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Variations in prescription drug monitoring program use by prescriber specialty

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ABSTRACT

Background: Although prescription drug monitoring programs (PDMPs) have been widely implemented to potentially reduce abuse of prescription opioids, there is limited data on variations in PDMP use by prescriber specialty. Such knowledge may guide targeted interventions to improve PDMP use.

Methods: Using data from Washington state Medicaid program, we performed a retrospective cohort study of opioid prescribers and their PDMP queries between Nov 1, 2013 and Oct 31, 2014. PDMP registration was mandatory for emergency physicians, but not for other providers. The unit of analysis was the prescriber. The primary outcome was any prescriber queries of the PDMP. We used multivariate regression models to identify variations in PDMP queries by prescriber specialty, as well as to explore explanatory pathways for observed variations.

Results: We studied 17,390 providers who prescribed opioids, including 8718 (50%) who were not registered with PDMP, 4767 (27%) who were registered but had no recorded use of the PDMP, and 3905 (23%) PDMP users (queries/user: median 18, IQR 5–64). Compared to general medicine physicians, PDMP use was higher for emergency physicians (OR 1.4, 95%CI: 1.2–1.7), and lower for surgical specialists (OR 0.1, 95%CI: 0.08–0.1), obstetrician-gynecologists (OR 0.2, 95%CI: 0.1–0.2) and dentists (OR 0.4, 95%CI: 0.4–0.5). Higher use by emergency physicians appeared to be mediated by higher registration rates, rather than by provider level predilection to use the PDMP.

Conclusions: A minority of opioid prescribers to Medicaid beneficiaries used the PDMP. We identified variations in PDMP use by prescriber specialty. Interventions to increase PDMP queries should target both PDMP registration and PDMP use after registration, as well as specialties with current low use rates.

1. Introduction

1.1. Background

Drug overdoses are now the top reason for unintentional mortality in the United States, and prescription opioid abuse is a major contributor to this public health crisis ("CDC. Prescription opioid overdose data.,", 2016; Seth, Scholl, Rudd, & Bacon, 2018). Nearly all states have adopted prescription drug monitoring programs (PDMPs) that track dispensed controlled substances to unique patients (Gugelmann & Perrone, 2011). PDMP data may help providers improve opioid prescribing behaviors, particularly to patients with a prior history of high-risk prescription opioid use. State-level data suggest that introduction of PDMPs may be reduce opioid supply and opioid "shopping" behavior (Buchmueller & Carey, 2017; Pardo, 2016).

1.2. Importance

Preliminary studies suggest that, in the past, prescribers and pharmacists rarely use PDMPs (Feldman, Williams, Coates, & Knox, 2011; McCauley, Leite, Melvin, Fillingim, & Brady, 2016; Perrone, Deroos, & Nelson, 2012; Young 2nd, Tyndall, & Cottler, 2017) due to logistic and time constraints (Greenwood-Ericksen, Poon, Nelson, Weiner, & Schuur, 2016; Poon et al., 2016). States have responded with a variety

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of policies, including requirements for mandatory PDMP use prior to opioid prescribing (Buchmueller & Carey, 2017) and integrated systems that "push" PDMP data to emergency department physicians ("Washington ACEP. EDIE and PMP Integration,", 2015).

However, there are limited data on variation of PDMP use by prescriber specialty. Prior studies of prescriber PDMP use are limited by survey methodology, low response rates, and potential recall and selection bias (Feldman et al., 2011; McCauley et al., 2016; Perrone et al., 2012; Young 2nd et al., 2017). Furthermore, these surveys have typically targeted prescribers within specific specialties, limiting generalizability across all prescribers. Improving knowledge of prescriber use patterns is essential for developing targeted interventions to improve PDMP use (e.g. directed at low-utilizing specialties). Identifying potential mechanisms to improve PDMP use is particularly important for prescribers to Medicaid beneficiaries, who have a six-fold increased risk of opioid overdose compared to other insured populations ("CDC. Overdose deaths involving prescription opioids among medicaid enrollees - Washington, 2004-2007,", 2009).

1.3. Goals of this investigation

Using linked PDMP provider, query, and dispense files, we assessed prescriber specialty variation in PDMP use among opioid prescribers to Washington state Medicaid beneficiaries.

We further explored whether variations in PDMP query rates were mediated by registration rates or by predilection to use the PDMP among registrants. We exploited a natural policy experiment which required emergency physicians, but not other specialists, to register for the PDMP.

