

# Profile of Pediatric Outpatient in Cardiology Clinics in the City of Ribeirão Preto

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## Objective

To verify the pediatric cardiology outpatient clinic characteristics in Ribeirão Preto (RP) city, emphasizing reasons for referral, definitive diagnosis and outcome through analysis of patients seen in 3 distinct settings.

## Methods

In 1996, 1,365 consecutive patients, aged 1 month to 14 years were seen: G1 (n = 562), public pediatric cardiology outpatient clinic; G2 (n = 420), private practice; G3 (n = 383) pediatric cardiology outpatient clinic at Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto. Origin of the patients: G1: RP (78%) and region (22%); G2: RP (67%), region (25%), and other regions/states (8%); G3: RP (26%), region (43.5%), and other regions/states (30.5%).

## Results

Reasons for referral: G1: murmur (71%), arrhythmia (8%), chest pain (7%), breathlessness (6.5%), other reasons (7.5%). G2: murmur (70%), chest pain (7%), arrhythmia (7%), breathlessness (4%), postoperative follow-up (4%), other reasons (8%). G3: murmur (56%), postoperative follow-up (24%), arrhythmia (4%), other reasons (16%). Patients lost to follow-up: G1: 31%, G2: 17%, G3: 3%. Final diagnosis: G1: 346 (89%) normal and 43 (11%) abnormal patients; G2: 268 (76%) normal and 82 (24%) abnormal patients; G3: 22 (6%) normal and 351 (94%) abnormal patients. Outcome: G1: discharge (89%), follow-up (11%); G2: discharge (76%), follow-up (24%); G3: discharge (6%), follow-up (94%).

## Conclusion

Clinical profile is different among the 3 groups (G1 and G2 are similar). Intervention in the Basic Health Units seems to be necessary to verify structural facilities and to offer basic pediatric cardiology training to pediatricians. It is important to verify the high index of patients lost to follow-up, particularly in G1. Structural and human resources are needed if adequate assistance is to be expected for the highly complex cases seen in G3. The pediatric cardiology public outpatient clinic should be maintained until resolution of cases by the pediatricians in the Basic Health Units improves.

## Key words

pediatric cardiology, pediatric outpatient, heart murmur

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Despite last years' great advance verified in terms of diagnosis and treatment available to patients with congenital heart disease, some aspects related to the characteristics of these patients have not been discussed. Because a rationale for adequate investments is currently considered an important matter, particularly in our country, it is obviously important to know the epidemiological information regarding these patients to optimize individual assistance. In this context, the organization of the pediatric cardiology assistance, as already suggested for other areas<sup>1</sup>, may contribute to a better individual outcome and allow for adequate investment of resources. The purpose of this paper is to present the information obtained during a consecutive period of 12 months (1996) regarding the pediatric cardiology outpatient clinic assistance offered in the City of Ribeirão Preto, State of São Paulo. The main characteristics and pattern of referral of the patients were analyzed as well as the incidence, type of heart disease, and outcome; part of these data have already been published<sup>2</sup>. It should be emphasized that the referral of the cases to the 3 units involved is not compulsory. However, in view of the great number of patients referred, we believe that the data herein presented could be considered a reliable and representative sample of the cases seen in the region, conferring a particular epidemiological relevance to the study.

## Methods

During a 12-month period (January 2 to December 31, 1996), 1,365 patients were consecutively seen in 3 outpatient clinics, geographically and functionally independent: G1 (SUS): 562 patients referred from the local and regional Basic Health Units and seen at a specialized public pediatric outpatient clinic located downtown; G2 (CLIP): 420 patients seen in a private office; G3 (HCFMRP): 383 patients seen at the pediatric cardiology outpatient clinic of the Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto, a tertiary center offering specialized diagnosis and treatment. The patient distribution according to sex masculine or feminine was similar: G1: 54% and 46%; G2: 56% and 44%; G3: 52% and 48%, respectively. Regarding the age of the patients, the proportions, respectively, from G1 to G3 were newborns ( $\leq 30$  days): 4%, 4%, 3.5%; infants ( $> 30$  days and  $\leq 2$  years): 24%, 20%, 23%; preschool age ( $> 2$  years and  $\leq 6$  years): 31%, 40%, 27.5%; school age ( $> 6$  years): 41%, 36%, 46% (fig. 1). In relation to the origin of the patients, we noted G1: RP city (77%), RP region (22%), and other regions (1%); G2: RP city (67%), RP region (25%), and other regions/states (8%); G3: RP city (26%), RP region (43.5%), and other regions/states (30.5%). All the G1

