (PDMP) are databases which collect prescribing and dispensing information for high-risk medicines, and are one approach to mitigate prescription opioid-related risks.

Aim To examine correlates of PDMP use under voluntary and mandatory conditions, among a representative sample of community pharmacists in Victoria, Australia.

Method An online anonymous survey was conducted and collected data in relation to pharmacist and pharmacy characteristics, comfort in performing certain tasks, PDMP training and the frequency of PDMP use under voluntary and mandatory conditions. Multivariate logistic regression models were performed to determine the effect of each covariate on voluntary and mandatory PDMP use.

Results In total, 265 pharmacists participated (response rate 47%). Under voluntary conditions, a quarter of pharmacists (24.9%) used the PDMP all the time, while half (51.7%) used the PDMP all of the time, once mandated. Pharmacies that stocked naloxone (OR: 1.96; 95% CI 1.11–3.45) and pharmacists that had attended formal PDMP training (OR: 1.78; 95% CI 1.05–3.05), were significantly associated with regular PDMP use under voluntary conditions. Under mandatory conditions, increased odds of PDMP use were associated with pharmacies that stocked naloxone (OR: 1.88; 95% CI 1.06–3.34). Pharmacists working in regional and rural areas had significantly lower odds (OR: 0.35; 95% CI 0.20–0.63) of always using the PDMP, as did pharmacists with > 15 years' experience (OR: 0.24; 95% CI 0.11–0.51) once use was mandated.

Conclusion Given that PDMP utilisation was slower or less regular amongst pharmacists located in regional and rural areas, pharmacists with more years of experience and those not already supplying naloxone, targeted training aimed at these sub-populations may be beneficial.

Keywords Community pharmacy · Mandates · Opioids · Prescription drug monitoring program · Pharmacists

Impact statements

- Under mandatory use conditions, only half of the pharmacists used the prescription drug monitoring program all of the time.
- Targeted training for sub-populations where uptake was slow or irregular may be beneficial.

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Introduction

Prescription drug monitoring programs (PDMP) are databases which collect information relating to the prescribing and dispensing of high-risk medicines, and are one approach to mitigate prescription opioid-related risks. They commonly utilise algorithms which generate alerts relating to higher-risk scenarios including high dose, high-risk drug combinations and multiple prescriber and pharmacist episodes [1].

The effectiveness and usability of PDMP is shaped by factors such as the design and accessibility of the system. There is wide variation in features such as the governing or operating agencies, medicines monitored, who can access the PDMP, how access is obtained and whether this access in voluntary or mandatory [2]. What information is displayed and collected is also inconsistent as are requirements for entering data, where some adopt real-time data collection approaches, while others have time delays [3].

PDMPs have the potential to be extremely useful resources for clinicians, however they are often underutilised due to various barriers [4, 5]. Common design-related barriers include log in and password related barriers, unreadable data formats, time-consuming or complicated program navigation and interfaces, inability to access patient information across state borders and PDMP software that does not integrate with electronic health records [6, 7]. Additional barriers include insufficient time to respond to risks, lack of reimbursement for clinician's time and hesitancy disclosing dispensing practices due to fear of legal ramifications [8, 9]. Such barriers deter regular PDMP use, and as a corollary, result in the under-utilisation of these widely adopted tools.

One strategy designed to increase PDMP utilisation is the adoption of mandates, most commonly related to PDMP registration and use, where studies have reported that PDMP mandates have resulted in rapid increases in utilisation [10]. Other studies however, have reported the use of mandates are not always effective. For example, Shev and colleagues found that whilst registration increased dramatically in the lead up to California's registration law, it plateaued following mandatory registration, with a large percentage of clinicians remaining unregistered, despite registration being mandated [11].

In Australia, Tasmania was the first state to implement a real-time PDMP in 2009, but use was not mandated [12]. In 2018, all Australian states and territories agreed to implement a federalised real-time PDMP, which aims to identify patients at risk of harm due to non-medical use, overuse, or dependence on controlled medicines, identify patients who are visiting several doctors for the same prescriptions of a controlled medicine, and provide state and territory regulators with data to identify healthcare professionals who are not complying with regulations [13].

Victoria implemented its PDMP in 2019, through a staged process, beginning with voluntary use of the program, before use was mandated for all community-based prescribers and pharmacists in April 2020. Although PDMP use is mandatory, clinical responses relating to the information within the PDMP are determined by individual clinician's judgement, and may include continued medicine supply, decisions not to supply medicine and referral for further assessment or treatment. Given Victoria was the first Australian jurisdiction to mandate PDMP use, it is currently unclear whether this mandate has resulted in increased use. Little is also known about the factors associated with PDMP use under voluntary and mandatory conditions, which may help to inform the successful adoption and implementation in other jurisdictions.

