RESEARCH

Drug Court Review: Summer 2024

dcr.ntcrc.org

Prescription Drug Monitoring Programs in the United States: A Review of System Characteristics and their Impact on Opioid-related Harms

Lindsay J. Baker
Social Science Researcher, National Treatment Court Resource Center

Kristen E. DeVall
Co-Director, National Treatment Court Resource Center

Jacqueline J. Crowell
Graduate Assistant, National Treatment Court Resource Center

Christina Lanier
Co-Director, National Treatment Court Resource Center

Abstract

Prescription drug monitoring programs (PDMPs) are utilized as a means to combat opioid-related harms associated with the ongoing opioid crisis by tracking prescription medications at the state level. This study provides an overview of state and territory PDMP characteristics gathered from PDMP Technical Training Assistance Center (TTAC) profiles. Descriptions of state/territory characteristics include agencies that oversee the systems, data reporting frequency, data retention period, monitored substances, system training, prescriber and dispenser access, law enforcement access, licensing board access, and state mandates for use and enrollment. The goal of this research is to provide insight into the current strengths of these systems and to offer recommendations for improvements that will reduce opioid prescribing rates and prevent opioid-related overdose deaths. Previous literature on PDMP characteristics is incorporated to develop suggestions for optimal use.

Keywords: prescription drug monitoring programs, opioid prescribing and dispensing patterns, substance use disorders, prescription drug monitoring system characteristics

Lindsay J. Baker, M.A., National Treatment Court Resource Center, 680 South College Road, Wilmington, NC 28403.
Email: bakerlj@uncw.edu

The Opioid Crisis

Treating chronic pain poses a significant challenge to healthcare providers in the United States where an estimated one in five adults report chronic pain (Dowell et al., 2022). Chronic pain is defined by the Centers for Disease Control (CDC) as pain that lasts more than three months, or past the expected time of tissue healing (Dowell et al., 2022). For the last several decades, physicians have frequently prescribed opioids to address chronic pain. However, long-term prescription opioid use presents serious risks to patients, such as the development of an opioid use disorder and/or an opioid-related overdose (Dowell et al., 2016). Between 1999 and 2020, more than 263,000 people died from a prescription opioid-related overdose in the United States (CDC, 2022).

High rates of prescription opioid-related overdose deaths correspond with a rise in opioid prescriptions to treat pain. The national opioid dispensing rate experienced a steady increase starting in 2006 and peaked in 2012 when more than 255 million opioid prescriptions were dispensed (CDC, 2021). The national dispensing rate in 2012 was 81.3 per 100 persons but declined to 43.3 per 100 persons in 2020. In response to high prescribing rates, the CDC released opioid prescribing guidelines in 2016 and in 2022. These reports include recommendations for determining when opioids are appropriate for chronic pain; opioid selection, dosage, duration, follow up, and discontinuation; and opioid use risk assessment (Dowell et al., 2016; 2022). While these guidelines are valuable resources for physicians, the CDC emphasizes that all recommendations are voluntary and do not supplant individualized, "patient-centered" care. Thus, despite decreased rates of opioid dispensing in recent years, dispensing rates remain high in certain areas of the United States (CDC, 2021). For example, in 2020, there were enough opioid prescriptions dispensed in 3.6% of U.S. counties for "every person to have one" (CDC, 2021). Due to the addictive nature of these substances, access to prescription opioids through higher dispensing rates may lead to increased rates of nonmedical prescription opioid use, or the "use of opioids that have not been prescribed or that are taken only for the experience/feeling they cause" (Marsh et al., 2018, p. 79).

According to the CDC (2022), the number of drug overdoses in the United States is largely driven by opioids, including those prescribed for chronic pain. In 2020, 68,830 overdose deaths (74.8%) involved an opioid, and this figure is eight times higher than it was in 1999. Due to high rates of opioid prescribing in certain regions, as well as high rates of opioid-related overdose deaths in the last decade, the U.S. Department of Health and Human Services (HHS) (2021) declared a public health emergency in 2017. In addition to voluntary prescribing guidelines from the CDC, there are now several ongoing efforts to combat various aspects of the opioid epidemic and its ties to chronic pain management. Prescription drug monitoring programs (PDMPs), which track the way prescription opioid medications are prescribed and dispensed at the state level, are one such effort.

Prescription Drug Monitoring Programs (PDMPs)

History and Growth

According to Holmgren et al. (2020), the United States saw the cultivation of PDMPs "well before the contemporary opioid crisis" (p. 1192). The blueprints for PDMPs originated in 1919 when New York State implemented a system to track prescribed opioids under the Boylan Act. In contrast to previous recordkeeping systems, all pharmacies were required to send copies of opioid prescriptions to the health department within 24 hours of filling prescriptions for substances like heroin, cocaine, morphine, opium, and/or codeine (PDMP TTAC, 2018; Holmgren et al., 2020). Although New York's early system was only in place for three years, it paved the way for PDMPs as they exist today.

In 1939, less than 20 years after New York's Boylan Act system was rescinded, California established the oldest "continuously operated" PDMP in the United States (PDMP TTAC, 2018, p. 4). Originally known as the "California Triplicate Prescription Program," this monitoring system required doctors to use state-issued, triplicate prescription forms when ordering prescriptions for controlled substances. Due to the triplicate nature of these documents, the practitioner, pharmacist, and state PDMP could all maintain a copy of the prescription form for record keeping purposes. In the years following the implementation of California's system, Hawaii, Illinois, Idaho, and Pennsylvania also established PDMPs, with Illinois being the first to house its program within a Department of Health. States continued implementing PDMPs throughout the 20th century, but the majority of states implemented PDMPs between 2000–2010 following the rise of the Internet and electronic systems (Holmgren et al., 2018). The Internet revolutionized the way PDMPs operated by allowing prescribers and dispensers to upload prescription information to an electronic database instead of sending physical copies via mail. Oklahoma's system, established in 1990, was the first completely electronic PDMP, paving the way for other state PDMPs to utilize an electronic interface. Thus, between 2000 and 2010, 27 states established PDMPs that were entirely online. Notably, "70% of all current PDMPs were established in the first 15 years of this century" (PDMP TTAC, 2018, p. 7).

As of 2022, every state (including the District of Columbia and the U.S. territories of Guam and Puerto Rico) has implemented a PDMP to help curtail the ongoing opioid crisis, particularly as it relates to the inappropriate prescribing, dispensing, and misuse of prescription opioids. The PDMP Training and Technical Assistance Center (TTAC) describes contemporary PDMPs as systems "designed to facilitate the collection, analysis, and reporting of information on the prescribing, dispensing, and use of prescription drugs within a state" (2018, p. 2). In this way, PDMPs increase patient/prescriber accountability by allowing physicians to upload important prescription information to their state database. PDMP reports often contain information related to patient prescription history, information about health care providers who wrote the prescription, the type of medication(s) prescribed, and the number of medication refills remaining for that patient (U.S. Government Accountability Office, 2020). Although PDMP reporting requirements and capabilities vary by state,

PDMPs are generally focused on ensuring patient wellbeing, treatment, and substance misuse prevention through increased monitoring of prescription opioids.

Effectiveness of PDMPs: System Characteristics and Impact on Opioid-Related Outcomes

As the number of PDMPs grew across the United States, researchers began investigating the extent to which PDMPs effectively reduce prescribing rates and prescription opioid overdose deaths. Of particular interest to PDMP researchers are the specific characteristics associated with program strength, as PDMP effectiveness is often linked to robust program features that allow for the most comprehensive oversight. For example, studies of PDMP effectiveness indicate that system monitoring of more than Schedule II controlled substances (including Schedule III, IV, and V) is an important feature of PDMPs, as well as at least weekly updates of dispensing data (Pardo, 2017; Patrick et al., 2016; Manasco et al., 2016; Pauly et al., 2018). In line with the overarching goals of PDMPs, the most robust systems are predicted to have a greater impact on opioid prescribing practices, consequently reducing prescription opioid-related poisonings and overdose deaths through increased accountability and monitoring.

One way to evaluate PDMP strength and identify robustness criteria is through the use of matched comparison groups. For example, Haffajee et al. (2018) compared four states with robust system characteristics (Kentucky, New Mexico, Tennessee, and New York) against systems in comparable states that were "weak" (Texas, Georgia, and New Jersey) or had no PDMP (Missouri). The authors classified a state PDMP as being "robust" if it exhibited at least eight out of ten characteristics associated with PDMP strength. These characteristics include prescriber access to the PDMP, active "comprehensive" use mandates that specify PDMP use criteria, civil and/or criminal liability if prescribers fail to check/use the PDMP, at least weekly updates of the PDMP, and PDMP monitoring of at least schedule II-IV substances (for the full list of robustness characteristics, see Haffajee et al., 2018b). Additionally, the authors required that PDMPs include three specific features out of the ten to be considered robust: prescriber access, a use mandate, and a comprehensive use mandate. State systems that lack one or more of these three features were classified as weak even if other robustness features were present. However, it is worth noting that none of the comparison state PDMPs exhibited more than four of the seven remaining robustness features.