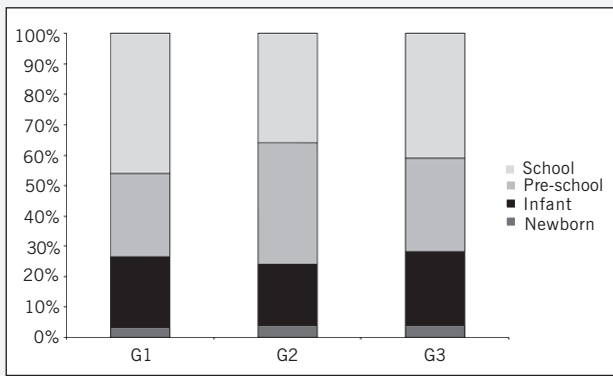


Fig. 1 - Percentage distribution of 1,365 patients referred, according to age and divided into 4 groups.

and G2 patients were examined by one of the authors (FA) when a full cardiovascular clinical examination was done with the patient at rest. The author also examined the great majority of G3 patients and used the information available in the patients' notes in the other cases. The electrocardiogram (EKG) was done routinely during the first consultation in all cases. The chest X-ray and echocardiogram were done in all patients suspected of having congenital heart disease and also in the obvious cases. To establish the final diagnosis, we only considered patients who completed the investigation returning with the tests requested (n = 1112). The individuals considered normal from the cardiac point of view were those with an innocent murmur and those whose echocardiogram was normal.

## Results

In G1, 399 (71%) patients were referred due to a heart murmur, and other causes for referral were arrhythmia 45 (8%), chest pain 39 (7%), breathlessness 37 (6.5%), and various others causes 42 (7.5%). In G2, 293 (70%) patients were also referred due to a heart murmur, and the other reasons were chest pain 29 (7%), arrhythmia 28 (7%), breathlessness 16 (4%), postoperative follow-up 19 (4%), and various others causes 35 (8%). In G3, the majority of the patients had originally been referred due to a heart murmur (n = 214, 56%), and the other reasons were postoperative follow-up 92 (24%), arrhythmia 17 (4%), and various other causes 60 (16%) (fig. 2).

The patients who did not complete the investigation or were lost to follow-up were defined for those patients who did not return to the outpatient clinic with the tests requested after the initial diagnosis (G1 and G2) and those who were lost to follow-up (G3). This prevalence, respectively from G1 to G3, was 31% (n = 173), 17% (n = 70), and 3% (n = 10).

The final diagnosis was established in 1.112 patients who completed the investigation. In G1 (SUS), 346 (89%) were normal while 43 (11%) had a heart disease. Among these, the diagnoses were ventricular septal defect (VSD) 10 (23%), pulmonary valve stenosis (PS) 9 (21%), atrial septal defect (ASD) 5 (12%), mitral valve prolapse (MVP) 4 (9%), rheumatic fever (RF) 4 (9%), idiopathic dilatation of the pulmonary artery (PAD) 2 (5%), atrioventricular septal defect (AVSD) 2 (5%), and other various diagnoses 7 (16%) including one case each of valvar aortic stenosis (AE), Wolff-Parkinson-White syndrome, double outlet right ventricle

