Prescription Drug Monitoring Program Use and Utility by Washington State Pharmacists: A Mixed Methods Study

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A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2019

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Program Authorized to Offer Degree:

Department of Health Services

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Abstract

Prescription Drug Monitoring Program Use and Utility by Washington State Pharmacists:

A Mixed Methods Study

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Objectives: To explore factors and situations that influence pharmacists to utilize the prescription drug monitoring program (PDMP) and to characterize actions taken by pharmacists following alarming scenarios from a PDMP query. Also, to explore the theory of planned behavior's (TPB) utility, along with perceived obligation, in predicting pharmacists' high intention to utilize the PDMP.

Design: Explanatory sequential two-phase mixed methods design: (1) cross-sectional web-based survey of Washington State pharmacists followed by (2) interviews with purposefully selected respondents to explore significant quantitative findings.

Setting: Washington State from September 2018 to February 2019.

Participants: A total of 967 Washington State pharmacists from various practice settings, including inpatient and outpatient pharmacies. Ten outpatient pharmacists were interviewed in the second phase.

Outcome measures: Pharmacist reported the frequency of PDMP use, opinion on the usefulness of PDMP, action(s) taken following a concerning PDMP report and a model to predict pharmacists' high intention to utilize the PDMP by applying the TPB with the addition of perceived obligation.

Results: The usable response rate for pharmacists with a PDMP account was 17.6% (818/4659) and for all pharmacists was 10.4% (967/9263). PDMP use varied by ethnicity, practice setting and employer policy on PDMP use. Among the 818 PDMP users, 396 (48%) utilized the database at least once during a shift. Frequent PDMP users were more likely to recommend naloxone compared to less frequent users (Adjusted odds ratio, 1.70; 95% confidence interval, 1.09-2.65; P = 0.02). The constructs of subjective norms, perceived behavioral control, and perceived obligation significantly predicted pharmacists' high intention to utilize the PDMP (P = <0.001).

Conclusion: PDMP has value to pharmacists of all practice settings studied. Frequent PDMP use may facilitate more pharmacist-interventions, such as a naloxone prescription. Outreach, training and communications that address pharmacists' subjective norms, perceived behavioral control and perceived obligation may be more likely to increase pharmacists' high intention to utilize PDMP.

Keywords: Pharmacists, prescription drug monitoring program, opioids, naloxone, mixed methods, theory of planned behavior

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Background:

The United States is in the middle of a public health crisis of prescription opioid abuse, misuse, overdose, and death.[1-3] Over 46 people in the United States die from prescription opioid overdose every day[4,5] – a rate that has quadrupled since 2000.[6] In parallel, per-capita rates of dispensing prescription opioids also tripled from 1999 to 2015.[2] The United States uses 80% of the worldwide opioid supply and over 99% of the worldwide hydrocodone supply.[7] The combination of increased opioid use associated with opioid-related morbidity and mortality are key characteristics of the epidemic.

To combat this epidemic, all 50 states, the District of Columbia, Guam and Puerto Rico have implemented prescription drug monitoring programs (PDMPs) which are state-level databases containing records of dispensed controlled drugs and other drugs with abuse potential. Depending on state policy, PDMP data are available to prescribing health care providers and their delegates and to pharmacists.[8] The benefits of using PDMPs are widely acknowledged: PDMPs can help identify patients with concerning prescription utilization and assist in decision-making related to dispensing and prescribing opioids;[9] have been effective in reducing "doctor-shopping" – the practice of visiting multiple prescribers to obtain multiple prescriptions typically for opioid misuse, abuse or diversion;[10,11] can be used to analyze drug use and abuse trends. The additional data from PDMP queries help identify patients who might benefit from referral to drug abuse and misuse treatment. Mandatory-access policies, which raise PDMP utilization rates by requiring prescribers to query a drug history prior to prescribing a controlled substance, are associated with a reduction in opioid abuse, especially among young adults.[12] While an increasing number of states are mandating prescribers to query PDMP histories before prescribing opioids, only 20 states require pharmacists to query PDMP before dispensing an opioid. Washington State does not mandate dispenser queries of PDMP.[8]

Pharmacists are the "gatekeepers" of controlled substances and have a corresponding responsibility to ensure each opioid prescription is issued for a legitimate medical purpose.[13] PDMPs support pharmacists in fulfilling this corresponding responsibility by detecting high-risk opioid regimens and drug-seeking behavior[14] and can support pharmacist decision-making to prevent opioid diversion, reduce opioid abuse and potentially save lives.[10,12,15] However, despite the value and utility of PDMPs, pharmacist use is highly variable.[16,17]

This study aimed to examine factors and situations that influence pharmacist use of the PDMP. Understanding the socio-cognitive factors that influence pharmacists' intention to utilize the PDMP may inform outreach, training and communications to increase the profession's utilization of the program. Some studies have shown the theory of planned behavior (TPB) is predictive of prescriber and pharmacist intention to use the PDMP.[18-20] The basis for TPB is that behavior is influenced by attitudes (i.e., usefulness of PDMP), subjective norms (i.e., PDMP use is expected), and perceived behavior control (i.e., ability to access and use the PDMP). Fleming et al., (2014), reported that the addition of pharmacist perceived obligation toward utilizing PDMP was predictive of pharmacists' high intention to use the PDMP.[18] Using the TPB as the framework, this study examined the contribution of each construct with the addition of perceived obligation in predicting high intention to utilize the PDMP.

Objectives:

This study had three objectives: 1) to explore factors and situations that influence pharmacists to query a patient's controlled substance prescription history using the PDMP; 2) to characterize actions taken by pharmacists following a concerning report from a PDMP query; and 3) to evaluate the TPB constructs with the addition of perceived obligation in predicting

Washington State outpatient pharmacists' high intention to use the PDMP as part of their decision-making process when dispensing opioids.

Methods:

Study Design

The study population consisted of Washington State pharmacists licensed by the state as of September 1, 2018. The study design was an explanatory sequential two-phase mixed methods study beginning with a cross-sectional web-based survey followed by key informant interviews.[21] The survey identified all Washington State pharmacists who had a valid email on file with the Washington State Pharmacy Commission. To a create a complete study population pool, public records requests for a list of licensed pharmacists, pharmacy permits and the number of pharmacists with an active state PDMP registration in the state were made to Washington State. The pharmacist list included names, age, date of first licensure, sex and email (if on-file), but did not indicate if current practice status in the state or specify employment type (i.e., inpatient). The preliminary list included 10,571 state licensed pharmacists, with only 9,263 (87.6%) having a valid email on-file as of 8/31/2018. Of these, 4,659 (44%) pharmacists had registered to access the state PDMP as of 9/1/2018. The list of pharmacy permits provided the pharmacy type (i.e., outpatient, inpatient) and address as of 9/26/2018. Respondents were excluded if they indicated via survey self-report they did not practice in Washington State. Pharmacists were included if they reported either dispensing controlled substances or performing medication reconciliations as part of their usual practice. The primary study population of interest included 4,659 pharmacists who had a PDMP account as of 9/1/2018; however, emails were obtained from the list of 10,571 without knowing beforehand who had a PDMP account. The 4,659 were targeted to characterize the program's use and utility and to evaluate socio-

cognitive factors predicting intention to use the PDMP. The remainder, who met inclusion criteria, were analyzed to characterize factors of non-use of PDMP.

Development of an interview guide and selection of informants were completed after analysis of the survey. Telephone interviews were conducted with ten purposefully selected pharmacists who responded to the initial survey as a PDMP user from an outpatient setting with differing company policies on accessing PDMP. Their interviews were used to help elucidate significant quantitative results from the study.

The University of Washington Institutional Review Board (IRB) deemed this study to be exempt from IRB review

Survey instrument

The survey questions were developed based on the literature with input from the study authors and suggestions from the Washington Department of Health (DOH) PDMP operations manager.[17,22-27] The survey instrument was pilot tested with eight pharmacists with different backgrounds and experience to ensure validity and clarity on questions, response choice, and length. Based on pilot feedback the survey underwent minor modifications. The final instrument contained 71 items with branching logic; the possible number of questions ranged from 17 to 50 items for any respondent, depending on their self-reported use of the PDMP.