For each state included in the study, opioid prescription claims were analyzed for adults aged 18-64 who were enrolled in plans "offered by a larger national health insurer" between 2010 and 2014 (Haffajee et al., 2018, p. 965-966). In each state, the authors found that PDMP implementation was associated with sustained declines in the total opioid dosage prescribed, as well as the number of opioids filled. Thus, between 2010 and 2014, "opioid dosages prescribed had declined significantly and in clinically meaningful quantities in all four states with robust PDMPs relative to their comparison states" (Haffajee et al., 2018, p. 969).

While robustness features such as the monitoring of more than Schedule II substances and frequent data reporting were important, Haffajee et al. (2018) cited the strength of PDMP mandates that require prescribers and/or dispensers to register with and utilize their state PDMP database. For example, while the New York PDMP was classified as robust, this state's system had fewer robust features when compared to other states in the intervention group (e.g., no registration mandate). In contrast, Kentucky, with both a use and registration mandate for its PDMP, experienced the greatest and most sustained declines in opioid prescribing. Other research also supports the notion that PDMP mandates increase the effectiveness of these systems in relation to limiting high-risk opioid prescribing (Bao et al., 2018; Strickler et al., 2019). Although studies have linked robust PDMPs to lower prescribing rates and opioid-related risk measures, other research suggests that commonly studied robustness features may not be particularly effective or useful in preventing fatal opioid overdoses. In a study of policy impacts on prescription and nonprescription opioid overdoses, Vuolo et al. (2022) found little evidence that mandating prescribers or dispensers to review or "query" patient profiles in the PDMP system is associated with reductions in opioid-related overdose deaths. Although their findings indicated that PDMP implementation may be associated with reductions in opioid overdose rates over time (approximately one year after implementation), there was little evidence that mandatory prescriber and/or dispenser query impacts the effectiveness of PDMPs (Vuolo et al., 2022). The authors noted that this may be because states began strengthening PDMPs with mandates as prescription opioid overdose deaths were stabilizing and heroin/fentanyl overdose deaths were increasing. Rhodes et al. (2019) also found little evidence that PDMPs were associated with opioid harm reduction in their systematic review of literature. Of the 22 articles included in the review, no significant associations were found when assessing PDMP implementation and heroin use, past year opioid dependence, opioid care outcomes, and both prescription and nonprescription opioid overdose deaths.

There are also barriers to using PDMPs that may limit the overall effectiveness of these systems in reducing opioid prescribing rates and prescription opioid overdose deaths. Rutkow et al.'s (2015) survey of practicing primary care physicians across the United States and D.C. examined physician attitudes, beliefs, and experiences with PDMPs. More specifically, the authors were interested in the ability of physicians to access PDMP data to examine a patient's prescription drug use. Despite finding PDMPs useful overall, two of the most commonly cited barriers to PDMP use reported by physicians was the time-consuming nature of information retrieval and that the information was not presented in an "easy to use" format. Rutkow et al. (2015, p. 489) concluded that while most physicians in their sample were aware of their state's PDMP and found them to be useful monitoring tools, there were a number of technical barriers that prevented physicians from accessing PDMPs consistently.

In the United States, dramatic increases in opioid prescribing and misuse occurred after the turn of the century as patients began experiencing more chronic pain. Though opioid prescribing rates have decreased in recent years, the prevalence of opioid misuse and related harms remains a concern for both clinicians and policymakers. PDMPs, which were conceptualized long before the modern opioid crisis, have been implemented across the United States to help monitor inappropriate opioid prescribing and reduce prescription

opioid misuse. However, research on the effectiveness and accessibility of PDMPs reveals mixed findings. Some studies support the notion that PDMPs are effective in combating opioid misuse and reducing opioid prescribing, particularly when healthcare providers are mandated to use these systems (Pardo, 2017; Patrick et al., 2016; Manasco et al., 2016; Pauly et al., 2018; Haffajee et al., 2018; Bao et al., 2018; Strickler et al., 2019; Fink et al., 2018). However, other research finds little evidence of an association between PDMPs and improved opioid-related outcomes, such as reductions in prescription opioid overdose deaths (Vuolo et al., 2022; Rhodes et al., 2019). There is also evidence that these systems are difficult for physicians to utilize consistently due to access barriers (Rutkow et al., 2015).

Current Study

To understand the current features of PDMPs in the United States, this study provides an updated overview of state and territory PDMP characteristics collected from publicly available PDMP Technical Training Assistance Center (TTAC) profiles (Institute for Intergovernmental Research, 2022). The PDMP TTAC, which is operated by the Institute for Intergovernmental Research (IIR), is funded by the Bureau of Justice Assistance (BJA) as part of BJA's Comprehensive Opioid, Stimulant, and Substance Abuse Program (COSSAP). State and territory TTAC profiles are filled out by PDMP administrators from each state/territory and include important information about system access and characteristics. The goal of this research is to examine PDMP characteristics on a national level and provide evidence-based insight into the current strengths of these systems, as well as make recommendations for how these systems can continue improving in the future to reduce opioid prescribing rates and prevent opioid-related overdose deaths.

Methods

Data regarding PDMP characteristics were collected for all 50 states, as well as the District of Columbia, Guam, and Puerto Rico (n=53) from state/territory TTAC profiles (IIR, 2022). Several noteworthy PDMP characteristics were examined and divided into seven categories: basic system characteristics, user training, prescriber and dispenser access, other available PDMP reports and capabilities, law enforcement access, physician and pharmacist licensing board access, and state PDMP mandates. It is important to note that while some law enforcement access variables were included in state/territory TTAC profiles, this information was often difficult to interpret for the purposes of this study. Thus, PDMP administrators were contacted directly via email to clarify information related to law enforcement, such as how law enforcement access PDMP information (directly or indirectly) and the documents required to access the PDMP (search warrant, court order, etc.).

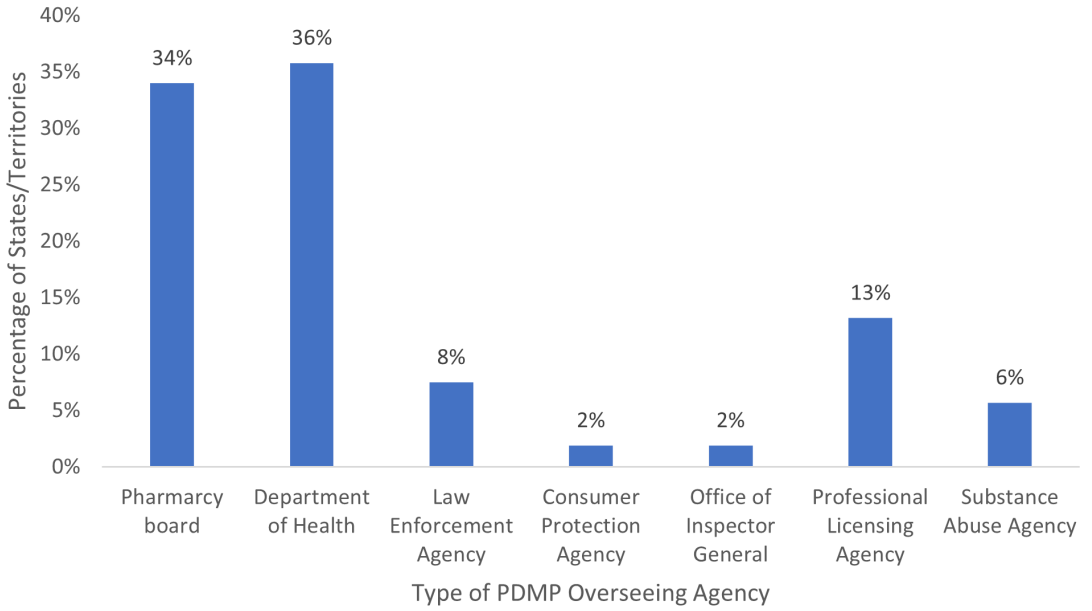
Results: Descriptive Overview of PDMPs

The following sections provide an overview of state/territory PDMP characteristics based on information available in the PDMP TTAC (IIR, 2022) profiles.

