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THE EPIDEMIOLOGY OF POSTPARTUM DEPRESSION (PPD) IN A COMMERCIALLY INSURED POPULATION

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INTRODUCTION

The American Psychiatric Association characterizes postpartum depression (PPD) as a major depressive episode with peripartum onset or within 4 weeks of childbirth;[1] in clinical practice, PPD is often recognized as depression that occurs between 4 weeks and up to 1 year after childbirth.[2]

- Symptoms may include diminished interest/pleasure, depressed mood, difficulty bonding with the baby, insomnia, and thoughts of suicide.[3,4]

PPD affects an estimated 10–20% of women in the United States following childbirth. Prevalence estimates vary widely due to assessment methods (e.g. interviews, Patient Health Questionnaire-9 [PHQ9], Edinburgh Postnatal Depression Scale [EPDS]), timing, and population characteristics.[5]

OBJECTIVE

To estimate the rate of PPD cases among live births in a large, nationally representative commercial insurance claims database.

METHODS

Study Design and Data Source

This was a retrospective cohort study, using de-identified claims (1/1/2012–12/31/2014) from the commercial claims core data set that is part of the Truven Health Analytics MarketScan® Research Databases. Coverage is provided under a variety of fee-for-service, fully capitated, and partially capitated health plans, including preferred provider organizations, point of service plans, indemnity plans, and health maintenance organizations.

Study Cohort and PPD Case Identification

Criteria that were used to develop the study cohort are described in **Figure 1**.

- Date of first delivery in identification period was defined as the index date.
- Subsequent claims identifying a live birth were considered evidence of a new pregnancy if the subsequent claim was at least 6 months after the first live birth; all live births were included in the analysis.

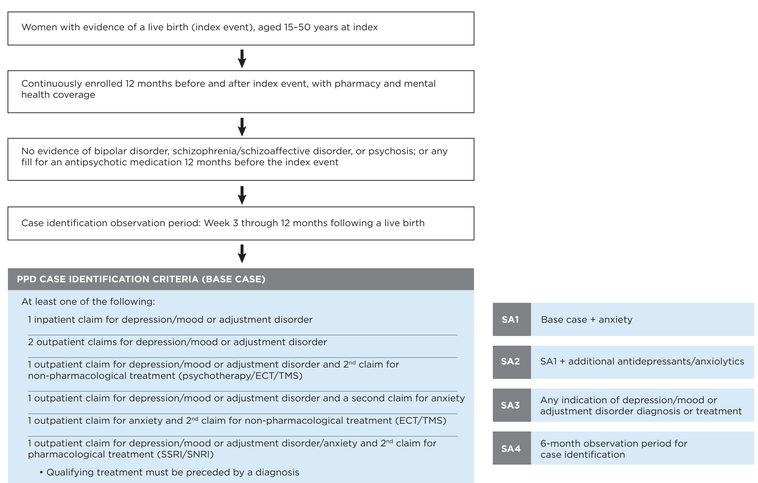
PPD case identification was based on an observation period that began at Week 3 through 12 months following a live birth to avoid identifying short-term depression as PPD.

PPD cases were identified based on diagnosis codes (depression or adjustment disorder), procedure codes (psychotherapy, electroconvulsive therapy), and drug codes for pharmacologic treatment on the inpatient, outpatient, or pharmacy claims.

Case identification criteria were varied in sensitivity analyses (SAs) to determine the impact on the PPD rate.

- **SA1:** Anxiety considered a qualifying diagnosis on an inpatient claim or on a second outpatient claim
- **SA2:** Criteria for SA1 plus inclusion of other antidepressants and anxiolytics as qualifying prescription drugs
- **SA3:** Single claim for either depression or treatment with ECT, TMS, psychotherapy, SSRI or SNRI
- **SA4:** 6-month observation period for case identification

