

Use of a Prescription Drug-Monitoring Program by Emergency and Surgical Prescribers: Results of a Hospital Survey

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Abstract *Background:* Drug overdoses are the leading cause of death due to injury in the USA. Currently, 49 states have prescription drug-monitoring programs (PDMPs) available to prescribers. *Questions/Purposes:* We aimed to assess knowledge and practice of two groups of acute-care prescribers regarding controlled substances. *Methods:* A 16-question survey was distributed to a list of surgical and emergency medicine prescribers at our institution. The survey asked about prescriber demographics, previous experiences with a PDMP, and opinions about patient risk factors available within an electronic medical record (EMR). *Results:* We received 60 responses (27.1% response rate). All prescribers recognized a growing problem with opioids, both in general and in their own practices, with an average rating of 8.3/10 and 7.9/10, respectively. Although 95% were aware a PDMP was available, only 60% were registered users. Emergency medicine prescribers were significantly more likely to have registered and used the database; 52% said the PDMP was too time-consuming and 23% said the information was not easy to use. All respondents who reported PDMP use indicated it carried some clinical utility, with 87% reporting it to be “somewhat” or “very” useful. Emergency medicine prescribers were more likely to use the PDMP regularly, with 73% selecting “somewhat frequently”

or higher, while only 9% of surgery prescribers indicated the same. Of all respondents, 97% agreed that an integrated alert in the existing EMR would be helpful. *Conclusion:* Acute-care prescribers at our institution are universally aware of the opioid epidemic, but efficient and useful tools for identifying at-risk patients are lacking. Our prescribers desired an alert system integrated into the EMR to highlight targeted risk factors.

Keywords prescription drug-monitoring programs · opioid · emergency medicine · surgeons · substance misuse

Introduction

Prescription opioids have become the target of growing concern within the medical community. According to the National Center for Health Statistics, the age-adjusted rate of drug-poisoning deaths rose from 6.1 to 19.8 per 100,000 from 2000 to 2016 [7]. Opioid analgesics alone accounted for over 16,000 deaths in 2011, with 31% of cases involving co-ingestion of benzodiazepines [3, 4]. Prescribers have shown some adjustment in response to the epidemic, with a 4.9% annual reduction in opioid prescriptions written from 2012 to 2016 [2]. However, in 2016, over 42,000 deaths were associated with opioid use, of which 40% were prescription opioids [7]. This may in part be due to the strength of medications prescribed. From 1999 to 2002, 42.4% of people who used opioids used medications weaker than morphine, and only 17% used medications that were stronger, and in 2011 to 2012 only 20% of those who used a prescription opioid used one weaker than morphine and 37% used one stronger than morphine [6, 16].

In response to these high numbers of prescriptions and deaths, many states began to track individual prescriptions for controlled substances by creating a prescription drug-monitoring program (PDMP). The Center for Disease Control and Prevention (CDC) published a Policy Impact Brief in 2011 encouraging providers to use their respective

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PDMPs and institutions to better integrate these databases and electronic medical records (EMR) for ease of access [3]. At that time, only 36 states had active monitoring programs, but that number has since risen to 49 [12]; Missouri is the only state without a statewide program.

Since 2011, prescribing rates have decreased [2]. Furthermore, PDMP use has been linked to a change in prescribing habits. One study of emergency departments found that the treatment was changed in 41% of the encounters involving the use of a newly available statewide database [1]. However, more current data has showed mixed results regarding the efficacy and impact of PDMP availability and use guidelines. In 2018, a review of over 3000 un-weighted patient encounters in the National Ambulatory Medical Care Survey database found no statistical link between monitoring programs with their associated policies and subsequent prescribing habits [9]. In the acute-care setting, McAllister et al. explored using the PDMP as a supplement to patient encounters provided by the pharmacy across 710 patient encounters [11]. There were no changes in the number of prescriptions provided, but prescribers noted that they were “more comfortable” sending prescriptions with patients after reviewing the available data. Conversely, the Kaiser-Permanente health care system rolled out a comprehensive Safe and Appropriate Opioid Prescribing (SAOP) program, including education and prescription monitoring; across more than three million patient encounters, they showed substantial reductions in high-dose opioid prescribing, high pill-count prescribing, long-acting opioid prescribing, and concurrent opioid-benzodiazepine prescribing [10]. Overall, it still is not known whether PDMPs lead to changes in patient outcomes [5].