Aim

To examine correlates of PDMP use under voluntary and mandatory conditions, among a representative sample of community pharmacists in Victoria, Australia.

Ethics approval

Ethical approval for the study was granted on 3rd October, 2019 by Monash University Human Research Ethics Committee (MUHREC) (No. 20541).

Method

Design and setting

This study was conducted in Victoria, the second most populated state in Australia, and comprises 26% of the Australian population [14]. We invited a representative sample of community pharmacists to participate in an online, cross-sectional anonymous survey on a newly mandated real-time PDMP. Victoria's PDMP is integrated into existing clinical software, and allows prescribing and dispensing records for specific high-risk medicines to be transmitted in real-time to a centralised database. For pharmacists, the PDMP is integrated into dispensing software, where they automatically receive pop-up notifications when they initiate a dispensing of a monitored medication [15]. A 'traffic light' notification system is used, where red and amber notifications require prescribers and pharmacists to check the PDMP, while a green notification is not associated with any risk according to the PDMP algorithm, and therefore does not require the PDMP to be accessed. The notifications relate to (i) multiple prescriber or pharmacist episodes, (ii) high dose and (iii) high-risk drug combinations and are based on medication history over the past 90 days [16].

Sampling of pharmacies

Community pharmacies in Victoria were identified primarily through two marketing lists—Maven Marketing [17] listed 1850 pharmacies while CoreList had 1819 [18]. Both lists were merged and duplicates were removed, as were any services (e.g. suppliers, consultants etc.) or non community-based pharmacies, leaving 1240 pharmacies. Data were also extracted from Google Maps for pharmacies in Victoria, with the final list of community pharmacies in Victoria being 1400. This sample was stratified based on location using the Modified Monash Model, ensuring even distribution across metropolitan, regional and rural locations

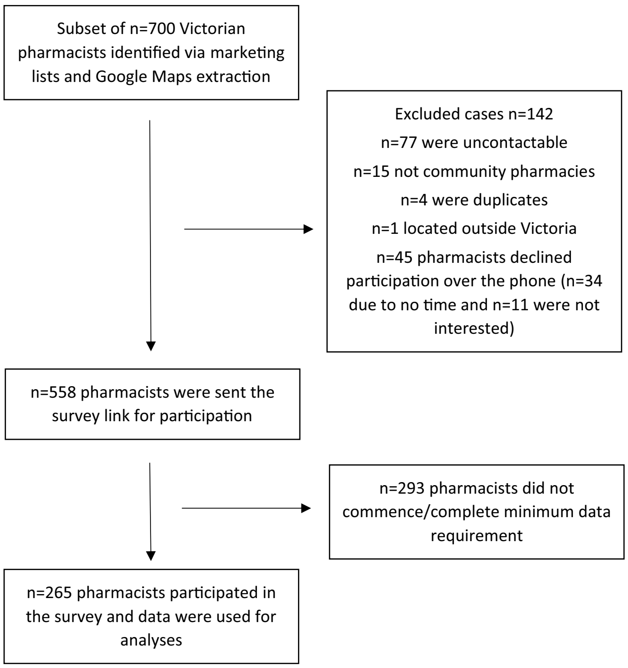

Fig. 1 Flow diagram of participation

[19]. These 1400 pharmacies were then randomised into two subsamples, using the excel formula "=rand()", and one subsample (n=700) was used for the current study.

Participants and procedures

Individual pharmacies were contacted via telephone, where the pharmacist in charge at the time was invited to participate. They were informed of the study aims, purpose and requirements of participation using a structured telephone script. 700 pharmacies were contacted between October and November 2020, of which 77 were uncontactable, 15 were not community pharmacies, four were duplicates, and one was located outside Victoria. A further 34 pharmacists declined due to insufficient time and 11 pharmacists indicated they were not interested in participating. These pharmacists we not contacted again and no additional data were collected. The remaining 558 pharmacists indicated their interest in participating by providing their email address to which the survey link was sent, as were reminder emails after one and two weeks (Fig. 1).

