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

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 1, 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 2. 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 (≤ 30 days): 4%, 4%, 3.5%; infants (> 30 days and ≤ 2 years): 24%, 20%, 23%; preschool age (> 2 years and ≤ 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
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 (n = 1112). 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 351 (94%) 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 to 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. 1 - Percentage distribution of 1,365 patients referred, according to age and divided into 4 groups.](image)

![Fig. 2 - Reasons for referral in 1,365 patients according to the 3 groups studied. Arrit: arritmia cardíaca; Postop: patients followed up after surgery.](image)

![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.](image)
diatric Outpatient Clinic located downtown. Regarding pediatric consultation are usually referred to the Regional Specialized Pe-
skirts of the city. The pediatric cases that need specialized assistance are performed by 32 doctors. The percentage of patients discharged while 94% were discharged while 11% 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 doctors. The percentage of patients discharged while 94% were discharged while 24% needed follow-up. In G3 (HCFMRP), 6% were discharged while 94% needed outpatient follow-up.

![Diagram 1](image1)

**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.

![Diagram 2](image2)

**Fig. 5** - Final diagnosis and outcome in 373 G (HCFMRP) patients. ASD clos: surgical closure of an atrial septal defect; PDA: patent ductus; AVSD: atrioventricular septal defect; AS: aortic valve stenosis. Others as fig. 3-4.

In the data here presented, the incidence of patients who did not return to the clinic with the tests requested; this aspect has been emphasized and is a well-known fact in medical practice. 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.

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 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 and also expensive when inadequately used, 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, 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?
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 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. 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 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 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