Basic System Information

Figure 1 displays the type of agencies that oversee state/territory PDMPs. Of the 53 PDMPs, 36% (n=19) are housed within a Department of Health. Pharmacy boards oversee 34% (n=18) of PDMPs. Only a handful of PDMPs were overseen by a professional licensing agency (n=7), a law enforcement agency (n=4), or a state substance use agency (n=3). Additionally, only one state PDMP was overseen by a Consumer Protection Agency or an Office of Inspector General. Thus, the majority of state/territory PDMPs were overseen by either a Department of Health or by a Pharmacy Board (see Appendix A for a complete list of overseeing agencies by state/territory).

Figure 1. Type of Agency Overseeing PDMP (2022) (n=53)

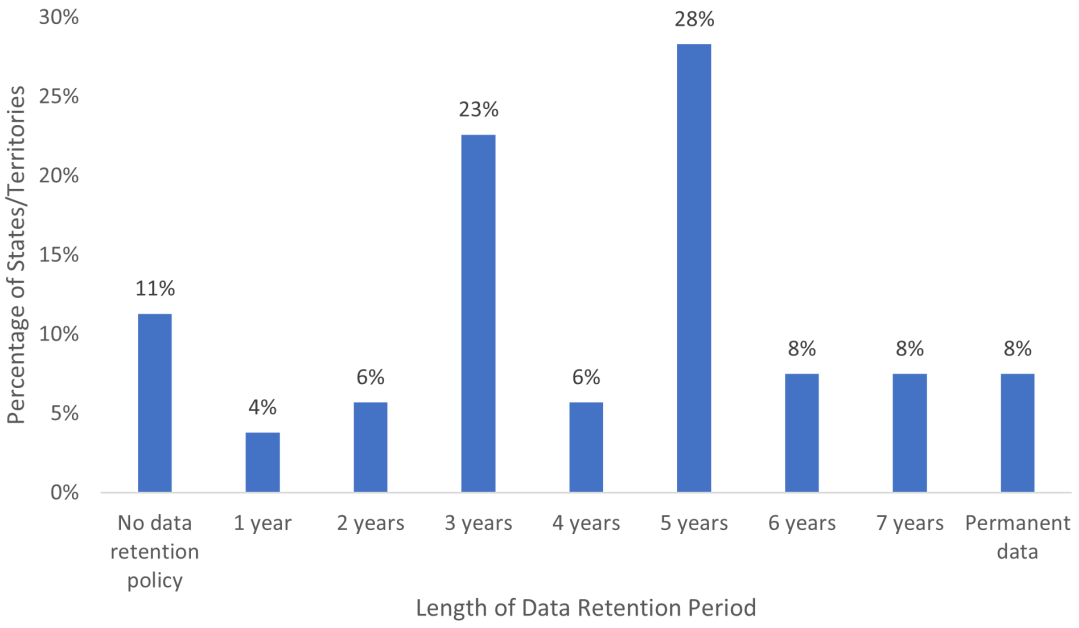


It is worth noting that 91% (n=48) of state/territory PDMPs require daily or next business day reporting. Only one state reports data in real time, while four states report data less frequently, ranging anywhere from every two days to every two weeks.

Figure 2 shows the data retention period for PDMPs across the United States and territories. As can be seen, 28% (n=15) of states/territories maintained data for a period of five years, while 23% (n=12) maintained data for a period of three years before purging

information. It is worth noting that 7% (n=4) states/territories maintained data permanently, meaning the PDMP data from previous years has yet to be purged. Finally, 11.3% (n=6) of states/territories did not indicate having a data retention policy.

Figure 2. PDMP Data Retention Period (2022) (n=53)



Regarding the drug classifications tracked by PDMPs across the states and territories, the majority of PDMPs (n=42) tracked Schedule II-V substances. Other states/territories noted that their PDMP collected information on all prescription drugs, all controlled substances, or unspecified "drugs of concern." It is important to note that drug classification categories are not mutually exclusive, as some state/territory PDMPs tracked specified schedules in addition to substances such as cannabis.

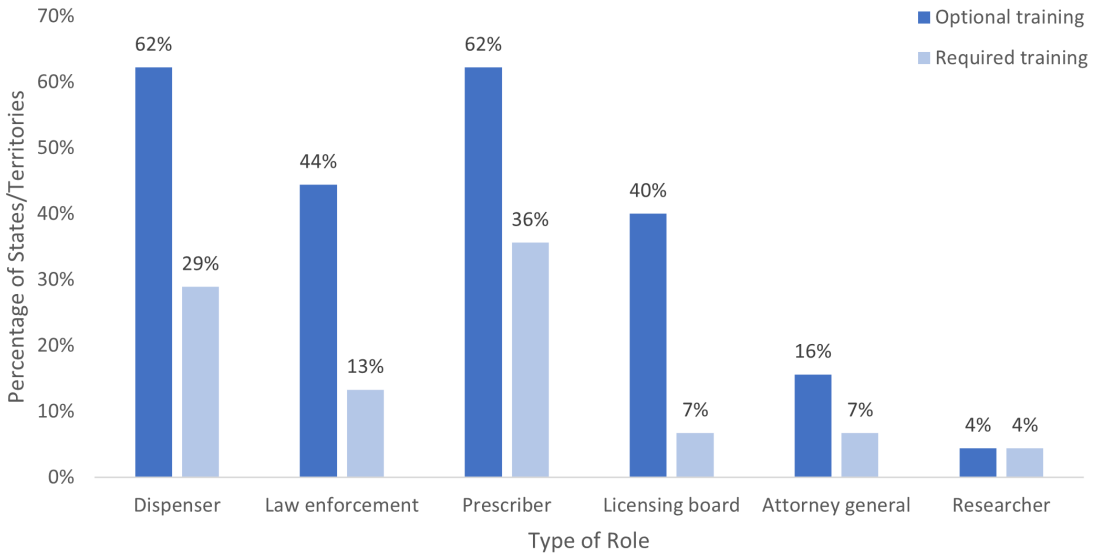
PDMP Training

Figure 3 shows the role specific PDMP training offered across the states and territories. It is important to note that only 45 states/territories provided training information on their TTAC profile, meaning the training requirements of 8 states/territories is unknown. The 8 states/territories without training information were excluded from the analysis of this variable.

For each role, states/territories differentiated between optional training resources and required training. Among the 45 states and territories with data, 62% (n=28) provided optional training resources for dispensers, while only 29% (n=13) required dispenser training. Similarly, 62% (n=28) of states/territories offered optional training resources to prescribers,

while slightly more than one-third (n=16) required prescriber training. For individuals in other roles, such as those in law enforcement and those serving licensing boards, access to optional training resources was more commonplace than required training. Finally, training opportunities, both optional and required, were less commonly offered to those who served as attorney generals or researchers. For example, while 16% (n=7) of states/territories offered optional training resources to attorney generals, only 7% (n=3) required training for these individuals.

Figure 3. Optional v. Required PDMP Training by Role (2022) (n=45)



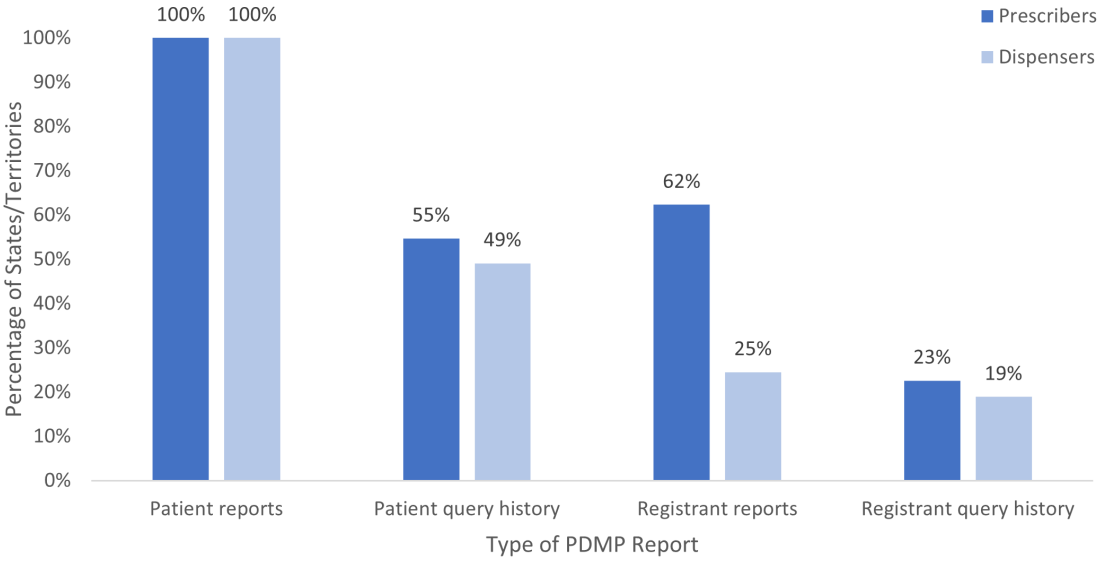
Prescriber and Dispenser PDMP Access

Figure 4 shows the PDMP reports available to prescribers and dispensers who utilize their state/territory system. According to PDMP TTAC state and territory profiles, patient reports were available to prescribers and dispensers in 100% (n=53) of states/territories. Registrant reports, which capture the prescribing or dispensing history of other registered PDMP users, were available for prescribers in 62% (n=33) of states/territories and for dispensers in 25% (n=13) of states/territories. Slightly more than half (n=29) of the states/territories allowed prescribers to access patient query history, while less than one quarter (n=12) allowed prescribers to access registrant query history. Likewise, dispensers could access patient query history in 49% (n=26) of states/territories, while only 19% (n=10) of states/territories allowed dispensers to access registrant query history. Patient query histories capture the list of searches made on a specific patient within the PDMP over a specified time period. Similarly, registrant query histories capture the list of PDMP searches made by a specific registrant.