(DORV), coarctation of the aorta (CoAo), hypertrophic cardiomyopathy (HOCM), persistent ductus arteriosus and subvalvar aortic stenosis (fig. 3). In G2 (CLIP), 268 (76%) were normal while 82 (24%) had a heart disease. Among these cases, 62 were being followed with no previous intervention and with a diagnosis of VSD 14 (22%), PS 12 (19%), AE 7 (11%), and other diagnoses 29 (48%) including 5 cases of ASD, 5 of PAD, 3 cases of arrhythmia, 3 MVP, 2 cardiomyopathy, 2 CoAo, 2 cases of systemic hypertension, and one case each of tetralogy of Fallot (TF), transposition of the great arteries (TGA), AVSD, DORV, mitral stenosis, RF, and univentricular atrioventricular connection. Regarding the 20 patients being treated, the procedures performed were VSD closure 6 (30%), modified Blalock Taussig operation 4 (20%), relief of CoAo 2 (10%), correction of TF 2 (10%), and one case each of correction of AVSD, TGA, and ASD. Three patients underwent an interventional catheterization for relief of AS, PS, and to occlude a ductus with a coil (fig. 4). In G3 (HCFMRP), 22 (6%) individuals were normal while 351 (94%) had a heart disease. Among these cases, 247 were being followed with no previous intervention and with the following diagnoses: VSD 68 (28%), PS 36 (15%), ASD 29 (12%), AS 20 (8%), rheumatic fever 18 (7%), arrhythmia 14 (5%), MVP 14 (5%), TF 9 (4%), acute myocarditis 7 (3%), Ebstein malformation 4 (2%), AVSD 3 (1%), HOCM 3 (1%), dilated cardiomyopathy 3 (1%), and other various diagnoses 19 (8%) including 2 cases each of TGA, univentricular atrioventricular connection and tricuspid atresia, and one case each of pulmonary arteriovenous fistula, pulmonary hypertension due to lupus, DORV, persistence of left superior vena cava, mild aortic regurgitation, PAD, mild AS associated with mild PS, tricuspid regurgitation, glycogenosis, pulmonary atresia with a VSD, mitral regurgitation, follow-up after endocarditis, and Turner syndrome. Regarding the 104 patients followed up after invasive therapy, the procedures done were balloon dilatation of the

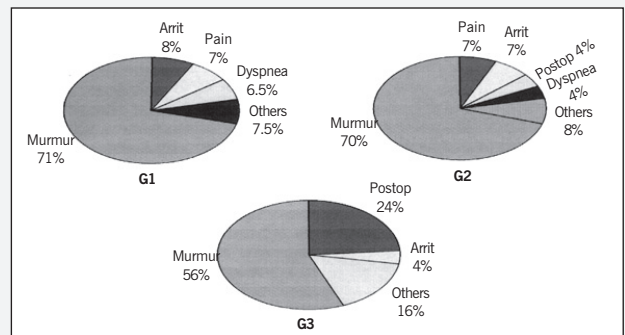


Fig. 2 - Reasons for referral in 1.365 patients according to the 3 groups studied. Arrit: arritmia cardíaca; Postop: patients followed up after surgery.

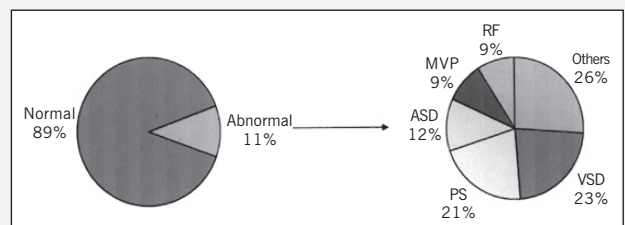


Fig. 3 - Final diagnosis and outcome in 389 G1 (SUS) patients. VSD: ventricular septal defect; PS: pulmonary valve stenosis; ASD: atrial septal defect; MVP: mitral valve prolapse; RF: rheumatic fever.



pulmonary valve 5 (5%), surgical closure of a VSD 30 (29%), surgical closure of an ASD 16 (15%), modified Blalock-Taussig anastomosis 14 (13%), correction of TF 14 (13%), surgical closure of a ductus 9 (9%), relief of CoAo 5 (5%), AVSD correction 4 (4%), and other various surgical procedures 7 (7%) including 2 cases of relief of PS and one case each of correction of pulmonary atresia with an intact septum, subaortic stenosis, Fontan operation, pulmonary artery banding and surgery for endomyocardiofibrosis.