Unfortunately, PDMP databases tend to be cumbersome and difficult to access and are not built into the workflow of most EMRs. As providers see more patients in shorter periods, the additional time required to log onto and search a separate PDMP database may significantly impede its routine use. Recently, Rutkow et al. released the results of a survey of primary care providers in which 28% said they were either unaware of their state’s program or uncertain as to whether one existed [13]. In the same study, 31% of prescribers trained in access found that it was somewhat or very difficult to obtain the relevant information; 58% found the database too time-consuming and 28% found the format difficult to navigate.

As our health care system activates integrated clinical decision support design to identify patients at risk of misuse, abuse, or diversion of prescription opioids and benzodiazepines [14], we felt it important to measure and report the baseline controlled-substance reporting system utilization of our acute-care prescribers. Our objective was to highlight baseline PDMP use and identify weaknesses and barriers to the use of existing infrastructure.

Materials and Methods

Our questionnaire used questions similar to those of Rutkow et al. [13]. To inform future interventions in our health care system, we included questions related to the clinical utility of potential risk factors to be built into a prescribing alert

algorithm, as well as whether they perceived a need for the integration of a monitoring program into the EMR. No other demographic data or patient-population demographics were requested beyond practice and license type and years of practice. As the previous study focused on a nationwide sample of primary care practitioners only, we included only surgical and emergency medicine prescribers within the host system.

After developing the survey and obtaining approval from our institutional review board, we obtained a list of licensed prescribers in both surgical and emergency medicine departments, with the consent of individual department chairs and site-based medical directors for distribution of the targeted questionnaire (Online Resource 1). The electronic questionnaire with cover letter was sent via e-mail to these prescribers, with the understanding that all responses would be anonymous.

Initial electronic invitations to participate were sent by department heads and secretaries, and a follow-up e-mail was sent weekly for 3 weeks. Responses were obtained from 6/1/2015 to 7/21/2015. Subgroup analyses were completed by reviewing surgical and emergency medicine subspecialties, as well as those in practice for 10 years or less and those in practice more than 10 years.

Results

A total of 221 prescribers in the emergency medicine and surgical departments of our health care system were invited to participate in the survey. Sixty prescribers completed surveys, for an overall 27.1% response rate.

There was a near-equal distribution of emergency medicine and surgical medicine represented—29 and 31 respondents, respectively. Prescribers were categorized as “junior” or “senior” in their practice, defined as 0 to 10 years of experience and more than 10 years of experience, respectively (Table 1).

When asked to quantify on a 10-point scale their professional opinion on the presence of opioid prescription abuse, misuse, and diversion both in the general population and in their own practice, respondents rated it at 8.3 and 7.9 out of 10, respectively (Table 2). These answers remained similar under a subgroup categorization, without any statistically significant difference between specialties or years of experience.

There were no differences among groups in percentage of patients reported to need both opioids and benzodiazepines, and responses were distributed fairly evenly between 0 to 20% and 80 to 100% (Table 1). With respect to prescribing both short- and long-acting opioids, surgeons showed a trend toward higher rates of co-prescription. At any one level, there is not a statistically significant difference between practice experience or field except for the category of “sometimes,” including 21% of senior providers and only 2.8% of junior prescribers ($p = 0.023$).

Nearly all respondents were aware of a centralized PDMP in our home state, but only 60% were registered users of the database (Table 3). Of note, there was a

Table 1 Characteristics of prescriber respondents, by specialty and years of experience