Additionally, while not shown in Figure 4, it is worth noting that prescribers have the option to access their own prescribing history from the PDMP in 93% (n=49) of states/

territories. Dispensers may access their own dispensing history from the PDMP in 42% (n=22) of states/territories.

Figure 4. PDMP Reports Available to Prescribers and Dispensers (2022) (n=53)

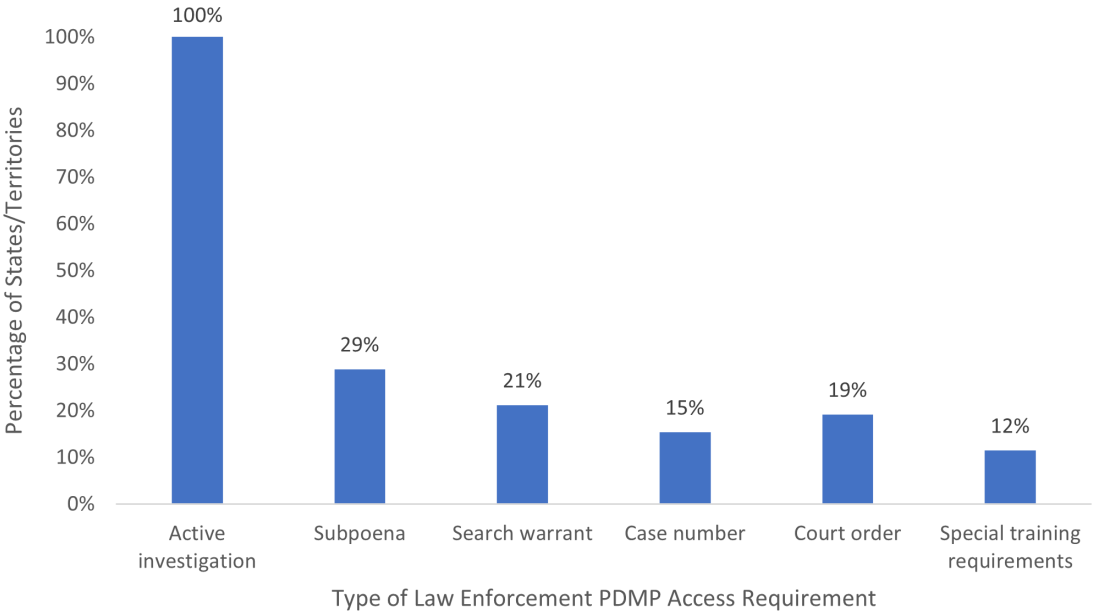


Law Enforcement Access

In each state/territory, law enforcement personnel must meet specific criteria in order to access PDMP information. This means that law enforcement cannot typically access PDMP information without a relevant cause. For example, in all states/territories that provide information to law enforcement (n=52), law enforcement must prove they are involved in an active investigation (usually of a drug-related crime) to access their state PDMP. Less than one-third (n=15) of states/territories require law enforcement to have a valid subpoena. Only 21% (n=11) of states require a search warrant, while 15% (n=8) of states require a case number to obtain relevant information. Additionally, less than one-fifth of all states (n=10) require law enforcement to provide a court order. Finally, 12% (n=6) of states that require law enforcement to receive specialized Drug Diversion Investigator training to access PDMP information. This information is displayed in Figure 5.

It is important to note that categories of law enforcement access are not mutually exclusive. While some states only indicate an active investigation requirement for law enforcement access, other states indicate multiple access requirements (for example, active investigation, subpoena, AND case number). Law enforcement access information was not available for New Mexico.

Figure 5. Law Enforcement PDMP Access Requirements (2022) (n=52)



Once law enforcement personnel meet the access requirements described in Figure 5, the way law enforcement access PDMP information varies by state/territory. Law enforcement personnel in 14% (n=7) of states/territories have direct access to the PDMP. This means that law enforcement may access information relevant to their investigation without submitting a formal request to a PDMP administrator. In the majority of all states/territories (n=45), law enforcement personnel have indirect access to PDMP data. Notably, 65% (n=34) states provide law enforcement with the ability to register with the PDMP (even if they cannot access information directly). Law enforcement access information was not available for New Mexico.

Figure 6 shows the PDMP reports available to law enforcement personnel who meet PDMP access requirements. According to PDMP TTAC state profiles, patient reports were available to law enforcement in all U.S. states and territories except Kansas, Nebraska, and Rhode Island (n=50). Additionally, law enforcement personnel may access prescriber reports from the PDMP in 91% (n=48) of states/territories. Dispenser reports from the PDMP were also available to law enforcement in 79% (n=42) of states/territories. Slightly more than half (n=30) of all states/territories allowed law enforcement to access patient query history, while nearly two-thirds (n=33) allowed law enforcement to access registrant query history. This means that the majority of states allow law enforcement personnel to access the list of searches made on specific patients within the PDMP, as well as searches made by users registered with the system.

Figure 6. PDMP Reports Available to Law Enforcement (2022) (n=53)

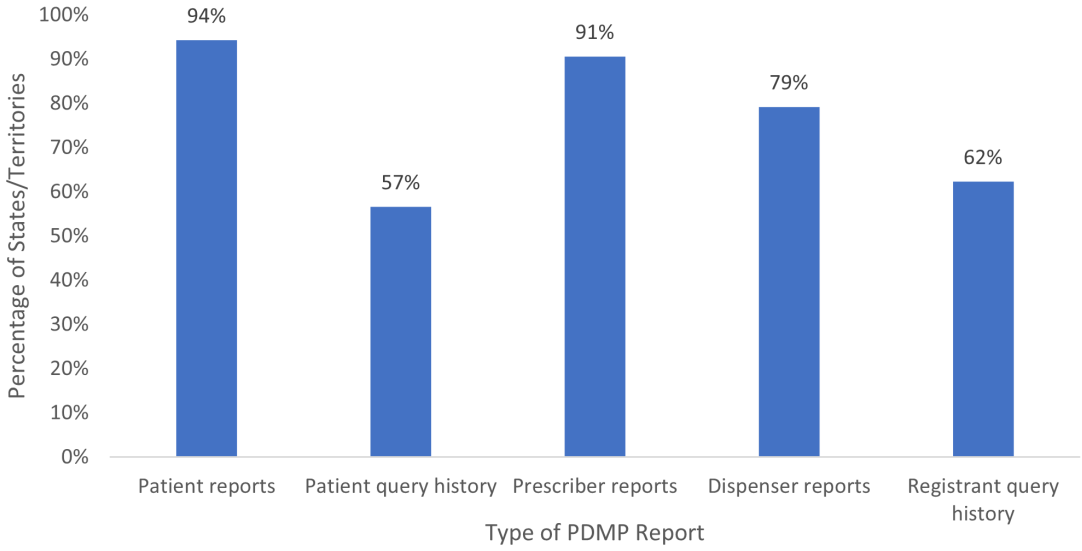
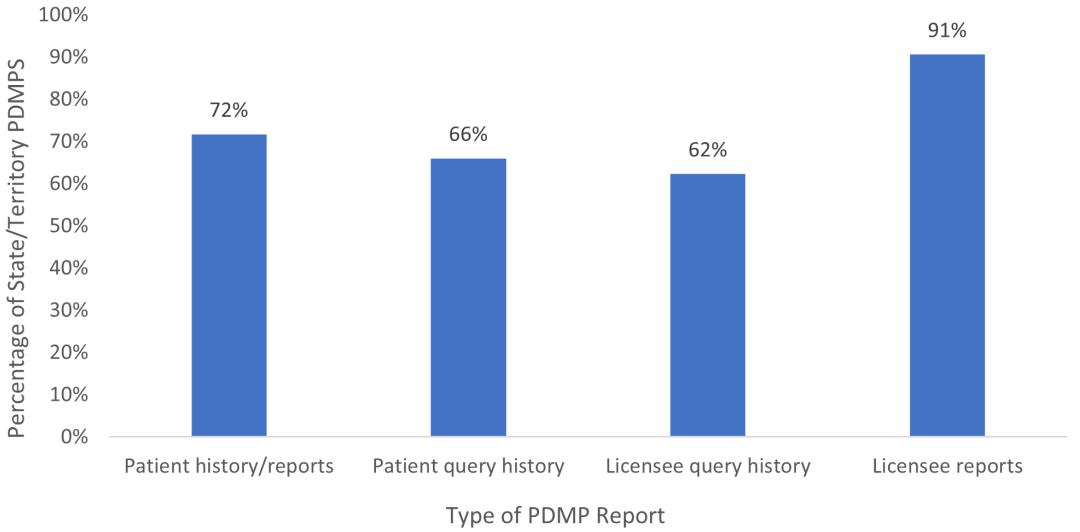


