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How Reliable Is a Statewide Prescription Monitoring Program for Identifying Post-Cesarean Opioid Use?

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Am J Perinatol Rep 2020;10:e101–e105.

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Abstract

Objective   This study was aimed to estimate the percentage of women taking opioids post-cesarean who could be detected in a state prescription monitoring program (PMP) and characteristics of those not able to be detected.

Study Design   This observational cohort study included all women with an Illinois address who delivered via cesarean section and used opioids within 24 hours prior to discharge at a tertiary care hospital between August 21, 2017 and March 1, 2018. The Illinois PMP was queried for presence of an opioid prescription filled within the first 3 months postpartum. Sociodemographic and clinical factors associated with an undetectable PMP record were evaluated in bivariable and multivariable logistic regression analyses.

Results   A total of 517 women underwent a cesarean delivery during the study period, of whom 344 (66.5%) met inclusion criteria. Of these women, 169 (49%) did not have a detectable PMP record of filling any outpatient postpartum prescription opioid. On bivariable and multivariable logistic regression analysis, year of delivery (2018 vs. 2017) was significantly associated with a higher incidence of detectable postpartum prescription opioid record in the PMP with increasing relative risk of detectable records in the second year of analyses ($n = 110/244$ [45%] in 2017 vs. $n = 59/100$ [59%] in 2018, adjusted risk ratio [aRR] = 1.32, 95% confidence interval [CI]: 1.06–1.64, $p = 0.013$). No other sociodemographic or clinical characteristics was significantly associated.

Conclusion   Nearly half of women who underwent a cesarean section and who were administered opioids 24 hours prior to discharge did not have a detectable postpartum opioid prescription in the PMP. While identification of prescription filling improved with time, many of women were not detectable in the PMP system. These data call into question the accuracy of PMPs in identifying prescription opioid filling patterns in the postpartum setting.

Keywords
► cesarean section
► postpartum
► opioid use
► prescription monitoring program

Prescription opioid use outside of pregnancy has surged in the past decade in the United States, driven both by treatment practices, as well as marketing from pharmaceutical corporations.[1] Contemporary data from the Centers for Disease Control and Prevention (CDC) demonstrate approximately 27.7% of privately insured and 39.4% of Medicaid-insured reproductive-aged women filled a prescription for an opioid between 2008 and 2012.[2] While opioids are often

Last Name	First Name	DOB	Date Filled	Label Name	Strength	Metric Qty/ Days Supply	Payment Type	Pharmacy/ City	Prescriber
			2/5/2018	ACETAMINOPHEN-OXYCODONE	325 MG-5 MG	5/1	Commercial Insurance	OSCO DRUG	

Fig. 1 An example of the output derived from a prescription monitoring program database.

indicated to achieve adequate pain control, they are subjected to misuse and subsequent risks of addiction.[3–6] Therefore, there has been a significant urge from American College of Obstetricians and Gynecologists (ACOG) to consider both the indication for and duration of prescription opioid use by obstetricians and gynecologists, particularly in the postpartum period.[7]

As part of mindful prescription habits, ACOG recommends that all providers check a prescription monitoring program (PMP) database prior to prescribing a controlled substance to ensure that there is no evidence of aberrant filling patterns suggestive of opioid use disorder.[7] PMP databases, present in 49 states, allow for the ability of a practitioner to assess whether a given patient is filling prescriptions for schedule 2, 3, 4, and 5 drugs.[8,9] In Illinois, the PMP was implemented in 2016 and a legislative mandate requires all medical providers in Illinois to check the PMP prior to writing a prescription for a controlled substance in an effort to identify aberrant use (►**Fig. 1**).[10]

However, the validity and reliability of a PMP in the postpartum period has yet to be investigated. Therefore, we sought to investigate the prevalence of postpartum patients administered opioids within 24 hours prior to discharge who were able to be detected through the Illinois PMP. We also investigated if there were any sociodemographic or clinical factors associated with detection in the PMP.

Methods

We conducted a retrospective cohort analysis of women with an Illinois address who delivered via cesarean section and administered opioids within 24 hours prior to discharge at Northwestern Memorial Hospital between August 21, 2017 and March 1, 2018. Women were included if they received antenatal care within the five Northwestern Medicine obstetric and midwifery practices to facilitate access to their prenatal records to identify potential covariates. We limited our analysis to women undergoing cesarean section and administered opioids within 24 hours prior to discharge, as we hypothesized that these women would be most likely to fill a prescription for opioids after discharge from the hospital at an Illinois pharmacy. All names and dates of birth were entered in the PMP and correlated with dates of discharge through the electronic medical record. Patients were noted to have an identifiable PMP record if there was evidence of filling a prescription opioid within 3 months of discharge (►**Fig. 1**).