The self-administered survey was delivered via Qualtrics. Participants provided informed consent prior to survey commencement. At the completion of the survey, pharmacists were directed to a separate secure portal where they could enter a prize draw. To further encourage participation, the following evidence-based strategies were also applied: limiting the survey length, using predominantly closed-ended questions, calling pharmacists and inviting them to participate, prior to sending the survey link, sending reminder emails and explicitly stating the research was conducted by an academic institution [20].

Survey instrument

The survey instrument ("Appendix 1") was developed based on current literature relating to PDMP implementation and use. Items of interest, including those previously associated with PDMP use, were included in the current survey and related to five broad areas:

(i) Individual pharmacists' demographic information including age and gender.
(ii) Pharmacy characteristics including location, pharmacy type and supply of medications.
(iii) Provision of pharmacy services such as naloxone and Medication Assisted Treatment for Opioid Dependence (MATOD) were included as they have previously been shown to be offered following PDMP use or associated with confidence discussing opioid-related risks and harms [21, 22]. It was hypothesized these variables would be associated with regular PDMP use.
(iv) Comfort to perform specific tasks including intervening when concerned about an opioid prescription and comfort discussing overdose prevention and naloxone. Similar questions have been used in previous surveys amongst pharmacists [23, 24] and it was hypothesized that increased comfort would be associated with regular PDMP use.
(v) PDMP specific training and program use which included asking participants questions related to PDMP training they had attended and how often they used the PDMP prior to and after its use was mandated. It was hypothesized that pharmacists who attended PDMP training would be more likely to be regular PDMP users.

Cognitive interviews

Cognitive interviews were conducted with four pharmacists, prior to the commencement of data collection, to ensure the items and terminology within the survey was comprehended as intended. Cognitive interviews are designed to improve the quality of survey questions through testing comprehension, retrieval, judgment, and response processes [25]. Using an interview guide, pharmacists were systematically probed on whether they could repeat the questions and what came to their mind when they heard a particular phrase or term. They were also asked about response options, how they decided on their responses to certain questions, and if the response options were acceptable. Respondents reported any words or terms that were not clear and ensured the correct terminology associated with the topic was used. Minor changes were made to the overall survey, based on these cognitive interviews, prior to data collection commencing.

Statistical analysis

To interpret the covariates in a more intuitive and useful way, variables were collapsed into fewer categories. Age was converted to categorical variable by 10-year grouping (21–30, 31–40, 41–50, 51–60, > 60 years). Years of practices were categorised into '< 5 years', '5–15 years' and '> 15 years' levels. Number of prescriptions per day was dichotomised into '200 or less' and '> 200' groups, while number of opioid prescriptions per day was categorised as 10 or less, 11–20 and > 20. Pharmacy type and location were dichotomised into 'Independent' and 'Banner group/other' groups, and 'capital city' and 'urban/rural/remote', respectively. Two binary variables were created to indicate whether the pharmacy stocked naloxone and offered MATOD. Questions about comfort were collapsed into two categories: 'Very uncomfortable/ uncomfortable' and 'Comfortable/very comfortable'. Attending formal PDMP training was dichotomised into 'Yes' and 'No'. PDMP use under voluntary conditions was coded as 0 (never, rarely and sometimes) and 1 (most of time and all the time), while mandatory use was coded as 0 (never, rarely, sometimes and most of the time) and 1 (all of the time). These binary variables were created to measure study outcomes based on median splits. This method was chosen due to the skewness of the outcome variable data and to aid interpretation of the results [26]. Data cleaning and analyses were conducted using SPSS 25 and STATA 16.

Descriptive statistics were used to describe the sample characteristics. Two separate multivariate logistic regression models were performed to determine the effect of each pharmacist and pharmacy related covariate on voluntary and mandatory PDMP utilisation outcomes. The measure of effect was reported in adjusted Odds Ratio (OR) and 95% Confidence Interval (CI). A p-value less than 0.05 was considered statistically significant.

Results

Sample characteristics

The sample characteristics (n = 265) are displayed in Table 1. The overall response rate was 47% and the sample comprised equal representation across genders (50.6% females), with most pharmacists being aged 40 or younger (n = 157, 59.2%). Consistent with geographical distribution of pharmacies in Victoria, the majority of pharmacies were located in Melbourne (the capital city of Victoria), while the mean years of practice was 15 years.

