CHILDREN'S ACCESS TO TREATMENT FOR CONGENITAL HEART DISEASE THROUGH HEALTH INSURANCE SCHEMES IN KARNATAKA

A Hospital Study

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INTRODUCTION

Congenital anomalies can be defined as structural or functional anomalies, including metabolic disorders, which are present at the time of birth. It is estimated that world wide,1 in 33 infants suffer from a congenital defect every year and these disorders are the fourth largest cause of neonatal mortality[1]. These defects come in various forms, functional defects (that hamper function or development) like in Down's syndrome, Thalessemia, congenital hypothyroidism, etc and structural defects like cleft palate, organ defects like heart defects, neural tube defects or club foot, etc. The March of Dimes report (Christianson & Howson, 2006) estimates that about 7.9 million children globally are affected by birth defects (including structural, functional and genetic). In India it is estimated that about 1.7 million birth defects occur annually (roughly 9.6% of the birth rate) (Ministry of Health and Family Welfare, 2013). Congenital anomalies account for 8-15% of perinatal deaths and 13-16% of neonatal deaths in India (Bhat & Ravikumara, 1996; Shamnas, PS, Thottumkal, & Deepak, 2013). Higher prevalence of these birth defects is seen most in low and middle income countries where the diagnosis and post diagnostic care is also low. With the decrease in infant mortality rates due to improved maternal screening and treatment, the incidence of congenital malformations in India has become more apparent. The most common congenital defects seen globally and in India are congenital heart defects (CHD). CHDs are defined as any defect in the function or anatomy of the heart at birth.

There are many types of congenital heart defects depending on the area of the heart it affects. There is no specific cause for CHD. It can occur because of infectious causes like Rubella during pregnancy, or as a part of chromosomal/ genetic disorder like Down's syndrome or due to smoking/ drug abuse or medications during pregnancy. The most common presentations for CHD are ventricular septal defects (VSD), patent ductus arteriosis (PDA), atrial septal defects (ASDs) (Saxena, 2005) and these are relatively easy to correct as compared to the more serious conditions like Tetralogy of Fallots, Pulmonary Atresia, transposition of great arteries etc. Most studies on CHD are hospital based studies and these have found that more boys have sought treatment as compared to girls. A community based study of 11,833 children found that the prevalence rate of CHD was higher in boys for the age groups 0-4 years and 5-9 years whereas it was higher in girls in the adolescent age group (10-14 years) (Chadha, Singh, & Shukla, 2001). In a study of 405 children aged under 12 years of age, advised to undergo surgery for CHD, only 44% of girls underwent surgery as compared to 70% of boys (Ramakrishnan et al., 2011). The same study showed that gender, socio-economic class, education level of head of household and price of surgery were significantly associated with undergoing the surgery. As most medical expenditure in India is borne out-of pocket, its high cost is especially financially taxing on the poor. Frequently the poor only seek treatment when they are at the predicament of facing death. This is especially true in treatment seeking for conditions of the heart or cancer where the treatment is very expensive. The Government of Karnataka (GoK) has two schemes that provide financial security by providing coverage for tertiary care surgical procedures i.e. the Yeshasvini scheme and the Vajpayee Aarogyashri Scheme (VAS). Both of these schemes have been successful in curbing out of pocket expenditures on surgical treatments (Aggarwal, 2009; Rajasekhar & Manjula, 2012; Wagner, Nagpal, & Mullen, 2014). No studies have been conducted on the use of Yeshasvini and Vajpayee Aarogyashri Scheme for treatment for congenital heart disease. This study attempts to understand the utilization patterns among paediatric patients suffering from congenital heart disease under Yeshasvini and VAS. Data from a Government run cardiac speciality hospital has also been used to study the utilization patterns among CHD patients.

[1] *http://www.who.int/mediacentre/fact-sheets/fs370/en/*

AIM

To study the utilization patterns of children (0-18 years) in accessing treatments for CHD in a publically owned cardiac care hospital and see whether the same patterns are found in accessing CHD care under Yeshasvini and VAS.