Prescriber characteristics	% (N)	Emergency % (N)	Surgery % (N)	p (E/S)	Junior % (N)	Senior % (N)	p (Y/O)
Practice							
Emergency	48.3% (29)	100% (29)	0% (0)	–	41.7% (15)	58.3% (14)	0.204
Surgery	51.7% (31)	0% (0)	100% (31)	–	58.3% (21)	14.7% (10)	
Category							
Physician	85.0% (51)	72.4% (21)	96.7% (30)	0.008	80.6% (29)	91.7% (22)	0.238
Other prescriber	15.0% (9)	27.6% (8)	3.2% (1)	0.008	19.4% (7)	8.3% (2)	
Years in practice							
0–5	48.3% (29)	44.8% (13)	51.6% (16)	0.596	80.6% (29)	–	–
6–10	11.7% (7)	6.9% (2)	16.1% (5)	0.267	19.4% (7)	–	–
11–15	16.7% (10)	24.1% (7)	9.7% (3)	0.134	–	41.7% (10)	–
16–20	10.0% (6)	13.8% (4)	6.5% (2)	0.342	–	25.0% (6)	–
20+	13.3% (8)	10.3% (3)	16.1% (5)	0.509	–	33.3% (8)	–
Portion of patient population receiving opioids and/or benzodiazepines							
0–20%	20.0% (12)	31.0% (9)	9.7% (3)	0.039	19.4% (7)	20.8% (5)	0.897
21–40%	25.0% (15)	31.0% (9)	19.4% (6)	0.298	27.8% (10)	20.8% (5)	0.542
41–60%	21.7% (13)	24.1% (7)	19.4% (6)	0.653	16.7% (6)	29.2% (7)	0.250
61–80%	16.7% (10)	10.3% (3)	22.6% (7)	0.204	16.7% (6)	16.7% (4)	1.000
81–100%	16.7% (10)	3.5% (1)	29.0% (9)	0.008	19.4% (7)	12.5% (3)	0.478
Frequency of prescribing both short- and long-acting opioids to patients							
All the time	1.7% (1)	0% (0)	3.2% (1)	0.327	0% (0)	4.2% (1)	0.215
Most of the time	5.0% (3)	3.5% (1)	6.5% (2)	0.596	2.8% (1)	8.3% (2)	0.332
Sometimes	10.0% (6)	13.8% (4)	6.5% (2)	0.342	2.8% (1)	20.8% (5)	0.023
Rarely	38.3% (12)	31.0% (9)	45.2% (14)	0.263	47.2% (17)	25.0% (6)	0.083
Never	45.0% (27)	51.7% (15)	38.7% (12)	0.313	47.2% (17)	41.7% (10)	0.675

substantial difference in the number of emergency prescribers registered versus surgical prescribers registered: 86 and 35%, respectively. This difference was again seen when comparing those who had utilized the database to evaluate a patient’s history (93 vs. 35%, respectively). Both values were statistically significant ($p = 0.0001$).

When respondents were asked to quantify the level of difficulty or ease associated with using the database, there was a bi-modal distribution of responses, with the majority falling in the “somewhat difficult” or “somewhat easy” categories (Table 3). The junior prescriber and emergency medicine subgroups indicated a marginally easier experience than did the senior and surgical subgroups.

Eighty-seven percent of respondents said the information available in the PDMP was “somewhat useful” or “very useful” (Table 3). While there was no difference in use by years of practice, there were differences by specialty. Emergency medicine prescribers were more likely to use the PDMP on a “somewhat regular” basis, with at least 73% selecting “somewhat frequently” or higher, while only 9%

of surgery providers responded in the same category (“infrequently,” $p < 0.001$; “frequently,” $p = 0.03$). All 38 of the respondents who had ever used the PDMP indicated that it provided at least some clinical utility, with no responses in the “not at all” category. Despite the variations in use in clinical practice, 97% of respondents said that the information integrated into workflow via the existing EMR would be helpful.

In addition to being asked about prescribing and PDMP use, respondents were asked about potential barriers to regular use of the state PDMP. Only respondents who had used the system in the past were able to select from the list of possible barriers. A majority (51%) said that the database was too time-consuming to query (Table 4). Interestingly, when isolating surgical responses, nearly 12% indicated that they did not have enough patients in their practice to consider utilizing the PDMP.

Finally, when asked to rank five characteristics in order of perceived importance in considering utility in identifying patients at risk for abuse, misuse, or diversion of prescribed

Table 2 Prescriber opinion of magnitude of prescription drug abuse problem

Statement	Average ranking	Emergency	Surgery	p (E/S)	Junior	Senior	p (Y/O)
On a scale of 1–10 (10 = highest) how big of a problem is prescription drug abuse/diversion?	8.3	8.6	8.1	0.114	8.3	8.3	1.000
On a scale of 1–10 (10 = highest), how big of a problem is prescription drug abuse/diversion in your patient population?	7.9	8.3	7.4	0.090	7.8	8.0	0.646

Table 3 Prescription drug monitoring program opinions and use, by specialty and years of experience