Table 1 Sample characteristics

Sample and pharmacy characteristics	N	(%)
Age group		
21–30 years	57	21.5
31–40 years	100	37.7
41–50 years	52	19.6
51–60 years	42	15.8
> 60 years	14	5.3
Gender		
Male	131	49.4
Female	134	50.6
Years of practice (mean, SD)	15.15	11.6
Pharmacy geographic location		
Capital city (Melbourne)	158	59.6
Other urban centre (pop > 100,000)	31	11.7
Rural location (pop 5001 and 99,999)	53	20
Remote (pop < 5000)	23	8.7
Pharmacy type		
Single independent	102	38.5
Small chain (2–9 branches)	38	14.3
Large chain (10 or more branches)	123	46.4
Other	2	0.8
Stock naloxone		
Yes	100	37.7
No	165	62.3
Offer MATOD		
Yes	117	44.2
No	148	55.8
Number of prescriptions dispensed per day		
≤ 100	61	23.0
101–200	94	35.5
201–300	44	16.6
301–400	38	14.3
401–500	16	6.0
> 500	12	4.5
Number of opioid prescriptions dispensed per day		
≤ 10	95	35.8
11–20	84	31.7
21–30	40	15.1
31–40	17	6.4
41–50	12	4.5
> 50	17	6.4
Attended PDMP training		
Yes	149	56.2
No	116	43.8

MATOD Medication Assisted Treatment for Opioid Dependence; *PDMP* Prescription Drug Monioring Program

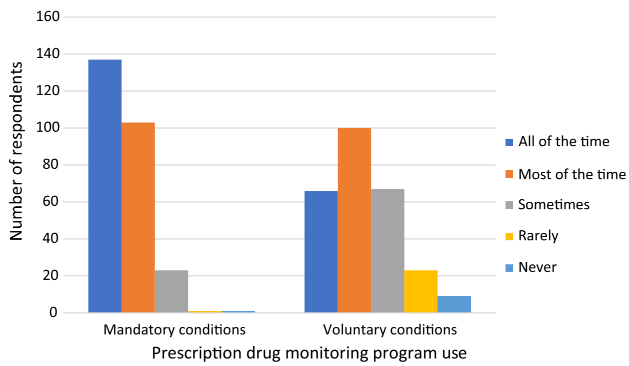

Fig. 2 Frequency of PDMP use under voluntary and mandatory conditions

PDMP use under voluntary and mandatory conditions

Under voluntary conditions, one in four pharmacists (n = 66, 24.9%) used the PDMP all the time, 37.7% (n = 100) used it most of the time, 25.3% (n = 67) used it sometimes, 8.7% (n = 23) indicated they used it rarely and 3.4% (n = 9) never used it. Once mandated, one in two (n = 137, 51.7%) pharmacists indicated they used the PDMP all the time, while more than a third (38.9%; n = 103) stated they used it most of the time (Fig. 2).

Correlates of voluntary PDMP utilisation

Table 2 displays the regression results examining PDMP utilisation under voluntary conditions. Pharmacists working in pharmacies that stocked naloxone had 1.96 times higher odds (95% CI 1.11–3.45) of regularly using the PDMP, compared to participants working in pharmacies that did not stock naloxone. Pharmacists who undertook PDMP related training had 1.78 times higher odds (95% CI 1.05–3.05) of regular PDMP use, compared to pharmacists who did not undertake training.

Correlates of mandatory PDMP utilisation

Table 2 also shows the correlates of PDMP utilisation under mandatory conditions. Pharmacists working in regional and rural areas had significantly lower odds (OR: 0.35; 95% CI 0.20–0.63) of always using the PDMP, compared to pharmacists working in Melbourne (the capital city of Victoria). Pharmacists with over 15 years' experience had significantly lower odds (OR 0.24; 95% CI 0.11–0.51) of always using the PDMP once mandated, compared with pharmacists with fewer than five years' experience. Similar to use under voluntary conditions, pharmacists working in pharmacies that stock naloxone had almost twice the odds (OR: 1.88, 95% CI 1.06–3.34) of using the PDMP once use was mandated.

Discussion

Statement of key findings

The current study, amongst a representative sample of Victorian community pharmacists, has revealed various pharmacist and pharmacy related correlates of voluntary and mandatory PDMP utilisation. One in four pharmacists always used the PDMP under voluntary conditions, while only half always used it under mandatory conditions. Regular utilisation under voluntary conditions was significantly associated with undertaking PDMP training and amongst pharmacists working in pharmacies that stock naloxone. Under mandatory conditions, results showed that pharmacists working in a capital city, those with fewer than five years' experience and pharmacists working in pharmacies that stock naloxone were significantly more likely to be regular PDMP users.