METHODS

Claims data from Yeshasvini Trust and Survarna Arogya Suraksha Trust was obtained for Yeshasvini and Vajpayee Aarogyashri Schemes respectively. All patient data from Sri Jayadeva Institute of Cardiac Sciences and Research was also obtained. Yeshasvini Dataset[2]: This dataset included data for the years 2009-2013. Analysis included only data for the years 2011-12 and 2012-13 as data for 2009-10 and 2010-11 were incomplete and did not include details on packages. The data included details on preauthorization number, age, gender, caste, patient district, hospital district, dates of admission and discharge, package (divided into 16 systemic categories), package code (procedure code within each package), surgery/procedure performed, amount claimed by the hospital and status of the claims. Only those patients, whose date of admission fell within the policy term period for that year i.e. 1st June to 31st May, were included. We used the CVS category in Yeshasvini for analysing cardiac procedures. VAS Dataset[3]: We included the years 2010-11, 2011-12 and 2012-13 for analysis. The data included details on BPL No, preauthorization number, age, gender, caste, patient district, hospital district, dates of admission and discharge, package name (divided into 7 systemic categories), package code (procedure code within each package), surgery or procedure performed, net amount paid to the hospital, and the type of hospital. The category, Cardiac diseases under VAS was used for analysing cardiac procedures. Jayadeva Dataset[4]: All data for in-patients admitted to Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bangalore, Karnataka for the years 2010 to 2013 were obtained. Only de-identified patient data was obtained i.e. details of name, address or date of birth of the patients were not available. The data only included details of the Patient ID, IP Episode (inpatient number), gender, age, marital status, dates of admission and discharge and the diagnosis. The diagnosis was available with corresponding International Classification of Diseases-10 code (ICD-10). The date of admission of all patients fell within 1st January to 31st December of each year, except in 2013, where data was available only till 26th September, 2013. All age values (in all datasets) were converted into years; ages less than 1 year were converted to '0' years and the remaining were rounded up to completed years e.g. 18 months was converted to 1 year. All the data analysis was performed using the SPSS version 20 software.

FINDINGS

There were a total of 84,425 patients admitted in Jayadeva from 2010 to September 2013. Similarly, 1,42,599 patients utilized Yeshasvini from 2011 to 2013 and 24,483 patients utilized VAS from 2010 to 2013. All patients coming to Jayadeva were cardiac patients. Looking at age-wise distribution of all patients, the lowest utilisation was for children (0-18 years) at 6.6% in Jayadeva (Table 1) and 7.2% in Yeshasvini (Table2). In VAS however, 21.9% of the total patients coming for treatment were children (Table 3). Looking at distribution

[2] *The Yeshasvini Scheme began in 2003 and all members of co-operative societies in Karnataka can avail the scheme by paying Rs.210/per family member. Members avail secondary and tertiary surgical care at private and public empanelled hospitals*

[3] *The Vajpayee Aarogyashri Scheme began in 2009 (Gulbarga division) and was extended to all Karnataka in 2012. The scheme is available free of charge for all BPL card holders and offers tertiary surgical coverage for up to Rs 1.5 lakh per family.*

[4] *Sri Jayadeva Institute of Cardiac Sciences and Research is a Government owned Autonomous Institute and is offering super specialty treatment to all Cardiac patients in Bangalore, Karnataka. Presently on an average 800-1000 patients visit this hospital every day and annually 25,500 In patients are treated. http://www.jayadevacardiology.com/index.html .*

for only cardiac patients, the utilisation decreased slightly in 0-18 year olds for Yeshasvini to 6.9%. In VAS, utilization percent increased to 29.1%, making them amongst the highest users of cardiac care in VAS second only to the 37- 55 year olds at 30.8%.

Gender-wise distribution of all patients coming to Jayadeva showed that only 30.5% of all cardiac patients were women. This was even lesser in Yeshasvini, where only 25.7% women accessed cardiac care. In VAS however, women comprised 40% of all cardiac patients. Looking only at utilisation by 0-18 year olds, the percentages for utilization by girls improved to 47.1% in Jayadeva, 39.7% in Yeshasvini and 48% in VAS. Looking further within the paediatric age group, 0-5 year olds accounted for almost 70% of children (0-18 years) utilizing Yeshasvini but only 49% of the children in VAS .This was even lower in Jayadeva, where the percentage was 42.6% (Table 4).

