

Online Data Supplement**Neonatal Cardiac Surgery in Low Resource Settings; Implications of Birth Weight**

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1. Human and material resources available.

For a unit that is performing ~ 700 operations annually, we have had 4 cardiologists until 2017; when a fifth cardiologist joined as faculty. For the majority of the study period, two senior surgeons and one or two assistant surgeons and three staff anesthesiologists were employed. No dedicated pediatric cardiac intensivists work in the center. Intensive care is jointly delivered by anesthesiologists, surgeons and pediatric cardiologists with daily interdisciplinary rounds.

A total of 10 beds are assigned for early post-operative care and 10 beds are assigned for pre-operative stabilization as well as for intermediate level of care for patients transitioning from the early postoperative ICU to the ward. These ICU beds are looked after by nursing staff with variable levels of experience. Generally, at a given time only a third of employed nurses have an experience of a year or more in pediatric cardiac care.

A dedicated ECMO service does not exist. For most of the duration of the study there was no capability to perform ECMO. In the last two years of this study (post 2017), ECMO was able to be arranged for selected patients only if funding is assured. Specific challenges are also frequently encountered with other material resources such as disposables for interventional catheter procedures and heart surgery that have required improvisation and innovation.

Since a dedicated Fetal Cardiology service was instituted in 2008, an increasing number of neonates are delivered at our institution following prenatal diagnosis of critical CHD. Peri-partum care and timing of delivery are generally based on obstetric indications with preference for delivery at near term by normal vaginal route whenever possible.

References:

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- Balachandran R, Nair SG, Kumar RK, Establishing a pediatric cardiac intensive care unit - Special considerations in a limited resources environment, in press, *Ann Pediatr Card*, 2010;3:40-49
- Rao SG. Pediatric cardiac surgery in developing countries. *Pediatr Cardiol*. 2007;28:144-8.;
- Kumar RK, Tynan M, Catheter Interventions for Congenital Heart Disease in the Third World, *Pediatr Cardiol* 2005;26:1-9.)

Definitions

- Sepsis was defined as known culture-positive bacterial sepsis or clinical evidence of fever or hypothermia, tachycardia, hypotension, tachypnea, leukocytosis, or leucopenia, based on the assessment of the physicians.
- Surgical site Infection (SSI) was defined as an infection that could be subclassified as a deep incisional SSI, superficial incisional SSI, or mediastinitis.
 - o Reference: Sen AS, Morrow DF, Balachandran R, et. al Postoperative Infection in Developing World Congenital Heart Surgery Programs: Data From the International Quality Improvement Collaborative. *CircCardiovascQual Outcomes*. 2017;10:e002935. DOI: 10.1161/CIRCOUTCOMES.116.002935
- Palliative operations included conditions where the underlying heart defect was not corrected to a separated two ventricular circulation. These babies all require additional operation to correct the defect or additional palliative operations for lesions that are not correctable (e.g. single ventricle physiology).

The following conditions constituted palliative operations:

 1. Blalock Taussig shunt
 2. Pulmonary artery banding
 3. Stage I Norwood for hypoplastic operations.

Corrective operations were operations that corrected the underlying defect and restored normal two ventricle physiology and normal or near normal anatomy. All the remaining conditions constituted corrective operations.

2. Distribution of operations in the two epochs

In the later epoch fewer operations were performed on low birth weight infants. We postulate that this be attributable to an institutional increasing preference for catheter based palliative procedures such as ductal stenting instead of the Blalock-Taussig shunt. In the first epoch 46 BT shunts were performed and this declined to 12 in the second epoch. The only other operations to have declined between the two epochs was the Norwood operation (reduced from 14 to 6 between the two epochs). This latter example may have been because of the introduction of a government funded program in the second epoch that specifically excluded Norwood Stage I operation from the list of approved operations.

Diagnosis Code	First Epoch (2011-14)	Second Epoch (2015-18)	Total
Aorto Pulmonary Window	3	3	6
	50.00%	50.00%	100.00%
Arterial Switch Operation	118	123	241
	49.00%	51.00%	100.00%
Atrioventricular Septal defect	0	1	1
	0.00%	100.00%	100.00%
Blalock Taussig Shunt	46	12	58
	79.30%	20.70%	100.00%
Coarctation Repair	23	26	49
	46.90%	53.10%	100.00%
Coarctation with closure of atrial septal defect	0	1	1
	0.00%	100.00%	100.00%
Coarctation with patent ductus arteriosus closure	0	1	1
	0.00%	100.00%	100.00%
Coarctation with ventricular septal defect closure	15	18	33
	45.50%	54.50%	100.00%
Tetralogy of Fallot repair	1	2	3
	33.3%	66.67%	100.00%
Norwood Stage I	14	6	20
	70.00%	30.00%	100.00%
Others	5	6	11
	45.5%	54.5%	100.00%
Pulmonary artery Band	1	5	6
	16.70%	83.30%	100.00%
Patent ductus arteriosus	9	7	16
	56.30%	43.80%	100.00%
Permanent Pacemaker implant	3	0	3
	100.00%	0.00%	100.00%
Total Anomalous pulmonary Venous Return	54	56	110
	49.10%	50.90%	100.00%
Ventricular Septal Defect Closure	2	7	9
	22.20%	77.80%	100.00%
Total	294	274	568
	51.80%	48.20%	100.00%

3. Yearly number of PDA stents performed

Year	Frequency	Percent
2012	8	4.7
2013	8	4.7
2014	13	7.6
2015	16	9.4
2016	30	17.6
2017	23	13.5
2018	35	20.6
2019	37	21.8
Total	170	100.0