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Barriers to Utilization of Prescription Drug Monitoring Programs Among Prescribing Physicians and Advanced Practice Registered Nurses at Veterans Health Administration Facilities in Oregon

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Abstract

Objective. To identify barriers to using state prescription drug monitoring programs (PDMPs) among prescribing physicians and advanced practice registered nurses across a variety of Veterans Health Administration (VA) settings in Oregon. **Design**. In-person and telephone-based qualitative interviews and user experience assessments conducted with 25 VA prescribers in 2018 probed barriers to use of state PDMPs. **Setting**. VA health care facilities in Oregon. **Subjects**. Physicians (N = 11) and advanced practice registered nurses (N = 14) who prescribed scheduled medications, provided care to patients receiving opioids, and used PDMPs in their clinical practice. Prescribers were stationed at VA medical centers (N = 10) and community-based outpatient clinics (N = 15); medical specialties included primary care (N = 10), mental health (N = 9), and emergency medicine (N = 6). **Methods**. User experience was analyzed using descriptive statistics. Qualitative interviews were analyzed using conventional content analysis methodology. **Results**. The majority of physicians (64%) and advanced practice registered nurses (79%) rated PDMPs as "useful." However, participants identified both organizational and software design issues as barriers to their efficient use of PDMPs. Organizational barriers included time constraints, clinical team members without access, and lack of clarity regarding the priority of querying PDMPs relative to other pressing clinical tasks. Design barriers included difficulties entering or remembering passwords, unreadable data formats, time-consuming program navigation, and inability to access patient information across state lines. **Conclusions**. Physicians and advanced practice registered nurses across diverse VA settings reported that PDMPs are an important tool and contribute to patient safety. However, issues regarding organizational processes and software design impede optimal use of these resources.

Key Words: Prescription Drug Monitoring Program; Opioid Epidemic; Opioids; Patient Safety

Introduction

Veterans who use Department of Veterans Affairs (VA) health care have a higher rate of fatal overdose than the general US population, with opioids noted as a primary source [1,2]. Opioid overdose among VA users may reflect higher levels of physical and psychological trauma, manifested as chronic pain, mental health disorders, social isolation, and even suicidal behaviors among former service members [2–4]. Structural and social factors leading to educational, professional, and financial inequities are also likely associated with increased risk [5,6]. However, increases in veterans' overdose risk may be most directly related to opioid prescribing practices in the VA, which, like other health care systems over the last two decades, involved the use of long-term opioid therapy, high opioid doses, and concurrent prescriptions for sedative-hypnotics such as benzodiazepines alongside opioid prescriptions [7,8]. It is also possible that veterans' receipt of concurrent prescriptions from both inside and outside the VA has contributed to veterans' increased risk of overdose and other complications [9–12].

In response to the high rates of opioid use and overdose among VA patients, as well as the national opioid crisis generally, in 2013 the VA launched an Opioid Safety Initiative [13]. This national program takes a multifaceted approach to the reduction of opioid prescribing. The VA Opioid Safety Initiative includes the development and implementation of an electronic dashboard tool to monitor opioid-related prescribing, implementation of a naloxone distribution program, and development of administrative policies to support these programs [13,14]. One such administrative policy is the requirement for providers to check state prescription drug monitoring program (PDMP) databases for patients receiving new controlled substance prescriptions, and on at least a yearly basis for patients receiving ongoing prescriptions [13,15,16]. Patient-specific results of these queries are then recorded in their electronic health record (EHR) [16].

PDMPs are statewide initiatives that collect information from outpatient pharmacies or dispensing clinicians across the respective state, enabling providers and pharmacies to access information on patients' recent prescriptions of controlled substances [17]. Use of state PDMPs is intended to reduce "doctor shopping" and otherwise concurrent prescriptions across disparate health care systems, such as the receipt of opioids from both VA and non-VA providers, and thereby increase patient safety. As of 2019, PDMPs are available in all 50 states, the District of Columbia, and territories including Puerto Rico and Guam [18]. Some evidence suggests that the implementation of PDMP programs has reduced high-risk opioid prescribing in the respective states and territories [17,19–21]. However, the effects of state PDMPs on opioid overdoses are uncertain. A recent systematic review identified that, among 17 eligible studies published between 2011 and 2018 that examined PDMPs and overdose, there was low-strength evidence of association between PDMP implementation and reduced fatal overdoses; programs that were associated with reductions in overdose rates were backed by strong policies such as mandatory provider queries [22].