Figure 7 displays the PDMP reports available to licensing boards. Licensing boards ensure that physicians and other healthcare providers ("licensees") follow standards of professional conduct while serving their patients. The majority of states/territories (n=48) allowed licensing boards to access licensee reports. Only 72% (n=38) of states/territories allowed licensing boards to access patient reports. Slightly fewer states/territories (n=35) allow licensing boards to access patient query history, and even fewer states/territories (n=33) allow licensing boards access to licensee query history.

Figure 7. PDMP Reports Available to Licensing Board (2022) (n=53)



Other Available Reports

In addition to role-specific reporting capabilities, most PDMPs also provide a variety of other reports to its users. The majority of state/territory PDMPs (n=45) can provide morphine milligram equivalent (MME) calculations. According to the CDC (2022), calculating MMEs from opioid prescriptions "helps identify patients who may benefit from closer monitoring, reduction or tapering of opioids, prescribing of naloxone, or other measures to reduce risk of overdose." Slightly more than three-quarters (n=41) of all states/territories also provided statewide statistics to help identify opioid prescription trends at the state level. Prescriber report cards, PDMP evaluation reports, and data dashboards are also commonplace among more than half of all state/territory systems. Lost/stolen prescription information (n=8) and overdose reports (n=5) are less common among these systems. See Table 1 for a full list of PDMP reports and capabilities.

Table 1. Other Available PDMP Reports and Capabilities (2022) (n=53)

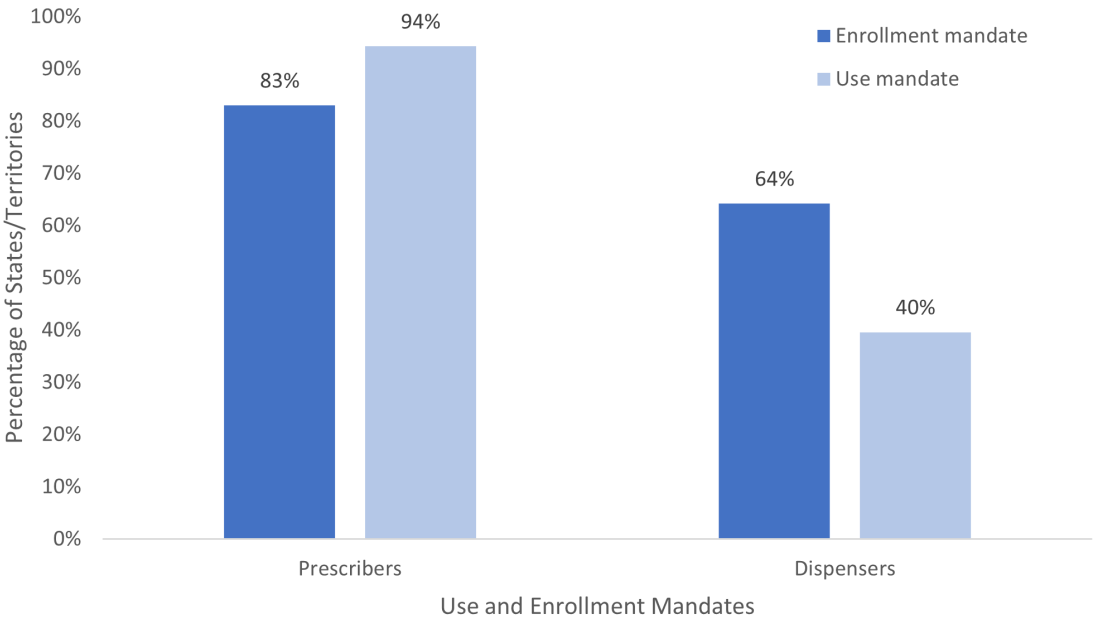
Available Reports and Capabilities	% (n)
MME calculations	85% (45)
Statewide statistics	77% (41)
Prescriber report cards	72% (38)
PDMP evaluation reports	68% (35)
Data dashboard	59% (31)
Drug trend reports	55% (29)
PDMP annual reports	53% (28)
Multiple provider episodes	49% (26)
Prescription drug combinations	49% (26)
Summary data using patient reports	47% (25)
Risk scores	43% (23)
Geo-mapping of prescription data	43% (23)
Clinical alerts	38% (20)
Customized reports by user type	32% (17)
Peer comparison reports	30% (16)
Lost/stolen prescription information	15% (8)
Overdose reports	9% (5)

Use and Enrollment Mandates

Figure 8 displays whether states and territories have implemented use and enrollment mandates among prescribers and/or dispensers. As of 2022, 83% (n=44) of states/territories mandated PDMP enrollment among prescribers. This means that prescribers are required to register with the PDMP database but does not necessarily mean that prescribers must use the system. Conversely, 94% (n=50) of states/territories mandated use of the PDMP among prescribers. The three states/territories that did not mandate use of the PDMP among prescribers are Kansas, South Dakota, and Puerto Rico. Among all states/territories, 81% (n=43) had both an enrollment and use mandate in place for prescribers.

Many states and territories have also implemented enrollment and/or use mandates specific to dispensers. Dispensers were required to register with the PDMP in 64% of states/territories (n=34). Fewer states/territories required dispensers to use the PDMP (n=21). Among all states/territories, 32% (n=17) had both an enrollment and use mandate in place for prescribers. It is worth noting that among the states/territories, 32% (n=17) mandated enrollment and use among both prescribers and dispensers as of 2022.

Figure 8. Use and Enrollment Mandates among Prescribers and Dispenser (2022) (n=53)



Discussion

Why Do Certain PDMP Characteristics Matter?

In any discussion of PDMP characteristics across states/territories, it is necessary to understand *why* certain features may help facilitate reductions in opioid-related harms. This section provides an overview of literature focused on specific system characteristics in relation to contemporary PDMP traits, as well as justifications for why such characteristics matter in the context of the contemporary opioid crisis.

Overseeing agency. One feature of PDMPs that appears in the literature on system robustness features relates to the type of agency overseeing the state/territory system. As of 2022, the majority of PDMPs are overseen by either a Pharmacy Board (n=18) or a Department of Health (n=19). Only 8% (n=4) of the 53 PDMPs are overseen by law enforcement agencies (See Figure 1). Among other features, Haffajee et al. (2019) characterized robust PDMPs as being housed within a Department of Health, Board of Pharmacy, or a Professional Licensing Body. According to the authors, being housed within a health agency is indicative of program robustness because those state systems are more likely to be "designed as a user-facing clinical tool for prescribers," whereas law enforcement oversight might result in systems geared towards tracking illegal activity (Haffajee et al., 2018b, p. 2).

In contrast, a study of specific associations between PDMP robustness features and opioid-related overdose death trends found a negative association between PDMPs overseen

by law enforcement agencies and opioid-related overdose death rates (Pardo, 2017). Thus, PDMPs housed within a law enforcement agency experienced lower opioid-related deaths than PDMPs overseen by other agency types. Specifically, professional and licensing agencies were associated with *increases* in opioid-related overdose deaths. One explanation for these findings relates to the law enforcement focus of many early PDMPs that are now regarded as the most "experienced" systems. The author also references the common goal of PDMPs which is to reduce prescription opioid abuse "rather than promote patient health" (Pardo, 2017, p. 1781). While the promotion of patient health is an important aspect of many state/territory systems, reducing prescription opioid abuse is a goal more closely aligned with the goals of law enforcement agencies. This may be why PDMPs overseen by law enforcement agencies find more success in reducing opioid-related overdose deaths than PDMPs housed within health agencies. While only a handful of U.S. systems are currently housed within a law enforcement agency, it is important to recognize the way overseeing agencies may influence the goals of PDMPs, as well as the potential impact overseeing agencies may have on opioid-related outcomes.

