The impact of health insurance, race, and prenatal diagnosis on pediatric cardiac surgical outcomes

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Introduction

- The mortality rate for pediatric cardiac surgeries has decreased significantly over the past decade. As such, mortality as the primary indicator of post-operative success may not be the best measure.
- Despite significant advances in the field, previous studies and data from surgical centers indicate that there are continued disparities based on race and insurance status for pediatric patients undergoing cardiac surgery.
- Using patients from a private outpatient pediatric cardiology clinic which is in the unique position of being able to refer patients to various surgical centers based on lesion complexity, this pilot study analyzed the relationship between several predictors including insurance status and race and several outcomes.
- Cardiac lesions were classified based on complexity, and we utilized categories provided by the Society of Thoracic Surgeons Congenital Heart Disease Database where higher STAT categories correlate to more complex cardiac surgeries.

Methods

- This retrospective chart review was approved by the Louisiana State University School of Medicine Institutional Review Board.
- Patients who were referred for cardiac congenital surgery between January 2014 and December 2019 from a private practice, not associated with a surgical program, were identified.
- The primary surgical procedure was identified and classified by STAT category (1-5).
- For each surgery, predictors and outcomes were identified using the patient's medical records, operative reports and discharge summaries.
  - **Predictors**: race, insurance type, gender, ethnicity, presence of prenatal diagnosis, and surgical center volume (low volume = <100 cases/year, medium volume = greater than 100 but less than 250 cases/year, high volume = >250 cases/year)
  - **Outcomes**: number of readmissions within 30 days of discharge, number of unplanned reoperations within 90 days of discharge, length of stay, residual cardiac lesion, and mortality within 30 days of discharge.

Results

Table 1. Primary Predictor-Outcome Analyses

	n	Number of Readmissions			Number of Reoperations				Length of Stay				Residual Lesions				
		mean	std	p-value	mean	std	p-value	post-hoc*	mean	std	p-value	post-hoc*	none	major	moderate	minor	p-value
STAT Categories																	
STAT 1	111	0.08	0.27		0.05	0.208		1 vs 4 < .001	6.95	6.35		1 vs 3 = .034	86	1	3	21	
STAT 2	79	0.05	0.22	0.885	0.16	0.741	<0.001	1 vs 5 = .001	13.89	18.50	<0.001	1 vs 4, 5 < .001	50	1	5	23	0.207
STAT 3	41	0.07	0.26		0.34	0.825		2 vs 4 = .001	23.00	36.00		2 vs 4, 5 < .001	29	1	1	10	
STAT 4	49	0.10	0.37		0.69	1.176		2 vs 5 = .021	44.22	58.81		3 vs 4 = .008	40	0	3	7	
STAT 5	23	0.09	0.29		0.7	0.822			45.96	25.84		3 vs 5 = .033	20	0	2	1	
Insurance																	
Private insurance	126	0.07	0.26	0.813	0.25	0.779	0.749	n/a	16.96	27.77	0.189	n/a	97	1	3	25	0.41
Government-funded insurance	177	0.08	0.29		0.28	0.753			22.03	36.29			128	2	11	37	
Race																	
White	186	0.06	0.25	0.865	0.22	0.569	0.552	n/a	16.62	23.55	0.14	n/a	136	2	9	40	0.533
Black	101	0.06	0.24		0.27	0.747			22.53	36.43			77	1	4	19	
Prenatal Diagnosis																	
Yes prenatal diagnosis	124	0.11	0.34	0.045	0.47	1.016	0.001	n/a	31.21	45.09	<0.001	n/a	97	2	5	21	0.613
No prenatal diagnosis	163	0.04	0.20		0.14	0.495			12.65	18.00			119	1	9	34	
Center Volume																	
Medium Volume Center	222	0.06	0.26	0.173	0.26	0.78	0.577	n/a	19.82	33.72	0.929	n/a	164	2	13	44	0.29
High Volume Center	80	0.11	0.32		0.31	0.722			20.21	31.59			60	1	1	18	

*post-hoc comparisons not listed were not statistically significant

Table 2. Secondary Analyses

Insurance		Prenatal Diagnosis		
		No	Yes	
	Government	107	63	$\chi^2(1) = 6.80, p = .009$
	Private	56	62	

STAT Category		Prenatal Diagnosis		
		No	Yes	
	STAT 1	84	19	
	STAT 2	49	24	
	STAT 3	12	28	$\chi^2(4) = 70.26, p < .001$
	STAT 4	13	37	
	STAT 5	5	17	

Race		Surgical center volume		
		Medium	High	
	White	118	68	$\chi^2(1) = 27.58, p < .001$
	Black	93	8	

Race		Insurance		
		Government	Private	
	White	75	112	$\chi^2(1) = 72.88, p < .001$
	Black	93	8	

Results

- 30-day mortality rate: 1.9% overall
- Both insurance status and STAT category were related to prenatal diagnosis such that children with private insurance or higher STAT category lesions were more likely to be diagnosed prenatally.
- The presence of prenatal diagnosis was related to more readmissions, more reoperations and longer length of stay.
- Lower STAT category lesions had fewer reoperations and shorter length of stay.
- Black children were more likely to be referred to medium volume centers and to have government-funded insurance.
- Race was not related to being diagnosed prenatally nor to STAT category.

Conclusions

- Our study did not find a significant difference in outcomes related to health insurance, race, or surgical center volume. Power analysis suggests that our sample size lacks the power to detect effect.
- One explanation for the difference seen in race distribution by surgical center volume is the Medicaid policy that prevents patients from being sent out of state without prior approval (and race was significantly associated with insurance type), thus limiting the surgical center options for these patients.
- Future studies will address the factors that contribute to the lack of prenatal diagnosis in patients with government-funded insurance.