Previous research has evaluated potential barriers to optimal utilization of state PDMPs, both within and outside of the VA. Specific barriers identified across the literature include time constraints, incomplete prescription data, difficulty navigating the system, passwords, the need for other clinical staff to have the ability to access the system, and overall difficulty accessing the system [23–28]. A potential limitation of this prior research is the inclusion of only specific clinician types or specialties. Many health care systems, including the VA, use a team-based health care model for delivery of care, and there are many health care providers and specialties involved in patients' prescribing. Thus, research examining barriers to PDMP use in a broad sample of prescribing clinicians may yield new insights. In this study, we explored barriers that a mix of prescribers from VA health care teams and settings, and those working in distinct areas of clinical practice, experience in utilizing state PDMPs. The goal of this research was to identify target areas for PDMP-related improvements that could lead to sustained, increased utilization by a diverse set of prescribing clinicians.

Methods

This was a qualitative study of clinicians with prescribing privileges and patient panels at VA health care systems located in Oregon State (VA Portland Healthcare System, VA Roseburg Healthcare System, VA White City Healthcare System). We used semistructured telephone and in-person interviews to assess clinicians' experiences using PDMPs and PDMP query results in patient care [29]. Interviews took place from February to June of 2018. Participation was voluntary, and all participants provided informed consent before participating, which specified that they could refuse to answer any question or stop the interview at any time. Participants who elected to complete interviews outside of their work hours were compensated $50 for their time. All interviews were audio-recorded. The conduct of this study, including all procedures, measures, and instrumentation, was approved by the VA Portland Healthcare System Institutional Review Board and Research and Development Committee.

Participants and Sampling

To be included in the study, clinicians had to have prescribing privileges and take part in the active management of patients with opioid prescriptions receiving care at any one of the three Oregon VA sites. Prescribing

clinicians included physicians and advanced practice registered nurses (APRNs; e.g., nurse practitioners, clinical nurse specialists). Participants also were required to use information obtained from PDMP queries in their clinical practice. An environmental scan of current practices and policies in one facility revealed that the Pharmacy Department had been conducting PDMP queries of patients receiving opioids to meet VA Opioid Safety Initiative targets. However, at the time of this study, the Pharmacy Department had reduced its role in conducting PDMP queries and transferred the responsibility to the treating clinical units. Therefore, pharmacists were excluded from the scope of this study. Residents and fellows were also excluded.

Eligible participants were purposively sampled for maximum variation using two approaches [29]. First, we queried VA administrative databases to identify active prescribers within each Oregon VA health care system who worked in primary care, mental health, or emergency medicine services and prescribed either opioids or benzodiazepines. Additionally, we sought to include providers who used PDMPs "a lot," as well as those who did not use them as frequently, so we could learn about a variety of barriers.

Second, we utilized snowball sampling techniques to identify additional participants. This involved asking participants at the completion of their interview to recommend additional VA staff who might be willing to participate in interviews. Using both approaches, we identified a total of 230 physicians and APRNs to invite to participate in this study. All invitations to participate were sent by e-mail. Interested participants responded to study staff, who verified eligibility. As is common in qualitative research studies, participant recruitment was ongoing until saturation was reached (i.e., no new themes arose from the data) [29,30].

Procedure and Materials

After documenting informed consent, study staff gathered demographic and overall PDMP use information. Overall ease of use and usefulness of PDMPs were initially measured by two questionnaire items from the Usability Metric for User Experience–Lite (UMUX-Lite), a validated user experience metric [31]. Participants were asked to answer the extent to which they agreed or disagreed with the following statements: "The PDMP is easy to use" and "The PDMP's capabilities meet my requirements." UMUX-Lite response options are on a scale of 1–7, with 1 denoting "strongly disagree" and 7 denoting "strongly agree."