2. Methods

2.1. Study design and cohort selection

We performed a retrospective cohort study of providers who prescribed opioids to Medicaid beneficiaries during the one-year period between November 1, 2013 and October 31, 2014. The Washington state PDMP started data collection on Schedule II, III, IV, and V drugs starting October 2011. Prescriber and prescriber delegates could register for PDMP access using an online process. Starting in July 2012, all emergency physicians in Washington State were required to be registered with the PDMP (Sun et al., 2017). Hospitals attested to compliance with this requirement. There have been no other registration or use requirements for other prescribers. In November 2014, Washington State began implementation of an automated PDMP query intervention in all non-federal emergency departments (EDs). This initiative increased the proportion of ED visits with a validated PDMP query from 4 to 70% (Sun et al., 2017). To isolate the predictors of voluntary PDMP use from the effects of this policy intervention, we restricted the current study to the period prior to the automated ED PDMP queries.

We included health care providers if they wrote at least five opioid prescriptions for Medicaid beneficiaries during the study period and had a Drug Enforcement Agency number registered in Washington State.

The Washington state PDMP identified opioid prescribers to Medicaid beneficiaries, and provided dispense, prescriber, and query files to the study team. The dispense file included all instances of controlled substance dispensing to Medicaid beneficiaries. The prescriber file included specialty and PDMP registration status for unique prescribers in the dispense files. The query file included all PDMP queries on patients with a prior controlled substance dispense. Queries on patients without any prior controlled substance dispense are not recorded by the PDMP.

The Institutional Review Boards of Washington State and of Oregon Health & Science University approved this study.

2.2. Outcomes

The primary outcome was any recorded PDMP query made by a prescriber during the study period.

2.3. Provider specialty

The PDMP vendor linked self-reported National Prescriber Identifier specialty data to the prescriber file ("Center for Medicare and Medicaid Services. National Provider Identifier Registry", 2017). We aggregated specialty categories that were provided in the prescriber file (Appendix Table 1).

2.4. Co-variates

Increased volume of opioid prescribing may be correlated with PDMP use. If true, then measures of opioid prescribing frequency would potentially confound the relationship between specialty and PDMP use. To control for confounding, we used PDMP dispense data to create variables that describe past opioid prescribing. These variables included the total number of patients that each provider prescribed opioids for during the one year study period, as well as the total dispensed morphine milligram equivalents (MMEs) prescribed by each provider. We calculated MMEs using the following conversion factors ("Centers for Medicare and Medicaid Services. Opioid Morphine Equivalent Conversion Factors", 2015; "Oregon Health, & Science University. Guideline for Safe Chronic Opioid Therapy Prescribing For Patients with Chronic Non-cancer Pain", 2014; Paulozzi, Kilbourne, & Desai, 2011): codeine-0.15; fentanyl citrate-0.13; fentanyl patch-7.2; hydrocodone-1; hydromorphone-4; levorphanol-11; meperidine-0.1; methadone-3; morphine- 1; oxycodone-1.5; oxymorphone-3; and tapentadol-0.4. We only considered oral/transdermal formulations.

2.5. Analysis

We wished to explore two possible, non-exclusive mechanisms for variations in PDMP use by specialty. First, there may be variations in registration by specialty, i.e. non-registered prescribers never have the opportunity to query the PDMP. Second, there may be variation in PDMP use among registered prescribers by specialty.

We generated descriptive tables of the prescriber cohort, stratified by the following three categories (1) Not registered with the PDMP, (2) Registered with the PDMP, but with no recorded PDMP query, and (3) Registered with the PDMP, and has at least one recorded PDMP query for the study year.

We used a multivariate logistic regression model to assess the association between any recorded PDMP query and prescriber specialty. The model included the two potential confounders described above. The unit of analysis was an individual prescriber, and all prescribers were included in the regression analysis regardless of PDMP registration status. Because of right skewed data, we parameterized continuous variables using indicators for quintile values.

Using the same variables, we performed two additional logistic regression analyses to understand the reason for differences in PDMP use by specialty. First, we assessed the association between provider level variables and PDMP registration. Second, we assessed the association between provider level variables and PDMP use among those prescribers who were registered for the PDMP.

All data management and statistical analyses were performed in R version 3.3.2 ("R: A language and environment for statistical computing", 2015) and STATA MP 14.0.

3. Results

Our study cohort included 17,390 providers (Fig. 1) who prescribed controlled substances to 506,249 Medicaid beneficiaries, including