Most of the children coming for cardiac care in Yeshasvini came from Mandya (8%), Mysore (7.9%) or Davanagere (7.5%) (figure 1); while in VAS the patients mainly resided in Belgaum (12.7%), Gulbarga (12.2%) and Bellary (9.7%) (figure 2). Bangalore district (rural + urban) was most common district chosen for treatment, in both Yeshasvini (84.4%) and VAS (87.8%) (figures 3 & 4). All patients utilizing Yeshasvini for availing cardiac treatment have utilized services in only 25 districts. This number decreases to 16 districts in the 0-18 age group and in Bangalore alone the percentage of users has increased from 62% (all ages) to 84% (0-18 years). Similarly in VAS, the number of districts utilized for cardiac treatment reduces from 13 to only 10 districts from all age groups to 0-18 age-group. No data was available for the patient's district in the Jayadeva dataset. However, looking at Jayadeva patients utilizing Yeshasvini or VAS, it was seen that Yeshasvini users were also most commonly from Mandya (12.8%), Mysore (11.7%) and Tumkur (9.4%) all of which are neighbouring districts to Bangalore. This pattern differed in VAS patients where the highest number came from Bellary (32.7%), Yadgiri (14.3%) and Gulbarga (10.7%) - all in the northern part of Karnataka where VAS was first introduced.

Children coming to Jayadeva were most commonly diagnosed with Congenital Heart Disease[5] (64%) although the type of CHD was not always specified. Where specified, Atrial Septal Defect (ASD) (11%), Ventricular Septal Defect (VSD) (10%), Patent Ductus Arteriosis (PDA) (7%) and Tetralogy of Fallot (6%) (TOF) were the most common followed by Rheumatic Heart Disease (RHD) (9.9%) (Figure 7). Congenital Heart Disease was also present in 12.7% of patients aged 19-36 years. More women (55.9%) aged 19-36 years, than men (44.1%) sought treatment for CHD (Table 6). This is in contrast to 0-18 year olds, where more boys (52.3%) than girls (47.7%) have sought treatment in Jayadeva (Table 4). As data on diagnosis in Yeshasvini and VAS were not available, analysis on the type of cardiac procedures performed for paediatric patients was performed. Looking at figure 8 it is seen that the most common procedure was intra-cardiac repair for ASD and VSD (34%), followed by Coronary Angiogram (CAG) at 13%, adding other procedures like ASD (3%), VSD (4%) and PDA (6%) closures, totalling to 47% of all surgeries undertaken in this age group. Similarly, VAS showed (Figure 9) 54% of its paediatric patients undergoing treatment for CHD.

In case of costs associated with surgery, cardiac surgeries are the most expensive in both Yeshasvini and VAS schemes amongst the 0-18 year olds (Table 7 & 8). Amounts claimed under VAS are higher as compared to Yeshasvini for the same surgery. E.g. PDA device closure, ASD device Closure and VSD device closure cost Rs 25,000 each in Yeshasvini[6] while they cost, Rs 60,000, Rs. 80,000 and Rs 80,000 respectively in VAS[7].

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[5] *Congenital heart disease(CHD) includes Unspecified CHD, Atrial Septal Defect(ASD),Ventricular Septal Defect (VSD) and Tetralogy Of Fallot(TOF)*

[6] *http://www.yeshasvini.kar.nic.in/Surgery_List_with_Cost_2012.pdf, accessed on 13.3.2015, benefits package dated 2012.*

[7] *http://karhfw.gov.in/SAST/about-sastvas.pdf, accessed on 13.3.2015, Benefits package rates dated 6/7/2012*

Table 1: Distribution of all Cardiac patients coming to Jayadeva by Age and Gender (2010-13)

AGE Category	Gender					
	Female		Male		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
0-18 years	2632	47.1	2954	52.9	5586	6.6
19-36 years	3816	39.9	5744	60.1	9560	11.3
37-54 years	7081	24.9	21355	75.1	28436	33.7
55-75 years	10849	29.0	26610	71.0	37459	44.4
above 75 years	1371	40.5	2013	59.5	3384	4.0
Total	**25749**	**30.5**	**58676**	**69.5**	**84425**	**100.0**

Table 2: Distribution of all Cardiac patients using Yeshasvini by Age and Gender (2011-13)

AGE Category	Gender					
	Female		Male		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
0-18 years	472	39.7	718	60.3	1190	6.9
19-36 years	785	45.8	930	54.2	1715	10.0
37-54 years	1501	24.7	4579	75.3	6080	35.5
55-75 years	1653	20.3	6499	79.7	8152	47.6
Total	**4411**	**25.7**	**12726**	**74.3**	**17137**	**100.0**

Table 3: Distribution of all Cardiac patients using VAS by Age and Gender (2010-13)

AGE Category	Gender					
	Female		Male		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
0-18 years	1816	48.0	1970	52.0	3786	29.1
19-36 years	1680	57.0	1269	43.0	2949	22.7
37-54 years	1178	29.4	2834	70.6	4012	30.8
55-75 years	533	24.0	1688	76.0	2221	17.1
> 75 years	13	31.7	28	68.3	41	0.3
Total	**5220**	**40.1**	**7789**	**59.9**	**13009**	**100.0**