Sociodemographic and medical data were abstracted from the medical record. Bivariable analyses, utilizing Chisquared or Fisher's exact test for categorical variables or Wilcoxon's rank-sum test for continuous variables, were used to assess if there were any sociodemographic or medical factors that were associated with having an undetectable

record of filling a postpartum prescription for an opioid in the PMP. Multivariable logistic regression was performed, controlling for prespecified covariates. Maternal age, parity, body mass index (BMI), maternal race/ethnicity, insurance status, and history of cesarean section were selected because they have been demonstrated to be associated with postoperative opioid use in the literature.[11–13] Year of delivery was included in the model given the rapid secular changes in opioid prescription recommendations during this time, as well as the potential for evolution in PMP accuracy.[7,14] Finally, we included county of residence as women who resided close to the border may have been more likely to fill their prescription in an adjoining state, thus making them undetectable in the Illinois PMP.

A prespecified subgroup analysis was performed to assess whether the association between women utilizing the highest quartile of opioids 24 hours prior to discharge and a detectable PMP record differed by medical or sociodemographic factors by using a Breslow–Day test of interaction. This specific subgroup was chosen as we felt this population to be at the highest likelihood of filling a prescription for opioids upon discharge. A p-value of 0.05 was used to indicate statistical significance. All analyses performed in Stata 15.1 (StataCorp, Cary, NC). All reported analyses and outcomes adhere to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines (►**Supplementary Material S1**; available online only).[15] Approval from the institutional review board was obtained from Northwestern University (STU00206703) prior to data collection.

Results

A total of 517 women underwent cesarean section during the study time period, of whom 344 (66.5%) used opioids within 24 hours of discharge. Of these 344 women, 169 (49%) had detectable PMP records indicating they filled a prescription for opioids within 3 months after delivery. Baseline medical and demographic information between those with and without a detectable PMP record were notable for a higher incidence of women having a detectable PMP record in 2018 versus 2017 ($n = 110/244$ (45%) in 2017 vs. $n = 59/100$ (59%) in 2018, $p = 0.019$; ►**Table 1**). Other covariates were not significantly different between groups.

The median morphine equivalents (MEQs) noted in the PMP was 205, with an interquartile range of 100 to 300 MEQs. Only four women filled a prescription for more than one opioid during the study timeframe, and 159 of the 169 detectable PMP records (94.1%) were for hydrocodone/acetaminophen.

After controlling for prespecified covariates, only the year of delivery was independently associated with having a detectable PMP record (adjusted odds ratio [aRR] = 1.32, 95% confidence interval [CI]: 1.06–1.64, $p = 0.013$). If a birth

Table 1 Bivariable analysis of factors associated with identification of an opioid prescription in the prescription monitoring program

Variable	Opioid prescription identified in PMP		p-Value
	Yes $n = 169$	No $n = 175$	
Age (y)	34 (31–37)	34 (31–37)	0.206
Nulliparity	71 (42.0)	64 (36.6)	0.302
BMI > 30 (kg/m²)	71 (42.0)	65 (37.1)	0.356
Race/ethnicity			
Non-Hispanic white	86 (50.9)	76 (43.4)	0.543
Non-Hispanic black	30 (17.7)	34 (19.5)	
Asian or Pacific Islander	13 (7.7)	21 (12.0)	
Hispanic	24 (14.2)	24 (13.7)	
Other	16 (9.5)	20 (11.4)	
History of cesarean section	58 (34.3)	73 (41.7)	0.158
Commercial insurance	136 (80.5)	141 (80.6)	0.882
Cook County residence	159 (97.5)	167 (97.1)	0.798
Year of delivery			
2017	110 (65.1)	134 (76.6)	0.019
2018	59 (34.9)	41 (23.4)	

Abbreviations: BMI, body mass index; PMP, Prescription Monitoring Program.
Note: data presented as median (interquartile range) or n (%).

occurred in 2018, there was 14% absolute increase in having a detectable PMP record when compared with a birth in 2017. Regarding the prespecified sensitivity analysis, a total of 52 women were identified as high opioid utilizers (e.g., using the top quartile of opioids 24 hours prior to discharge). Of these women, only 26 (50.0%) were detectable in the PMP. Breslow–Day tests of interaction demonstrated homogeneity in the risk for a detectable PMP record across all prespecified medical and sociodemographic variables.