Strengths and weaknesses

Strengths of this study include a large representative sample of Victorian community pharmacies and a good response rate (47%). As the sample comprises pharmacists from only one state, findings may not be generalisable to pharmacists in other jurisdictions. Victoria was however, the only state to have mandated PDMP use at the time and therefore inclusion of other jurisdictions was not feasible. When inviting pharmacists to participate, the pharmacist in charge was invited and therefore this sample may not be representative of all Victorian pharmacists. Legislation was in place to mandate use of the PDMP, effective from April 2020, however this coincided with Australia's first COVID-19 outbreak and therefore PDMP use was not actively monitored or enforced by government authorities and is one possible explanation as to why regular utilisation was lower than expected. Furthermore, COVID-19 is likely to have resulted in additional challenges, placing additional strain on possibly existing workforce issues. Finally, data collection was completed six months after mandatory use, with this timepoint chosen to enable sufficient PDMP experience yet minimise recall bias. However, it remains possible that pharmacists may have experienced some recall bias when answering questions around PDMP use.

Interpretation

As hypothesized, PDMP training was associated with regular PDMP use. Previous research has similarly reported associations between PDMP training and increased enrolment and utilisation, whilst some studies also associated training with more favourable attitudes towards PDMPs. For example, a systematic review exploring community pharmacists' attitudes and knowledge towards registration and utilization of PDMPs, found pharmacists who undertook training reported significantly more favourable attitudes towards the PDMP, higher PDMP registration rates, and improved opioid safety knowledge [27]. A qualitative study amongst various PDMP stakeholders reported participants indicated the value of additional targeted training for both current and potential PDMP users [28]. These findings suggest that compulsory PDMP training may be beneficial and may result in more regular use.

Pharmacists working in pharmacies which stock naloxone were significantly more likely to be regular PDMP users. As naloxone is an opioid reversal medication used in overdoses, pharmacists offering this medication may be more confident and or aware of possible harms associated with prescription opioids, which may serve as a motivator for PDMP use. Other studies have reported naloxone being recommended or supplied following PDMP use [21, 29]. An additional study amongst a nationally representative sample of pharmacists in Australia revealed most pharmacists were willing to stock and dispense naloxone and were comfortable to supply naloxone to individuals in a range of circumstances [24]. Interestingly, six years later, only 38% of pharmacies stock naloxone and this may indicate a need for broader efforts to increase comfort in responding to a range of challenges with opioids. Furthermore, given the association between regular use and naloxone supply, this supports greater promotion of naloxone provision within Australian pharmacies, with the aim of increasing pharmacists' familiarity and capacity to provide different interventions to reduce opioid related harm.

Under mandatory PDMP conditions, pharmacists in regional and rural areas had 65% lower odds of PDMP use, when compared to those working in a capital city. Whilst it is difficult to speculate why this may be the case, one possible explanation could be in relation to patient familiarity. Unlike familiar pharmacy patients, pharmacists know less about a new patient's medication history, and therefore can obtain this information via a PDMP, prior to supplying medications. Numerous studies have reported that new or unfamiliar patients prompt clinicians to check the PDMP [21, 30]. A national study exploring the Australian rural and remote pharmacist workforce revealed high job satisfaction, with one reason being their regular and close relationships with patients [31] and it is possible that such relationships result in less frequent or regular use of the PDMP. Hays and colleagues [32] described motivators for pharmacists working in rural locations including patient familiarity, feeling trusted and having a 'better relationship with your patients'.

Another possible explanation for this finding may relate to pharmacy workforce issues. Existing research has found rural and remote pharmacists tend to have a higher workload, which may be exacerbated by staff shortages, being a sole pharmacist, difficulty accessing locums, and having to perform a wider range of duties [31, 33]. As the rate of unintentional fatal overdoses is higher in rural and regional areas [34], these findings may service to highlight the importance of greater implementation efforts in these areas.

Pharmacists with over 15 years' experience had significantly lower odds of mandatory PDMP use, when compared to pharmacists with less than five years' experience. In the current study, years of experience is highly correlated with age and this may partially explain the current finding. For example, it is possible that less experienced, and younger pharmacists were more confident, comfortable or receptive to using the online PDMP platform or that they were more likely to comply with the legislated mandate to use the PDMP. An alternative explanation may relate to knowledge and confidence. Existing research has shown a strong positive correlation between pharmacist's knowledge and experience, knowledge and confidence and experience and confidence [35]. It is possible that pharmacists with more years' experience may have confidence in making these clinical decisions without objective information from the PDMP, however a recent systematic review exploring how PDMP utilisation influences clinical decision-making [36] found studies reported that PDMP use challenged and reduced clinicians underlying biases, further warranting regular PDMP use.