Table 4: Distribution within 0-18 year old cardiac patients in Jayadeva, Yeshasvini and VAS

Age Category	Jayadeva Totals		Yeshasvini Total		VAS Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
0-1years	1068	19.1	344	28.9	852	22.6
2-5years	1315	23.5	482	40.5	989	26.3
6-10years	1355	24.3	145	12.2	682	18.1
11-14years	958	17.2	55	4.6	608	16.1
15-18years	890	15.9	164	13.8	634	16.8
Total	**5586**	**100**	**1190**	**100**	**3765**	**100**

Figure 1: Percentage Distribution of Yeshasvini Peadiatric CVS patients by District of Residence (2011-13)

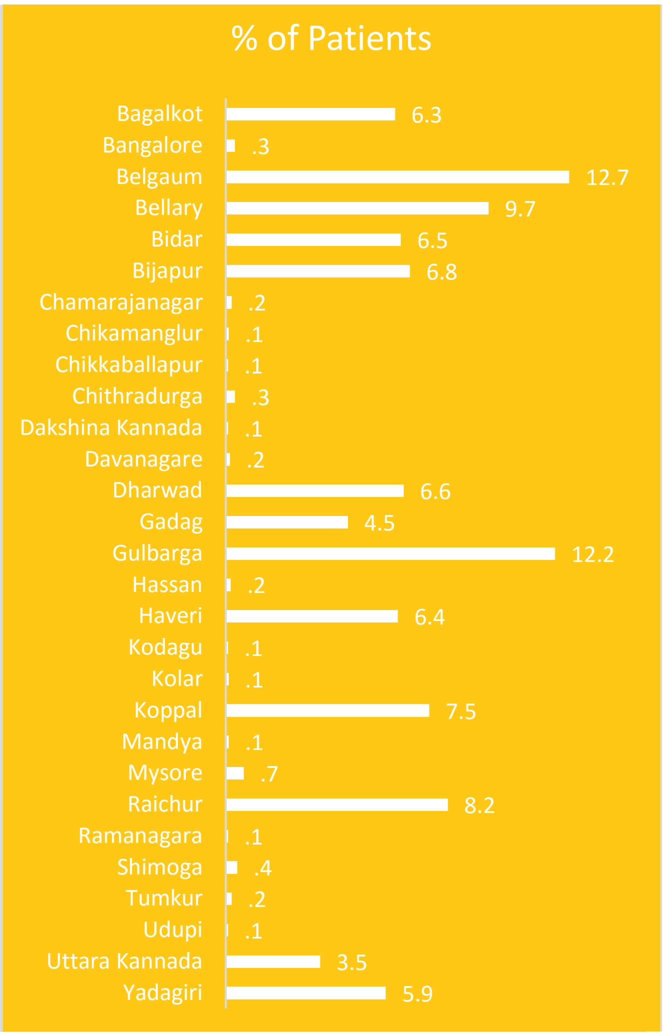

Figure 2: Percentage Distribution of VAS Peadiatric CVS patients by District of Residence (2010-13)

