

## Introduction and Objectives

### INTRODUCTION

- Postpartum depression (PPD) affects approximately 10–20% of women following childbirth, corresponding to an estimated annual rate of 500,000–750,000 women.<sup>1,2</sup>
  - Symptoms may include diminished interest/pleasure, depressed mood, difficulty bonding with the baby, insomnia, and thoughts of suicide.<sup>3,4</sup>
- PPD has multiple definitions. The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (5th Edition) characterizes PPD as a major depressive episode with peripartum onset or within 4 weeks of childbirth.<sup>5</sup> In clinical practice, PPD is often recognized as depression that occurs between 4 weeks and up to 1 year after childbirth.<sup>6,7</sup>

### OBJECTIVES

To examine the pattern of PPD diagnosis over 1-year postpartum using different PPD definitions and to use this pattern to approximate PPD rate in a new population.

## Methods

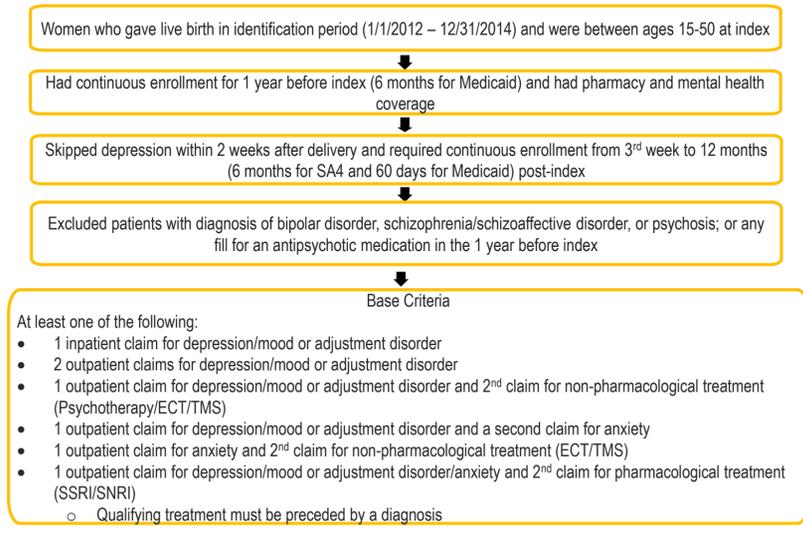
### STUDY DESIGN AND DATA SOURCE

- Retrospective cohort study using the Truven MarketScan<sup>®</sup> commercial and Medicaid databases.
- Claims-based algorithm for PPD case identification derived from exploratory analysis.

### PATIENT POPULATION AND TIME FRAME

- Identified women who gave birth (see full code list in **Fig. 1**) in index period (1/1/2012-12/31/2014) and who were between 15 and 50 years old (**Fig. 1**).
  - Date of first delivery in identification period was defined as index date.
  - Subsequent claim with a delivery code was considered new pregnancy if claim was greater than 6 months from previous delivery date.
- Commercial database patients were required to have continuous enrollment for ≥1 year prior to and (for base case) 1 year following the index delivery date and to have both pharmacy and mental health coverage in health plan.
- Since Medicaid for pregnant women has limited coverage, continuous enrollment for 6 months before and 60 days after delivery was required.
- To avoid identifying short term, non-major depression ("baby blues") we did not look for depression in the first 2 weeks after delivery.
- Patients were further identified as having PPD (i.e., cases) based on the presence of certain conditions (e.g., depression or adjustment disorder; see full code list in **Fig. 1**) and treatment (e.g., psychotherapy, ECT, or pharmacologic treatment) in the inpatient, outpatient, or pharmacy claims (**Fig. 1**).
  - Patients with bipolar disorder, schizophrenia/schizoaffective disorder, or psychosis coding or use of prescription anti-psychotic medication in the year prior to index delivery were excluded.
  - The base case inclusion criteria were then modified according to conditions, treatment, or observation time to create 4 sensitivity analysis definitions (SA1-SA4, depending on the database) to identify upper and lower bound estimates of PPD rate (**Fig. 1**).
  - The observation period for Medicaid patients was 14-60 days after delivery. This observation period was applied to the base criteria and all sensitivity analyses.

Figure 1. PPD Identification



ECT: electroconvulsive therapy; TMS: transcranial magnetic stimulation; SSRI: selective serotonin reuptake inhibitor; SNRI: serotonin-norepinephrine reuptake inhibitor.  
**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, F32.3, 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  
<sup>a</sup> Only applicable to Commercial claims database population. Required continuous enrollment from 3 weeks to 6 months post-index.

