

Applying the OMOP Common Data Model to Characterize Postpartum Healthcare Utilization at an Academic Medical Center: A Feasibility Study

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Background

The postpartum period is a critical time for reproductive care; to manage recovery from childbirth, address complications experienced during pregnancy or childbirth and monitor for emergent developing problems. Currently, the American College of Obstetricians and Gynecologists (ACOG) recommends personalized, ongoing postpartum care beginning no later than three weeks following birth with follow-up visits as needed up to a concluding visit no later than 12 weeks postpartum.¹ However, available data suggest at least 25% of women in the United States do not attend any postpartum visit.² Analyzing health network data to describe the prevalence of postpartum care attendance within the first twelve weeks can inform our understanding of postpartum care utilization in the United States, including adherence to proposed ACOG guidelines. The purpose of this study was to demonstrate the feasibility of applying Observational Medical Outcomes Partnership Common Data Model (OMOP-CDM) standardized EHR data to characterize postpartum care utilization, and to develop a computable phenotype suited for scalable, multi-site replication across the OHDSI network.

Methods

Using de-identified electronic health record (EHR) data for 2.1 million patients seen at Johns Hopkins University (JHU) between 2017-2024, that has been standardized with the OMOP Common Data Model (CDM), we created a cohort of patients that received continuous care through the health system (rather than having a delivery at the hospital but accessing prenatal and postnatal care elsewhere). We included patients with the following criteria: female, ages 12-55, singleton live birth, and at least 2 occurrences of procedures, observances, or measurements indicative of prenatal care within 250 days prior to birth. Prenatal care occurrences included various components of obstetrical care that are commonly recorded in a pregnant patient's EHR, such as antenatal visits, ultrasounds, or nonstress tests. The OMOP standard concepts for identification of these criteria were tested to compile a preliminary validated computable phenotype for this characterization measure on a single instance of OMOP data, to prepare for using in measuring postpartum healthcare utilization at a global scale.

A descriptive analysis was then conducted to assess the prevalence and type of visit occurrences within 3, 6, and 12 weeks postpartum (+/- 7 days for each defined time to allow for scheduling variance in outpatient visits). Visit types included outpatient, inpatient, and emergency department (ED). This study was reviewed and approved by the Johns Hopkins Institutional Review Board (Protocol #IRB000453833) and the GitHub link is: https://github.com/OHDSI-JHU/MHF_PP_Utilization.

Results (Table 1)

The cohort consisted of n= 38,642 patients who met inclusion criteria and delivered between July 1, 2017, and December 31, 2024. Only 32.1% (n=12,394) of patients attended an outpatient visit in the first

three weeks postpartum, while 47.3% (n=18,287) did so in the first 6 weeks, and 66.2% (n=25,520) in the first 12 weeks. While ED and inpatient visits had lower prevalence, by week 12, 2.9% of patients (n=1,105) had been seen in the ER, and 2.2% of patients had been seen in an inpatient setting.

Table 1. Cumulative prevalence of healthcare visits among postpartum patients by week and type of visit				
Week Postpartum	ED (n (%))	Inpatient (n (%))	Outpatient (n (%))	All Encounters (n (%))*
3	416 (1.08%)	605 (1.57%)	12,394 (32.07%)	12,589 (32.58%)
6	576 (1.49%)	674 (1.74%)	18,287 (47.32%)	18,493 (47.86%)
12	1,105 (2.86%)	831 (2.15%)	25,590 (66.23%)	25,798 (66.76%)
*Patient could have experienced multiple visits and be included in the ED, inpatient, and outpatient counts and prevalences. The “All Encounters” column represents each patient, rather than each visit.				

Table 1. Cumulative prevalence of healthcare visits among postpartum patients by week and type of visit

Conclusion

This study demonstrates that OMOP CDM-standardized EHR data from a single academic medical center can be used to operationalize and measure adherence to ACOG postpartum care guidelines at scale. The computable phenotype developed here is designed for straightforward deployment across OHDSI network sites, enabling future multi-site replication without requiring site-specific data harmonization. Findings showed only two-thirds of postpartum women who delivered at JHU received follow-up care at JHU within the first 12 weeks following childbirth, which translates to potentially missed emergent and severe complications, including postpartum onset preeclampsia or depression. Incomplete reproductive care could impact future pregnancies, overall health, and costs for both the patient and the health system.³ Limitations of this study include the possibility of not fully capturing patients who received only delivery care at the facility and obtained postpartum follow-up care from a provider outside the site’s EHR system. This limitation was potentially remedied by needing at least two instances of ‘prenatal care’. Additionally, data could be missing or incomplete within the OMOP CDM. This study provides preliminary data to suggest patients may not receive the recommended amount of follow-up during the crucial postpartum period. Larger studies with multiple sites are necessary to understand these patterns and further determine postpartum healthcare utilization following ACOG’s updated postpartum care recommendations, and this work offers a computable phenotype that is designed specifically for scalable and reproducible measurement of postpartum care over the global OHDSI network.

References

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