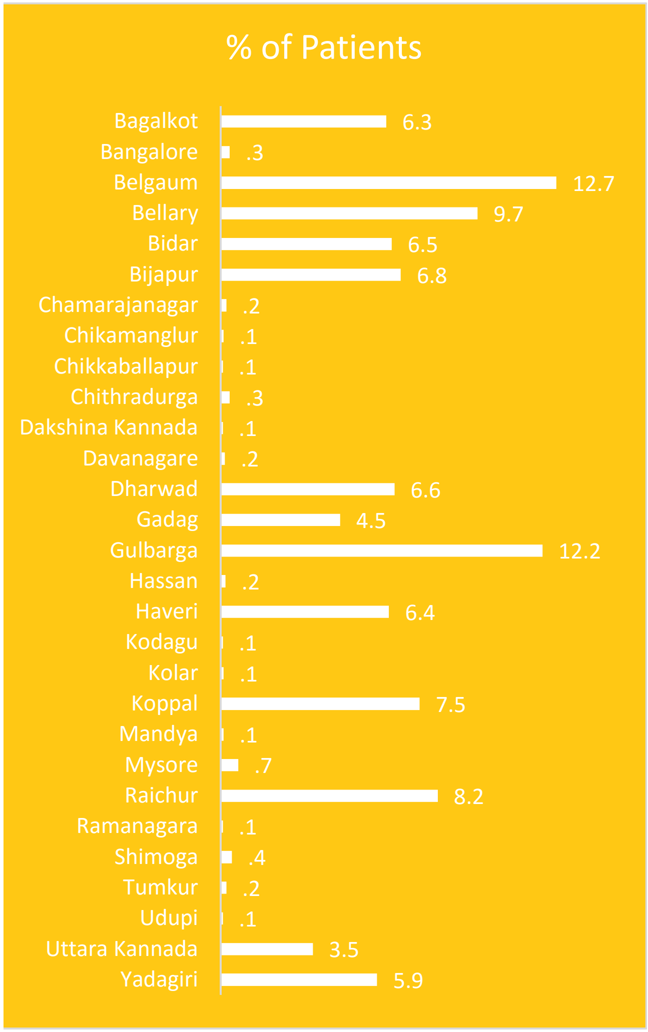

Figure 3: Percentage Distribution of Yeshasvini Peadiatric CVS patients by District of Hospital (2011-13)

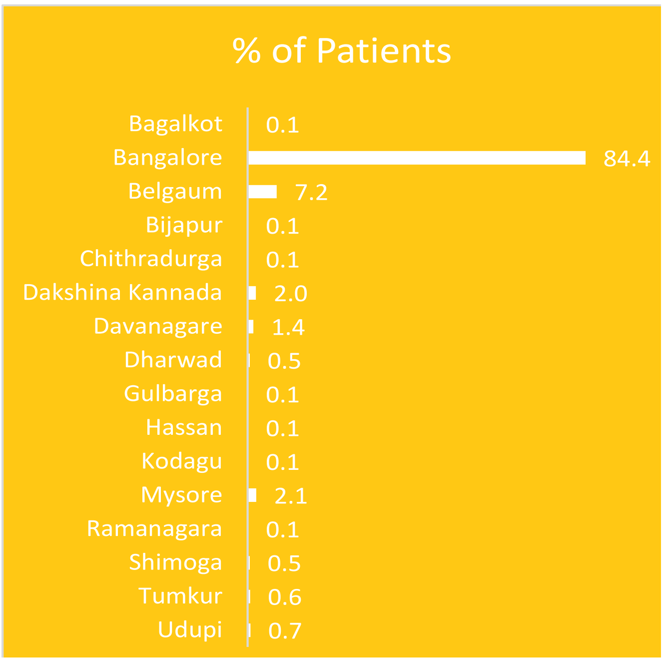

Figure 4: Percentage Distribution of VAS Peadiatric CVS patients by District of Hospital (2010-13)

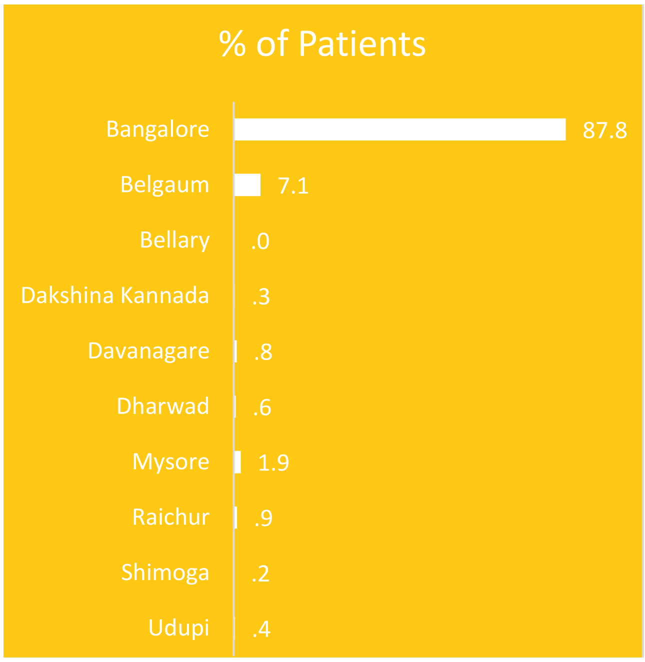

Figure 5: Percentage Distribution of District of Residence for Jayadeva CVS patients 0-18 years using Yeshasvini (2011-13)

