beyond oxytocin, $MgSO_4$ toxicity requiring calcium gluconate, neonatal ICU admission and perinatal death. PPH was defined by an EBL $\geq$ 1500 mL at delivery or the immediate postpartum period, a blood transfusion, or a hysterectomy for hemorrhage or atony. Comparisons were made based on the administration of of $MgSO_4$ anytime during the delivery hospitalization. Multivariable logistic regression was used to adjust for confounding.

RESULTS: Of the women in the initial cohort, 2,468 (2.1%) met inclusion criteria. The groups differed by maternal race, insurance status, tobacco/drug use and gestational age at birth. The crude and adjusted odds ratios (OR) are in Table. The frequency of composite maternal morbidity was significantly higher in women who received $MgSO_4$ (8.6%) compared with those who did not (3.9%; aOR 2.1). Those who received $MgSO_4$ had 4-fold higher odds of ICU admission (aOR 4.2) and were more likely to require additional uterotonics (aOR 1.6). Neonatal outcomes were similar. Magnesium toxicity occurred in 7 women (0.5%). Results were similar after adjustment for hospital.

CONCLUSION: When $MgSO_4$ is used in preeclampsia without severe features, it is associated with an increased risk of severe maternal morbidity.

Table - Maternal and neonatal outcomes comparing the use of magnesium sulfate in mild preeclampsia

	No magnesium sulfate use (N=1,115)	Magnesium sulfate used (N=1,353)	Adjusted odds ratio (95% CL)
Composite severe maternal morbidity	44 (3.9%)	117 (8.6%)	2.1 (1.5, 3.1)
Hemorrhage	37 (3.4%)	64 (4.8%)	1.4 (0.90, 2.1)
Hysterectomy	0	3 (0.2%)	P=0.49†
Pulmonary edema	2 (0.2%)	10 (0.7%)	P=0.09†
ICU admission	10 (0.9%)	55 (4.1%)	4.2 (2.1, 8.4)
Maternal death	0	0	n/a
Cesarean delivery	457 (41.0%)	540 (39.9%)	1.0 (0.84, 1.2)
Additional uterotonics other than oxytocin	119 (10.7%)	205 (15.2%)	1.6 (1.2, 2.0)
NICU admission*	192 (17.2%)	280 (20.7%)	0.94 (0.74, 1.2)
Perinatal or neonatal death	2 (0.2%)	2 (0.1%)	P=1.00†

Odds ratios from logistic regression models adjusted for maternal age, race/ethnicity, BMI, primary source of payment, tobacco use, illicit drug use, diabetes, and chronic hypertension
* Also adjusted for gestational age at delivery
† Unadjusted p-value.

433 Small for gestational age: Is neonatal morbidity related to preeclampsia?

Clifton O. Brock, Baha M. Sibai, PETRA Investigators
McGovern Medical School - University of Texas at Houston (UTHealth), Houston, TX

OBJECTIVE: Diagnosis of small for gestational age (SGA) newborns often occurs in the setting of pre-eclampsia (PreE) due to placental insufficiency. However, it is unclear whether the poor outcomes associated with SGA are caused by co- existing PreE, or simply related to the early gestational age (GA) at which these neonates deliver.

STUDY DESIGN: This is a secondary analysis of a prospective multicenter study designed to evaluate the role of placental growth factor in predicting PreE. Women were included in the parent study if they presented with concern for developing PreE. In our analysis, all women from the parent study with singleton, non-anomalous pregnancies who delivered a neonate with SGA were included. Women who developed PreE were compared to those who did not. The primary outcome was composite neonatal morbidity and mortality (Table 1). Secondary outcomes included respiratory distress syndrome (RDS), 5-minute Apgar score < 4, arterial cord gas pH less than 7.1, and cesarean delivery. Univariate analysis was performed to compare characteristics and outcomes between the groups. To control for GA, the groups were compared after stratification (i.e. delivery before vs after 32 weeks GA). Finally, multivariate logistic regression models were fit to determine adjusted odds ratios associated with PreE and GA at delivery for each outcome.

