

## 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

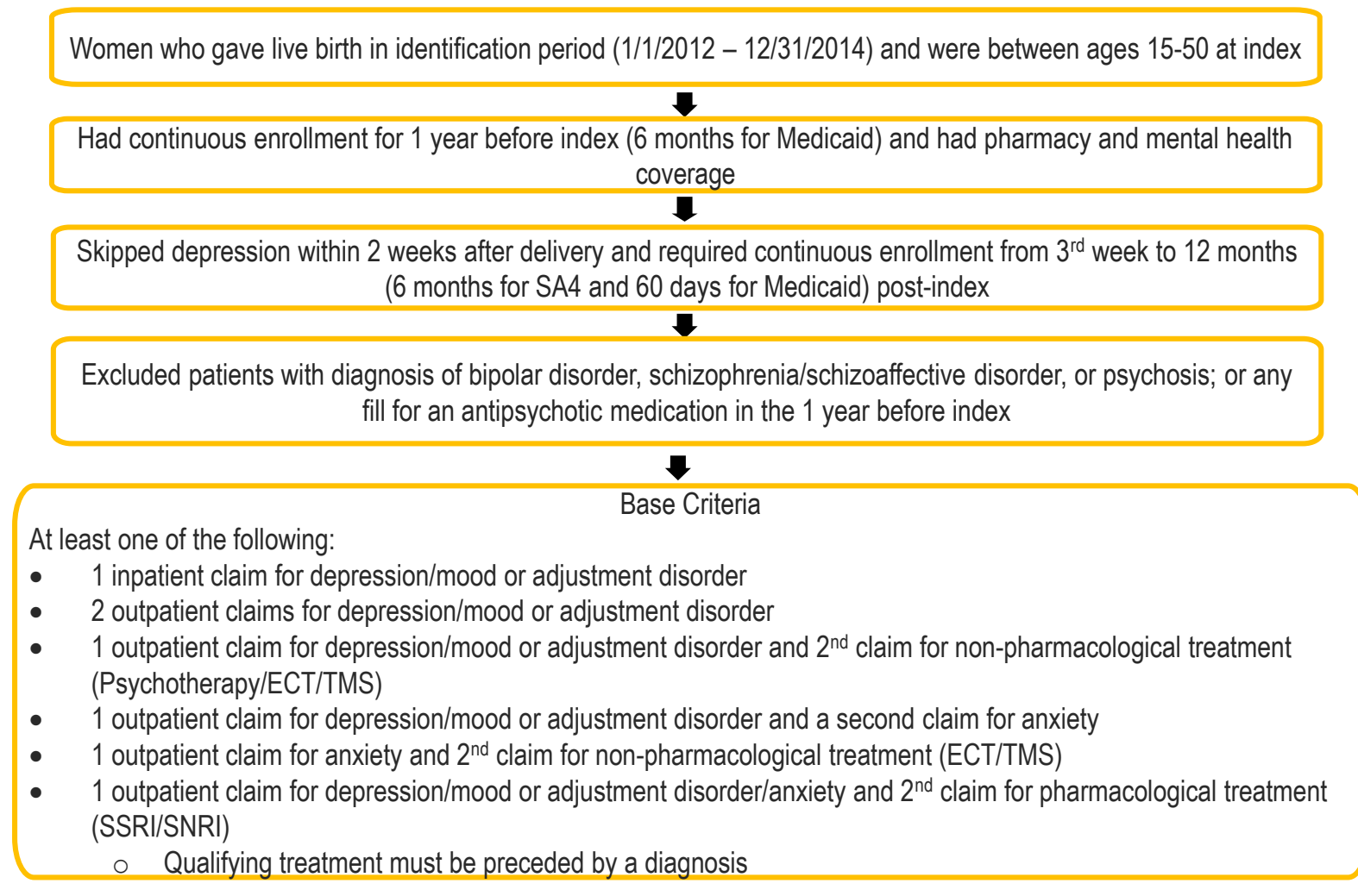
### STUDY DESIGN AND DATA SOURCE

- 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>\*</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.