Reporting. Timely, accurate system updates support oversight of patient behaviors among healthcare providers who utilize PDMPs. Literature on PDMP effectiveness often identifies enhanced reporting frequency as a robust feature of state PDMP systems (Haffajee et al., 2018; Pardo, 2017; Pauly et al., 2018). Moreover, increased reporting has been found to be significantly associated with reductions in prescription opioid overdose deaths (Pardo, 2017; Pauly, 2018). It is suggested that daily updates are ideal for optimal PDMP effectiveness, especially as it relates to overdose prevention (Haffajee et al., 2018). As of 2022, 91% (n=48) of the 53 states/territories require system updates daily or within the following business day. The presence of timely data uploading requirements across the majority of state/territory systems is noteworthy, as delays in reporting time can result in negative consequences such as increased doctor shopping (Manasco et al., 2016). Doctor shopping, which involves the solicitation of prescription opioids from multiple prescribers, has been identified as a trend among individuals who misuse opioids. Individuals may also engage in "doctor hopping" which involves traveling longer distances to acquire prescription opioids from distant prescribers (Young et al., 2019). Research indicates that both practices are linked to high-risk opioid use. However, when PDMP data is uploaded on a daily basis, prescribers and dispensers may be more equipped to identify and prevent doctor shopping behaviors among patients. Reports uploaded to the system should also be not only timely, but as accurate and as complete as possible. Accurate, complete reports benefit other system users when prescription histories come into question. This is particularly true of law enforcement personnel who use PDMP reports in active investigations (GJSI, 2015).

In addition to reporting frequency, the types of substances reported in PDMPs have been linked to PDMP effectiveness. More specifically, programs that monitor a minimum of Schedule II through IV substances and perform data updates at least once a week are associated with considerable reductions in opioid overdose deaths compared to states/territories with PDMPs that lack these features (Patrick et al., 2016). As mentioned previously, 80% of state/territory PDMPs monitor Schedule II-IV substances. Moreover, some states/territories monitor all prescription drugs and controlled substances as well as other substances including

cannabis and various drugs of concern. In terms of reducing opioid-related harms, system monitoring of Schedule II-IV substances is necessary for greatest reductions in opioid related overdose deaths (Patrick et al., 2016).

Training requirements. To date, there is very little information available regarding the impact of PDMP training for primary users of these systems, such as prescribers and dispensers. Although research on PDMP training is scant, there are many recommendations regarding enhanced system training to support PDMP effectiveness. It has been suggested that prescriber training may improve PDMP usage and educate prescribers on the benefits of utilizing these systems (Ellyson, 2021). Moreover, other researchers have advised states/territories to invest in prescriber education to facilitate widespread awareness of PDMP systems and overcome prescriber usage barriers such as issues with registration and other technical problems (Rutkow, 2015). As of 2022, slightly more than one-third (n=16) of states/territories with PDMP systems mandate prescriber training while 62% (n=28) made optional training available for prescribers. In order to support ease of use and widespread knowledge of PDMP systems, comprehensive PDMP system training should be made available to prescribers.

System training for dispensers may also support optimal PDMP utilization and help promote opioid safety education. In one study, researchers looked at the effects of RESPOND, an online pilot training program for pharmacists aimed at improving "integration of PDMP into daily workflow," among other goals (Alley et al., 2020, p. 1424). Dispensers who participated in all three modules of the RESPOND program experienced significant improvements in PDMP knowledge and self-efficacy. Notably, guidelines for outreach and how to navigate difficult conversations with patients and prescribers were among the most favorable aspects of training, as reported by participants. As of 2022, 62% (n=28) of states/territories with PDMP systems offer optional training to dispensers, while only 29% (n=13) require dispenser training. Similar to prescriber training, offering comprehensive pharmacist training in more states/territories may ease the utilization and understanding of PDMP systems by those who dispense opioid medications. The RESPOND program is just one example of what formal dispenser training could look like (Alley et al., 2020).

In addition to prescriber and dispenser training, PDMP training for law enforcement personnel is highly recommended, as it is important for officers to understand how to properly request and interpret data pulled from PDMPs (GJSI, 2015). For example, law enforcement officials in Kentucky who were adequately trained on how to use their state PDMP found system reports easier to understand than officers who did not receive adequate training (Wixson et al., 2014). Likewise, law enforcement personnel that receive PDMP training are more likely to value PDMPs as tools for decreasing prescription drug abuse and diversion (Freeman et al., 2015). While the way law enforcement personnel are currently trained varies by state/territory, it is recommended that law enforcement training covers the purpose of PDMP reports, the confidentiality of reports, and how to retrieve and interpret reports (GJSI, 2015; Freeman et al., 2015). As of 2022, only 44% (n=20) of states/territories offer PDMP training for law enforcement, and even fewer (n=6) mandate law enforcement training. If law enforcement is expected to use PDMP data to aid in active investigations, it will be increasingly important for law enforcement to receive training on how to access and

interpret PDMP reports in the years to come. Additional research is needed on how training should be conducted, and if it is worthwhile to mandate training for specific roles.

Law enforcement access. While PDMP information is described as being "invaluable" to law enforcement (GJSI, 2015, p. 8), there is currently limited research on the way law enforcement personnel access and utilize PDMP data. Most academic insight into this relationship comes from focus group interviews with law enforcement. For example, Block et al. (2018) conducted focus group interviews with law enforcement personnel representing Indiana, Kentucky, Ohio, and West Virginia in relation to these systems. Law enforcement from Indiana and Kentucky cited that their PDMPs are very inclusive, allowing physicians, dispensers, and law enforcement personnel access to PDMP information. Law enforcement in these states also receive PDMP training or must be cleared through an identity/credit check. Conversely, officers representing Ohio and West Virginia were more limited in their PDMP access. In most cases, officers in these states may only request a prescription history report when certain criteria are met.

Notably, officers in each state indicated that PDMP data is rarely used to initiate new cases and is instead used to "confirm investigatory evidence that officers have already compiled" (Block et al., 2018, p. 582). The reactive use of PDMP data is evident in current law enforcement access requirements (see Figure 5). At the very least, all states/territories require law enforcement to be involved in an active investigation prior to accessing PDMP data. Additionally, not every state/territory permits law enforcement personnel to access PDMP information directly. This means that rather than accessing the data at their own discretion, the majority of states/territories require law enforcement personnel to submit data requests to a PDMP administrator. Law enforcement's indirect access to PDMP information may ensure patient privacy and prevent searches for potential suspects (aka, "fishing expeditions"), but indirect access requirements may slow down active investigations (GJSI, 2015). This is why law enforcement in certain states/territories seek "fuller" access to PDMP information (Block et al., 2018; Freeman et al., 2015).

Mandates. Previous studies of PDMPs tend to focus on how mandates that require physicians to register with and/or utilize these systems impact opioid-related outcomes. For example, in one study of PDMP effectiveness, researchers found that comprehensive use mandates appear to limit high-risk opioid prescribing (Bao et al., 2018). Data on privately insured nonelderly adults was examined in conjunction with PDMP policy implementations to measure overlapping prescriptions, multiple prescriber characteristics, and high dosage episodes. Results indicated that PDMP use mandates were associated with significant reductions in multiple opioid prescriber episodes (MPEs), overlapping opioid prescriptions, and overlapping opioid and benzodiazepine prescriptions (Bao et al., 2018, pp. 1599-1601).

In a similar study, Strickler et al. (2019) examined the impacts of comprehensive mandatory PDMP use laws on measures of patient risk and prescriber usage of PDMPs in three states. The measures of patient risk included MPEs and rates of opioid prescribing, overlapping opioid and benzodiazepine prescriptions, and high daily dosages. Several characteristics were taken into consideration when assessing the comprehensiveness of the three states' use mandate laws. These included mandatory PDMP query prior to prescription of

Schedule II, III, or IV controlled substances and regular query after initial prescription of addictive substances, including opioids, benzodiazepines, and other "pain-relieving controlled substance" prescriptions (Strickler at al., 2019, p. 3). Data on measures of patient risk and prescriber use from Kentucky, Ohio, and West Virginia from 2010 to 2017 were accessed via the Prescription Behavior Surveillance System (PBSS). Using these data, Strickler et al. (2019) assessed changes in patient risk measures before and after mandate implementation. Analyses revealed that mandatory PDMP query by prescribers appeared to be effective in combating opioid misuse, as all four measures of patient risk decreased in both Kentucky and Ohio after initial mandate implementation. Further, state specific mandate customization was associated with strengthened effectiveness, and comprehensive mandate implementation was associated with rapid increases in both PDMP registration and usage.

