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A Pediatric Cardiology Outreach Clinic in a Local Hospital: An Experience Review from South A'Sharqiyah, Oman

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ABSTRACT

Objectives: Specialized pediatric cardiology clinics conducted in local hospitals are an important part of delivering specialized care to patients close to their homes. This study aimed to review our experience with a specialized pediatric cardiology outreach clinic at Jaalan Bani Bu Ali Hospital, South A'Sharqiyah, Oman. ***Methods***: Patient records for each individual, seen in the outreach clinic between March 2018 and June 2022, were reviewed to determine demographic information, reason for referral, underlying diagnosis, and clinic visit outcomes. ***Results:*** Over the study period, 29 clinics were conducted, with 360 patients seen. Of these, 200 (55.6%) were male with a median age of 13 months. The majority of patients (n = 271; 75.3%) were referred due to a cardiac murmur. Most patients had a normal cardiac evaluation (n = 177; 49.2%). The most common congenital heart diseases detected were mild pulmonary valve stenosis (14.8%) and moderate to large secundum atrial septal defects (13.7%). Significant cardiac lesions detected included severe pulmonary hypertension (2.2%), tetralogy of Fallot (1.6%), and cor triatriatum sinistrum (0.5%). Overall, 70 (19.4%) patients were referred to tertiary care hospitals, and 179 (49.7%) were reassured and discharged. ***Conclusions:*** Conducting specialized pediatric cardiology outreach clinics in overpopulated areas is effective and well-received by families. It reassures many families and reduces the need for unnecessary travel to specialized centers. These clinics also play a crucial role in detecting patients with significant cardiac defects requiring urgent care. Implementing specialized clinics in primary and secondary health centers could be beneficial for other subspecialties in reducing long waiting lists.

The incidence of congenital heart disease (CHD) in Oman is 7.1/1000 live births, consistent with the international literature.[1] Wilayat Jaalan Bani Bu Ali, a district in South A'Sharqiyah governorate, has an estimated population of over 107 637 as per the National Center for Statistics and Information census in 2020.[2] It is about 350 kilometers south of Muscat. Currently, there is only one primary care level hospital and other local health centers spread over the wide area of the wilayat. Providing specialized pediatric cardiology care in local hospitals is limited globally, with such care primarily located mainly in major cities. Referring patients to pediatric cardiology clinics overwhelms these clinics and increases the waiting list. The majority of referrals often yield normal findings, requiring reassurance, while others demand urgent or semi-urgent care. Conducting specialized pediatric cardiology clinics with pediatricians in local hospitals is an important part of delivering specialized care close to patients' homes. Patients attending local specialized clinics experience less travel time and financial benefits. These clinics also provide cardiologists with an opportunity to educate staff, improve local care, and offer early management and intervention for certain pediatric heart problems, as well as reassurance for those with normal findings. This study aimed to review our experience of conducting a pediatric cardiology outreach clinic in Jaalan Bani Bu Ali Hospital.

METHODS

Following the approval from the Centre of Studies and Research at the Directorate General of Planning and Studies at the Ministry of Health, we reviewed the records for each patient seen in the outreach clinic between March 2018 and June

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2022. Data including patient demographics, reason for referral, underlying diagnosis, outcome of the clinic visit, and clinic size were extracted from the patient's electronic system (Al Shifa) and the clinic logbook. Descriptive statistics were used for analysis using SPSS (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.) obtaining frequencies for categorical variables and means and medians for continuous variables.

RESULTS

A pediatric cardiologist conducted 29 outreach clinic visits. The visits comprised new consultations from local healthcare providers and follow-up visits for patients previously seen in tertiary pediatric cardiac centers. The visits occurred monthly or as required, in coordination with the local hospital, based on the waiting list.