Because pharmacists practicing in inpatient settings use the PMDP differently than pharmacists practicing in outpatient settings, the option “not applicable” was added to several questions to ensure respondents could easily navigate the survey. Pharmacists from all practice settings were asked how often they used the PDMP in different case scenarios and their opinion of PDMP’s usefulness in different situations utilizing a 5-point Likert item scale. Another series of questions asked pharmacists what actions they would take following a report from a PDMP

query in two different situations – one suggesting potential diversion or misuse and another revealing dangerous combinations of medications – both of which would concern a reasonable pharmacist. Respondents in these scenarios could select all that apply from a list of options developed from prior literature. Pharmacists who reported they did not use or underused the PDMP were asked to rank their top three reasons from a list developed by the authors with input from Washington's DOH PDMP operations manager. Items regarding TPB constructs were developed from prior literature and assessed via a 5-point Likert item scale. The number of items constituting each TPB construct was limited to two to three items per construct after feedback from piloting indicated the survey was too long. A copy of the survey instrument is in Supplement A.

The survey also collected demographic information (i.e., age, sex, time since first licensed by WA, location, and practice setting) to aid in explorations, stratification of analyzed data, and identification of possible subjects for recruitment for interviews.

Recruitment of interview participants

The demographic survey information enabled purposeful selection for interview. Specifically, pharmacists identified as PDMP users from different outpatient practice settings and differing company policies governing PDMP use were recruited to elucidate significant quantitative results using semi-structured interviews. Pharmacists eligible for interview recruitment included those who indicated willingness to participate in a follow-up interview and provided their telephone number (23% of all respondents). Ten pharmacists meeting the interview criteria were recruited. All interview respondents were entered into a drawing for a single fifty-dollar cash card as an incentive.

Survey

Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Washington.[28] REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies. The survey instrument was loaded into REDCap, and an invitation was distributed via email to all 9,263 Washington State pharmacists with a valid email in September 2018. Two reminder emails were sent one week apart to nonrespondents. The survey closed four weeks after the initial email. A drawing for one of two fifty-dollar cash cards was used as an incentive to improve responses.

Interview

A semi-structured interview guide was developed based on similar guides in the literature.[29,30] Topics in the interview guide were limited in scope to serve as follow-up items from survey results to triangulate the interpretation of significant quantitative findings. Topics included: 1) situations where the pharmacist most often used the PDMP; 2) how PDMP influenced filling prescriptions; 3) how PDMP reports are communicated to patients and prescribers; and 4) pharmacist practice concerning naloxone recommendations. All interviews were digitally audio-recorded and transcribed using an independent transcription service. A copy of the interview guide is included in Supplement B. Interviews were conducted by phone in February 2019 by RP as the sole interviewer. At the beginning of the interview, RP identified himself as a pharmacist practicing in Washington State. Each interview ranged from 12 minutes to 25 minutes in duration.

Data analysis

Descriptive statistics were performed when appropriate to describe the survey sample and survey responses. Bivariate statistics using logistic regression and the likelihood ratio test (Rao-

Scott) were used to identify factors that influence PDMP use. All statistics were determined using survey weights.[31] Survey weights were calculated through calibration of survey responses by raking the data using known population parameters (number with PDMP account registration, sex, age, time since first licensed, and location) obtained from public records. Missing data were reviewed for patterns. Variables with missing data were determined to be missing at random, except for the demographic variable 'practice setting' where inpatient pharmacists skipped more questions. Multiple imputation using predictive mean matching was used to address missing data.[32]

Cronbach's alpha was used to assess TPB scale reliabilities and Spearman's rank correlation assessed the correlation between the TPB constructs. TPB construct of intention was measured on a scale of 0 (never use) to 4 (always use). Analysis of intention was dichotomized into high intention and not high intention with a mean ≥ 2.5 as high-intention to utilize the PDMP. Multivariate statistics used logistic regression and the likelihood ratio test to simultaneously test all TPB constructs to determine which constructs influence a pharmacists' high intention to utilize PDMP. Multivariate logistic regression also determined factors influencing naloxone recommendations by pharmacists. Logistic regression was used to calculate odds ratios with 95% confidence intervals. The likelihood ratio test was used to analyze variables with >2 categories while including survey weights. Statistical analysis was performed using R statistical software (version 3.5.2).[33] Differences were considered significant at $P < 0.05$ set a priori.

Results:

The results section reflects the integration of quantitative survey results with the concordant qualitative primary themes that emerged from the qualitative interviews.

Demographics

Out of the 10,571 licensed pharmacists (as of 8/31/2018), only 9,263 (88%) had a valid email on file. The response rate was 17.6% among pharmacists with a registered PDMP account and 12% among all pharmacists invited to participate. The final usable response rate for PDMP users and non-users was 10.4% after excluding ineligible respondents. Figure 1 describes the characteristics of respondents who were excluded. Respondent demographics are compared to known population demographics in Table 1. The demographics of those selected for an interview are shown in Table 2.

Respondents were mainly PDMP account holders (84.6%), Caucasian (56%) and primarily from an outpatient setting (72%). The distribution of sex, age, years since first licensed and practice location were representative to known population numbers, available through public records. A comparison of the distribution of respondents and pharmacy permits by Washington State Medicaid region is shown in Figure 2.

Pharmacists' use of PDMP

All pharmacists were asked about their use of PDMP and reasons for non-use or under-use if average utilization was reported as less than once a shift. A total of 15% (n=149) of eligible respondents reported not using the PDMP in the last year. The top reasons reported for non-use were not relevant to practice (52%, 78/149), insufficient time (24%, 36/149), and not knowing how to use PDMP (21%, 32/149). Top reasons for underuse were not relevant to practice (58%, 298/515), insufficient time (50%, 256/515), lack of reimbursement for additional time to use PDMP (13%, 65/515), and do not believe PDMP would make a difference (10%, 52/515).

Interviews confirmed that time was an important aspect to utilizing the PDMP. Barriers to signing into the database may add to the time burden. Staffing within the pharmacy and competing duties contributed to the time constraints reflected in the interviews. A few pharmacists who worked at multiple locations explained they sometimes were unable to sign into PDMP if they lacked adequate cell phone reception due to two-factor identification requirements when logging into a new computer.

What barriers affect your ability to check PDMP?

"When I work there are no other pharmacists working. I don't have enough time." – [pharmacist 4]

"It takes additional time to log into the PDMP and check it." – [pharmacist 5]

"I think the way retail is going, if they pile more and more on us, it makes it hard. I don't check the PDMP every time, and part of that is a time constraint." – [pharmacist 3]

"Not getting the text message or the phone message [for two-factor identification log-in] when you go to a pharmacy you haven't been to in a long time or haven't been to before." – [pharmacist 5]

Among PDMP users, 396 (48%) reported utilizing the database at least once a shift. Pharmacists who worked in a chain pharmacy used the PDMP more often than any other setting. Respondents were significantly less likely to use PDMP at least once a shift in the absence of a company policy governing PDMP use compared to those whose employer had a policy (adjusted odds ratio 0.13; 95% confidence interval, 0.10-0.19; P value = <0.001). Only 18% of respondents working at an independent pharmacy reported an employer policy regarding PDMP use compared to 52% of outpatient chain pharmacies. A comparison of factors influencing PDMP use is shown in Table 3.

Even in the absence of a policy mandating a dispensing pharmacist query of PDMP, employers may influence the pharmacist's ability to use the PDMP. Several interviews reflected on their employer training on the pharmacist's collateral duty for dispensing controlled substances and ensuring each pharmacist ability and confidence to both access and interpret the database.

What policies, if any, does your employer have regarding checking the PDMP?

"[Outpatient chain] has a specific policy that they want you checking [the PDMP] on patients that you're not familiar with our patients that have never come into the pharmacy before." – pharmacist 2]

"It's [checking PDMP] not mandated, but every pharmacist needs access. My employer makes sure, and as a manager, I'm supposed to make sure all my staff pharmacists have access and that they know how to get on there and that they can get on there. Whether or not they always utilize it, that's up to them. But they [employer] provide access for us and encourage us to go on there." – [pharmacist 3]

"[Outpatient chain] made sure that everyone is aware of our corresponding responsibility and there was even training for employees where we had to go in and acknowledge that we have an account and had access to the PDMP website and knew how to use it." – [pharmacist 7]

"We don't have any policies with accessing the PDMP. I use it on a case by case basis to access PDMP. I don't access it for every prescription." – [pharmacist 5]

"I check everybody, not just people who set off alarms because it's mandatory where I work." – [pharmacist 1]

Pharmacists practicing in outpatient settings were asked how their use of PDMP varied by different circumstances commonly encountered in an outpatient practice surrounding the prescription itself, patient characteristics, or prescriber type. A cash paying patient was the top scenario for checking the PDMP often to always (85%). In contrast, only 44% of pharmacists would check the PDMP often to always for an established patient. The prescriber type had only minor differences for checking PDMP between specialties with 56% checking often to always if the prescriber practiced at an emergency room or urgent care setting compared to 45% for pain specialists or primary care providers. A complete breakdown of use by each case is shown in Figure 3. Appendix A shows differences in PDMP use from each case by outpatient setting.