Further research

Further research to explore why PDMP uptake is slower in certain sub-populations is warranted. For example, given that training was positively associated with PDMP use, tailored and targeted training during implementation, in addition to ongoing or 'refresher' type training may be beneficial. Furthermore, training has been shown to be important in influencing attitudes and knowledge [37] and therefore exploring mandatory PDMP training may increase uptake and regular use amongst pharmacists.

From our cross-sectional study design, we do not know if pharmacies stocking naloxone reflect those that are earlier adopters of new interventions more generally, or if naloxone provision specifically may be associated with pharmacists that are more willing to intervene if PDMP information identifies opioid-related risk. This finding does suggest that there is considerable scope for both expanding naloxone supply in pharmacies and increasing PDMP utilisation. Future interventions could incorporate PDMP related information into overdose prevention counselling and explore effect on pharmacy practice and overdose mortality [29].

Table 2 Correlates of prescription drug monitoring program utilisation under voluntary and mandatory conditions

Variable	aOR	95% CI lower	95% CI upper	*p* value	aOR	95% CI lower	95% CI upper	*p* value
	Voluntary conditions				Mandatory conditions			
Gender								
Male	Ref				Ref			
Female	0.860	0.503	1.469	0.580	1.043	0.604	1.802	0.880
Pharmacy type								
Independent	Ref				Ref			
Banner group/other	0.789	0.436	1.428	0.434	0.897	0.492	1.636	0.722
Pharmacy location								
Capital city (Melbourne)	Ref				Ref			
Urban/rural/remote	1.037	0.595	1.806	0.899	**0.352**	**0.198**	**0.625**	**p < 0.0001**
Years of practice								
5 years or less	Ref				Ref			
6–15 years	0.900	0.443	1.830	0.771	0.705	0.337	1.472	0.352
> 15 years	0.891	0.426	1.865	0.760	**0.238**	**0.110**	**0.514**	**p < 0.0001**
Number of prescriptions per day								
200 or less	Ref				Ref			
> 200	0.744	0.369	1.499	0.408	0.761	0.373	1.551	0.452
Number of opioid prescriptions per day								
10 or less	Ref				Ref			
11–20	1.841	0.919	3.688	0.085	1.525	0.761	3.055	0.234
> 20	1.111	0.491	2.514	0.800	0.991	0.429	2.290	0.983
Stock naloxone								
No	Ref				Ref			
Yes	**1.955**	**1.107**	**3.450**	**0.021**	**1.879**	**1.058**	**3.339**	**0.031**
Offer MATOD								
No	Ref				Ref			
Yes	0.735	0.418	1.291	0.284	0.575	0.323	1.023	0.060
Comfort intervening when concerned about an opioid prescription								
Very uncomfortable/uncomfortable	Ref				Ref			
Comfortable/very comfortable	0.879	0.482	1.604	0.674	0.834	0.451	1.544	0.565
Comfort discussing overdose prevention and naloxone								
Very uncomfortable/uncomfortable	Ref				Ref			
Comfortable/very comfortable	1.052	0.584	1.898	0.865	1.165	0.639	2.123	0.618
Attend formal PDMP training								
No	Ref				Ref			
Yes	**1.784**	**1.045**	**3.045**	**0.034**	1.726	0.992	3.003	0.054

aOR adjusted odds ratio, *CI* confidence interval, *Ref* Reference group, *MATOD* Medication Assisted Treatment for Opioid Dependence, *PDMP* prescription drug monitoring program

Bold font indicates statistical significance

Conclusion

Even under mandatory use conditions, only half of all community pharmacists used the PDMP all of the time. Given that PDMP utilisation was slower or less regular amongst pharmacists located in regional and rural areas, pharmacists with more years of experience and those not already supplying naloxone, targeted training aimed at these sub-populations may also be beneficial. Given the current and planned roll out of similar PDMPs in other jurisdictions throughout Australia, these findings may help inform future implementation efforts.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11096-022-01523-3.

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Conflicts of interest No authors have conflicts to declare related to the current research study. SN has received unrelated research funding from Indivior and Seqirus, and her institution has received honoraria for training delivered on codeine dependence from Indivior. TL has been an investigator on untied education grants from Seqirus.

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