Regarding outcomes, in G1 (SUS) 89% of the cases were discharged while 11% needed outpatient follow-up. In G2 (CLIP), 76% were discharged while 24% needed follow-up. In G3 (HCFMRP), 6% were discharged while 94% needed outpatient follow-up.

## Discussion

The City of Ribeirão Preto has a population of approximately 500 000 people, and basic outpatient assistance is offered by 32 so-called Basic Health Units (BHU), most of them located in the outskirts of the city. The pediatric cases that need specialized consultation are usually referred to the Regional Specialized Pediatric Outpatient Clinic located downtown. Regarding pediatric

cardiology, this assistance is offered during 5 weekly periods of 4 hours each through computerized booking, also including the neighboring cities. After a full clinical cardiac examination, noninvasive tests are requested, such as EKG, chest X-ray (no restriction), and echocardiogram (limited). Patients with complex heart disease requiring hemodynamic studies, heart surgery, or both, are usually referred to the Medical School Hospital. It should be emphasized that this pattern of assistance is not compulsory, being however adopted for the great majority of patients seen in the BHU.

As suggested by the São Paulo State Interinstitutional Commission in 1989<sup>1</sup>, the awareness of this mode of assistance offered to the population is important if the purpose is to improve the pattern of assistance, establish necessary resources, and promote adequate assistance referring the patient according to the complexity of the problem. We believe that the data here presented may offer adequate information regarding the pediatric cardiology mode of assistance.

The reason for referral was defined as the reason justified for seeing the patients in one of the 3 clinics. The high number of children referred due to a heart murmur, particularly to the public (71%) and private (70%) clinics, is noteworthy. As would be expected, this number is lower for the G3 patients (56%), because this is a tertiary unit with a great number of patients being followed up after cardiac surgery. Regarding the other reasons for referral, such as chest pain, breathlessness, arrhythmia, and other causes, we noted a similar occurrence in G1 and G2. The 24% occurrence of patients in G3 being followed up after surgery should be noted. This did not occur in the other groups. These numbers, particularly the great number of patients referred due to a heart murmur, are well documented in the literature and have been thoroughly discussed<sup>3,4</sup>.

Patients lost to follow-up were defined as the patient who did not return to the clinic with the tests requested; this aspect has been emphasized<sup>3,4</sup> and is a well-known fact in medical practice. In the data here presented, the incidence of patients who did not complete the investigation is very high, occurring in 31% of G1 and 17% of G2 cases. We believe this fact should be specifically investigated. Factors related to the characteristic of the assistance such as structural conditions and patient-doctor relationship should be considered in an attempt to identify elements influencing this control. Considering that the occurrence of children with a heart murmur is high and that the benefits of tests requested are low<sup>5-7</sup> and also expensive when inadequately used<sup>8</sup>, this practice should be questioned and, if abandoned, would lead to a considerable diminution of patients lost to follow-up.

Referring final diagnosis, as already reported<sup>3,4</sup>, subjects considered normal from the cardiac point of view comprise the great majority of cases seen in the public and private outpatient clinic. In the present investigation, these numbers were 89% and 76%, respectively, and the small difference between them could, perhaps, be explained by a better referral pattern for the private patients. As most of these patients are referred after the initial pediatric examination, some doubts may arise regarding the primary assistance: the existence of a specialized clinic makes the pediatrician automatically refer most of the patients with no attempt to solve the problem? Does the pediatrician have formative knowledge and structural conditions in the BHS to recognize an innocent murmur?