### STUDY MEASURES

- Age at delivery
- Rate of PPD defined as the proportion of women identified with PPD during the observation period among women who gave birth within the entire multi-year study period
- Time to diagnosis was examined by assessing the distribution of PPD diagnosis timing in 2-month increments over the course of 1 year (2 months for Medicaid patients) following the index delivery date.

### STATISTICAL ANALYSIS

- Descriptive statistics were conducted to generated frequencies and proportions of PPD cases.
- Sensitivity analyses were conducted using modified claims-based definitions of PPD (**Fig. 1**) to assess the impact of variable definitions on estimates of PPD rate.
- To estimate a 1-year rate of PPD for Medicaid patients, we extrapolated the proportion of Commercial PPD cases that were identified in the first 2 months to the Medicaid population.

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. O'Hara MW, et al. Annu Rev Clin Psych. 2013; 9:379-407. 2. Hamilton BE, et al. National Center for Health Statistics, 2015,64,12. [http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64\\_12.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_12.pdf). 3. Grace SL, et al. Arch Womens Mental Health. 2003;6(4):263-274. 4. Meltzer-Brody S. Dialogues Clin Neurosci. 2011;13(1):89-100. 5. APA. Diagnostic and statistical manual of mental disorders, 5th ed.: DSM-5. Arlington, VA: American Psychiatric Publishing, 2013. 6. Wisner KL, et al. N Engl J Med. 2002;347:194-199. 7. Gaynes BN, et al. Evid Rep Technol Assess (Summ). 2005;1-8. 8. Howard LM et al. Lancet. 2014;384(9956):1775-1788. 9. Stewart RC. Matern Child Nutr. 2007;3(2)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 is the PI and receives research grant funding from Sage Therapeutics.

## Results

- A total of 350,193 and 549,585 deliveries were identified from 2012-2014 in the Commercial and Medicaid databases, respectively (the total number of deliveries for the Commercial population under the SA4 definition was 447,303).
  - In the Commercial population, 25,094 (rate of 7.2%) had a diagnosis of PPD under the base case criteria.
  - In the Medicaid population, 11,040 (rate of 2.0%) had a diagnosis of PPD under the base case criteria (**Table 1**).
- The age group with the highest rate of PPD was ≤17 years for both databases (**Table 1**).
- PPD prevalence estimates in the sensitivity analyses ranged from 4.5% (SA4) to 18.3% (SA3), and from 2.4% (SA1) to 9.9% (SA3) in Commercial and Medicaid databases, respectively (**Fig. 2**).
- For commercially insured patients, the distribution of diagnosis timing varied according to each PPD definition; however, most diagnoses occurred within the first 2 months for all of the definitions (**Table 3; Fig. 3**).
- If the same pattern in timing of diagnosis for commercial patients using base criteria was also observed in Medicaid patients, then we could expect the Medicaid PPD rate at 1-year following delivery to be about 6% (**Fig. 2**).
  - Using the SA3 inclusion criteria, which was comparable for Commercial and Medicaid populations, the approximate rate of PPD in the Medicaid population would be about 22% using the above method (**Table 3**).

Table 2. Overall Rate of PPD (2012-2014): Base Case

	All Deliveries		
	PPD, N	Deliveries, N	Prevalence, %
<b>Commercial Claims</b>	25,094	350,193	7.2%
<b>All</b>			
<b>Age at delivery</b>			
<=17	197	1,865	10.6%
18-34	18,161	259,018	7.0%
>=35	6,736	89,310	7.5%
<b>Medicaid</b>			
<b>All</b>	11,040	549,585	2.0%
<b>Age at delivery</b>			
<=17	398	15,588	2.6%
18-34	9,746	495,316	2.0%
>=35	896	38,681	2.3%