Prescriber characteristics	% (N)	Emergency % (N)	Surgery % (N)	p (E/S)	Junior % (N)	Senior % (N)	p (Y/O)
Aware of NC PDMP							
Yes	95.0% (57)	96.6% (28)	93.4% (29)	0.596	97.2% (35)	91.7% (22)	0.332
No	5.0% (3)	3.5% (1)	6.5% (2)	0.596	2.8% (1)	8.3% (2)	
Registered user of NC PDMP							
Yes	60.0% (36)	86.2% (25)	35.5% (11)	<0.001	50.0% (18)	75.0% (18)	0.052
No	40.0% (24)	13.8% (4)	64.5% (20)	<0.001	50.0% (18)	25.0% (6)	
Has used PDMP to examine prescription drug use of one of own patients							
Yes	63.3% (38)	93.1% (27)	35.5% (11)	<0.001	61.1% (22)	66.7% (16)	0.660
No	36.7% (22)	6.9% (2)	64.5% (20)	<0.001	38.9% (14)	33.3% (8)	
Ease of accessing PDMP info							
Very difficult	5.3% (2)	3.7% (1)	9.1% (1)	0.503	4.6% (1)	6.3% (1)	0.818
Somewhat difficult	42.1% (16)	40.7% (11)	45.5% (5)	0.787	36.4% (8)	50.0% (8)	0.401
Neither easy nor difficult	10.5% (4)	3.7% (1)	27.3% (3)	0.032	9.1% (2)	12.5% (2)	0.728
Somewhat easy	34.2% (13)	40.7% (11)	18.2% (2)	0.184	45.5% (10)	18.8% (3)	0.087
Very easy	7.9% (3)	11.1% (3)	0% (0)	0.250	4.6% (1)	12.5% (2)	0.368
Utility of PDMP info							
Not at all useful	0% (0)	0% (0)	0% (0)	–	0% (0)	0% (0)	–
A little useful	13.2% (5)	7.4% (2)	27.3% (3)	0.101	18.2% (4)	6.3% (7)	0.085
Moderately useful	26.3% (10)	22.2% (6)	36.4% (4)	0.368	18.2% (4)	37.5% (6)	0.180
Very useful	60.5% (23)	70.4% (19)	36.4% (4)	0.051	63.6% (14)	56.3% (9)	0.646
Frequency of PDMP use							
Never	2.6% (1)	3.7% (1)	0% (0)	0.516	4.6% (1)	0% (0)	0.390
Infrequently	42.1% (16)	22.2% (6)	90.9% (10)	<0.001	45.5% (10)	37.5% (6)	0.624
Somewhat frequently	26.3% (10)	33.3% (9)	9.1% (1)	0.124	18.2% (4)	37.5% (6)	0.180
Frequently	23.7% (9)	33.3% (9)	0% (0)	0.029	27.3% (6)	18.8% (3)	0.542
All the time	5.3% (2)	7.4% (2)	0% (0)	0.352	4.6% (1)	6.3% (1)	0.818
An integrated EMR alert about patient-specific risk factors would be useful							
Yes	96.7% (58)	96.6% (28)	96.8% (30)	0.960	97.2% (35)	95.8% (23)	0.772
No	3.3% (2)	3.5% (1)	3.23% (1)	0.960	2.8% (1)	4.2% (1)	0.772

EMR electronic medical record, NC North Carolina, PDMP prescription drug-monitoring program

opioids, 35% said that a previous overdose would be the most important variable, and a similar proportion (32%) said that the presence of three or more controlled-substance prescriptions was the most important. A documented history of positive urine drug screening or abnormal blood alcohol level was considered the least important (less than 2% selecting as most important factor) (Table 5). These rankings were fairly similar between specialties, as well as years in practice.

Discussion

Our study confirms that emergency medicine and surgery prescribers are concerned about the impact of opioids on their patients. This should come as no surprise, given the significant attention given to the topic in academic journals and the lay press. However, our study shows that prescribers are largely dissatisfied with the tools available to assist them in identifying patients at risk for abuse, misuse, and

Table 4 Reported barriers to prescription drug monitoring program use, by specialty and years of experience

Statement	Prescribers agreeing % (N)	Emergency prescribers agreeing % (N)	Surgery prescribers agreeing % (N)	Junior prescribers agreeing % (N)	Senior prescribers agreeing % (N)
I do not have enough patients for whom I need information from the PDMP.	11.7% (7)	0% (0)	22.6% (7)	13.9% (5)	8.3% (2)
I do not have enough information about the details of the PDMP.	20.0% (12)	3.5% (1)	35.5% (11)	27.8% (10)	8.3% (2)
The information from the PDMP is too time-consuming to retrieve.	51.7% (31)	55.2% (16)	48.4% (15)	50.0% (18)	70.8% (17)
The PDMP information is not in a format that makes it easy for me to use.	23.3% (14)	31.0% (9)	16.1% (5)	25.0% (9)	20.8% (5)
My current clinical practice site does not allow me to have easy access to the PDMP.	18.3% (11)	13.8% (4)	22.6% (7)	19.4% (7)	16.7% (4)
None of the above	15.0% (9)	24.1% (7)	6.5% (2)	11.1% (4)	20.8% (5)