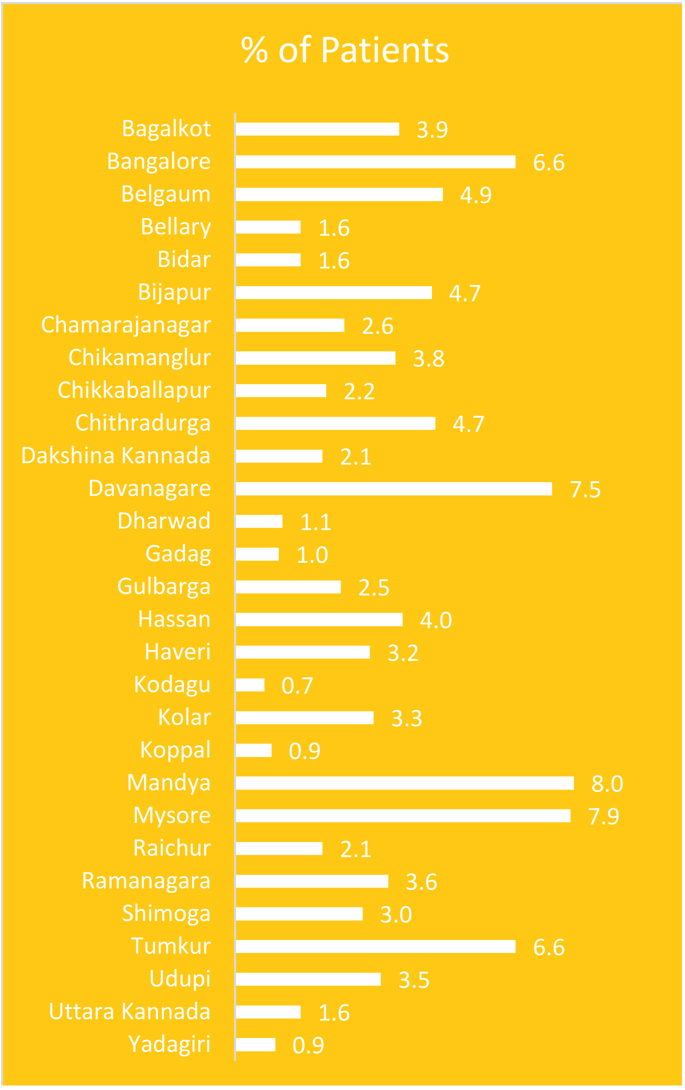

Figure 6: Percentage Distribution of District of Residence for Jayadeva CVS patients 0-18 years using VAS (2010-13)

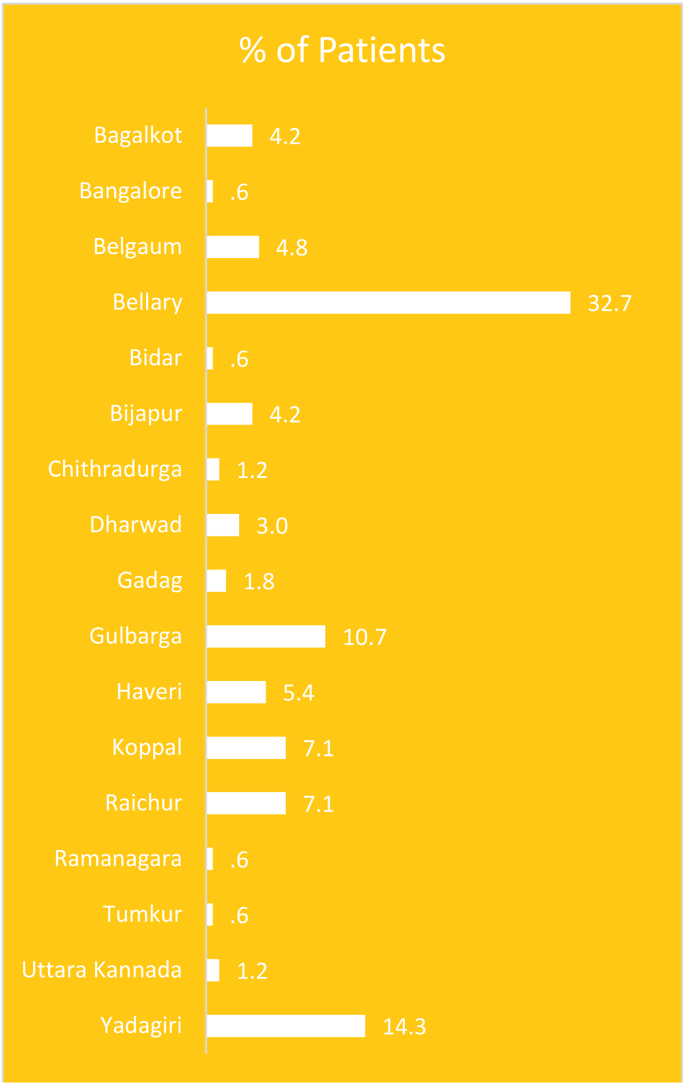

Figure 7: Percentage Distribution of diseases amongst 0-18 year old in Jayadeva Hospital (2010-13)