Figure 1 **PPD Study Cohort and Case Identification Criteria**



ECT: electroconvulsive therapy; PPD: postpartum depression; SA: sensitivity analysis; SNRI: serotonin-norepinephrine reuptake inhibitor; SSRI: selective serotonin reuptake inhibitor; TMS: transcranial magnetic stimulation.
Delivery codes: Diagnosis: ICD-9 650, 651.x1, 644.21, 645.11, 645.21, 649.81, 649.82, 669.70, 669.71, V27.0, V27.2, V27.5, V27.9; Procedure codes: CPT 59409, 59410, 59514, 59612, 59614, 59620; ICD-9 72.0, 72.1, 72.21, 72.29, 72.31, 72.39, 72.4, 72.51-72.54, 72.6, 72.71, 72.79, 72.8, 72.9, 73.22, 73.59, 73.6, 74.0-74.2, 74.4, 74.99; DRG 370–375, 765-768, 774, 775; Stillbirth: ICD-9 V27.1, V27.3, V27.4, V27.6, V27.7, 651.31, 651.41, 651.51, 651.61
Diagnosis codes: Depression/mood or adjustment disorder: ICD-9 648.40-648.44, 311, 296.20, 296.22, 296.23, 296.25, 296.26, 296.30-296.33, 296.35, 296.36; ICD-10 F32.0, F32.1, F32.2, F32.4, F32.5, F32.8, F32.9, F33.0-F33.2, F33.4, F33.8, F33.9, F34.8, F34.9, F43.2, O90.6, R45.8; Anxiety: ICD-9 300.0, 293.84, 309.24, 309.28, 296.9, 309.0, 309.1; ICD-10 F06.4, F41.0, F41.1, F41.3, F41.8, F41.9, F43.0, F43.8, F43.9; Bipolar: ICD-9 296.0, 296.1, 296.4, 296.5, 296.6, 296.7, 296.8 ; Schizophrenia: ICD-9 295.x, 290.x ; Psychosis: ICD-9 291.x-294.x, 296.24, 293.89, 296.34

Study Measures and Descriptive Analyses

Descriptive analyses included the calculation of frequencies of PPD cases for each calendar year, and overall.

- Annual rate: Proportion of live births with evidence of PPD during the observation period, among women who gave birth during the specified calendar year.
- Overall rate: Proportion of live births with evidence of PPD among live births during the entire study period.

Service utilization associated with PPD cases was characterized as high, moderate, low, or no treatment (mutually exclusive categories; **Table 1**).

PPD-related medication use was characterized according to the number of distinct pharmacological therapies indicated for treating symptoms related to depression that were associated with a PPD case.

Sensitivity Analyses

Sensitivity analyses were conducted to assess the impact of varying criteria for case identification (qualifying diagnoses, qualifying prescription drugs, and length of the observation period) on the frequency of PPD cases in the study cohort.

Table 1 **PPD Service Utilization Categories**

Category	Description
High Service Utilization	Any of the following:
	Inpatient/ER claim with primary diagnosis of depression/mood or adjustment disorder/anxiety
	Suicide attempt/ideation
	Residential psychotherapy (Inpatient)
	ECT
	TMS
	Use of 3 or more distinct pharmacological treatments during the 6 months after PPD diagnosis
	Greater than 16 non-residential psychotherapy (Outpatient) visits during the 6 months after PPD diagnosis
Medium Service Utilization	Any of the following:
	Greater than 4 non-residential psychotherapy (Outpatient) visits during the 6 months after PPD diagnosis
	Residential psychotherapy (Outpatient)
	At least 1 pharmacological treatment
Low Service Utilization	Any non-residential psychotherapy (Outpatient)
No Treatment	None of the above

ECT: electroconvulsive therapy; ER: emergency room; PPD: postpartum depression; TMS: transcranial magnetic stimulation.

RESULTS

Proportion of PPD Cases

A total of 350,193 deliveries were identified from 2012-14 in the database; of these, 25,094 cases of PPD were identified according to base case criteria, demonstrating an overall PPD rate of 7.2% (**Table 2**).

Among age groups, the rate of PPD was found to be highest in women aged ≤ 17 years (10.6%), compared with 7.0% among women aged 18–34 years and 7.0% in women ≥ 35 years (**Table 2**).

PPD rates varied by geographic region, with the numerically highest rate observed in the Midwest (8.1%) and the lowest in the South (6.7%; **Table 2**).

In the sensitivity analyses, SA3 (the inclusion of any indication of depression/mood or adjustment disorder diagnosis, or treatment) resulted in the highest PPD case rate of 18.3%, whereas SA4 (an observation period of only 6 months) resulted in a rate of only 4.5% (**Figure 2**).

More than three-quarters of PPD cases were characterized by moderate service utilization (78.2%), followed by high utilization (15.6%), no treatment (3.2%), and low utilization (3.0%; **Figure 3**). Overall, 88.2% of cases used at least 1 PPD-related pharmacologic treatment and ≥ 2 pharmacologic treatments were observed in 40.4% of cases.