Beyond an employer policy, cues to action sway a pharmacist to query the PDMP. Most interviews reflected on checking PDMP for new patients and patients that pay for prescriptions fully out-of-pocket, without insurance. Some pharmacists use the PDMP as part of their process for a complete medication reconciliation. Some interviews informed that the PDMP is also used to make medication decisions on dosing and dispensing when checking if a patient is opioid naïve or tolerant or to obtain a patient's full medication list by identifying other pharmacies the patient has used through the PDMP report.

What prompts you to check PDMP?

"I'm checking the PDMP for people I don't know." – [pharmacist 2, outpatient chain]

"When I have a patient coming in that I don't recognize or that I can tell they have not filled here before I will check the PDMP. Especially if they prefer to pay cash and they claim they don't have insurance I will check it." – [pharmacist 3]

"If it's from a prescriber that's far away or if the prescription appears altered in one way or another it will tip me off to check it. Anytime I get a new high dose opioid, I'll check it." – [pharmacist 4]

"If they pay out of pocket for it or if it's a refill too soon." – [pharmacist 5]

"Their morphine dose is outside the acceptable, what's considered acceptable limits or going to more than one pharmacy. That's the big alarm bell right there." – [pharmacist 6]

"I usually use it whenever it's a new patient presenting a controlled substance or an existing patient but their first time presenting a controlled substance. I'll usually check to make sure that they haven't filled a controlled substance recently in another chain." – [pharmacist 7]

"I review the PDMP before seeing a patient and then determining whether the patient was suitable for a refill or a change in dose of medication and to assess compliance as well as making sure there was not any polypharmacy." – [pharmacist 10]

Pharmacists' opinion towards the usefulness of PDMP

All pharmacists who have used the PDMP in the last year were asked how useful the database was in different health care situations. Most pharmacists felt PDMP was either moderately or extremely helpful in identifying doctor and pharmacy "shoppers" (97%), misuse or abuse of opioids (91%), and those at high risk for opioid-related overdose (78%). Further, most pharmacists felt the database was moderately to extremely useful to help decide whether to dispense (or fulfill) a controlled substance prescription (or order) (90%). In contrast, 24% responded that the database was not useful at all or only slightly useful in helping to manage patients' pain. Pharmacists opinions on PDMPs' usefulness are shown in Figure 4.

Interviewers reflected on how PDMP queries influenced their decision to fill a prescription for a controlled substance. The added history helped to inform decision making.

How does PDMP affect your decision to fill a prescription?

"If there's an unresolved question I had about a prescription, I'm going to delay dispensing it until I can check the PDMP, whether it loads right now or later." – [pharmacist 7]

"I definitely don't fill prescriptions early anymore. Now we'll only do it two days before. [PDMP] definitely gives you a lot more knowledge of the patient's history." – [pharmacist 8]

"It has affected my decision to fill a prescription one way or another. It helps me gather enough information and data on the patient to feel comfortable whether or not I want to fill it or not." – [pharmacist 4]

Pharmacists' actions following use of the PDMP report

Respondents who used PDMP in the last year were asked what action(s) they would usually take if they discovered a concerning finding from a database query. The first scenario posed in the survey was a report that suggested potential diversion or misuse and the second was a report that suggested dangerous combinations of medications. Respondents could select all that apply and most answered by calling the prescriber (84% and 83% for scenarios 1 and 2 respectively) followed by discussing the concern with the patient (48% and 58%).

Interviews reflected on the pharmacists' professional role as a health care provider to help manage a patient's pain in a safe and effective manner and not one to police the use of opioids.

On patient counseling or calling the prescriber following a concerning PDMP report:

"I would make sure the patient is aware of the extra drowsiness or extra issues that might occur [from multiple controlled substances] and make sure it's all from the same doctor. If it was from different doctors, then we would contact the different doctors and let them know and give them a heads up on what other doctors are prescribing. Sometimes they [doctors] are unaware." – [pharmacist 9]

"I don't ever want to make [patients] feel like I'm policing them or that I am utilizing their private information. I try to come from the standpoint that I'm trying to make sure they're safe and that their pain is controlled, but safely." – [pharmacist 3]

"First, I want to contact the provider. I don't make a big fuss confronting the patient with any wrongdoing. I'll tell patients that I need to hear back from their doctor before dispensing." – [pharmacist 6]

A minority of respondents indicated that they would recommend or, under a collaborative practice agreement, prescribe naloxone in response to scenarios 1 and 2 (14% and 17% respectively). A complete description of pharmacist responses for both scenarios is shown in Table 4. Frequent PDMP users (those who checked PDMP at least once a shift) were more likely to recommend naloxone compared with less frequent users in a multivariate model (frequent 30% (119 of 396) Vs. less frequent 12% (49 of 422); adjusted odds ratio = 1.70, 95% confidence interval = 1.09-2.65, P = 0.02, see Table 5). Other interventions (discuss with the patient, refusing to fill, recommend an alternative) were significant in bivariate analysis, but not significant in a multivariate analysis after adjusting for practice setting, company policy, ethnicity and years since first licensed. Curiously, frequent PDMP users were less likely to call the prescriber than less frequent PDMP users in multivariate analysis (adjusted Odds Ratio = 0.54; 95% confidence interval = 0.31-0.94, *P* = 0.03).

All interviewers acknowledged the importance of naloxone in saving lives, but few considered making the recommendation to the patient or prescriber. One interview reflected on how their employer assisted them in understanding when to recommend naloxone.

Naloxone recommendation

"My employer has been so great and proactive about setting guidelines when we're to offer it [naloxone] and making these guidelines real clear to us pharmacists if the prescription is

over a certain morphine milligram equivalent amount or to anyone who is on [buprenorphine and naloxone] for treatment of opioid dependence." – [pharmacist 1]

"We have four pain clinics in this area, and they have all started prescribing it to their patients. I've always tried to really encourage people that they need that [naloxone]. It's not saying that it's protecting them, but it's also protecting the people around them." – [pharmacist 8]

"I've been thinking about it [naloxone] more with people who might be on high dose [opioids] to ask them if they are on it. This is something that I could counsel on with patients." – [pharmacist 6]

Theory of planned behavior

Outpatient pharmacists (n=655) stated intention to use the PDMP by outpatient scenario was used as the intention construct (from Figure 3). Intention score was between 0 (never) to 4 (always) for using the PDMP with the mean of 2.85. Pharmacists expressed a high level of intention to use PDMP in ordinary outpatient circumstances when presented with an opioid prescription. There were 432 (64%) pharmacists in the high intention group (mean intention score ≥ 2.5) compared to 223 (34%) in the non-high intention group (mean intention score < 2.5). Table 7 provides a summary of the items and scores for each construct.

Of all the constructs to predict intention, attitude had the highest mean score (mean ± SD, 1.44 ± 0.57, -2 [strongly disagree] to +2 [strongly agree]). Pharmacists felt strongly that the PDMP database was both valuable and helpful to their practice. Pharmacists perceived behavioral control, and subjective norms were also high (perceived behavior control 0.96 ± 0.78, subjective norm 0.90 ± 0.76) indicating a high level of agreement that pharmacists are confident they can utilize the PDMP and that those important to them support them in using the database.

Pharmacists perceived obligation had the lowest score of all constructs but remained high (0.83 ± 0.88) demonstrating a strong moral and professional obligation to query the PDMP as part of their professional practice. All constructs were significantly correlated with the intention to use the PDMP at a significance level of *P* <0.001 (Table 6). Each construct except perceived behavior control (α = 0.62) had Cronbach's alpha scores α ≥ 0.7 to determine scale reliability. The perceived behavior control construct only had two items, contributing to its low alpha score. The Cronbach's alpha scores for each construct and means for each item are shown in Table 7.