Figure 2. Prevalence Rate of PPD: Base Case and SA Criteria

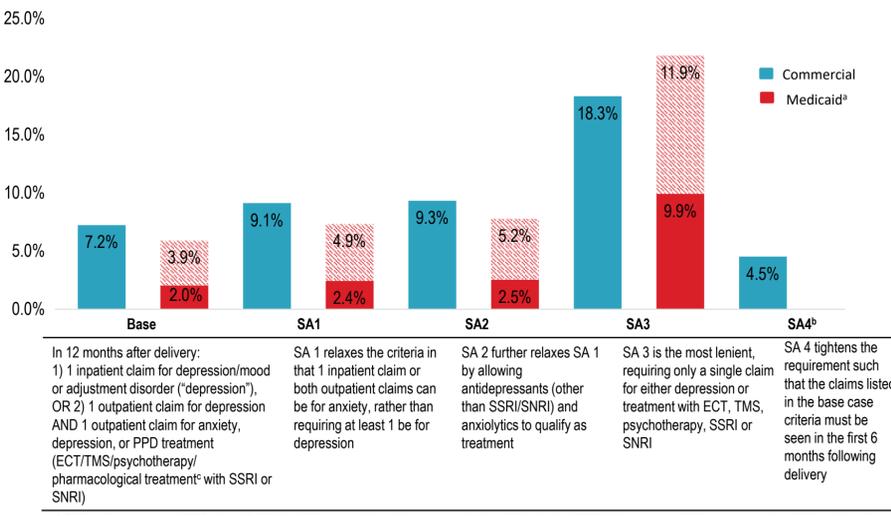
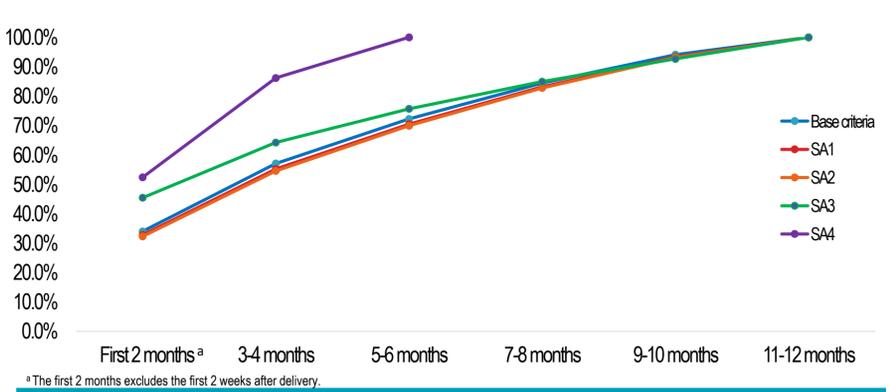


Table 3. Time of Diagnosis of PPD

	Prevalence of PPD	No. of PPD patients	% of PPD patients diagnosed						
			First 2 months <sup>a</sup>	3-4 months	5-6 months	7-8 months	9-10 months	11-12 months	
<b>Commercial Claims</b>									
Base criteria	7.2%	25,094	34.0%	23.1%	15.2%	12.2%	9.6%	5.9%	
SA1	9.1%	31,754	32.8%	22.4%	15.3%	12.7%	10.2%	6.7%	
SA2	9.3%	32,700	32.3%	22.3%	15.4%	12.9%	10.4%	6.9%	
SA3	18.3%	64,225	45.4%	18.8%	11.5%	9.3%	7.7%	7.3%	
SA4	4.5%	19,989	52.4%	33.8%	13.8%	NA	NA	NA	
<b>Medicaid *</b>									
Base criteria	2.0%	11,040	100.0%	NA	NA	NA	NA	NA	
SA1	2.4%	13,340	100.0%	NA	NA	NA	NA	NA	
SA2	2.5%	13,864	100.0%	NA	NA	NA	NA	NA	
SA3	9.9%	54,227	100.0%	NA	NA	NA	NA	NA	

\* Medicaid rates are not directly comparable to Commercial Claims due to differences in inclusion criteria. <sup>a</sup> The first 2 months excludes the first 2 weeks after delivery.

Figure 3. Accumulation of PPD Diagnoses over 1 Year: Commercial Claims



## Limitations

- Medicaid rates were not directly comparable to those in the Commercial population due to differences in inclusion criteria, and may not be generalizable to a non-Medicaid population.
- We assumed that the pattern of diagnosis (i.e. accumulation of diagnoses over 1 year) observed in the Commercial population would be similar in the Medicaid population.
- Claims are coded for reimbursement rather than research; thus, the accuracy and completeness of coding cannot be verified.
- The study included only those with adequate follow-up and continuous enrollment, potentially excluding patients who may have disenrolled due to severe depression.
- Data are representative of US sample only. Other studies report higher rates of PPD in low and middle income countries,<sup>8,9</sup> which we do not address in this study.

## Conclusions

- Our study found that only one-third of total PPD cases were identified in the first 60 days, suggesting that a restrictive definition dramatically underestimates the prevalence rate of PPD.
- The approximated 1-year PPD rate among Medicaid patients is 5.9%, less than the rate for commercially-insured patients (7.2%).