As of 2022, nearly all states/territories have implemented mandates that require prescribers to register for and use the PDMP (n=50), while only 40% (n=21) of states/territories mandate PDMP use among dispensers. Although research tends to focus on prescriber use mandates, it may be important for more states/territories to adopt use mandates for dispensers who serve as the link between prescribers, prescription medication, and patients. Additionally, it may be worthwhile for licensing boards to monitor how frequently prescribers use the PDMP, and if their use of these systems aligns with PDMP mandate laws. As of 2022, only 62% (n=33) of states/territories allow licensing boards to access query history of prescribers. Adding this extra layer of accountability from licensing boards may ensure that PDMPs are being used properly by physicians, although additional research in this area is needed.

Conclusion

As of 2022, PDMPs have been implemented in all states and territories to combat various aspects of the ongoing opioid epidemic. These systems track prescription opioid medications at the state level and ensure patient wellbeing, treatment, and substance use prevention through increased monitoring. Previous research on PDMPs tends to focus on system characteristics associated with decreases in opioid prescribing rates and opioid overdose death rates. For example, PDMPs that are overseen by a law enforcement agency are associated with reductions in opioid-related overdose deaths, whereas PDMPs overseen by professional and licensing agencies experience increases in overdose deaths (Pardo, 2017). This is interesting, as only 8% (n=4) of state/territory systems are overseen by a law enforcement agency. However, research indicates that frequent data reporting, as well as monitoring a minimum of Schedule II-IV substances, is also associated with reductions in opioid-related overdose deaths (Haffajee et al., 2018; Pardo, 2017; Pauly et al., 2018; Patrick et al., 2016) and doctor shopping behaviors (Manasco et al., 2016; Young et al., 2019). As of 2022, nearly all states/territories upload daily in real time or daily/next business day. Likewise, there are no states/territories that currently monitor less than Schedule II-IV substances. Finally, PDMP mandates which require physicians to register with and use the system are associated with reductions in high-risk opioid prescribing and opioid-related overdose deaths (Bao et al., 2018; Strickler et al., 2019; Haffajee et al., 2018). While most states/territories mandate use and registration for prescribers, it may be worthwhile to implement additional mandates for

dispensers who serve as an important link between prescribers, prescription medication, and patients.

Future studies of PDMPs should continue evaluating the training measures currently in place for physicians. At present, research on PDMP training for prescribers and dispensers is scant. Even in states/territories where training is mandated for these roles, it is unknown how role-specific trainings are conducted, nor what information these trainings provide. However, there are studies that emphasize the need for law enforcement to receive PDMP training, as law enforcement personnel who are properly trained on how to interpret PDMP reports tend to place a higher value on these systems and feel more confident using these data in active investigations (Wixson et al., 2014; Freeman et al., 2015). While the majority of states/territories offer and mandate training for prescribers and dispensers, most do not currently offer PDMP training for law enforcement. PDMP training for law enforcement personnel should become an integral feature of systems in the years to come, especially if law enforcement personnel are expected to use PDMP reports in investigations of prescription drug abuse/diversion.

There are important limitations to this work. First, although data housed within the PDMP TTAC website and state-specific reports are beneficial, it is important to note that this information is limited to what is reported by state/territory PDMP administrators. It is also unknown how frequently state/territory PDMP TTAC profiles are updated, so information provided in this study may not be entirely up to date. Additionally, this study provides a general overview of PDMPs in the United States and territories as well as a review of relevant PDMP literature, specifically focusing on important PDMP characteristics associated with reductions in opioid-related outcomes. While the descriptive nature of this work is valuable, conclusions and recommendations are limited to the insights of current PDMP literature. With that, this work does not focus on the individual factors and circumstances that may influence opioid prescribing and dispensing behaviors. Individual factors and their influence on opioid-related outcomes are worthy of review in future research, as prescribing and dispensing behaviors are impacted by more than the strength of state/territory PDMPs. Despite the limitations of this work, this is the first study to provide an updated overview of important state/territory PDMP characteristics. It is the hope that this study provides states/territories with recommendations for how to strengthen their systems in the future to combat the opioid crisis.

References

Alley, L., Novak, K., Havlin, T., Irwin, A. N., Carson, J., Johnston, K., O'Kane, N., & Hartung, D. M. (2020). Development and pilot of a prescription drug monitoring program and communication intervention for pharmacists. *Research in Social and Administrative Pharmacy, 16*(10), 1422–1430. https://doi.org/10.1016/j.sapharm.2019.12.023

Bao, Y., Wen, K., Johnson, P., Jeng, P. J., Meisel, Z. F., & Schackman, B. R. (2018). Assessing the impact of state policies for prescription drug monitoring programs on high-risk opioid prescriptions. *Health Affairs*, *37*(10), 1596–1604. https://doi.org/10.1377/hlthaff.2018.0512

Block, M. M., Vito, G. F., & Higgins, G. E. (2018). Strengths and weaknesses of prescription drug monitoring programs: A focus group assessment of law enforcement officers. *Deviant Behavior*, *39*(5), 576–586. https://doi.org/10.1080/01639625.2017.1286176

Centers for Disease Control and Prevention. (2021). *US opioid dispensing rate map.* https://www.cdc.gov/drugoverdose/rxrate-maps/index.html

Centers for Disease Control and Prevention. (2022). *Drug overdose: Overview.* https://www.cdc.gov/drugoverdose/deaths/prescription/overview.html

Dowell, D., Haegerich, T. M., & Chou, R. (2016). CDC guideline for prescribing opioids for chronic pain—United States, 2016. *Recommendations and Reports, 65*(1), 1-52. http://dx.doi.org/10.15585/mmwr.rr7103a1

Dowell, D., Ragan, K. R., Jones, C. M., Baldwin, G. T., & Chou, R. (2022). CDC clinical practice guideline for prescribing opioids for pain—United States, 2022. *Recommendations and Reports*, *71*(3), 1–95. https://doi.org/10.15585/mmwr.rr7103a1

Ellyson, A. M., Grooms, J., & Ortega, A. (2021). Flipping the script: The effects of opioid prescription monitoring on specialty-specific provider behavior. *Health Economics, 31*(2), 297–341. https://doi.org/10.1002/hec.4446

Fink, D. S., Schleimer, J. P., Sarvet, A., Grover, K. K., Delcher, C., Castillo-Carniglia, A., Kim, J. H., Rivera-Aguirre, A. E., Henry, S. G., Martins, S. S., & Cerdá, M. (2018). Association between prescription drug monitoring programs and nonfatal and fatal drug overdoses. *Annals of Internal Medicine, 168*(11), 783–790. https://doi.org/10.7326/M17-3074

Freeman, P., Blumenschein, K., Goodin, A., Higgins, G. E., Talbert, J., Vito, G. F., & Wixson, S. (2015). Optimizing prescription drug monitoring programs to support law enforcement activities (No. 249186). National Institute of Justice. https://www.ojp.gov/pdffiles1/nij/grants/249186.pdf

Haffajee, R. L., Mello, M. M., Zhang, F., Larochelle, M. R., & Wharam, J. F. (2018a). Four states with robust prescription drug monitoring programs reduced opioid dosages. *Health Affairs*, *37*(6), 964–974. https://doi.org/10.1377/hlthaff.2017.1321

Haffajee, R. L., Mello, M. M., Zhang, F., Larochelle, M. R., & Wharam, J. F. (2018b). Appendix to: Four states with robust prescription drug monitoring programs reduced opioid dosages. *Health Affairs*, *37*(6),1-28. https://www.healthaffairs.org/doi/suppl/10.1377/hlthaff.2017.1321/suppl_file/2017-1321_suppl_appendix.pdf

Global Justice Information Sharing Initiative. (2015). Justice system use of prescription drug monitoring programs: Overview and recommendations for addressing the nation's prescription drug and opioid abuse epidemic (pp. 1–19). Bureau of Justice Assistance. https://bja.ojp.gov/sites/g/files/xyckuh186/files/Publications/Global-JusticeSystemUsePDMPs.pdf

Holmgren, A. J., Botelho, A., & Brandt, A. M. (2020). A history of prescription drug monitoring programs in the United States: Political appeal and public health efficacy. *American Journal of Public Health*, *110*(8), 1191–1197. https://doi.org/10.2105/AJPH.2020.305696

Institute for Intergovernmental Research (IIR). (2022). *State PDMP profiles and contacts.* PDMP Training and Technical Assistance Center. https://www.pdmpassist.org/State

Manasco, A. T., Griggs, C., Leeds, R., Langlois, B. K., Breaud, A. H., Mitchell, P. M., & Weiner, S. G. (2016). Characteristics of state prescription drug monitoring programs: A state-by-state survey. *Pharmacoepidemiology and Drug Safety*, *25*(7), 847–851. https://doi.org/10.1002/pds.4003