Multivariate logistic regression compared all TPB constructs simultaneously to predict high intention to utilize PDMP. A second model to show the effect of the added construct, perceived obligation was also significantly related to predict high intention. The construct attitude was not significant in either model. The remaining constructs subjective norm and perceived behavior control were significant in both models. The likelihood ratio test was used to test overall significance in predicting high intention for both models, with and without perceived obligation and yielded a significance level of *P*<0.001 (Table 8).

Discussion:

Pharmacists are vital members of a patient's health care team and are well positioned in each practice setting to prevent and reduce the abuse and misuse of opioids. The oath of a pharmacist includes considering "…the welfare of humanity and relief of suffering my primary concerns."[34] Pharmacists uphold this oath in practice by employing their unique knowledge in the delivery of services to help assure optimal outcomes for their patients. When reviewing medication orders and prescriptions to manage their patients' pain, pharmacists commonly perform a retrospective and concurrent drug utilization review, which could include a query of the PDMP database. A PDMP report includes past controlled substance prescription fill history, including the medication name, formulation, quantity, day supply, dispensing pharmacy's name

and address and prescriber's name and address for each patient. This information may help the pharmacist determine the accuracy and appropriateness of a medication order and further aid in screening for potential drug-drug interactions, duplications in therapy, or flag the potential for inappropriate use.

PDMP has given the pharmacists an objective tool to base decisions on filling a prescription. Although insurance companies also informed pharmacists on the next available fill dates for prescription claims, the PDMP report covers uninsured patients and provides more detailed information on past dosing, prescriber and other combination(s) of medications, if any.

This study found a difference in PDMP use by pharmacists from different practice settings. This is partially explained by the database's likely usefulness for different settings. For example, the PDMP may help in transitions of care where an inpatient pharmacist may look to identify which pharmacy or pharmacies the patient utilizes to obtain a complete medication list or to confirm opioid tolerance for an inpatient opioid order. A clinic-based pharmacist may determine compliance with a pain contract or similarly obtain a current history as part of pain management. An outpatient retail pharmacist could query a PDMP history after receiving an opioid prescription as part of their corresponding responsibility to determine appropriateness. Among outpatient pharmacists, checking PDMP was often prompted by "red flags" or different business practices.

For pharmacists, Washington does not require checking PDMP before dispensing an opioid to the patient. In every practice setting, employers who had a policy on checking PDMP demonstrated more frequent use of PDMP than those whose employer lacked such as policy. State laws that require prescribers to check the PDMP led to reduced opioid abuse.[12] Future

studies should assess if opioid abuse is affected by mandating the use of PDMP before dispensing an opioid.

Naloxone

The PDMP may shed light on addiction and pharmacists are positioned to help refer patients for help. Washington is among a growing list of states that allow pharmacists with a collaborative practice agreement to prescribe naloxone, an opioid-reversal agent.[35] Naloxone is safely and easily administered by patients, family members, caregivers and bystanders in the event of an opioid overdose. Expanded access to this life-saving antidote by health care professionals, including pharmacists is one of the US Surgeon General's priorities in fighting the opioid epidemic.[36]

New opioid guidelines, state laws and company policies guide health care providers in offering naloxone to patients.[9,37] The present study showed that pharmacists who frequently use the PDMP were more likely to recommend or prescribe naloxone than those who use it less often, after adjusting for practice setting, years since first licensed, ethnicity and if the employer had a company policy on PDMP use. A prior study showed those who use the PDMP were more likely to refuse to dispense a prescription than those who did not; however, the present study failed to find a difference in the multivariate analysis.[38] Naloxone use was the only significant intervention between frequent and infrequent PDMP users in multivariate analysis suggesting the PDMP report may aid the pharmacist in every practice setting to recommend or prescribe naloxone by identifying those who may be at the most significant risk for overdose.

Theory of Planned Behavior

The purpose of the TPB model with the addition of perceived obligation was to determine the extent of the Theory of Planned Behavior constructs toward predicting Washington States outpatient pharmacists' high intention to utilize the PDMP database (Figure 5). Frequent use of the PDMP can help to identify patients at high risk for opioid overdose, identify patients struggling with addiction and to support the pharmacists' corresponding responsibility in ensuring the prescription is for a legitimate medical purpose. It is critical to understand what drives pharmacists' utilization of PDMP and the TPB can help explain that. The TPB constructs which include attitude, subjective norms, perceived behavioral control and the addition of perceived obligation were used in the study.

Respondents' intention is proximal to the intended behavior, i.e., PDMP use. Fleming et al., employed a similar study using the TPB constructs with the addition of perceived obligation in a mail-out survey of 254 Texas community (outpatient) pharmacists and found all constructs to be significant predictors of high-intention to utilize the PDMP.[18] A smaller study by Gavaza et. al, found all TPB constructs, including perceived obligation to be significant predictors of community pharmacists' intention to utilize the PDMP among 97 Virginia pharmacists from an online survey.[19] This study, however, failed to find attitude towards behavior as a significant predictor. This may be because average respondents' attitude toward PDMP was near the upper bound, whereas the mean score for the same construct was comparatively much lower in the study's by Fleming and Gavaza. This study confirms the findings by Fleming and Gavaza that subjective norms, perceived behavioral control and perceived obligation are all significant predictors towards outpatient pharmacists' high-intention to utilize the PDMP.

Limitations

The main limitation of the study was response bias, especially from non-PDMP users. Non-users of PDMP accounted for 15.4% of the usable survey sample, yet 55.9% of pharmacists did not have a PDMP account at the time of the study. Such a low response from non-users may not sufficiently explain all variables for non-use of PDMP. Statistical analysis corrected for low response of non-users through the inclusion of survey weights calibrated from the known population numbers as previously described. This helped to minimize the effect of response bias in the analysis.

Washington State is one of 30 states that do not require the pharmacist to query a patient history from the PDMP database before dispensing an opioid. These results may be less generalizable to states with such requirements.

Another limitation is the study did not verify the presence or absence of employer policies on PDMP use.

Conclusion:

PDMP is valuable to pharmacists from all practice settings, even though use varies in each setting. Frequent PDMP use may facilitate more pharmacist-interventions, such as a naloxone prescription. Interventions that address pharmacists' subjective norms, perceived behavioral control and perceived obligation may be more likely to increase pharmacists' high intention to utilize PDMP.

Acknowledgments:
The author would like to thank the Washington State pharmacists for their participation as well as Gary Garrety, the operations manager of the Prescription Monitoring Program for Washington State's Department of Health.

