Pregnancy Outcomes in Women with Sickle Cell Disease in California: A Retrospective Cohort Study

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Introduction

- Pregnancy exacerbates sickle cell pathophysiology via:
  - Increased metabolic and oxygen demands
  - State of hypercoagulability
  - Cardiopulmonary stress
- Women with Sickle Cell Disease (SCD) have increased prevalence of peripartum complications like:
  - Preeclampsia
  - Postpartum hemorrhage
  - Venous thromboembolism (VTE)
- Data on SCD and pregnancy outcomes are largely from single center studies with limited sample sizes
  - Alayed et al. , 1999-2008, National Inpatient Sample database
- Aim to add to this limited body of literature by including SCD pregnancy data over 3 decades from the diverse state of California

Objectives

- Describe baseline demographics of pregnant women with SCD
- Acute care utilization in SCD pre and post first pregnancy
- Compare pregnancy outcomes in Black women with and without SCD

Methods

- Identify retrospective cohort of women with SCD from California Office of Statewide Health Planning and Development (OSHPD) databases
  - Inpatient & emergency department discharge data, 1991-2019
  - SCD and pregnancy-related discharge codes (ICD 9/10)
  - Women ages 10-45 years
- Investigate differences in acute care utilization (for VOCs, ACS) before and during pregnancy
- Identify reference population of pregnant women without SCD
  - Pregnancy-related discharge codes (ICD 9/10)
  - Black, ages 10-45-years old
- Outcomes
  - Viable vs non-viable pregnancy
  - Age at delivery
  - Mode of delivery
  - Stillbirth and in-hospital maternal mortality rate
  - Peripartum complication rates:
    - Sepsis, VTE, preeclampsia, post-partum hemorrhage, preterm delivery, gestational diabetes
- Statistical Analysis
  - Descriptive statistics
  - Multivariable logistic regression models
    - Black women with and without SCD
    - Adjusted for age, era, insurance, Distressed Community Index (DCI) score, and Elixhauser index at time of delivery

Results

Figure 1. Cohort selection.

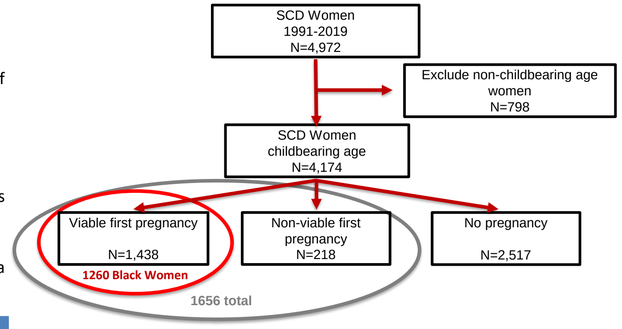
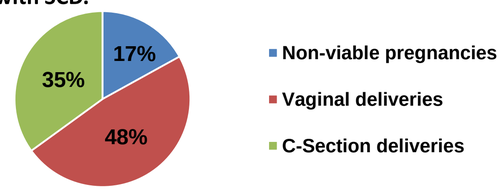


Figure 2. Distribution of all pregnancy outcomes in all 1656 women with SCD.



N=3,764 pregnancies

Acute care utilization data:

- Admissions for VOCs and ACS increased by a mean of 0.26 in all women with SCD during pregnancy, compared to their non-pregnant baseline 1-year prior

Figure 3. Age at first delivery in Black women.

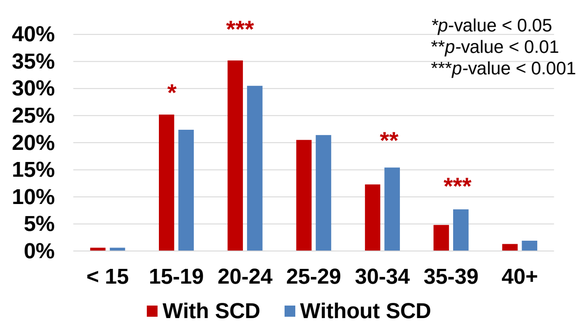


Table 1. Baseline characteristics of Black women during their first viable pregnancy.