SUPPORT This study was funded by Sage Therapeutics, Inc

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

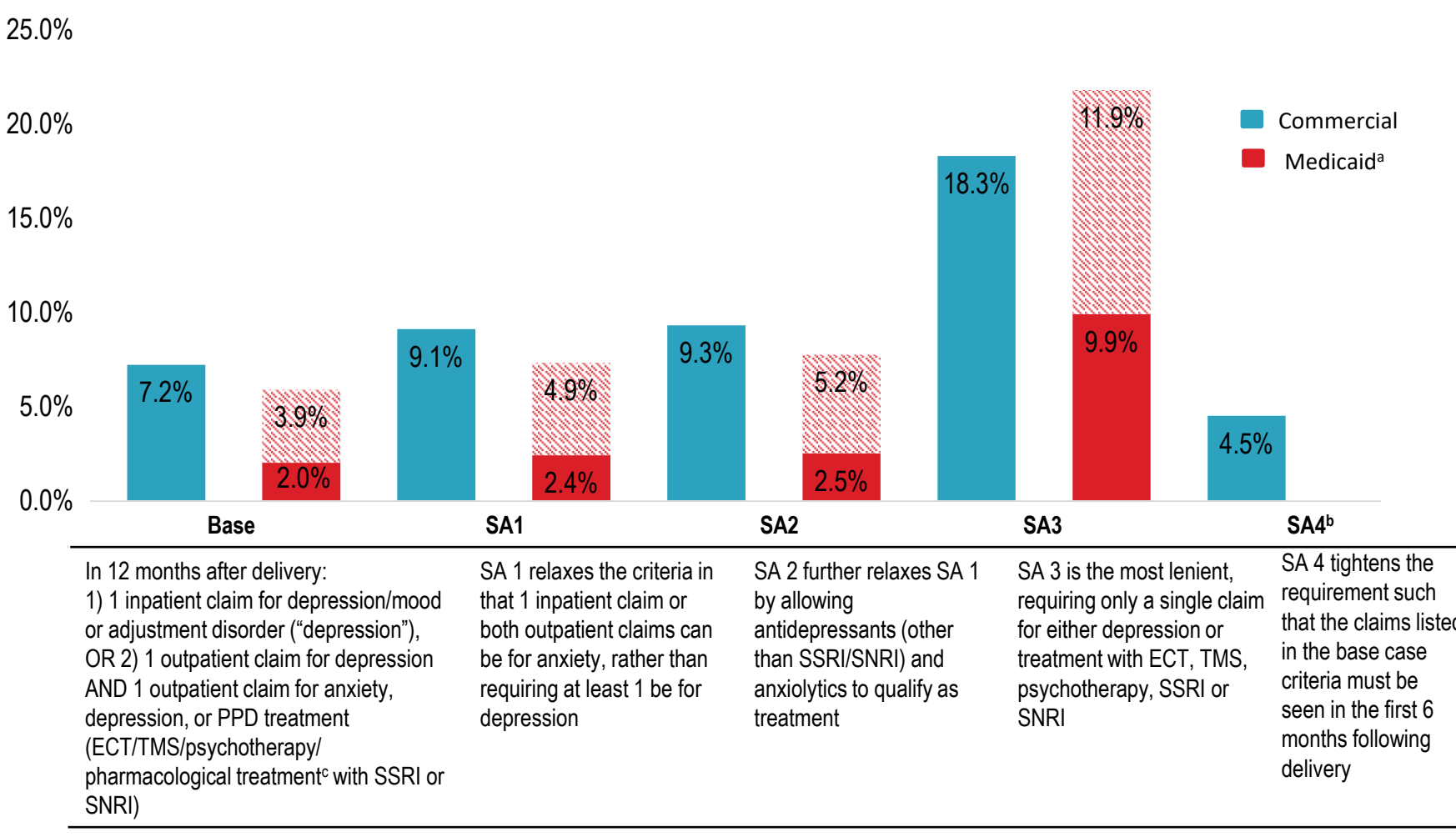
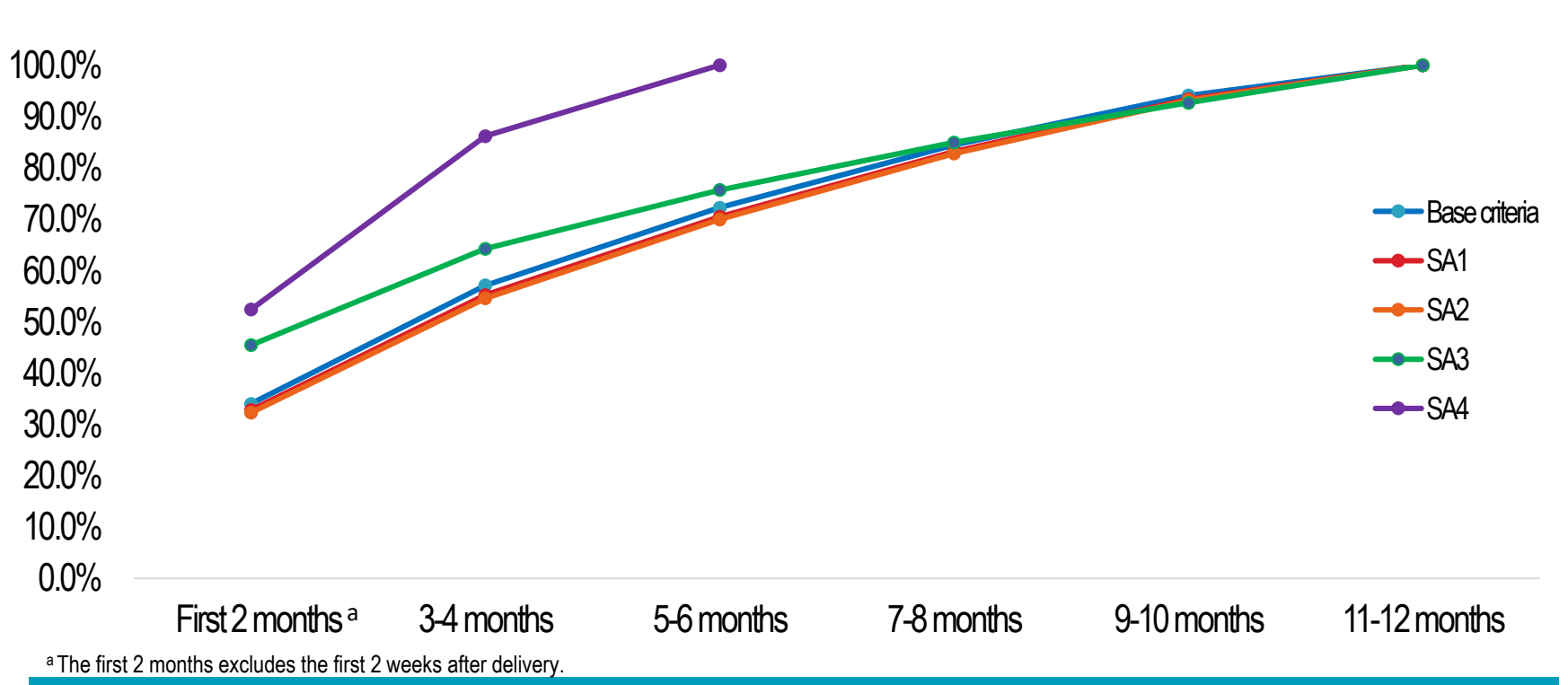


Table 3. Time of Diagnosis of PPD

	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



<sup>a</sup> The first 2 months excludes the first 2 weeks after delivery.

## 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%).