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Figures and Tables

Figure 1. Survey sample response rate and exclusion criteria

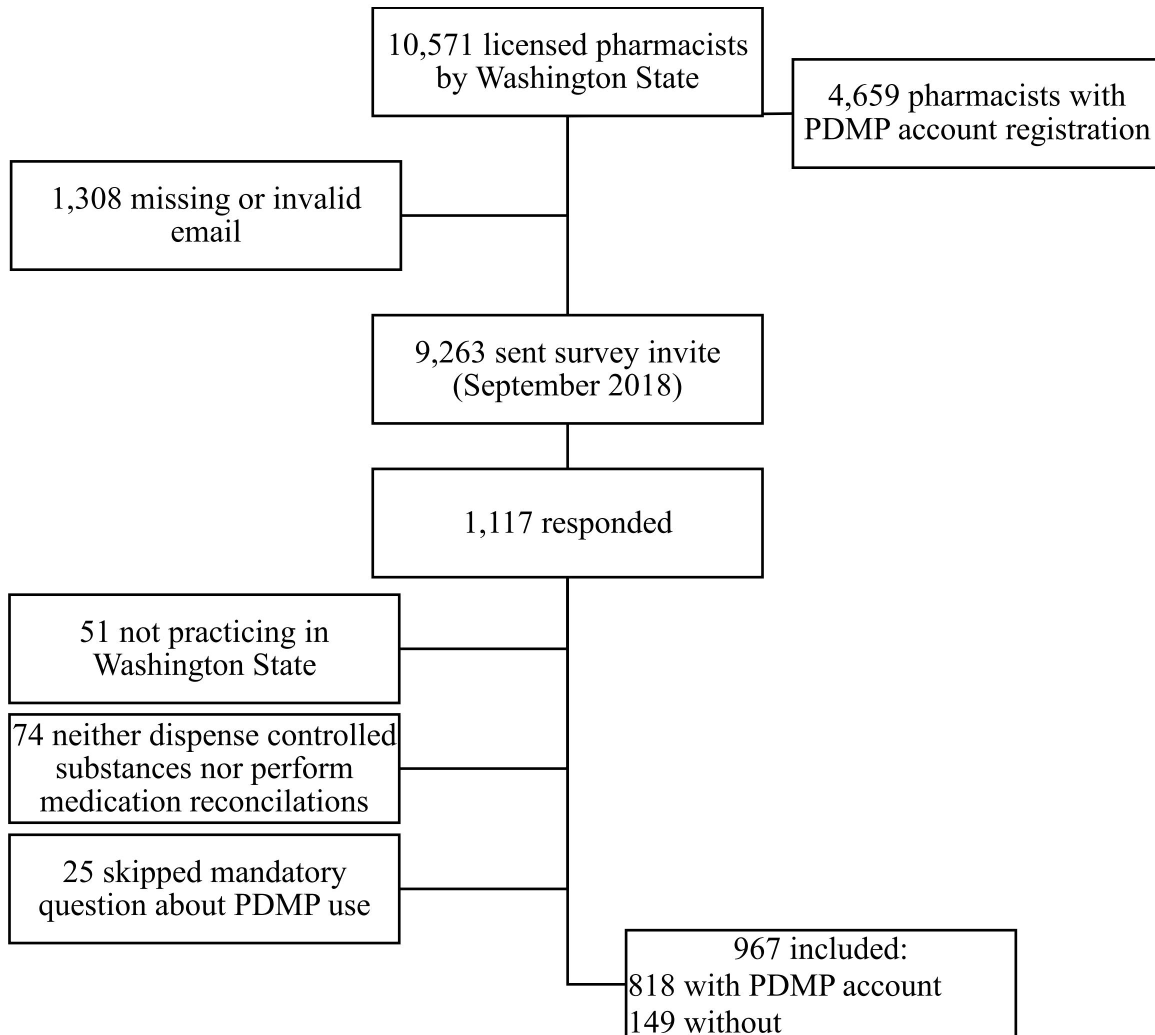
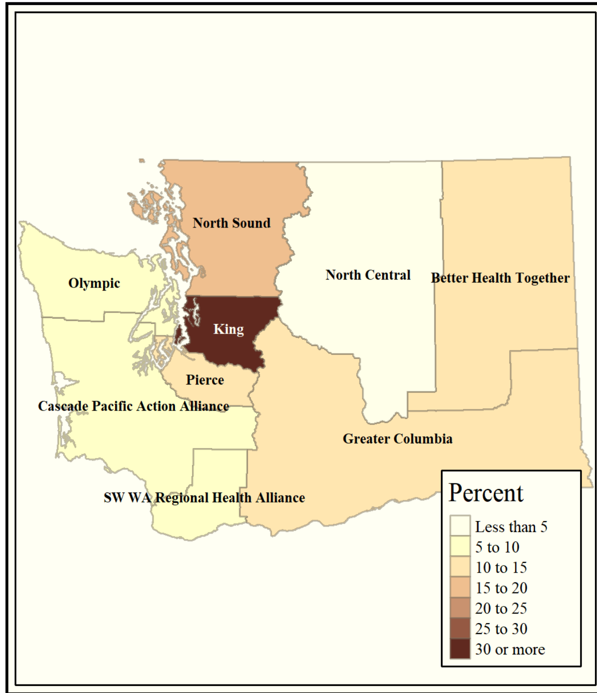


Figure 2. Comparison of respondents and pharmacy permit saturation by Washington State Medicaid region.