Next, study staff led participants through the semi-structured interview script, which addressed two broad themes. The first addressed how PDMPs fit into clinicians' work environment (e.g., Describe how you interact with the PDMP or get information from a PDMP query in a normal workday; How do PDMP queries compare to your other clinical priorities?). This was followed by questions that examined the overall usefulness of PDMPs (e.g., How does the state PDMP help or hinder you as you manage your patient panel?). Throughout interviews, staff probed for deeper responses or asked for clarifications as needed (e.g., Can you describe a time when you needed another method besides the PDMP to verify risk?).

Data Analysis

Demographic and UMUX-Lite data were analyzed using descriptive statistics. Overall disagreement with UMUX-Lite statements was calculated as any value <4; a value of 4 was interpreted as "neutral," whereas values >4 were interpreted as "agreement."

Qualitative interviews were transcribed verbatim and analyzed using conventional content analysis [30,32]. Study staff met each week to identify and discuss themes that arose from interviews. Initially, a priori themes from the literature were included for analysis (e.g., password difficulties are a barrier to PDMP use). During this iterative process, additional themes within interviews were also identified, and these themes were grouped into larger categories (Table 1). These themes then informed the development of an initial code list. Two members of the research team initially coded a complete transcript to determine inter-rater reliability. Percent agreement was found to be 91%. Coders discussed and came to consensus regarding any differences in the interpretation of the code list and coding approach that were identified through this process. The remaining transcripts were then coded by the two coders. Illustrative quotations are reported in the *Results* section below. To improve readability, filler language and false starts were removed from the quotations when not important to content [33]. Some small modifications (denoted by brackets) were also made to enhance clarity or to provide context.

Results

Participants

Eleven physicians and 14 APRNs took part in this study. Of these, 10 were primary care providers, nine were mental health providers, and six were emergency medicine providers. Ten were stationed at a primary medical center facility in the state; 15 were stationed at community-based outpatient facilities.

PDMP Rates of Use and Usefulness Perceived by Prescribers

In our sample, 52% of clinicians reported that they used PDMPs some of the time (N = 13). Forty percent used them "a great deal," and 8% used them "a little bit" (Table 2). A slightly higher proportion of physicians than APRNs reported that they used PDMPs "a great deal" (45% vs 35%, respectively). Another 45% of physicians

Table 1. Barriers to PDMP use themes and definitions

Code	Definition
PDMP Priority Within Clinic	Participants do not know if PDMP use is part of clinic metrics or where it falls in clinical priorities.
Lack Clinic Support for PDMP Queries	Clinic supervisors do not know/care about/support PDMP queries.
Time Barrier	A lack of time to use PDMPs, or PDMP use takes more time than the participant would like.
Lack Resources for PDMP Queries	Clinic does not provide training or staff to conduct PDMP queries.
Technology Barrier	The design or functionality of PDMPs are a barrier to use.

PDMP = prescription drug monitoring program.

Table 2. Use and perceived usefulness of state PDMPs

	Primary Care (N = 10)			Mental Health (N = 9)			Emergency Medicine (N = 6)		
	APRNs	Physicians	Total (%)	APRNs	Physicians	Total (%)	APRNs	Physicians	Total (%)
PDMP use									
A little bit	1	0	1 (10)	0	1	1 (11)	0	0	0 (0)
Some	3	1	4 (40)	5	1	6 (67)	0	3	3 (50)
A great deal	3	2	5 (50)	0	2	2 (22)	2	1	3 (50)
PDMP is useful									
Disagree	1	0	1 (10)	0	1	1 (11)	0	0	0 (0)
Neutral	1	0	1 (10)	1	1	2 (22)	0	2	2 (33)
Agree	5	3	8 (80)	4	2	6 (67)	2	2	4 (67)

APRN = advanced practice registered nurse; PDMP = prescription drug monitoring program.

reported that they used PDMPs "some," compared with 57% of APRNs.

Most clinicians agreed that the capabilities of PDMPs met their requirements. The median usefulness score (interquartile range) was 6 (3), which indicates strong agreement. The majority (80%) of primary care clinicians rated PDMPs as useful, whereas 67% of both mental health and emergency medicine clinicians reported that PDMPs were useful. APRNs tended to be more positive toward PDMPs than physicians. Across specialties, 79% of APRNs rated PDMPs as useful compared with 64% of physicians. Fourteen percent of APRNs were neutral regarding the usefulness of PDMPs, whereas 27% of physicians were neutral.