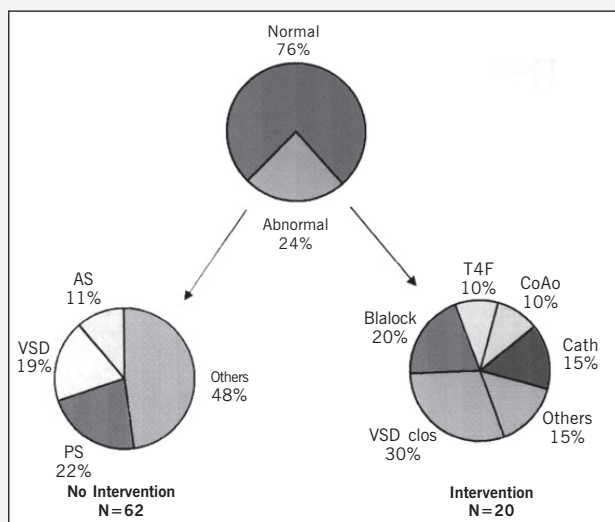


Fig. 4 - Final diagnosis and outcome in 350 G2 (CLIP) patients. VSD clos: surgical closure of a ventricular septal defect; Blalock: Blalock-Taussig anastomosis; TF: tetralogy of Fallot; CoAo: coarctation of the aorta; Cath: interventional catheterization; AS: aortic valve stenosis. Others as in Figure 3.

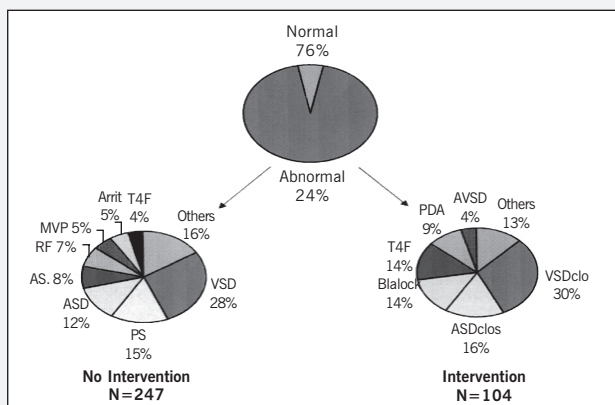


Fig. 5 - Final diagnosis and outcome in 373 G3 (HCFMRP) patients. ASD clos: surgical closure of an atrial septal defect; PDA: patent ductus; AVSD: atrioventricular septal defect; others as in fig. 3-4.

If the purpose is to solve the problem with low costs and avoid parental anxiety, we believe that most of these cases could well be solved by the pediatricians in the BHU, lowering considerably the number of cases referred to the specialized clinic. The small (6%) prevalence of normal cases in the tertiary outpatient clinic should be noted, which is a characteristic of a referral center.

The entities most commonly found in the 3 groups studied were similar, ventricular septal defect and pulmonary valve stenosis. However, the significant incidence (n=104) of patients with various diseases followed up after invasive therapy, mainly surgical, should be emphasized.

Regarding outcome, the high number of cases discharged in G1 (89%) and G2 (76%) actually reflect the high number of unnecessary referrals of cases that could be solved in the BHU. If that happens, the immediate consequence in the assistance process would mean fewer cases referred to the tertiary center, which is usually very busy because it is the only specialized public referral center in the region. In view of the great number of normal cases, the incidence of outpatient discharge was high in G1 (89%) and G2 (76%), respectively, which did not occur in G3 (6%).

The above data disclose a different outpatient profile among the 3 groups studied. Despite some differences, G1 is very similar to G2, and G3 has peculiar characteristics. The absence of similar investigations published makes a comparison with our data impossible. However, a recent study involving outpatient cardiac cases in our country<sup>9</sup> should be mentioned because it reflects the adult patient's cardiac profile, which should be useful for future comparison.

Finally, we believe that the data here presented allow us to conclude that: 1) basic pediatric cardiology training for the BHU pediatricians seems to be necessary, the main purpose being to lower the number of unnecessary referrals. Courses, lectures, and oriented outpatient practice should be implemented; 2) the BHU should be inspected to verify whether an adequate cardiac examination is possible; 3) a specific investigation seems to be necessary to verify the high number of patients lost to follow-up; 4) due to the high complexity of the cases seen in G3 (HCFMRP), structural and human resources should be considered.