Pharmacy Permit Distribution



Survey Response Distribution

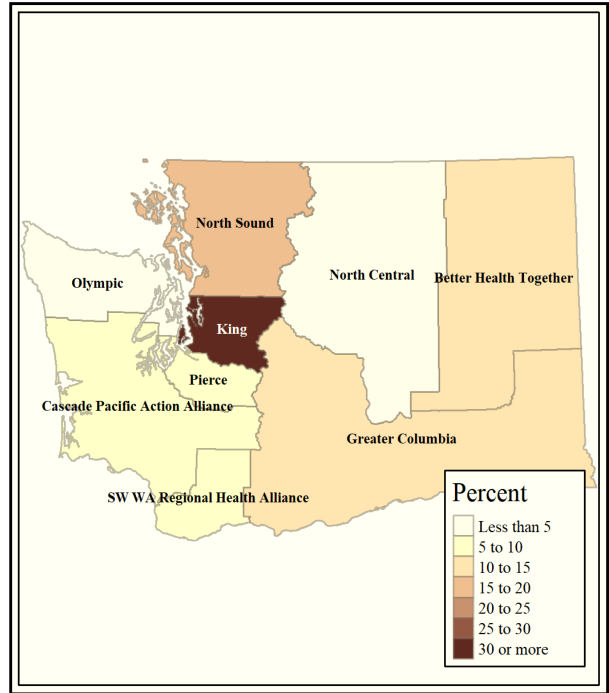


Figure 3. PDMP use by outpatient cases

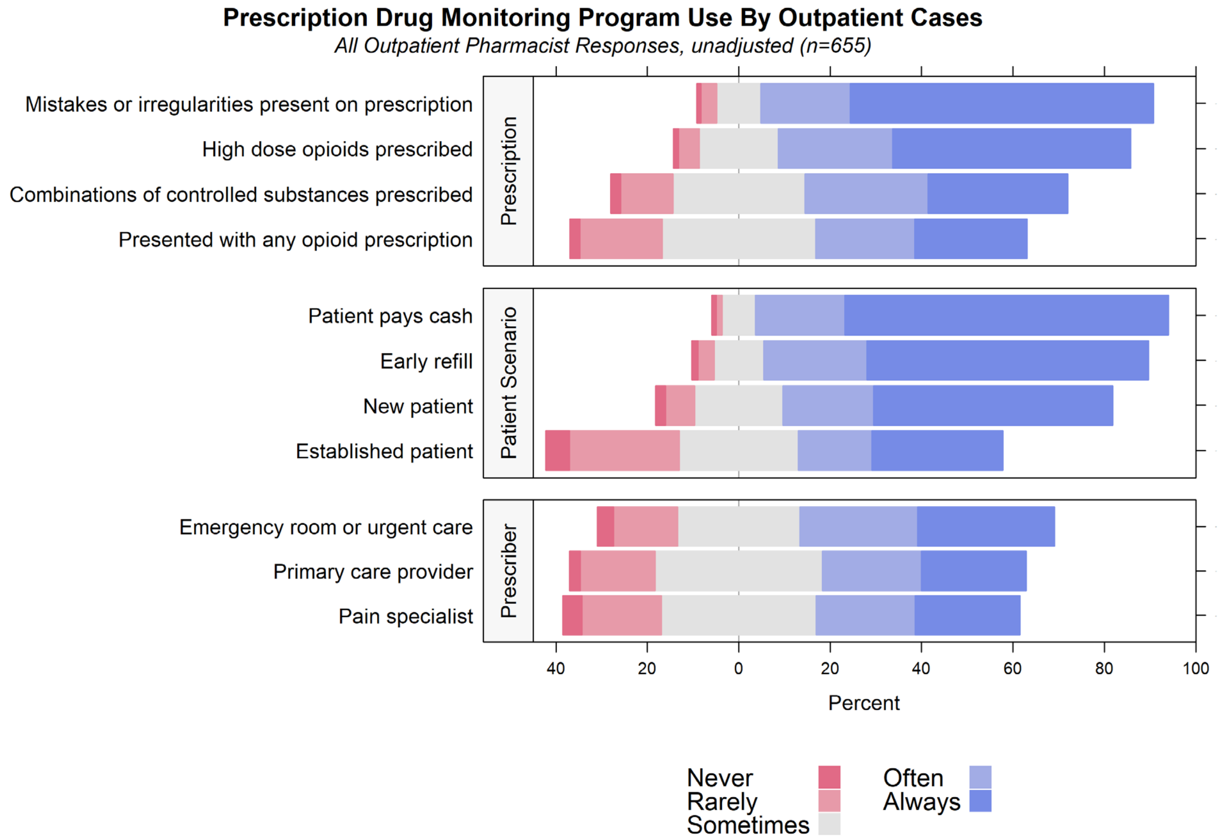


Figure 4. PDMP usefulness by scenario

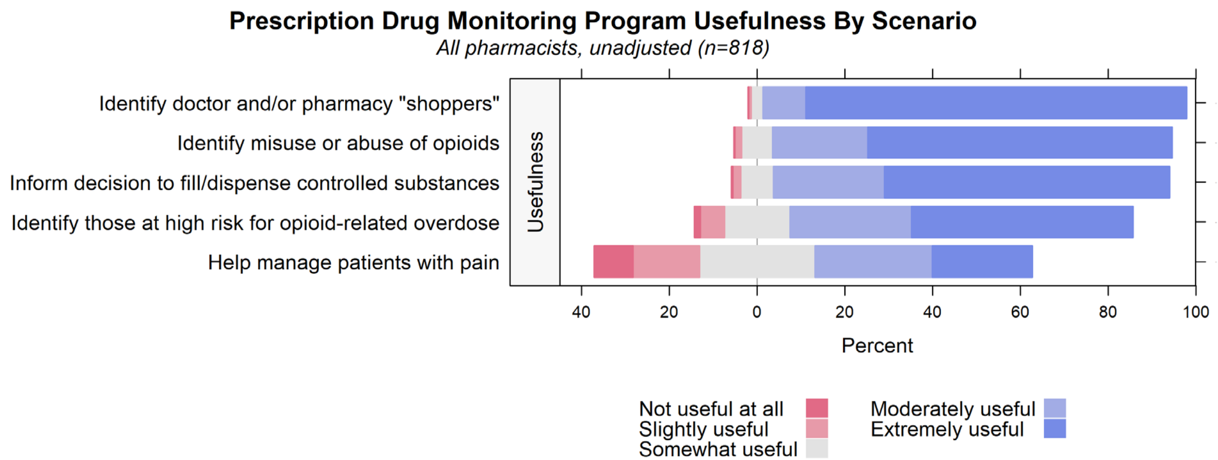


Figure 5. The theory of planned behavior with perceived obligation to predict pharmacists' high intention to utilize the PDMP

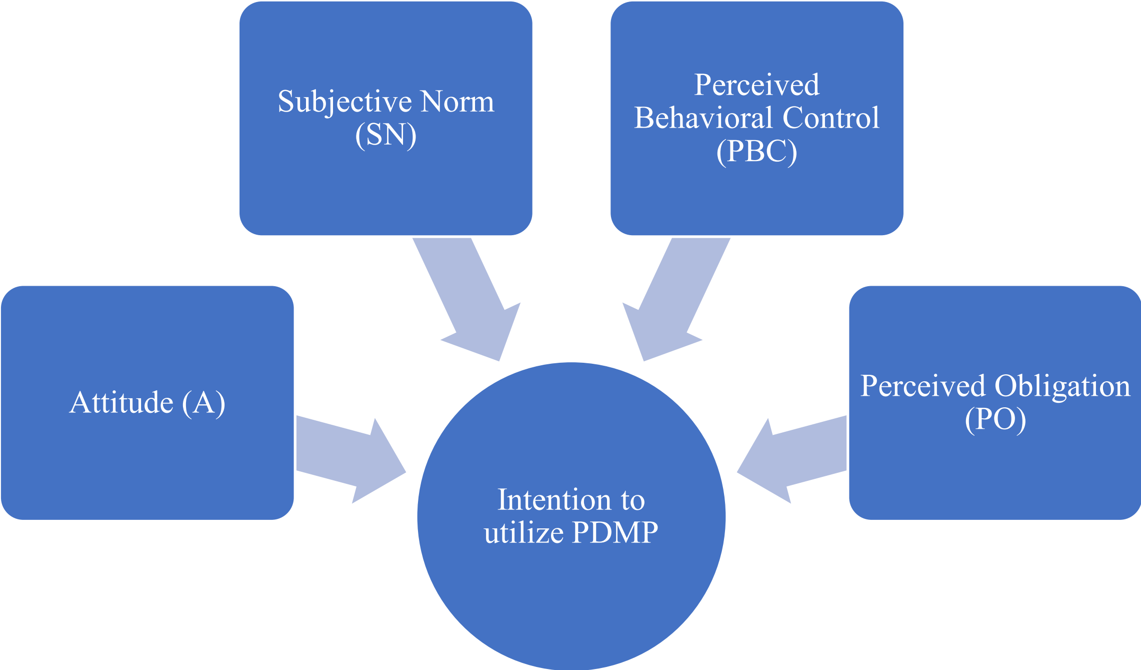


Table 1. Responder demographics	Sample n = 967	Population N = 10571 †
Variable	**Frequency n (%)**	**Population N (%)**
Prescription drug monitoring program use in last 12 months ‡		
Yes	818 (84.6)	4659 (44.1)
No	149 (15.4)	5912 (55.9)
Age (y) – mean (SD)	42.4 (11.9)	45.4 (12.4)
Age category (y)		
<30	110 (11.4)	812 (7.7)
30-39	296 (30.6)	3243 (30.6)
40-49	199 (20.6)	2842 (26.9)
50-59	131 (13.5)	1942 (18.4)
≥60	102 (10.5)	1732 (16.4)
Missing	129 (13.3)	-
Sex		
Male	289 (29.9)	4310 (40.8)
Female	567 (58.6)	6261 (59.2)
Missing	111 (11.5)	-
Years since first licensed in WA		
5 years or less	303 (31.3)	2982 (28.2)
6-10 years	160 (16.5)	1827 (17.3)
11-19 years	178 (18.4)	2451 (23.2)
20-29 years	142 (14.7)	1752 (16.6)
30+ years	102 (10.5)	1559 (14.7)
Missing	82 (8.5)	-
Practice location, Medicaid region §		
North Sound	131 (13.5)	(15.4)
King county	296 (30.6)	(30.0)
North West	34 (3.5)	(4.9)
West	47 (4.9)	(8.6)
Pierce county	79 (8.2)	(10.9)
North Central	27 (2.8)	(4.3)
North East	93 (9.6)	(10.0)
Greater Columbia	82 (8.5)	(10.4)
South West	80 (8.3)	(5.5)
Missing	98 (10.1)	-
Ethnicity		-
Asian	206 (21.3)	
Caucasian	542 (56.0)	
African American	12 (1.2)	
Other #	41 (4.2)	
Missing	166 (17.2)	
Practice setting		-
Outpatient: Chain	364 (37.6)	
Outpatient: Independent	92 (9.5)	
Outpatient: Clinic/Hospital	182 (18.8)	
Inpatient	160 (16.5)	
Other	90 (9.3)	
Missing	79 (8.2)	

† 10571 Washington State licensed pharmacists in active status as of 8/31/18
‡ Population number represents number of PMP account registrations by pharmacists as of 9/1/18.
§ WA Medicaid regions key: https://www.hca.wa.gov/assets/program/ach-map.pdf
# Multiple ethnicities grouped together for statistical purposes. "Other" represents: Hispanic/Latinx, Native American, Pacific Islander and other not listed

Table 2. Informant demographics

ID	Age	Sex	Outpatient type	Company policy on PDMP use
1	54	F	Chain	Yes
2	46	M	Chain	No
3	34	F	Chain	No
4	44	M	Independent	No
5	27	F	Independent	No
6	52	M	Chain	Yes
7	36	M	Chain	No
8	34	F	Independent	No
9	32	M	Independent	No
10	26	M	Clinic	No

Table 3. Sample demographics and bivariate analysis of prescription drug monitoring program (PDMP) use frequency among Washington State (WA) pharmacists