Organizational Barriers to PDMP Use

Clinicians collectively described a set of barriers to PDMP use that were associated with organizational climate. Although all of the interview participants were aware of VA and state mandates regarding opioid management, they were often unsure of the importance of PDMP queries relative to other performance metrics. When asked their impression of the priority of conducting PDMP queries in comparison with other pressing clinical tasks, one physician responded:

> I would say that the only hint of necessity to use the PDMP, or even the discussion about it, is that now that Oregon has the mandate, we need to be registered with the PDMP. But I would say rare to no; aside from that mandate, we really never talk about using the PDMP. It's really, I would say, just not discussed—in terms of my relationship with my supervisors at the VA.

When probed about PDMP-related quality metrics, clinicians varied in their perception of the extent that PDMP queries were a priority in their clinic or division in relation to other priorities.

> God, it's hard. I mean, there are so many competing priorities in primary care, not just from. . .leadership. . .you know, I would say. . .in terms of sort of the way our division approaches quality measures. Practically, they look at all the quality measures for the clinic and kind of try to find the ones that we think are most accurate and reflect our efforts the most, and sometimes they're opioids ones; sometimes they're more just sort of typical chronic disease management stuff, like diabetes or hypertension. But I don't know if the PDMP in particular is the measure that's focused on.

Regardless of their impressions of the priority of PDMP queries in their clinical practice, clinicians associated education and communication about PDMP use as markers of PDMP importance. As one physician explained:

> I'd say [PDMP queries are] a moderate level of priority. It's come up—we have weekly meetings with the pharmacist, all the prescribers do at our clinic, and I think once we were given a little educational session about it, and it comes up every now and then in those meetings if people are having issues, but it doesn't come up otherwise. There's no initiatives related to it that I'm aware of.

In the above quote, the physician described sporadic educational sessions, which they interpreted as identifying PDMP use as somewhat of an organizational priority. However, beyond these sessions, they reported no knowledge of broader organizational initiatives related to PDMPs. The explanation of an APRN participant provides more insight into this lack of organizational clarity:

> We see documentation [mandates] regarding it [PDMP queries]. But, we really don't get any feedback as to what that current status is. I know when I was in primary care, we received a lot of feedback as to the percentage of patients we monitored on the site, but currently, in the psychiatric areas I don't have that...

Another clinician (physician) concurred:

> It's [the PDMP is] not really discussed or e-mailed about. I think they send out an e-mail about guidelines, and then it's in there about the PDMP, but, unless it's integrated into our workflow, it makes it more of a challenge to use.

The commentary of these clinicians demonstrates the expectation that VA leadership integrate the PDMP into clinical workflow. This lack of continued communication, and audit and feedback, created uncertainty around the relative importance of the PDMP.

Interoperability Barriers to Efficient PDMP Use

Clinicians also described challenges they faced accessing relevant information in PDMPs and incorporating this information into the EHR, as well as issues with overall software functionality. Clinicians expressed that the software lacked key functionality that was necessary to assess patient safety. Chief among these limitations was a lack of interoperability; the software could not directly interface with other health information technology systems that held patient prescription data, such as the PDMPs of other states:

> Well, in our catchment area, we have people from Washington and California and people in Arizona, so Oregon doesn't provide that information from other states. I mean, that's an obvious one. So that's the biggest downfall because I can't check other states.

This APRN notes that veterans receiving care in Oregon might physically reside in another state, but that the state PDMP would not reveal prescription information for other states where their prescriptions might be filled. Another participant provided more insight into this statement:

> What I'd like to see is that we just open it up further [so] that we're not just doing Washington and Oregon; that's my only issue is—you know, we have snowbirds that go to Arizona, people that travel across the country. The PDMP is great for Washington and Oregon, but what about when they go to Idaho? Or Arizona? We can't track that if they're getting it from the outside. So, there's an issue with that.

The above physician expressed concern regarding the information they do not have when prescribing medications. They, alongside other clinicians, described how this concern was warranted, as veterans within their own health care system receive care from VA and non-VA providers in multiple states.

