Barriers that contribute to disparities seen in the prenatal diagnosis of congenital heart disease in patients with government-funded health insurance

Olivia Crapanzano[1*], Lauren Haddad, MD[2], Kathleen Crapanzano, MD[3]
Louisiana State University Health Sciences Center[1], Our Lady of the Lake Hospital[2], Pediatric Cardiology Associates[3]

Introduction

- Multiple national studies have established an inverse relationship between surgical center volume and surgical outcomes in pediatric cardiac surgery[1,2,3].
- Multiple factors determine where a child is referred for surgery including insurance coverage, surgeon expertise, parental preferences, and availability of expertise with the specific lesion.
- The aim of this study was to determine whether surgical outcomes for a private, outpatient pediatric cardiology practice that was not associated with a surgical center, differed based on the surgical center volume to which the patient was referred.

Methods

Study 1: Retrospective chart review of patients referred for cardiac surgery between January 2014 and December 2019

- 304 patients included
- Predictors: race, insurance type, presence of prenatal diagnosis, and surgical center volume
- Outcomes: readmissions within 30 days of discharge, unplanned reoperations within 90 days of discharge, length of stay, residual cardiac lesions, and mortality within 30 days of discharge.

Study 2: Survey administration to mothers of patients who underwent cardiac surgery to identify potential barriers to prenatal diagnosis

- 46 patients included

Results

Table 1. Part 1 - *Primary Predictor-Outcome Analyses*

		Number of Readmissions			Number of Reoperations				Length of Stay				Residual Lesions				
	n	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. Part 1 - *Secondary Analyses*

		Prenatal Diagnosis		
		No	Yes	
Insurance	Government	107	63	$\chi^2(1) = 6.80, p = .009$
	Private	56	62	
		Prenatal Diagnosis		
		No	Yes	
STAT Category	STAT 1	84	19	$\chi^2(4) = 70.26, p < .001$
	STAT 2	49	24	
	STAT 3	12	28	
	STAT 4	13	37	
	STAT 5	5	17	
		Surgical center volume		
		Medium	High	
Race	White	118	68	$\chi^2(1) = 27.58, p < .001$
	Black	93	8	
		Insurance		
		Government	Private	
Race	White	75	112	$\chi^2(1) = 72.88, p < .001$
	Black	93	8	

Table 1,2: Primary and secondary analysis for Part 1 research, analyzing relationships between predictors and surgical outcomes.

Study 1:

- 30-day mortality rate: 1.9% overall
- No difference in surgical outcomes by insurance, race or surgical center volume
- Children with private insurance or higher STAT category lesions were more likely to be diagnosed prenatally.
- 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.

Study 2:

- Higher STAT category lesions were more likely to be diagnosed prenatally.
- No association between race, insurance type and the presence of prenatal diagnosis

Conclusions

Study 1:

- Our study did not find a significant difference in surgical outcomes related to health insurance, race, or surgical center volume.
- Disparities in referrals to surgical centers exist in the community, although they do not seem to negatively affect surgical outcomes.
  - For example, black children are more likely to be referred to medium volume surgical centers vs. high volume centers.
  - Multifactorial explanation but include Medicaid limitations for out of state surgeries

Study 2:

- The second study's purpose was to identify barriers to prenatal care; however, the sample group all had prenatal care.
- Our studies confirmed that those with more severe cardiac pathology are more likely to be diagnosed prenatally.
- Further studies are needed to explore the group of children whose mothers did not receive prenatal care (and who were not represented in our follow up study) to determine the barriers to their access to care.

References

1. Hannan E.L., Racz M., Kavey R.E., Quaegbeur J.M., Williams R. Pediatric cardiac surgery: the effect of hospital and surgeon volume on in-hospital mortality. Pediatrics. 1998; 101: 963-969
2. Welke K.F., Diggs B.S., Karamlou T., Ungerleider R.M. The relationship between hospital surgical case volumes and mortality rates in pediatric cardiac surgery: a national sample, 1988-2005. Ann Thorac Surg. 2008; 86: 889-896
3. Welke K.F., O'Brien S.M., Peterson E.D., Ungerleider R.M., Jacobs M.L., Jacobs J.P. The complex relationship between pediatric cardiac surgical case volumes and mortality rates in a national clinical database. J Thorac Cardiovasc Surg. 2009; 137: 1133-1140

*Authors have no financial relationships to disclose.