Table 2 **Overall Rate of PPD: Base Case**

	All Deliveries		
	PPD Cases, n	Deliveries, N	PPD Rate, %
All	25,094	350,193	7.2
Age at Delivery			
≤ 17	197	1,865	10.6
18–34	18,161	259,018	7.0
≥ 35	6,736	89,310	7.5
Region			
Northeast	4,530	63,047	7.2
Midwest	6,231	77,186	8.1
South	9,908	147,793	6.7
West	4,425	62,167	7.1

RESULTS CONTINUED

Figure 2 **Overall and Yearly Rates of PPD: Base Case and Sensitivity Analyses**

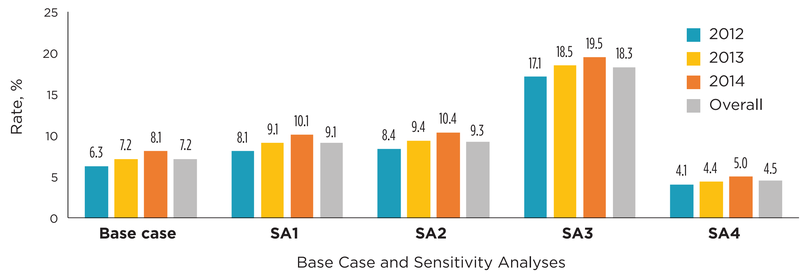
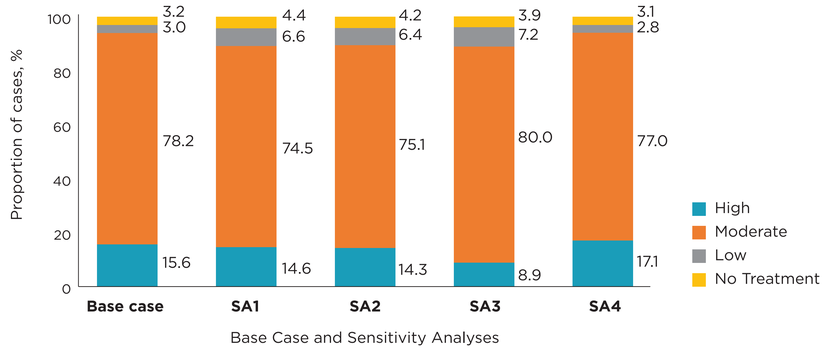


Figure 3 **Intensity of Service Use by Case Identification Criteria**



LIMITATIONS

Estimates of PPD frequency are based on administrative claims data rather than direct assessment using a screening tool; these estimates do not include women with PPD who do not seek treatment.

Results may not be generalizable to non-commercial or larger patient populations.

The study included only those with adequate follow-up and continuous enrollment, which may have excluded patients who potentially have disenrolled due to severe depression or other factors.

Data are from a US sample only; rates of PPD may be higher in low- and middle-income countries,[6,7] which have not been addressed in this study. In addition, estimated PPD rates in this sample may differ from other populations in the US with different characteristics related to age, socioeconomic status, or history of PPD.

CONCLUSIONS

The base case rate of PPD using a commercial claims database is lower than rates reported in studies using direct assessment. This suggests that there may be a sizable number of women with PPD who may not be identified and who do not receive treatment.

These findings suggest that there are opportunities to enhance screening programs to ensure that patients are appropriately diagnosed and treated.

Further research using other sources of data to validate claims-based identification of PPD cases may be warranted.

FOOTNOTE Results reported in the original abstract were generated as part of an exploratory analysis, on which the present base-case and sensitivity analyses are based.

REFERENCES 1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, 5th ed.: DSM-5. Arlington, VA: American Psychiatric Publishing, 2013. 2. Wisner KL et al. *Arch Womens Ment Health.* 2010; 13:37–40. 3. Grace SL et al. *Arch Womens Mental Health.* 2003; 6:263–274. 4. Meltzer-Brody S. *Dialogues Clin Neurosci.* 2011; 13:89–100. 5. O'Hara MW et al. *Annu Rev Clin Psych.* 2013; 9:379-407. 6. Howard LM et al. *Lancet.* 2014; 384:1775-1788. 7. Stewart RC. *Matern Child Nutr.* 2007; 3:94-107.

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DISCLOSURES. V. Bonthapally is an employee of Sage. R. Tieu and E. Chang are employees of Partnership of Health Analytic Research, LLC, a health services research company hired by Sage to conduct this research. L Gannu is a Graduate Teaching Assistant at MCPHS University. S. Meltzer-Brody reports that her institution receives grants for the conduct of clinical trials from Sage Therapeutics, Inc.