PDMP prescription drug-monitoring database

Table 5 Importance of selected risk factors by specialty and years of experience

Trigger	Average ranking 1–5 (1 being highest risk for abuse or diversion)	Percent ranking this factor as #1	Emergency average ranking	Emergency percent ranking #1	Surgery average ranking	Surgery percent ranking #1	Junior average ranking	Junior percent ranking #1	Senior average ranking	Senior percent ranking #1
3 or more prescriptions for opioid or benzodiazepine drugs in the past 30 days	2.18	31.67	2.17	31.03	2.19	32.26	2.08	36.11	2.33	25.00
A prescription for an opioid or benzodiazepine drug with greater than 50% of the prescription calculated to be remaining	3.12	15.00	2.97	20.69	3.26	9.68	3.14	16.67	3.08	12.5
Received an opioid or benzodiazepine drug in the ED/Urgent Care two or more times in the last 30 days	2.69	16.67	2.76	13.79	2.63	19.35	2.83	11.11	2.48	25.00
A history of positive toxicology screen for cocaine and/or marijuana, or a positive blood alcohol level	4.27	1.67	4.45	0	4.10	3.23	4.31	0	4.21	4.17
A history of overdose of opioid or benzodiazepine drugs	2.70	35.00	2.66	34.48	2.74	35.48	2.64	36.11	2.79	33.33

diversion of prescribed opioids. Current practice tools like the PDMP are commonly cited as too cumbersome for regular use, backed up by our findings (51% of prescribers found the database too time consuming). This is similar to the findings by Rutkow et al. of 58% among primary care prescribers [13]. Degree of reported PDMP utility was also similar, with nearly 60% selection in both studies.

Our study has some limitations. One distinct criticism of our data is the low response rate of invited prescribers. Our survey was optional and sent via e-mail to eligible prescribers within distinct subspecialties. In a recent systematic review, VanGeest et al. outlined a number of helpful tips for increasing response rates [15]. Interestingly, they noted a lower response with web-based surveys than with phone or mail-based surveys. Also noted was the need for brief, easy-to-answer questions. While our survey questions were brief individually, perhaps the overall survey length and the ranking of questions deterred potential responders.

When evaluating PDMP use between emergency department and surgical prescribers, we anticipated a difference in practice habits. Our data confirmed that emergency prescribers were significantly more likely to query the PDMP. When looking at practice structure, emergency providers see patients with much more variable pathology. Given that emergency physicians treat a more heterogeneous and undifferentiated patient population with variability in their follow-up options than do surgeons, it is understandable that these prescribers may be more sensitive to their patients' multiple risk factors for abuse, misuse, or diversion of prescriptions and thus have streamlined their database access to inform their prescribing practice. However, opioid and benzodiazepine exposure frequently occurs after a surgical or traumatic event managed by an acute-care surgeon. Surgical prescribers need the tools to easily identify patients at risk for prescription drug misuse or diversion as early as possible in order to incorporate primary prevention strategies, such as multimodal pain management approaches, shortened time between follow-up appointments, or in-depth patient education. As demonstrated by the Kaiser-Permanente SAOP system, a multi-faceted approach can produce substantial reductions in risky prescribing behaviors [10].

Because of our overall low response rate, we cannot generalize our results to all prescribers. However, the strong trends shown in our responses are indeed important considerations as we continue to move to a more connected network of PDMPs.

The abuse, misuse, and diversion of prescription opioids is a national crisis deserving of attention and resources to facilitate getting the right information into the hands of the end-prescriber. Our prescribers universally agreed that clinical decision support integrated into existing workflow designed to identify patients based on objective patient-level risk factors would be helpful. The Centers for Medicare and Medicaid Services has additionally highlighted the importance of integrating PDMPs into workflow [8]. Future efforts should center on pulling these risk factors from the EMR and presenting them in an organized and automated fashion for the prescriber and potentially streamlining and linking external databases such as the PDMP with the EMR.

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Compliance with Ethical Standards

Conflict of Interest: Daniel Leas, MD, Rachel B. Seymour, PhD, Meghan K. Wally, MSPH, Michael Beuhler, MD, Michael J. Bosse, MD, Michael Gibbs, MD, Christopher Griggs, MD, Steven Jarrett, PharmD, Animita Saha, MD, Bradley Watling, MD, and Stephen Wyatt, DO, declare that they have no conflicts of interest. Joseph R. Hsu, MD, reports receiving consulting fees from Acumed and the speaker's bureau of Smith & Nephew, during the conduct of the study. Michael Runyon, MD, reports receiving research funding from Janssen Pharmaceutical Companies, Boehringer Ingelheim Pharmaceuticals, and Durata Therapeutics International, outside the submitted work.

Human/Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013.

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