A second interoperability limitation described was that PDMPs do not interface with patients' EHRs. The most common complaint was that PDMP query results had to be copied and pasted into the EHR, which added laborious steps to the query process. As one APRN explained, "When they [queries] do come up positive, you have to copy and paste it into the chart.... I want it in the chart for record purposes, what we found." Participants explained how documenting PDMP queries allowed other clinicians to see this information using a PDMP-specific chart note in the EHR. Additionally, this documentation was needed to fulfill national VA requirements. Participants felt that the functionality of the cut-and-paste process could be improved. In one representative comment, a participant stated, "If we can get it to where you upload something [or] to where it copies and pastes nicer, then it'd be easier."

A third interoperability concern was that the format of PDMP queries did not transfer into the EHR in a way that was readable, and therefore useful during clinical encounters. As one physician explained:

> The format in which it [query results] comes from the pharmacist is really, really hard to read. It has too many columns, so, the columns on the right side spill over to the next line, you know, so it creates this kind of illegible thing.

Upon probing, clinicians referred to specific elements from PDMP queries that were difficult to read within the EHR. These included, but were not limited to, prescription fill dates and medications names, as well as patient names.

Interface Design Barriers to PDMP Use

Clinicians also referred to how PDMP design was a challenge as they interacted with the software in a normal workday. The two most common complaints were that "there was a lot of clicking" and the "ongoing issue of usernames and passwords." As one physician explained, the PDMP was "just kind of a clunky interface. It looks like kind of a 10-years-ago-web kind of thing, and it requires a lot of steps of authentication." When asked how PDMPs help or hinder clinicians as they manage their patient panel, a physician expressed:

> The only thing I'd say for hinder is that you do have to sit down at the computer and open up and put this long, lengthy password in there in order for it to be looked at.

Another physician described how the password process was just one aspect of a process that was tedious overall. They related that:

> You have to log into the computer, you have to go through the security of entering your password. And then you have to have [the patient's EHR] open, and you have to get the information about the patient up, and then entered into the chart. And there's not many ways around that.... Everybody in our system is busy, and everybody is probably being asked to do more than they have hours in the day to do, but I think having other members of the health care team participate in PDMP queries when it's needed is often helpful.

For this clinician, as for others, these small barriers to efficient use of the PDMP took on greater significance given the time pressures and often limited-resource environment in which they provided care.

Discussion

In this study, we identified organizational and design barriers to PDMP use among prescribing physicians and APRNs in the VA system of care. Our findings extend existing research by describing barriers to efficient use of the PDMP experienced by prescribing clinicians across a range of medical specialties and by describing how a lack of organizational clarity regarding the priority of the PDMP can inhibit use. Prior research has primarily included primary care physicians, emergency care physicians, and pharmacists in their examination of PDMP use and ease of use [23,26,28,34–36]. Few studies have included nurses as a population of interest [37]. This is a limitation of existing literature in this area, as states are expanding prescribing privileges to APRNs, and the VA has increasingly provided these privileges to help meet clinical needs. Clinicians also described an organizational culture that did not specifically prioritize use of state PDMPs. With the continued adoption of patient safety–related health information technology within health care systems, it is important to uncover how barriers related to these technologies are impacting the provision of health services and to consider remedies for these barriers. We discuss each of the barriers uncovered in our interviews in turn.

Organizational factors were identified as critical barriers to the use of state PDMPs. The major obstacle was that clinicians were uncertain of the extent to which PDMP queries were a priority in their clinic or division. They stated that they had been made aware of state and VA mandates, but specific information about PDMP queries was not provided to staff beyond the initial discussion of the mandates. For example, audit and feedback approaches to monitoring proportions of patients for whom PDMP queries had been conducted were used in primary care, but not in other disciplines, leaving continuity gaps in the emphasis on this practice across specialties. Altogether, this led several participants to rate the priority of PDMP queries as moderate to low and question where they fit into competing clinical priorities. These results suggest that the presence of a clinical champion and managerial support of health information technology could improve clinicians' intention to use the PDMP during clinical practice. These needs have been identified in the dissemination of other new technologies [38]. VA patient safety might benefit from organized efforts to champion and clarify the priority of PDMP queries in clinical practice.

Another prominent barrier experienced by participants was the design of the PDMP. An important insight was that inefficient (e.g., "clunky") navigation and a lengthy authorization process were perceived as barriers to PDMP use. The dissatisfaction that clinicians felt with passwords, multiple screens, and other administrative burdens is echoed in prior literature [28,35]. A novel finding of this study is that software design barriers compounded difficulties integrating the PDMP with other health information technology systems, such as the EHR. A crucial implication of this finding is that clinicians expend extra effort and time entering findings into the EHR. Future work might explore the development of EHR templates that could help to mitigate this barrier to ease use.