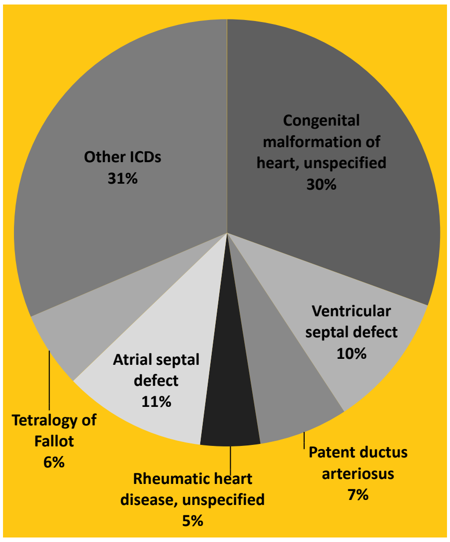

Figure 8: Percentage Distribution of Cardiac procedures in 0-18 year old in Yeshasvini (2011-13)

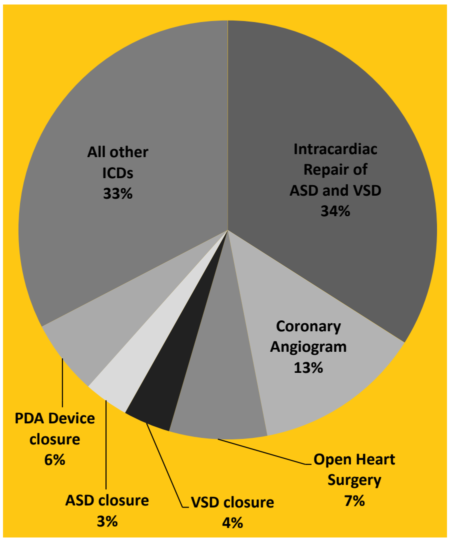

Figure 9: Percentage distribution of Cardiac procedures for 0-18 year olds in VAS (2010-13)

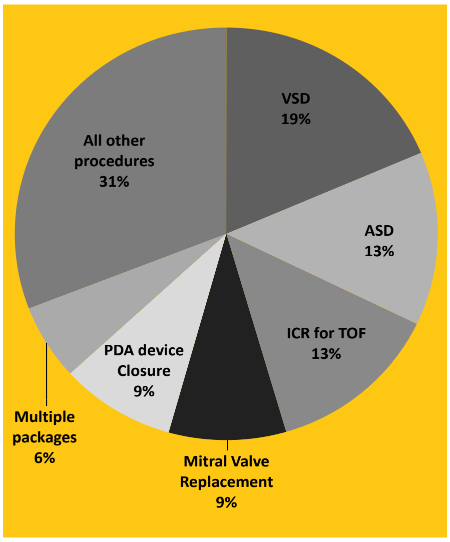

Table 5: Distribution of Diseases Gender-Wise in 0-18 year old patients coming to Jayadeva (2010-2013)

Disease	Male		Female		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
CHD*	2161	52.3	1967	47.7	4128	73.9
RHD	116	57.7	85	42.3	201	3.6
Mitral (Valve) Insufficiency	99	53.8	85	46.2	184	3.3
Other ICDs	578	53.9	495	46.1	1073	19.2
Total	**2954**	**52.9**	**2632**	**47.1**	**5586**	**100.0**

* *CHD includes Unspecified CHD,ASD,VSD and TOF.*

Table 6: Distribution of Diseases Gender-wise in 19-36 years patients coming to Jayadeva (2010-2013)

Disease	Males		Females		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Congenital Heart Disease	534	44.1	678	55.9	1212	12.7
Rheumatic Heart Disease	461	42.7	619	57.3	1080	11.3
Acute Myocardial Infarction	900	95.8	39	4.2	939	9.8
Chronic Ischaemic Heart Disease	399	86.7	61	13.3	460	4.8
Unstable Angina	591	94.1	37	5.9	628	6.6
Mitral Stenosis	256	36.7	441	63.3	697	7.3
Other ICDs	2603	57.3	1941	42.7	4544	47.5
Total	**5744**	**60.1**	**3816**	**39.9**	**9560**	**100**

Table 7: Expenditure on children (0-18 years) in Yeshasvini (2011-13)

