Social Determinants of Retinopathy of Prematurity

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Background

- ROP is a leading cause of visual impairment in preterm neonates and can lead to blindness.
- Low birthweight and earlier gestational age are known dominant risk factors for ROP development.
- While previous studies have suggested that race and/or ethnicity can influence ROP risk, gaps remain in how socioeconomic determinants of health, in the context of race, affect ROP risk.

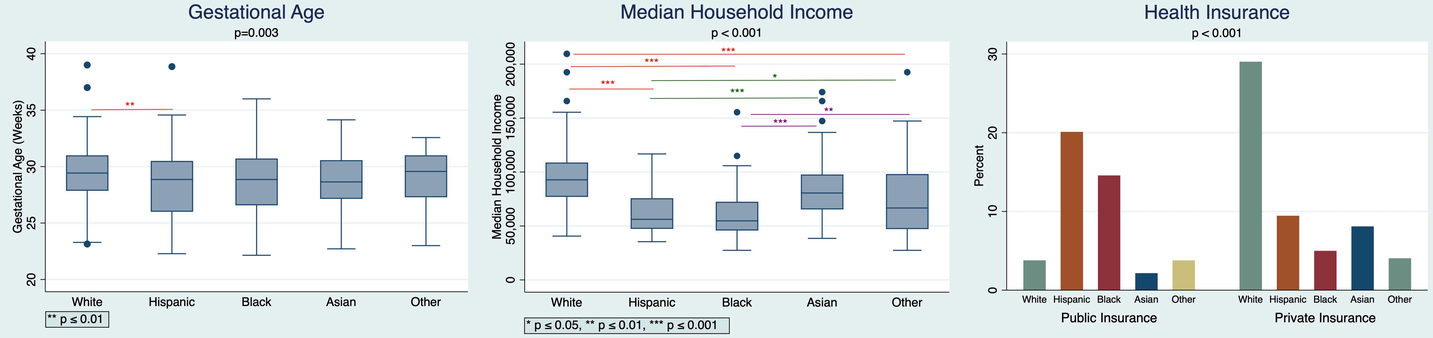
Hypothesis

Socioeconomic determinants of health, such as lower household income and public insurance, rather than race, are associated with worse ROP outcomes and severity.

Methods

- 745 neonates at UCLA Mattel Children's Hospital (152), UCLA Santa Monica (70), Cedars-Sinai (298), and Harbor-UCLA (99) were screened for ROP in the NICU between January 1, 2015 and December 31, 2020.
- Electronic medical record review was performed to extract NICU data, socioeconomic data (health insurance status, maternal zip code, etc.), subject race/ethnicity, and ROP exam data.
- ROP classification was performed using participants' worst ROP exam. The classifications included: no ROP, low-grade ROP, type 1 ROP (most severe).
- Univariate and multivariate data analyses performed.

Gestational age, median household income, and health insurance type varied significantly by race.



Univariate Analysis

Hispanic ethnicity was associated with greater ROP severity and need for treatment. Socioeconomic factors were associated with increased ROP severity and need for treatment.

ROP Severity

Neonates that had:

- Lower gestational age *(p<0.0001)*
- Public health insurance *(p=0.0005)*

→ More likely to have ***low-grade ROP***

- Lower gestational age *(p<0.0001)*
- Lower median household income *(p=0.0012)*
- Public health insurance *(p=0.0005)*
- *Hispanic ethnicity (p=0.001)*

→ More likely to have ***Type 1 ROP***

Need for ROP treatment

Neonates that had:

- Lower gestational age *(p<0.0001)*
- Lower median household income *(p=0.0001)*
- Public health insurance *(p=0.0001)*
- *Hispanic ethnicity (p=0.003)*

→ More likely to be treated for ROP

Multivariate Analysis

When co-varying for socioeconomic factors and gestational age, Hispanic ethnicity is not associated greater ROP severity.

ROP Severity	Low-grade ROP			Type 1 ROP		
	OR	*CI*	*p*	*OR*	*CI*	*p*
Gestational Age	0.92	0.91-0.94	<0.0001***	0.86	0.83-0.89	<0.0001***
Income	1.00	0.99-1.00	1.00	0.99	0.99-1.00	0.104
Public insurance	2.66	1.45-4.85	2.42	2.26	0.85-6.04	0.616
Race						
White (baseline)	-	-	-	-	-	-
Hispanic	0.68	0.33-1.42	0.304	0.83	0.24-2.82	0.765
Black	0.65	0.29-1.43	0.282	0.47	0.11-2.02	0.311
Asian	0.98	0.43-2.22	0.955	1.64	0.40-6.68	0.492
Other	1.81	0.75-4.37	0.184	2.45	0.49-12.29	0.274

Only lower gestational age, not Hispanic ethnicity, is associated with increased need for ROP treatment.

ROP Treatment			
	OR	*CI*	*p*
Gestational Age	0.90	0.88-0.92	<0.0001***
Income	0.99	0.99-1.00	0.067
Public insurance	1.39	0.64-3.06	0.403
Race			
Hispanic	1.05	0.40-2.76	0.921
Black	0.38	0.12-1.20	0.101
Asian	1.63	0.51-5.16	0.405
Other	1.77	0.48-6.47	0.388

Discussion

- Early gestational age is an important risk factor in need for ROP treatment and ROP severity.
- In univariate analysis, public health insurance and lower median household income were associated with greater need for ROP treatment and ROP severity.
- When controlling for socioeconomic determinants of health, Hispanic neonates did not have worse ROP outcomes.

Conclusion

- While previous studies have suggested race/ethnicity as ROP risk factors, it is vital to consider race/ethnicity in the context of socioeconomic determinants of health when assessing ROP risk factors.
- Addressing socioeconomic disparities may significantly reduce ROP burden.

References

1. Bashinsky AL. Retinopathy of Prematurity. N C Med J. 2017 Mar-Apr;78(2):124-128. doi: 10.18043/ncm.78.2.124. PMID: 28420777.
2. Husain SM, Sinha AK, Bunce C, Arora P, Lopez W, Mun KS, Reddy MA, Adams GG. Relationships between maternal ethnicity, gestational age, birth weight, weight gain, and severe retinopathy of prematurity. J Pediatr. 2013 Jul;163(1):67-72. doi: 10.1016/j.jpeds.2012.12.038. Epub 2013 Jan 23. Erratum in: J Pediatr. 2013 Dec;163(6):1798. PMID: 23351601.
3. Ying GS, Bell EF, Donohue P, Tomlinson LA, Binenbaum G; G-ROP Research Group. Perinatal Risk Factors for the Retinopathy of Prematurity in Postnatal Growth and Rop Study. Ophthalmic Epidemiol. 2019 Aug;26(4):270-278. doi: 10.1080/09286586.2019.1606259. Epub 2019 Apr 23. PMID: 31012360.
4. Fierson WM; American Academy of Pediatrics Section on Ophthalmology; American Academy of Ophthalmology; American Association for Pediatric Ophthalmology and Strabismus; American Association of Certified Orthoptists. Screening examination of premature infants for retinopathy of prematurity. Pediatrics. 2013 Jan;131(1):189-95. doi: 10.1542/peds.2012-2996. Epub 2012 Dec 31. PMID: 23277315.