Estimating the Effect of Postpartum Depression Treatment on Child Development using Non-OMOP Data and OHDSI Analytics Tools

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Background

- Postpartum depression (PPD) is one of the most common complications of childbearing, estimated to affect 10-15% of mothers worldwide.
- There are negative associations between PPD symptoms and infant cognitive development, language development, behaviors, and sleep quality.
- The recommended treatments for PPD are psychological therapy or pharmacotherapy, typically a selective serotonin reuptake inhibitor (SSRI).
- We aimed to emulate a randomized controlled trial estimating the effect of anti-PDD treatment on child development from observational data.
- As our data source is not compatible with the OMOP CDM, we suggest a hybrid analysis pipeline, which enables utilization of OHDSI's estimation tools on non-OMOP data.

Methods

Data: Primary care electronic medical records from IQVIA Medical Research Data (IMRD) incorporating data from The Health Improvement Network (THIN, a Cegedim database), which covers approximately 6% of the UK population, and is representative of the population in terms of demographics and condition prevalence[1]. The data model was not OMOP-CDM.

Eligibility criteria: Women who gave first live birth between 2000 and 2017, at age 18 to 45 years, and had one of the following during the six months postpartum (trial period): depression, anxiety, depression symptoms or anxiety symptoms. We excluded subjects without a linked child's record and subjects with inactive medical file.

Treatment assignment: Either an SSRI prescription or a medical code indicating non-pharmacological treatment (NPT) for depression during the trial period.

Outcome: Children having a recorded medical code indicating neurodevelopmental or behavioral disorder from the end of the trial period until the age of five[2].

Effect estimation:

- For each mother, we extracted a multitude of features, representing her socio-demographics, mental health history, pregnancy complications and birth.
- We transformed the extracted feature, treatment, and outcome data into a CohortMethodData object, allowing usage of the OHDSI analytic tools[3] (ver 3.1.1) (Fig 1).
- We matched pairs of treated and untreated women using a propensity model, fitted a conditional regression outcome model and calculated the treatment risk ratio.

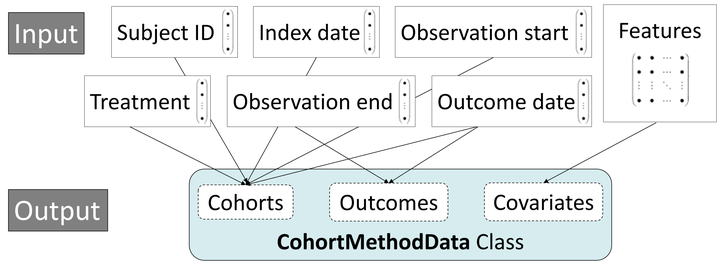

Figure 1: Transformation of non-OMOP data into a CohortMethodData object

Results

- The cohort included 17,407 eligible women (age 28.9±6.1), and their children (Table 1).
- The average age of the children at the occurrence of the outcome event was 2.8±1.1 years.
- Applying propensity score one-to-one matching resulted in 3169 women in each treatment group (pre-matching model's area under the ROC curve was 0.83).
- The treatments reduced the risk of neurodevelopmental disorders by 15% (from 1.087 with 95% CI [0.962-1.229] to 0.85 [0.707-1.022], P=0.07).
- Similar reduction was obtained when comparing SSRI treatment to NPT or no treatment (Fig 2).

	Treated	Untreated
N	13,395	4012
Age	28.7±6.1	29.6±5.9
Pre-pregnancy BMI	26.1±6.1	25.6±5.7
Deprivation index quantile	3.3±1.3	3.1±1.3
Gestational week	39.7±2.1	39.8±2.1
Child developmental disorder Dx	1100 (8.2%)	303 (7.5%)

Table 1: Cohort characteristics

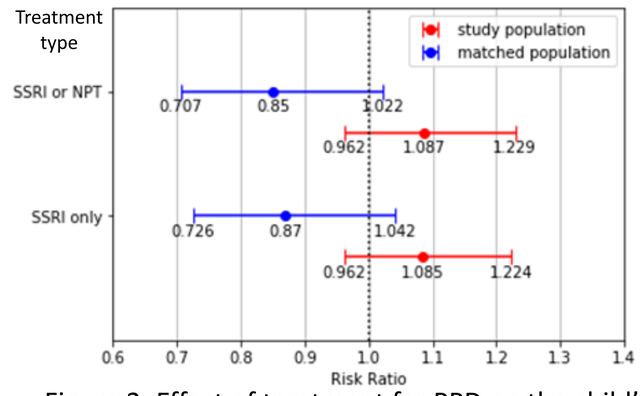

Figure 2: Effect of treatment for PPD on the child's risk of neurodevelopmental or behavioral disorder.

Conclusions

- Our analysis suggests that postpartum depression treatment (SSRI or non-pharmacological treatment) during the first six months after giving birth reduces the risk of the child's neurodevelopmental disorders.
- Our data analysis approach enabled to utilize the strength of OHDSI's population estimation tools on non-OMOP data.
- Future work will consider additional child development outcomes (such as motor and sensory development delay) and more refined treatment protocols. It may also consider treatment duration and dose to obtain more accurate estimations.

References

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2. Petersen, I. *et al.* Risks and benefits of psychotropic medication in pregnancy: cohort studies based on UK electronic primary care health records. *Health Technol Assess* **20**, 1–176 (2016).
3. Schuemie, M., Suchard, M. & Ryan, P. *CohortMethod: New-user cohort method with large scale propensity and outcome models*. (2020).

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