Package	Frequency	Percent	Total Expenditure(INR)	Mean	Percent
CVS	1190	11.6	55858600	46940	49.1
END	10	0.1	82200	8220	0.1
ENT	1674	16.3	9264580	5534	8.1
GNL	1878	18.3	11618039	6186	10.2
GST	142	1.4	1711516	12053	1.5
ME	10	0.1	16250	1625	0
NEURO	120	1.2	2733003	22775	2.4
NICU	2027	19.8	5429157	2678	4.8
OBG	506	4.9	2822900	5579	2.5
ONCO	10	0.1	188848	18885	0.2
OPHTHO	852	8.3	6938166	8143	6.1
ORTHO	698	6.8	6740844	9657	5.9
PED	630	6.2	5893387	9355	5.2
THR	18	0.2	304636	16924	0.3
URO	470	4.6	4158290	8847	3.7
VAS	4	0.0	51000	12750	0
Total	**10239**	**100**	**113811416**	**11115**	**100**

Table 8: Expenditure on children (0-18 years) in VAS (2010-13)

Package	Frequency	Percent	Total Expenditure(INR)	Mean	Percent
Burns	266	5.0	7838679	29468.72	2.7
Cancer Treatment	307	5.7	8823705	28741.71	3
Cardio Vascular Diseases	3780	70.6	248170037	65653.45	85.4
Neonatal	303	5.7	8704415	28727.44	2.9
Neurological Diseases	352	6.6	10528493	29910.49	3.6
Polytrauma	6	0.1	144000	24000	0
Renal Diseases	339	6.3	6300180	18584.6	2.1
Total	**5353**	**100**	**290509509**	**54270.41**	**100**

CONCLUSIONS AND RECOMMENDATIONS

Improving Utilization among girls: Children seeking treatment under Yeshasvini and Vajpayee Aarogyashri schemes have sought treatment mainly for congenital heart disease. The gender bias is apparent as more boys than girls are seeking treatment for CHD in all three datasets. Interestingly more women coming to Jayadeva than men are seeking treatment for congenital heart disease in the 19-36 age groups. This may tell us two things, 1) these women were left untreated when they were younger and hence have received treatment later when symptoms worsened or 2) these women are now treated to prevent complications during child birth as this is the reproductive age group. A study on this difference in utilisation for congenital heart disease, found that the parents of the girls were very concerned about the stigma associated with the scar after surgery. However, the most common reason for deferring the surgery in boys was financial incapability (Ramakrishnan et al., 2011). It is interesting to note that the population that uses Yeshasvini and comes to Jayadeva hospital come from all income groups, which may mean that the social stigma is deep rooted and not just present in lower socio-economic groups (as opposed to VAS data where all patients belong to the BPL category). High cost of surgery is not the only factor we deal with when improving utilisation in children for congenital heart disease, the social aspects around denying the surgery needs attention. Therefore there is a need to counsel parents regarding social stigma, especially in case of girls.

Increasing the number of cardiac speciality centres in Karnataka: Of the 30 districts in Karnataka only 16 districts have had hospitalizations due to cardiac surgeries in Yeshasvini with the 85% of hospitalizations mainly in 2 hospitals in Bangalore alone. This picture is similar for VAS too where only hospitals from 10 districts have been utilized for cardiac hospitalizations. The only other district that has a major contribution is one hospital in Belgaum. This paints a picture of paucity of known cardiac care hospitals in other districts of Karnataka. Effort should be made to develop or improve cardiac centres within established hospitals in all districts. Empanelment of more cardiac hospitals is required to improve ease of access for the paediatric patients and their parents.

Study on individual schemes: Children (0-18 years) comprised 29% of the cardiac patients utilizing VAS as compared to only 6.6% of cardiac patients in Jayadeva and 6.9% of cardiac patients in Yeshasvini respectively. VAS provides access to quality tertiary care free of charge to BPL population. This is in contrast to Yeshasvini which has an annual enrolment fee of Rs 210 per family member and is open only to members of co-operative societies and their families, while Jayadeva is a government owned autonomous super-speciality hospital, which offers lower rates for the poor, but is still expensive. More studies are required to understand why the utilization in VAS is higher for children and also for girls as compared to Yeshasvini. Adopting child friendly policies will improve the utilization by children and prevent complications due to late diagnosis of CHD in children.

Community based studies on Congenital Heart Disease: More community based studies in different populations are required to provide incidence data and study the barriers associated with obtaining treatment for CHDs in India.

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