Variable	Use in last month					Any use in last year				
	Total ‡	**≥ Once a shift**	**< Once a shift**	**Weighted Odds Ratio† [95% CI]**	**P-value**	**Total ‡**	**Any use**	**No use**	**Weighted Odds Ratio† [95% CI]**	**P-value**
	N = 818	N = 396	N = 422			**N = 967**	N = 818	N = 149		
Age category (y)					0.42					0.16
<30	115 (14)	62 (16)	53 (12)	*Reference*		125 (13)	115 (14)	10 (7)	*Reference*	
30-39	299 (37)	150 (38)	149 (35)	0.84 [0.56-1.26]		340 (35)	299 (37)	41 (28)	0.72 [0.24-2.23]	
40-49	195 (24)	95 (24)	100 (24)	0.77 [0.50-1.18]		230 (24)	195 (24)	35 (23)	0.66 [0.21-2.09]	
50-59	124 (15)	53 (13)	71 (17)	0.64 [0.40-1.02]		156 (16)	124 (15)	32 (21)	0.39 [0.11-1.40]	
≥60	85 (10)	36 (9)	49 (12)	0.68 [0.41-1.14]		116 (12)	85 (10)	31 (21)	0.25 [0.06-0.99]	
Sex					0.88					0.52
Male	284 (35)	136 (34)	148 (35)	*Reference*		331 (34)	284 (35)	47 (32)	*Reference*	
Female	534 (65)	260 (66)	274 (65)	1.02 [0.78-1.34]		636 (66)	534 (65)	102 (68)	0.80 [0.41-1.56]	
Years since first licensed					0.16					0.21
5 years or less	296 (36)	162 (41)	134 (32)	*Reference*		331 (35)	296 (36)	35 (23)	*Reference*	
6-10 years	154 (19)	65 (16)	89 (21)	0.67 [0.46-0.98]		176 (18)	154 (19)	22 (15)	0.93 [0.37-2.31]	
11-19 years	163 (20)	82 (21)	81 (19)	0.77 [0.54-1.10]		192 (20)	163 (20)	29 (19)	0.75 [0.31-1.82]	
20-29 years	120 (15)	53 (13)	67 (16)	0.65 [0.43-0.98]		158 (16)	120 (15)	38 (26)	0.37 [0.13-1.05]	
30+ years	85 (10)	34 (9)	51 (12)	0.65 [0.42-1.01]		110 (11)	85 (10)	25 (17)	0.39 [0.13-1.20]	
Ethnicity					<0.001					0.02
Asian	182 (22)	106 (27)	76 (18)	*Reference*	-	206 (21)	182 (22)	24 (16)	*Reference*	-
Caucasian	440 (54)	195 (49)	245 (58)	0.49 [0.35-0.68]	<0.001	542 (56)	440 (54)	102 (69)	0.66 [0.38-1.14]	0.13
Other	44 (5)	19 (5)	25 (6)	0.42 [0.22-0.78]	<0.01	53 (6)	44 (5)	9 (6)	0.65 [0.27-1.58]	0.34
Prefer not to answer	152 (19)	76 (19)	76 (18)	0.66 [0.44-1.00]	0.052	166 (17)	152 (19)	14 (9)	1.60 [0.79-3.26]	0.19
Practice setting					<0.001					<0.001
Outpatient: Chain	394 (48)	278 (70)	116 (27)	*Reference*	-	400 (41)	385 (47)	15 (10)	*Reference*	-
Outpatient: Independent	92 (11)	30 (8)	62 (15)	0.19 [0.12-0.30]	<0.001	99 (10)	92 (11)	7 (5)	0.50 [0.20-1.26]	0.14
Outpatient: Clinic/Hospital	169 (21)	54 (14)	115 (27)	0.22 [0.15-0.32]	<0.001	197 (20)	169 (21)	28 (19)	0.25 [0.13-0.50]	<0.001
Inpatient	105 (13)	13 (3)	92 (22)	0.06 [0.03-0.11]	<0.001	171 (18)	109 (13)	62 (41)	0.08 [0.04-0.14]	<0.001
Other	58 (7)	21 (5)	37 (9)	0.26 [0.15-0.46]	<0.001	100 (10)	63 (8)	37 (25)	0.08 [0.04-0.16]	<0.001
Company policy on PDMP use					<0.001					<0.001
Yes	298 (37)	227 (57)	71 (17)	*Reference*	-	316 (33)	298 (36)	18 (12)	*Reference*	-
No	410 (50)	123 (31)	287 (68)	0.13 [0.10-0.19]	<0.001	504 (52)	410 (50)	94 (63)	0.29 [0.17-0.49]	<0.001
Prefer not to say	20 (2)	10 (3)	10 (2)	0.31 [0.13-0.76]	0.01	24 (2)	20 (3)	4 (3)	0.25 [0.07-0.95]	0.04
Do not know	90 (11)	36 (9)	54 (13)	0.23 [0.15-0.37]	<0.001	123(13)	90 (11)	33 (22)	0.18 [0.10-0.33]	<0.001

Note: Values are n (total %, out of 818 for use in last month and out of 967 for any use in last year, respectively)

†Survey weights; Odds ratio for checking PDMP at least once a shift and for any use

‡ Multiple imputation using predictive mean matching was used to address missing data.

Table 4. Pharmacist response to concerning PDMP report scenarios (N=818)

	Scenario 1	Following a PDMP query, if the report suggests potential diversion or misuse, I usually…				
	Scenario 2	Following a PDMP query, if the report suggests dangerous combinations of medications, I usually…				
	Discuss the concern with the patient	Call the prescriber	Recommend a noncontrolled alternative drug	Refuse to fill the prescription or order	Recommend or prescribe naloxone	Other action not listed here
Response to scenario 1	395 (48)	686 (84)	119 (15)	321 (39)	113 (14)	43 (5)
Response to scenario 2	476 (58)	677 (83)	154 (19)	161 (20)	141 (17)	33 (4)

Values are n (total %, out of 818) and use unadjusted (raw) data; PDMP = prescription drug monitoring program
Response: Select all that apply; many respondents chose more than one option and therefore total number exceeds 818

Table 5. Logistic regression on pharmacist actions from Table 3 with frequent PDMP use[a] as dependent variable

Variable	Bivariate Analysis		Multivariate Analysis‡	
N=818 N (row %)	Weighted Odds Ratio† [95% CI]	P-value	Weighted Odds Ratio† [95% CI]	P-value
Naloxone Recommendation	3.23 [2.27-4.58]	<0.001	1.70 [1.09-2.65]	0.02
Discuss concern with patient	1.70 [1.29-2.24]	<0.001	1.23 [0.87-1.74]	0.24
Recommend an alternative non-controlled drug	1.49 [1.09-2.04]	0.01	1.46 [0.96-2.24]	0.08
Refuse to fill the prescription/order	1.94 [1.48-2.54]	<0.001	1.27 [0.92-1.77]	0.15
Call the prescriber	0.82 [0.56-1.22]	0.34	0.54 [0.31-0.94]	0.03

† Survey weights; Odds ratio for performing the action
‡ model adjusted for years since first licensed, ethnicity, practice setting, and company policy on PDMP use
[a] Frequent use in the last month = checking at least once a shift; PDMP = prescription drug monitoring program

Table 6. Spearman's rank correlation of theory of planned behavior and perceived obligation constructs.

Construct	Intention	Attitude	Subjective Norm	Perceived Behavioral	Perceived Obligation
Intention	1				
Attitude	0.29	1			
Subjective Norm	0.57	0.34	1		
Perceived Behavioral Control	0.24	0.38	0.30	1	
Perceived Obligation	0.55	0.47	0.59	0.30	1

All Spearman's rank correlations are significant $P < 0.001$

Table 7. Theory of planned behavior construct summary statistics and item statements

Construct		Outpatient pharmacists, N=655	
		Mean (SD)	**Cronbach's alpha**
Intention (Scale range: 0 to 4) [a]		**2.85 (0.84)**	**0.94**
1. Prescription characteristics	(4 items)	2.96 (0.84)	
2. Patient situation	(4 items)	3.08 (0.82)	
3. Prescriber type	(3 items)	2.5 (1.1)	
Attitude (Scale range: -2 to +2) [b]		**1.44 (0.57)**	**0.71**
1. PMP is valuable for pharmacy practice		1.58 (0.62)	
2. PMP is helpful for decision making		1.60 (0.59)	
3. PMP provides information that is not very useful†		1.15 (0.90)	
Subjective Norm (Scale range: -2 to +2) [c]		**0.90 (0.76)**	**0.83**
1. Most people who are important to me think I utilize the PMP _____.		0.86 (0.86)	
2. The pharmacists whose opinions I value would utilize the PMP _____.		0.95 (0.77)	
Perceived Behavioral Control (Scale range: -2 to +2) [d]		**0.96 (0.78)**	**0.62**
1. For me, interpreting PMP data is _______.		1.24 (0.72)	
2. For me, accessing PMP as part of my practice is ______.		0.67 (1.1)	
Perceived Obligation (Scale range: -2 to +2) [e]		**0.83 (0.88)**	**0.81**
1. Pharmacists have a professional responsibility to check PMP when dispensing controlled substances		1.04 (0.98)	
2. Using PMP when dispensing controlled substances is considered the standard of care		0.75 (1)	
3. There is no moral obligation to check PMP before dispensing controlled substances†		0.69 (1.1)	