Over the study period, 360 patients were seen, of which 200 (55.6%) were male and 160 (44.4%) were female, with a median age of 13 months (1 day–156 months). The maximum number of patients seen in each clinic ranged from 6–21 referrals. The majority of the referrals were due to an accidentally discovered heart murmur (n = 271; 75.3%). Other reasons for evaluation included follow-up after a diagnosis of CHD (n = 21; 5.8%), follow-up after cardiac and interventional cardiac procedures (n = 17; 4.7%), evaluated for suspected trisomy 21 (n = 12; 3.3%), evaluation for arrhythmia and syncope (n = 9; 2.5%), evaluation for recurrent chest infections (n = 9; 2.5%), and referrals for suspected acquired heart disease (n = 3; 0.8%) [Table 1]. Most children attending the clinic had normal cardiac evaluation (n = 177; 49.2%). The most common CHD lesions detected were mild pulmonary valve stenosis (14.8%), moderate to large secundum atrial septal defects (13.7%), and combined secundum atrial septal defect and ventricular septal defect (6.0%) from the group having abnormal echocardiographic examination [Table 2]. Significant cardiac lesions needing urgent or semi-urgent referral to tertiary care center included severe pulmonary hypertension (2.2%), tetralogy of Fallot (1.6%), severe pulmonary valve stenosis (1.6%), severe aortic valve stenosis (1.1%), and cor triatriatum sinister (0.5%). Out of the six patients referred due to palpitations, five (83.3%) were found to have features of non-compaction cardiomyopathy. The majority (66.7%) of patients who were referred because of recurrent chest infection had normal cardiac evaluations. One patient was found to have severe pulmonary hypertension out of the three patients referred due to syncope. Overall, 70 (19.5%) patients required referral to tertiary care hospitals, 111 (30.8%) patients were followed-up locally, and 179 (49.7%) were reassured and discharged. The clinic was well accepted by families, local staff, and administration, as it facilitated care delivery to these patients close to their homes and reassured many.

Table 1: Patients' demographics and reasons for referrals (N = 360).

Parameters	Results	Percentage, %
Median age, months (range), days	13 (1–156)	
Sex, male/female	200/160	55.6/44.4
Reason for referrals		
Cardiac murmur	271	75.3
Follow-up after a diagnosis of CHD	21	5.8
Cardiac screening for DS	12	3.3
Follow-up /cardiac surgery	9	2.5
Follow-up/cardiac catheterization	8	2.2
Recurrent chest infections	9	2.5
Palpitation	6	1.7
Syncope	3	0.8
Suspected acquired heart disease*	3	0.8
Others **	18	5.0

CHD: congenital heart disease; DS: Down syndrome.
**Kawasaki disease and myocarditis.*
***Exertional symptoms, developmental delay, failure to thrive, and dysmorphic features.*

Table 2: Echocardiographic findings of the patients seen at the pediatric cardiology outreach clinic (N = 360).

Findings	Number	Percentage of total patients (n = 177), %	Percentage of abnormal echo (n = 183), %
Normal	177	49.2 (177/360)	50.8 (183/360)
Moderate to large secundum ASD	25	6.9	13.7
Mild PS	27	7.5	14.8
Small mid-muscular VSD	21	5.8	11.5
Small secundum ASD	22	6.1	12.0
PFO	19	5.3	10.2
ASD secundum + VSD	11	3.1	6.0
Severe PHTN	4	1.1	2.2
Mild AS	4	1.1	2.2
Non-compaction CMP	5	1.4	2.7
ASD + PDA	4	1.1	2.2
Multiple VSD	4	1.1	2.2
TOF	3	0.8	1.6
Severe PS	3	0.8	1.6
Sinus venous ASD	2	0.6	1.1
AVSD	3	0.8	1.6
Small PMVSD	2	0.6	1.1
Moderate to large PMVSD	2	0.6	1.1
Moderate to severe MR	2	0.6	1.1
ASD+VSD+PDA	2	0.6	1.1
Situs inverses totalis	2	0.6	1.1
HCM	4	1.1	2.2
Moderate to severe AS	2	0.6	1.1
Small PDA	2	0.6	1.1
Moderate to large PDA	1	0.3	0.5
Cor triatriatum sinistrum	1	0.3	0.5
Double aortic arch	1	0.3	0.5
DCM	1	0.3	0.5
Mild AR	1	0.3	0.5
Prosthetic mitral valve	1	0.3	0.5
Anomalous LUPV to LIV	1	0.3	0.5
Moderate to severe PR	1	0.3	0.5

ASD: atrial septal defect; PS: pulmonary valve stenosis; VSD: ventricular septal defect; PFO: patent foramen ovale; PHTN: pulmonary hypertension; AS: aortic stenosis; CMP: cardiomyopathy; PDA: patent ductus arteriosus; TOF: tetralogy of Fallot; AVSD: atrioventricular septal defect; PMVSD: perimembranous ventricular septal defect; MR: mitral valve regurgitation; HCM: hypertrophic cardiomyopathy; DCM: dilated cardiomyopathy; AR: aortic regurgitation; LUPV: left upper pulmonary vein; LIV: left innominate vein; PR: pulmonary valve regurgitation.