Variables	With SCD N	With SCD %	Without SCD N	Without SCD %	*p*-value
All	1,260	100.0%	469,018	100.0%	.
Comorbidities at delivery					
0	829	65.8%	376,034	80.2%	<.0001
1-2	300	23.8%	88,108	18.8%	<.0001
≥3	32	2.5%	4,626	1.0%	<.0001
Delivery Year					
1991-1999	612	48.6%	233,346	49.8%	0.4026
2000-2009	359	28.5%	136,059	29.0%	0.6862
2010-2019	289	22.9%	99,613	21.2%	0.1412
Health Insurance					
Medicare	73	5.8%	2,149	0.5%	<.0001
Medi-Cal	798	63.3%	245,825	52.4%	<.0001
Other Government	19	1.5%	9,892	2.1%	0.1379
Self Pay	16	1.3%	8,814	1.9%	0.1115
Private	350	27.8%	201,171	42.9%	<.0001
Other	4	0.3%	1,080	0.2%	0.5192
Unknown	.	.	48	0.0%	0.7195
DCI Quintile					
1-Prosperous	105	8.3%	48,213	10.3%	0.0231
2-Comfortable	164	13.0%	73,061	15.6%	0.0123
3-Mid-Tier	302	24.0%	111,115	23.7%	0.8172
4-At Risk	434	34.4%	152,099	32.4%	0.127
5-Distressed	231	18.3%	75,534	16.1%	0.0316
Unknown Zipcode	24	1.9%	8,996	1.9%	0.9726
DCI Distress Score					
Mean (std)	58.88 (22.82)		56.23 (23.68)		<.0001

Table 2. Peripartum outcomes in Black women during first viable pregnancy.

Variables	With SCD N	With SCD %	Without SCD N	Without SCD %	*p*-value
All	1,260	100.0%	469,018	100.0%	
Mode of Delivery					
Vaginal	757	60.1%	333,453	71.1%	<.0001
C-Section	503	39.9%	135,565	28.9%	<.0001
Birth Outcome					
Live Birth	1,161	92.1%	443,081	94.5%	0.0003
Stillbirth	32	2.5%	5,574	1.2%	<.0001
Inpatient Maternal Mortality	4	0.3%	27	0.0%	<.0001
Complication					
Sepsis	34	2.7%	683	0.1%	<.0001
VTE	26	2.1%	667	0.1%	<.0001
Preeclampsia	138	11.0%	21,159	4.5%	<.0001
Postpartum Hemorrhage	73	5.8%	12,515	2.7%	<.0001
Preterm Delivery	159	12.6%	32,123	6.8%	<.0001
Gestational Diabetes	27	2.1%	12,610	2.7%	0.2316

Figure 4. Peripartum outcomes adjusted for covariates in Black women with and without SCD.

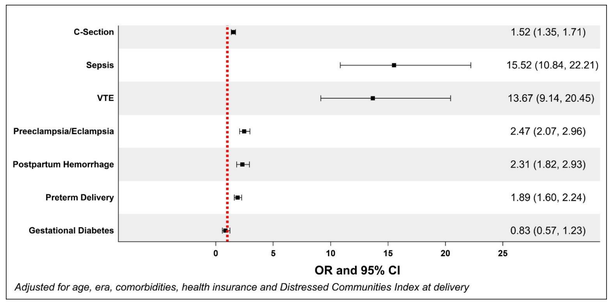
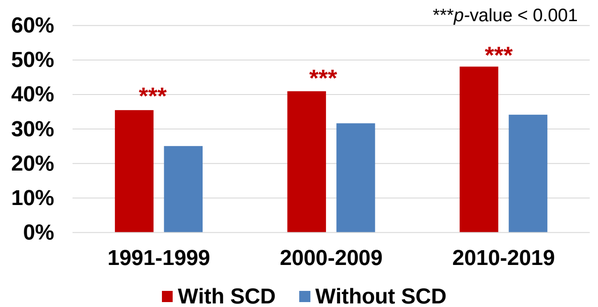


Figure 5. C-section deliveries in Black women over 1991-2019.



Conclusions

- Younger primigravid age
- Higher prevalence of:
  - C-section delivery
  - Stillbirth
  - Inpatient maternal mortality
- Increased adverse peripartum complications (in most common categories)
- Women with SCD remain a high-risk obstetric group who should be engaged in reproductive health education especially at pre-teen age. Increased multidisciplinary collaboration may also reduce adverse peripartum

References

1. Alayed N, Kezouh A, Oddy L, Abenhaim HA. Sickle cell disease and pregnancy outcomes: population-based study on 8.8 million births. J Perinat Med. 2014 Jul;42(4):487-92.

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