† reverse scale (+2 to -2)

[a] Scale, 0 = never to +4 = always ; see Figure 3 for summary statistics and description of each item statement

[b] Scale, -2 = strongly disagree to +2 = strongly agree

[c] Scale, -2 = never to +2 = always

[d] Scale, -2 = very difficult to +2 very easy

[e] Scale, -2 = strongly disagree to +2 strongly agree

Table 8. Multivariate logistic regression analysis of theory of planned behavior constructs and perceived obligation related to outpatient pharmacists' high intention to utilize the prescription drug monitoring program (N=655)

Independent variables	Odds Ratio	95% CI	P-value†
Model 1 – Theory of Planned Behavior			<0.001
Attitude	1.40	0.98-1.99	0.06
Subjective Norm	3.20	2.39-4.28	<0.001
Perceived Behavioral Control	1.39	1.09-1.78	<0.01
Model 2 – Addition of Perceived Obligation			<0.001
Attitude	1.17	0.81-1.70	0.41
Subjective Norm	2.14	1.55-2.95	<0.001
Perceived Behavioral Control	1.35	1.05-1.73	0.02
Perceived Obligation	1.94	1.47-2.56	<0.001

†Test of null hypothesis for model: Likelihood ratio test (Rao-Scott)

Supplement

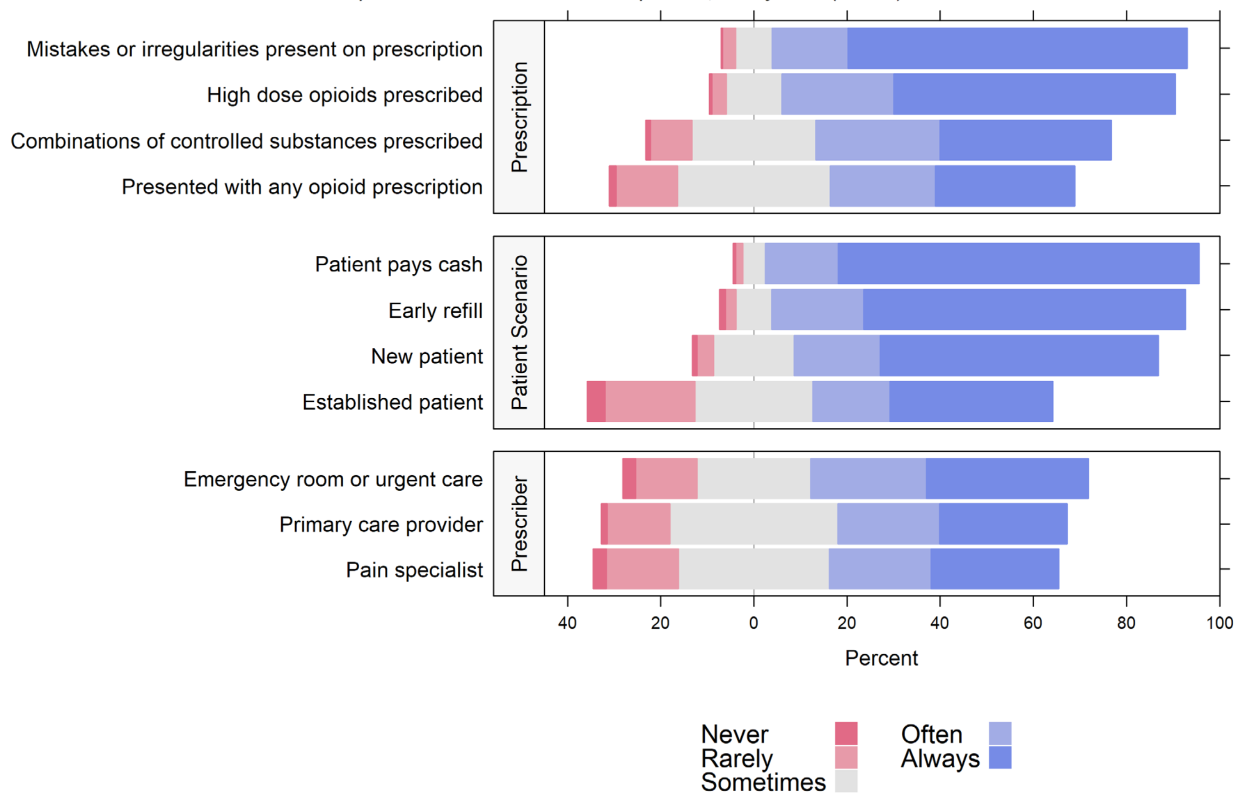
A) Survey Instrument

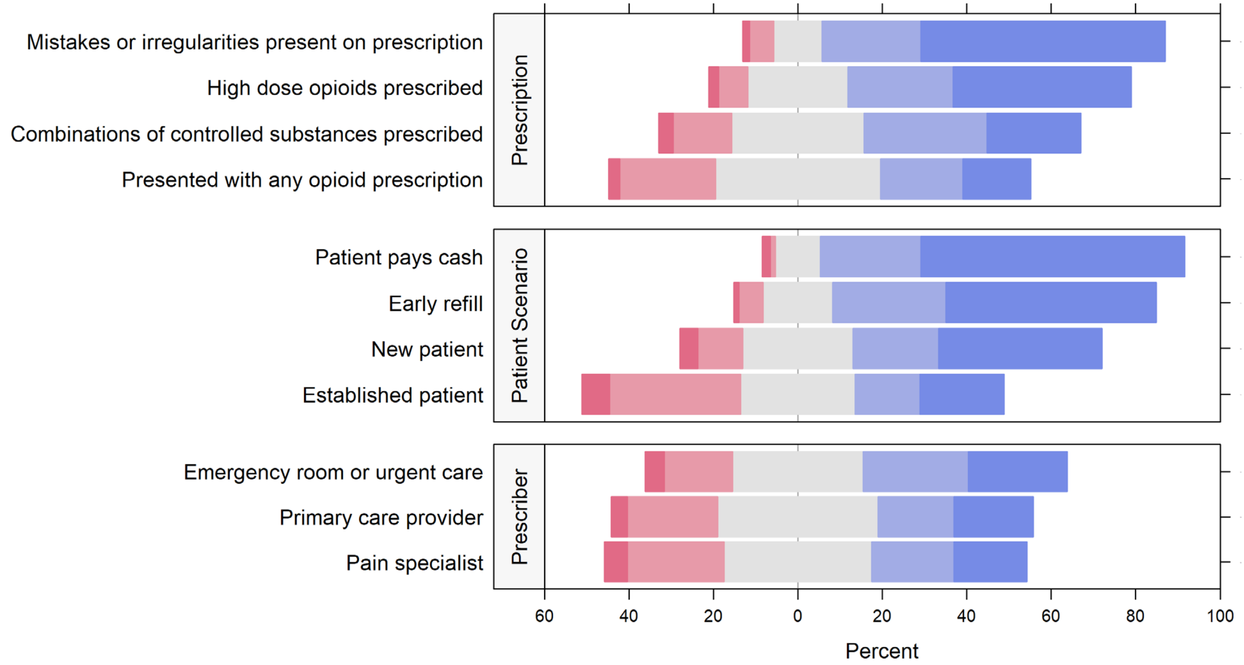
B) Interview Guide

- Supplement A and B: see enclosed files

Appendix

A) Respondent subset of PDMP use by outpatient cases: chain pharmacy setting and non-chain outpatient pharmacy setting





Prescription Drug Monitoring Program Use By Outpatient Cases
Outpatient Pharmacist (excluding chain) Responses, unadjusted (n=261)
Mistakes or irregularities present on prescription
High dose opioids prescribed
Combinations of controlled substances prescribed
Presented with any opioid prescription
Prescription
Patient pays cash
Early refill
New patient
Established patient
Patient Scenario
Emergency room or urgent care
Primary care provider
Pain specialist
Prescriber
60
40
20
0
20
40
60
80
100
Percent
Never
Rarely
Sometimes
Often
Always