Definitions by echocardiography assessment:

**Pulmonary valve stenosis: mild: < 40 mmHg, moderate: 40–60 mmHg severe: > 60 mmHg.*

**Aortic valve stenosis: mild: mean gradient < 25 mmHg or PG <40 mmHg, moderate: mean gradient 25–40 mmHg or PG 40–70 mmHg, severe: mean gradient > 40 mmHg PG >70 mmHg.*

**Atrial septal defects (diameter): trivial ≤ 3 mm, small: > 3 to ≤ 6 mm in diameter, moderate: > 6 to ≤ 8 mm in diameter, large: > 8 mm in diameter.*

**Ventricular septal defects classified in comparison to the diameter of the aortic valve annulus: small: ≤ 25%, moderate: 25–75%, large: > 75%.*

**Patent ductus arteriosus: very small: < 1.5 mm, small: 1.5–3 mm, moderate: > 3–5 mm, large: > 5 mm.*

**Pulmonary hypertension assessment by echocardiography: an echocardiographic assessment of a peak tricuspid valve velocity > 2.8 m/s suggests pulmonary hypertension after excluding right ventricular outflow tract obstruction.*

DISCUSSION

The availability of pediatric cardiac care units is limited in most parts of the world. In developing countries, these units are concentrated in major cities, serving a vast number of children and often inaccessible to significant portions of the population.

Bringing a child for an echocardiographic diagnosis to a clinic may be challenging due to financial, social, and practical reasons. Conducting specialized outreach clinics has proven to be visible, convenient, and financially beneficial.[3,4] Patients with non-urgent and mild problems can be assessed and managed locally, while those with moderate or severe issues can be transferred on a priority basis for further diagnostic clarification or management, reducing waiting periods and potentially preventing complications or fatalities.[5] This study indicates that the majority of referrals could be reassured by a single visit to a specialist in the local hospital (49.2%), particularly as many had innocent heart murmurs.[5,6] This has significant positive implications for families, reducing financial costs and parental stress. Moreover, urgent cases can be seen earlier in specialized centers, helping to reduce long waiting times. The study also highlights the early detection of significant cardiac lesions requiring urgent tertiary cardiac care, thus potentially reducing associated morbidity and mortality.

Wagstaff et al,[7] reviewed their experience with pediatric cardiology outreach clinics in the UK and emphasized the increasing need for local pediatric cardiology services, suggesting the expansion of the number of pediatric cardiologists or the development of local expertise. Al Harbi et al,[8] from Saudi Arabia demonstrated that 55% of echocardiography performed by experienced pediatric echo sonographers were normal and did not necessitate referral to cardiac centers. Other specialized outreach clinics are practiced worldwide. Specialized outreach clinics, like those studied by Bond et al,[9] in England, have shown higher quality care and efficiency compared to outpatient care. Reid et al,[10] did a cost analysis of outreach psychiatry clinics and found that running such clinics had substantial cost savings for the public healthcare system and reduced travel costs for patients without public travel funding. Conducting pediatric cardiology outreach clinics also provides an opportunity for cardiologists to train local staff in screening echocardiography, particularly in intensive care units, a service that could be more widely utilized with the availability of local telemedicine.[11] A Cochran review concluded after evaluating 73 outreach interventions that specialist outreach clinics in primary care and rural hospital settings can improve access, outcomes, and service use.[12] However, challenges such as less-than-ideal local facilities, infrequent consultant-led clinics due to increasing staff commitments, and the need for essential equipment like basic echocardiography and electrocardiography machines must be addressed.

CONCLUSION

Our study demonstrates that conducting specialized pediatric cardiology outreach clinics in overpopulated areas is effective and well-received by families. It reassures many families and reduces unnecessary travel to specialized centers. Importantly, it aids in the early detection of patients with significant cardiac defects requiring urgent care. Implementing similar clinics in primary and secondary health centers for other subspecialties could alleviate long waiting lists.

Disclosure

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