Based in these data, we believe that the public outpatient clinic should be kept in the same model until the solution of cases in the BHU improves. The pediatrician could well discharge patients with an innocent murmur without further tests and with a very low risk of errors<sup>10</sup>. The suspicious and obviously abnormal cases should then be referred to the specialized clinic. An interesting aspect to be discussed is the creation of an outpatient clinic for patients over 15 years with congenital heart disease. Tertiary centers all over the world are offering this service for this specific population<sup>11-14</sup> due to the need for specialized orientation.

In conclusion, we believe that we have presented information that could provide a better rationale for assistance in pediatric cardiology outpatient clinics. The conclusions here reported and already discussed<sup>15</sup> are theoretically applied to cities similar to Ribeirão Preto where primary, secondary, and tertiary units exist. Similar investigations from other centers would be welcomed for comparison of results.

## References

1. Comissão Interinstitucional de Saúde do Estado de São Paulo. Deliberações CIS/SP – 58 de 18/8/89. Diário Oficial do Estado 1989 aug 19; Seção I.
2. Amaral F, Granzotti JA, Simões BJB, Balestra DC, Dantas BG. Perfil ambulatorial em cardiologia pediátrica na cidade de Ribeirão Preto. Resultados preliminares. Rev Paul Pediatr 2002; 20: 179-86.
3. Amaral FTV, Granzotti JA, Nunes MA. Avaliação cardiológica em crianças com suspeita de cardiopatia. Resultados preliminares em 2.000 pacientes. J Ped 1995; 71: 209-13.
4. Amaral FTV, Granzotti JA, Nunes MA. Sopro cardíaco na criança. Experiência de um ambulatório especializado. Rev Paul Pediatr 1995; 13: 39-41.
5. Amaral FTV, Granzotti JA, Nunes MA. Abordagem da criança com sopro cardíaco. Importância diagnóstica dos exames complementares não invasivos. Arq Bras Cardiol 1995; 64: 195-9.
6. Amaral F. Sopros inocentes em crianças. In: Porto CC, ed. Doenças do Coração. Prevenção e Tratamento, 1ª ed, Guanabara Koogan, Rio de Janeiro, p. 333-5, 1998.
7. Smythe JF, Teixeira OHP, Vlad P, Demers PP, Feldman W. Initial evaluation of heart murmurs: are laboratory tests necessary? Pediatrics 1990; 86: 497-500.
8. Danford DA, Nasir A, Gumbiner C. Cost assessment of the evaluation of heart murmurs in children. Pediatrics 1993; 91: 365-8.
9. Yamada AT, Mansur AJ, Chizzola PR, Hofmann W, Bellotti G, Pileggi F. Atendimento cardiológico ambulatorial: comparação entre pacientes atendidos em hospital de referência e em centro de saúde comunitário. Arq Bras Cardiol 1990; 55: 181-7.
10. Amaral F, Granzotti JA. Erros diagnósticos na avaliação inicial de crianças com suspeita de cardiopatia. Prevalência e possíveis conseqüências a longo prazo. Arq Bras Cardiol 2003; 81: 148-51.
11. Perloff JK, Child JS. Congenital Heart Disease in adults. Philadelphia: WB Saunders, 1991.
12. Somerville J. Grown-up congenital heart disease: Who knows? Who cares? Cardiology 1990; 35: 893-8.
13. Hunter S. Management of adults with congenital heart disease. Heart 1997; 78: 15.
14. Deanfield J, Thaulow E, Warnes C et al. Management of grown-up congenital heart disease. Eur Heart J 2003; 24: 1035-84.
15. Granzotti JA, Amaral F, Simões BJB. Perfil ambulatorial em cardiologia pediátrica na cidade de Ribeirão Preto. Resultados preliminares. Anais XXX Congresso Brasileiro de Pediatria, Rio de Janeiro. Arq Bras Pediatr 1997; 27, supl. I.