RESULTS: Of the 337 women that delivered an SGA neonate, 258 (77%) had PreE and 79 (23%) did not. The two groups had similar maternal age, BMI, rates of chronic hypertension, and pre-gestational diabetes. Women that developed PreE were more likely to be nulliparous, African American, or have pre-existing renal disease. Women that developed PreE delivered at earlier gestational ages (33 vs. 36 weeks, $p < 0.01$) with higher rates of composite neonatal morbidity (12% vs. 4%, $p < 0.01$) and Cesarean delivery (65% vs. 51%, $p = 0.02$, Table 1). However, after stratification by gestational age, there were no differences in any of these outcomes (Table 2). By multivariate analysis, PreE did not contribute to neonatal morbidity (OR = 1.3, 95% CI 0.3 − 6.9). Instead, decreasing GA at delivery was strongly associated with neonatal morbidity (OR = 0.6, 95% CI 0.5 − 0.7).

CONCLUSION: Among SGA newborns, GA at delivery, not concomitant PreE, is associated with neonatal morbidity. Risk of RDS, low Apgars scores, and Cesarean delivery are also independent of PreE.

Table 1: Characteristics and Outcomes of Patients that delivered an SGA Neonate

Characteristic	Women with Pre-eclampsia (n = 258)	Women without Pre-eclampsia (n = 79)	P-Value*
Maternal Age	29.3 ± 6.7	30.6 ± 6.0	0.13
BMI	34.5 ± 9.4	33.8 ± 8.9	0.57
Nulliparity	**151 (59%)**	**36 (46%)**	**0.04**
Race			
Asian/Pacific Islander	10 (4%)	10 (13%)	**0.03**
Black	82 (32%)	17 (22%)	
Hispanic	40 (16%)	14 (18%)	
Other/Unknown	2 (1%)	0 (0%)	
White	124 (48%)	38 (48%)	
Chronic Hypertension	43 (17%)	17 (22%)	0.32
Diabetes	12 (5%)	5 (6%)	0.55
Autoimmune disease	**6 (2%)**	**6 (8%)**	**0.03**
Renal disease	**94 (36%)**	**15 (19%)**	**<0.01**
Gestational age at delivery	**33.0 ± 4.2**	**36.0 ± 3.6**	**<0.01**
Neonatal Composite**	**32 (12%)**	**3 (4%)**	**0.03**
Respiratory Distress Syndrome	66 (26%)	15 (19%)	0.23
5 Minute Apgar < 4	15 (6%)	2 (3%)	0.24
Arterial Cord pH < 7.1	6 (2%)	1 (1%)	0.56
Cesarean Delivery	**167 (65%)**	**40 (51%)**	**0.02**

*Analysis of discrete variables was performed using either the Chi-squared test or Fischers exact test for equality of distribution. Analysis of continuous variables was done using the Student's T test for normally distributed variables and the Mann-Whitney U test for non-normally distributed variables.
**The composite of neonatal outcomes includes perinatal mortality, grade 3 or higher intraventricular hemorrhage, periventricular leukomalacia, necrotizing enterocolitis, retinopathy of prematurity, and bronchopulmonary dysplasia.

Table 2: Outcomes of SGA Neonates Stratified by GA

Outcome	Women with Pre-eclampsia	Women without Pre-eclampsia	Odd Ratios	P-Value
Delivery ≥ 32 weeks	**(n = 167)**	**(n = 69)**		
Neonatal Composite	2 (1%)	0 (0%)		0.83
Respiratory Distress Syndrome	16 (10%)	9 (13%)	0.7 (0.3 - 1.7)	0.62
5 Minute Apgar < 4	2 (1%)	1 (1%)	0.8 (0.1 - 9.2)	0.02
Arterial Cord pH < 7.1	5 (3%)	1 (1%)	2.1 (0.2 - 18.3)	0.47
Cesarean Delivery	92 (55%)	34 (49%)	1.3 (0.7 - 2.2)	0.66
Delivery < 32 weeks	**(n = 91)**	**(n = 10)**		
Neonatal Composite	30 (33%)	3 (30%)	1.1 (0.3 - 4.8)	0.04
Respiratory Distress Syndrome	50 (55%)	6 (60%)	0.8 (0.2 - 3.1)	0.09
5 Minute Apgar < 4	13 (14%)	1 (10%)	1.5 (0.2 - 12.8)	0.14
Arterial Cord pH < 7.1	1 (1%)	0 (0%)		0.11
Cesarean Delivery	75 (82%)	6 (60%)	3.1 (0.8 - 12.4)	2.85