Discussion

In this retrospective cohort study of women at high risk for utilizing opioids in the outpatient postpartum setting, only 49% had a detectable PMP record for filling a perioperative prescription for opioids. As these women were taking opioids on the day of discharge and a prescription for postoperative opioids was provided, we suspect that the absence of records in the PMP is due to inaccuracy of the source, rather than an absence of filling opioids prescriptions. Corroborating this hypothesis was the finding that advancing epoch of delivery was independently associated with a 32% higher chance of successful identification in the PMP. Insofar, as outpatient prescriptions have been declining over time, these data suggest the accuracy of the PMP is dynamic and, perhaps, improving with increased pharmacy utilization.[16]

To the best of our knowledge, this study is the first of its kind to assess the reliability of identifying postpartum women in a statewide PMP who are at high risk of opioid utilization after discharge. ACOG has specifically emphasized opioid stewardship in regards to postpartum prescribing, and recommends referencing the state PMP prior to prescribing opioids for any patient.[7] PMPs have been implemented in a majority of states and have been associated with a decrease in prescription of schedule two opioids (e.g., hydromorphone and oxycodone).[17] However, limited data exist surrounding the relationship between a PMP and a reduction in multiple provider prescriptions or inappropriate prescribing patterns.[17] Our data call into question the overall accuracy of the PMP in identifying patients at high likelihood for filling a prescription opioid in the postoperative setting.

Our prevalence of filling a prescription for an opioid post-cesarean delivery that is detectable in the PMP is lower than other studies. Osmundson and colleagues noted that among 179 women who underwent cesarean section, 83% filled a prescription for an opioid, which was corroborated through both patient survey and querying the statewide PMP.[18] Prabhu and colleagues note that among 624 women who underwent cesarean section, 95% were prescribed opioids upon discharge.[16] Within our own institution, Badreldin and colleagues noted that 86.7% of women who underwent a cesarean section received a prescription for an opioid prior to discharge.[19] However, the latter two studies did not elucidate whether or not these prescriptions were filled through querying a PMP. Nevertheless, they suggest that outpatient opioid dispensation likely exceeds what we identified via PMP query.

Based on our data, both sociodemographic and medical factors are ill equipped to accurately predict the detection of

a PMP record for a prescription opioid. An important caveat is that rates of detection improved over time among the entire cohort. However, the need for further validation of our findings in the current era of utilization of PMPs prior to prescribing opioids is needed, particularly in a prospective fashion with corroboration from patient report of opioid prescription dispensation.[9]

Major strengths of this study include deriving our sample from a large, quaternary care center in a major metropolitan area of the United States. Detailed sociodemographic, biomedical, and prescription data were able to be obtained through our electronic medical record (EMR), which was utilized in our analysis. Moreover, we were able to individually query the statewide PMP to accurately assess whether or not a given patient had a detectable record.

Limitations

Limitations include the overall sample size of our study, which was small due to an EMR platform change, which would have affected the quality of data obtained. We were unable to assess whether physicians prescribed opioids to the cohort in question and were only able to assess whether or not a prescription for an opioid was filled. However, given previous data suggesting frequencies of filling a prescription opioid post-cesarean delivery between 83 and 95% among women prescribed opioids, our finding that the frequency was less than what is reported in the literature suggests the possibility of an issue in the PMP.[16,18,19] Furthermore, the small timeframe in which our study performed was during the early initiation of an PMP in our state may have affected the quality of data obtained from the database. This finding may represent issues with the implementation of the PMP, though our data suggest that detection may improve over time. Finally, we were unable to look at clinical variables, such as number of previous cesarean sections or intraoperative complications, which could contribute to a higher or lower risk of filling a prescription opioid.

Conclusion

In this retrospective cohort analysis of women who underwent cesarean-section delivery and utilized opioids within 24 hours prior to discharge, only 49% had evidence of an opioid prescription dispensation in the PMP. No sociodemographic or medical factor was associated with a detectable PMP record for a prescription opioid. However, year of delivery was independently associated with a detectable PMP record, calling into question the accuracy of the PMP as a mean to identify prescription filling patterns while suggesting a potential improvement in the PMP's database over time. Further studies should assess the accuracy of PMPs in accurately detecting prescription opioid use in the postpartum period. In the interim, caution should be taken when utilizing the PMP for reassurance pertaining to a history of aberrant prescription opioid use.

Key Points

1. The postpartum accuracy of PMPs is unknown.
2. 49% of women post-cesarean section had a detectable PMP record.
3. Year of delivery was associated with having a detectable PMP record.

Presentation
Accepted as an abstract at the Society for Maternal-Fetal Medicine's 40th Annual Pregnancy Meeting, February 3 to 8, 2020, Grapevine, Texas.

Conflict of Interest
The authors report no conflict of interest to declare.

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