Investigating Pregnancy-Related Health Outcomes Among Patients with Sickle Cell Disease and Linking with Health Disparities

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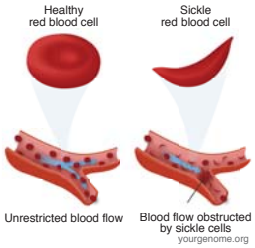
SICKLE CELL DISEASE

- Complex **inherited genetic disorder** and most common hemoglobinopathy in the US, affecting roughly 100,000 Americans[1]
- **Sickle cell trait (SCT)** individuals inherited one abnormal hemoglobin gene from their parents and may not experience symptoms
- **Sickle cell anemia (SCD)** results from two hemoglobin S genes, and is the most common and severe kind of sickle cell disease
- **Acute/chronic pain**, and **severe anemia** are a few of many common complications
- Characterized by **sickle hemoglobin**, or hemoglobin S, in the blood cells



STUDY MOTIVATION

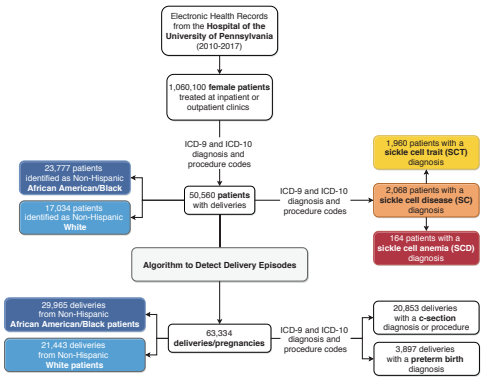
- Sickle cell disease receives less systemic support for comprehensive coordinated care than other genetic disorders and continues to be a **major public health concern**
- **Primarily affects individuals of African ancestry** and has been shown to be associated with high lifetime morbidity and premature mortality[2]
- **Increased risk of adverse outcomes** for pregnant individuals with sickle cell disease[3]
- Difficult to determine if adverse outcomes are due to sickle cell disease or a result of **health disparities** affecting the African American community[4]

The objectives of the study were:

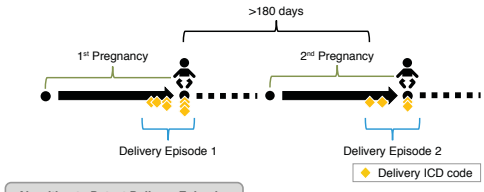
1. **To assess the rate of Cesarean (c-section) delivery and preterm birth among African American patients with and without sickle cell disease.**
2. **Develop an algorithm to detect deliveries in the Electronic Health Record (EHR) to evaluate outcomes at the pregnancy- rather than patient- level**

METHODS

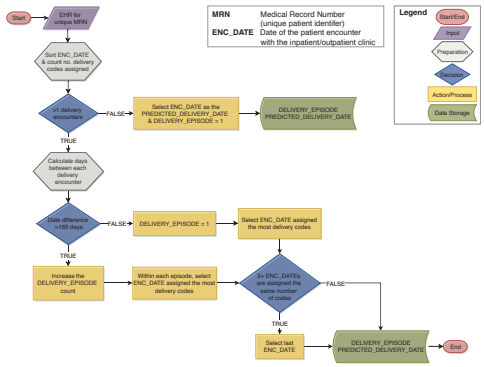
Defining the patient population



Detecting individual pregnancies



Algorithm to Detect Delivery Episodes



RESULTS

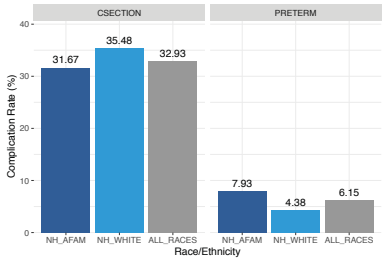
Centers for Disease Control and Prevention (CDC) Birth Rates[5]

Population	C-section (%)	Preterm Birth (%)
CDC 2017 African American	36.0	13.93
CDC 2017 White	30.9	9.05
CDC 2017 All	32.0	9.93

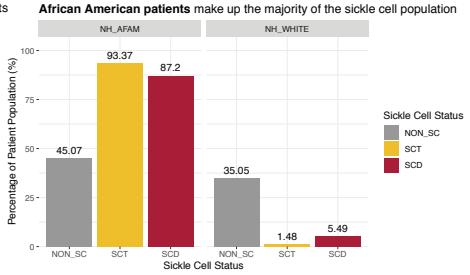
Patient age and deliveries detected by the algorithm

	Patients (%)	Deliveries (%)
Total population	50560 (100)	63334 (100)
Age, years (average 29.48 ± 6.08)		
< 18	1092 (2.16)	1129 (1.78)
18-24	11053 (21.84)	12670 (20.00)
25-34	28926 (37.39)	34139 (53.90)
35-44	13334 (26.34)	15079 (23.80)
45+	309 (0.61)	317 (0.50)

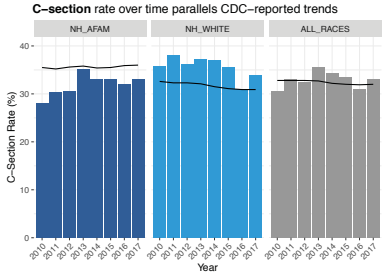
Lower c–section and **higher preterm birth** rates among African American patients



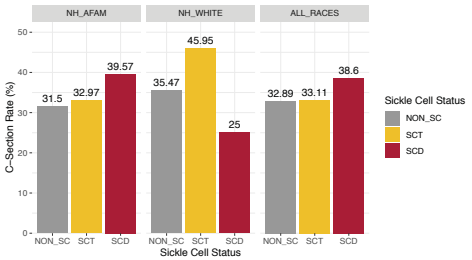
African American patients make up the majority of the sickle cell population



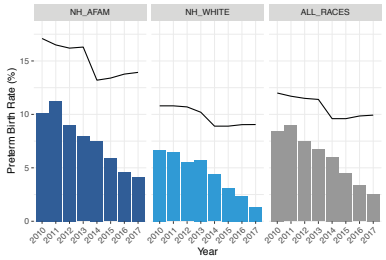
C–section rate over time parallels CDC–reported trends



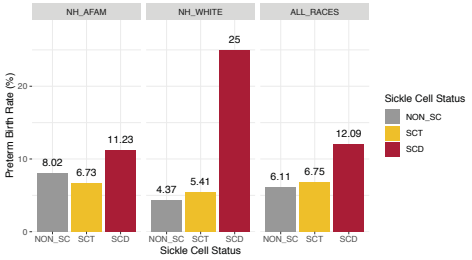
Higher **c–section** rate among African American patients with sickle cell anemia



Preterm birth rate over time parallel to and lower than CDC–reported trends



Higher **preterm birth** rate among patients with sickle cell anemia



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CONCLUSION

Trends point to a complex effect on adverse pregnancy-related outcomes resulting from contributions from both the sickle cell disease state and health disparities impacts.

Future work includes further distilling of the health disparities and their role on SC disease progression and adverse pregnancy outcomes, and characterization of preterm birth.

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