Another important finding was that clinicians were dissatisfied that state PDMPs did not interface with other state PDMPs or the EHR. Although some state PDMPs have become interoperable with other states' PDMP systems, the state PDMPs accessed by our participants (e.g., Oregon, Washington) have not. This resulted in an information silo, which negatively impacts high-level interoperability for these health information technologies [39]. Specific to the PDMP, clinicians in our sample found this to be worrisome because they knew from practice that some veterans were receiving care and prescriptions across state lines, and they were unable to confirm these patients' safe medication use or identify patients who might be at risk for opioid misuse. This concern would likely be magnified in regions of the United States with smaller states where patients are even more likely to receive health care and/or prescriptions from across state lines. Our participants' concerns mirror those reported in prior literature, where patient safety interoperability problems stemmed from EHRs receiving information from external data systems [40]. This suggests that a health policy campaign to support the creation of a nationwide, or at least regional, PDMP to address this lack of interoperability may be needed.

Holistically, our findings hold implications for the EHR modernization initiative that is currently in progress in the Veterans Health Administration. Over the next decade, the VA's longtime Computerized Patient Record System (CPRS) platform will be replaced. A primary objective of this migration is to increase

interoperability with the Department of Defense and other health care systems where veterans may receive care. Commercial EHR vendors provide features in their platform to gather information from state PDMPs from within the EHR [41]. This has the potential to provide real-time information that clinicians can use to assess risk and make decisions about prescribing [42]. However, our findings suggest that more is needed for efficient use of PDMPs. Health care leadership and clinical departments must also communicate and support the time, training, and resources needed to prioritize PDMP queries, such as that provided through academic detailing interventions [43], and PDMP developers must collaborate to enhance the formatting and readability of PDMP query results.

Synthesizing the results of our study with those of past studies examining barriers to PDMP use, both inside and outside the VA, we identified several additional interventions that could facilitate consistent PDMP use. These include centralization or automation of the query process so that routine queries are completed, with results pushed to patients' EHRs [44]. Automation of this process would enable queries to be conducted for all patients at risk (i.e., those with any recent history of opioids or other psychotropic medication receipt) rather than relying on clinical staff to prioritize patients they deem to be highest risk [45]. Such a mechanism would be similar to unsolicited PDMP reports, which have been shown to decrease patients' high-risk prescriptions [46–48]. The use of PDMP data for predictive analytics and enhanced data visualization techniques to communicate patients' risk could also facilitate PDMP usefulness; these efforts may allow information to be more readily synthesized and acted upon by prescribers [49]. Additionally, the development of a nationwide PDMP would reduce the administrative burden associated with querying multiple PDMPs and improve provider confidence in the completeness of query data, an issue highlighted in the present study as well as past studies (e.g., [28]).

There are several limitations of this study that should be considered when interpreting results. First, this qualitative study involved interviews with a relatively small sample of VA clinicians within a single state. Therefore, it is possible that our findings might not be applicable to clinicians from other facilities across the country or to those working outside of the VA. A second limitation is that we were unable to recruit an equivalent number of emergency medicine clinicians despite efforts to increase recruitment. Similarly, we did not recruit pain or addiction medicine specialists to the study. Clinicians from these disciplines may have a different view of the utility of PDMPs than those from primary care, mental health, or emergency medicine. Thus, although our results represent the viewpoints of a variety of prescribing disciplines, they may not represent the experiences or opinions of all specialties that play a role in prescribing safety.

Conclusions

Within our sample, physicians and APRNs in primary care, mental health, and emergency medicine services generally agreed that PDMPs are valuable to patient care and provide the information needed to identify at-risk patients. However, interviewees identified issues of organizational priority and software design that could be addressed to maximize the efficiency, ease of use, and value of the programs. Interventions to remove barriers and facilitate consistent PDMP use in accordance with policy guidelines are needed [45]. These may include organizational clarification of the priority of PDMP queries and their fit into clinical workflows, enhanced ability to template and assess query results, and interoperability of PDMP and EHR software across health care systems and states.

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