Marsh, J. C., Park, K., Lin, Y.-A., & Bersamira, C. (2018). Gender differences in trends for heroin use and nonmedical prescription opioid use, 2007–2014. *Journal of Substance Abuse Treatment*, *87*, 79–85. https://doi.org/10.1016/j.jsat.2018.01.001

Pardo, B. (2017). Do more robust prescription drug monitoring programs reduce prescription opioid overdose? *Addiction*, *112*(10), 1773–1783. https://doi.org/10.1111/add.13741

Patrick, S. W., Fry, C. E., Jones, T. F., & Buntin, M. B. (2016). Implementation of prescription drug monitoring programs associated with reductions in opioid-related death rates. *Health Affairs*, *35*(7), 1324–1332. https://doi.org/10.1377/hlthaff.2015.1496

Pauly, N. J., Slavova, S., Delcher, C., Freeman, P. R., & Talbert, J. (2018). Features of prescription drug monitoring programs associated with reduced rates of prescription opioid-related poisonings. *Drug and Alcohol Dependence*, *184*, 26–32. https://doi.org/10.1016/j.drugalcdep.2017.12.002

PDMP Technical Training and Assistance Center. (2018). *Technical assistance guide: History of prescription drug monitoring programs*. https://www.pdmpassist.org/pdf/PDMP_admin/TAG_History_PDMPs_final_20180314.pdf

Rhodes, E., Wilson, M., Robinson, A., Hayden, J. A., & Asbridge, M. (2019). The effectiveness of prescription drug monitoring programs at reducing opioid-related harms and consequences: A systematic review. *BMC Health Services Research*, *19*(1), 784. https://doi.org/10.1186/s12913-019-4642-8

Rutkow, L., Turner, L., Lucas, E., Hwang, C., & Alexander, G. C. (2015). Most primary care physicians are aware of prescription drug monitoring programs, but many find the data difficult to access. *Health Affairs*, *34*(3), 484–492. http://dx.doi.org/10.1377/hlthaff.2014.1085

Strickler, G. K., Zhang, K., Halpin, J. F., Bohnert, A. S. B., Baldwin, G. T., & Kreiner, P. W. (2019). Effects of mandatory prescription drug monitoring program (PDMP) use laws on prescriber registration and use and on risky prescribing. *Drug and Alcohol Dependence*, *199*, 1–9. https://doi.org/10.1016/j.drugalcdep.2019.02.010

U.S. Department of Health and Human Services (HHS). (2021). *What is the U.S. opioid epidemic?* https://www.hhs.gov/opioids/about-the-epidemic/index.html

U.S. Government Accountability Office (GAO). (2020). *Prescription drug monitoring programs: Views on usefulness and challenges of programs*. https://www.gao.gov/assets/gao-21-22.pdf

Vuolo, M., Frizzell, L. C., & Kelly, B. C. (2022). Surveillance, self-governance, and mortality: The impact of prescription drug monitoring programs on U.S. overdose mortality, 2000–2016. *Journal of Health and Social Behavior*, *63*(3), 1-20. https://doi.org/10.1177/00221465211067209

Wixson, S., Blumenschein, K., Goodin, A., Higgins, G., Vito, G., Talbert, J., & Freeman, P. (2014). Law enforcement perceptions of a prescription drug monitoring programme. *International Journal of Police Science & Management, 16*, 288–296. https://doi.org/10.1350/ijps.2014.16.4.347

Young, S. G., Hayes, C. J., Aram, J., & Tait, M. A. (2019). Doctor hopping and doctor shopping for prescription opioids associated with increased odds of high-risk use. *Pharmacoepidemiology and Drug Safety*, *28*(8), 1117–1124. https://doi.org/10.1002/pds.4838

Appendix A. PDMP Implementation Year and Type of Overseeing Agency by State/Territory (2022) (n=53)

State/Territory	Year of PDMP Implementation	Type of PDMP Overseeing Agency
Alabama	2006	Department of Health
Alaska	2011	Pharmacy Board
Arizona	2008	Pharmacy Board
Arkansas	2013	Department of Health
California	1939	Law Enforcement Agency
Colorado	2007	Pharmacy Board
Connecticut	2008	Consumer Protection Agency
Delaware	2012	Professional Licensing Agency
DC	2016	Department of Health
Florida	2011	Department of Health
Georgia	2013	Department of Health
Guam	2013	Department of Health
Hawaii	1943	Law Enforcement Agency
Idaho	1997	Professional Licensing Agency
Illinois	1968	Department of Health
Indiana	1998	Professional Licensing Agency
Iowa	2009	Pharmacy Board
Kansas	2011	Pharmacy Board
Kentucky	1999	Office of Inspector General
Louisiana	2008	Pharmacy Board
Maine	2004	Substance Abuse Agency
Maryland	2013	Department of Health
Massachusetts	1994	Department of Health
Michigan	1989	Professional Licensing Agency
Minnesota	2010	Pharmacy Board
Mississippi	2005	Pharmacy Board
Missouri	2017	Department of Health
Montana	2012	Pharmacy Board
Nebraska	2011	Department of Health
Nevada	1997	Pharmacy Board
New Hampshire	2014	Department of Health
New Jersey	2011	Law Enforcement Agency
New Mexico	2005	Pharmacy Board

State/Territory	Year of PDMP Implementation	Type of PDMP Overseeing Agency
New York	1973	Department of Health
North Carolina	2007	Substance Abuse Agency
North Dakota	2007	Pharmacy Board
Ohio	2006	Pharmacy Board
Oklahoma	1991	Law Enforcement Agency
Oregon	2011	Department of Health
Pennsylvania	1973	Department of Health
Puerto Rico	2018	Substance Abuse Agency
Rhode Island	1979	Department of Health
South Carolina	2008	Department of Health
South Dakota	2011	Pharmacy Board
Tennessee	2006	Pharmacy Board
Texas	1982	Pharmacy Board
Utah	1996	Professional Licensing Agency
Vermont	2009	Department of Health
Virginia	2003	Professional Licensing Agency
Washington	2011	Department of Health
West Virginia	1995	Pharmacy Board
Wisconsin	2013	Professional Licensing Agency
Wyoming	2004	Pharmacy Board

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

This project was supported by Grant No. 15PBJA-23-GK-02431-DGCT awarded by the Bureau of Justice Assistance. The Bureau of Justice Assistance is a component of the Department of Justice's Office of Justice Programs, which also includes the Bureau of Justice Statistics, the National Institute of Justice, the Office of Juvenile Justice and Delinquency Prevention, the Office for Victims of Crime, and the SMART Office.

Points of views or opinions in this document are those of the author and do not necessarily represent the official position or policies of the U.S. Department of Justice.

Authors

LINDSAY J. BAKER, MA is an alumna of the University of North Carolina Wilmington, earning a Bachelor of Arts in Criminology and Sociology in 2020 and a Master of Arts in Criminology in 2022. As a student, Lindsay's research centered around restorative justice and reentry which sparked her interest in treatment court work. Lindsay was a graduate fellow for the National Treatment Court Resource Center and now works with the team full time as Social Science Researcher. In this role, Lindsay helps collect and disseminate treatment court data. Her priority is to write about research in ways that connect with all audiences and to highlight the importance of therapeutic jurisprudence and treatment in the justice system.

KRISTEN E. DEVALL, PhD is the co-director of the National Treatment Court Resource Center and a professor of sociology and criminology at the University of North Carolina Wilmington. She received her PhD in sociology from Western Michigan University and has conducted evaluations of numerous treatment court programs and other criminal justice initiatives in various states for over 20 years. Overall, her work seeks to bridge the gap between academia and practitioners, as well as influence the development of evidence-based policies and practices.

JACQUELINE J. CROWELL, MA is a graduate of the University of North Carolina Wilmington. She earned a Bachelor of Arts in Sociology from UNCW in 2022 and a Master of Arts in Sociology in 2024. Jacqueline has worked alongside UNCW faculty on multiple projects focused on exposure to crime and violence among local youth. In addition, she has worked as a graduate fellow with the National Treatment Court Resource Center (NTCRC) throughout her time as a master's student and is assisting with the organization's national survey of treatment courts. Jacqueline plans to pursue a PhD in Sociology after completing the terminal master's program.

CHRISTINA LANIER, PhD is the co-director of the National Treatment Court Resource Center and a professor of sociology and criminology at the University of North Carolina Wilmington. She has extensive experience in the area of grant writing and program evaluation. She conducts program evaluations for recovery courts in North Carolina and is a co-evaluator for a number of local criminal justice programs. Her research focuses on the effectiveness of treatment courts and the integration of data program development. Her work has been published in Federal Probation, The Journal of Drug Issues, The Prison Journal, Substance Use and Misuse, and Violence Against Women.