Multivariate Analysis* (n = 337)	Adjusted Odds Ratio for Pre-Eclampsia	P-Value	Adjusted Odds Ratio for Gestational Age at Delivery	P-Value
Neonatal Composite	1.3 (0.3 - 6.9)	0.74	**0.6 (0.5 - 0.7)**	**<0.01**
Respiratory Distress Syndrome	0.7 (0.3 - 1.4)	0.27	**0.8 (0.7 - 0.8)**	**<0.01**
5 Minute Apgar < 4	0.9 (0.2 - 4.4)	0.94	**0.7 (0.7 - 0.9)**	**<0.01**
Arterial Cord pH < 7.1	1.1 (0.2 - 6.2)	0.90	1.0 (0.8 - 1.2)	0.75
Cesarean Delivery	1.2 (0.7 - 2.1)	0.57	**0.8 (0.8 - 0.9)**	**<0.01**

*Logistic regression models were fit using all variables with p-value < 0.2 in the univariate analyses. Variables included were maternal age, race, parity, renal disease, and GA at delivery.

434 Racial disparities in preeclampsia outcomes at delivery

Cynthia Gyamfi-Bannerman, Ambika Pandita, Jason D. Wright, Zainab Siddiq, Mary E. D'Alton, Alexander M. Friedman

Columbia University Irving Medical Center, New York, NY

OBJECTIVE: How race is associated with adverse outcomes in the setting of preeclampsia is not well characterized. The objective of this study was to assess maternal outcomes by race in the setting of preeclampsia.

STUDY DESIGN: This retrospective cohort study utilized the Nationwide Inpatient Sample (NIS) from 2012 to 2014. Women age 15 to 54 with preeclampsia were included. Race and ethnicity were categorized as non-Hispanic white, non-Hispanic black, Hispanic, Asian or Pacific Islander, Native American, other, and unknown. Overall risk for severe morbidity based on CDC criteria was analyzed along with specific outcomes such as stroke, acute heart failure or pulmonary edema (AHF/PE), eclampsia, and acute renal failure. Risk for severe morbidity was stratified by comorbid risk and compared by race. Log-linear models were created to assess risk for severe morbidity accounting for comorbidity, demographic, and hospital factors with risk ratios (RR) and 95% confidence intervals (CI) as measures of effect.

RESULTS: 101,741 women with preeclampsia from 2012 to 2014 were included in this analysis. Risk for severe morbidity was significantly higher among non-Hispanic black women (9.8%) than non-Hispanic white, Hispanic, and all other women respectively (6.1%, 7.7%, and 7.5% respectively, p<0.01). For non-Hispanic black compared to non-Hispanic white, Hispanic, and all other women risk was higher for stroke (17.1 versus 6.5, 12.7, and 9.3 per 10,000 deliveries respectively, p<0.01) and AHF/PE (56.2 versus 32.7, 30.2, and 38.4 per 10,000 deliveries respectively, p<0.01 (Figure 1). Non-Hispanic black women were also more likely than non-Hispanic white women to experience renal failure (136.4 versus 60.4 per 10,000 deliveries, p<0.01) and eclampsia (171.1 versus 133.6 per 10,000 deliveries, p<0.01) (Figure 2). Adjusting for comorbidity, demographic, and hospital factors, black women remained at higher risk for severe morbidity (RR 1.60 95% CI 1.51-1.69). Risk for death was higher for black compared to non-black women (121.8 per 100,000 deliveries, 95% CI 69.7-212.9 versus 24.1 per 100,000 deliveries, 95% CI 14.6-39.8, respectively, p<0.01).

CONCLUSION: Black women were at higher risk for severe morbidity and mortality associated with preeclampsia. Addressing these differentials may be important in efforts to reduce overall racial disparities.

Figure 1. Risk for stroke and pulmonary edema or heart failure by race

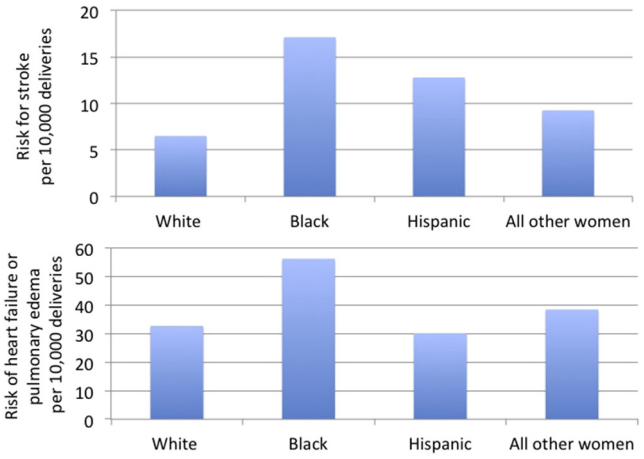

Figure 2. Risk for renal failure and eclampsia by race