



RESEARCH ARTICLE

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Early Diagnosis and Management Strategies in Pediatric and Congenital Cardiology: A Clinical Perspective

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Abstract

Pediatric and congenital cardiology has evolved significantly over recent decades, with earlier diagnosis and more refined treatment options contributing to improved survival and quality of life for children with congenital heart diseases (CHDs). This study aims to evaluate current diagnostic modalities and management protocols in a diverse cohort of pediatric patients with congenital heart anomalies. We conducted a multicenter retrospective study analyzing clinical outcomes, diagnostic accuracy, and treatment efficacy in children diagnosed with CHDs from 2018 to 2023. Results indicate a significant association between early echocardiographic screening and better surgical outcomes, particularly in cyanotic heart diseases. Furthermore, the integration of multidisciplinary care teams contributed positively to the long-term prognosis of affected children. Our findings underscore the importance of early detection, coordinated care, and ongoing surveillance in pediatric cardiology.

Keywords: pediatric cardiology, congenital heart disease, echocardiography, early diagnosis, surgical intervention, cyanotic heart defects, multidisciplinary care

Introduction

Congenital heart disease (CHD) is the most common congenital anomaly, affecting approximately 8 out of every 1,000 live births globally. While advances in prenatal screening and neonatal care have increased survival rates, disparities in early diagnosis and treatment continue to pose challenges, particularly in low-resource settings. Pediatric cardiology plays a vital role in the continuum of care for these patients, encompassing diagnosis, medical management, surgical intervention, and long-term follow-

up. This study evaluates the impact of early diagnosis and intervention strategies in pediatric and congenital cardiology, examining outcomes across various healthcare settings. Emphasis is placed on the role of non-invasive imaging, multidisciplinary care teams, and timing of surgical correction.

Materials and Methods

Study Design

A retrospective cohort study was conducted across three tertiary pediatric hospitals located in the United Kingdom, India, and Chile.

Population

The study included pediatric patients aged 0–18 years diagnosed with a congenital heart disease between January 2018 and December 2023. Patients with incomplete records or non-cardiac congenital syndromes were excluded.

Data Collection

Patient data were collected from electronic health records and included demographic information, type of CHD, diagnostic modalities used, time to diagnosis, treatment approach (surgical or non-surgical), and clinical outcomes over a minimum follow-up period of 12 months.

Variables

- Primary variables: type of CHD, diagnostic timing, intervention method
- Secondary variables: postoperative complications, survival rate, growth parameters
- Statistical Analysis: Descriptive statistics, chi-square tests, and logistic regression models were applied using SPSS v26.

Results

A total of 652 pediatric patients met the inclusion criteria. The median age at diagnosis was 4.2 months. Among them, 64% were diagnosed before 6 months of age. The most common congenital defects included ventricular septal defect (VSD, 32%), tetralogy of Fallot (TOF, 21%), and transposition of the great arteries (TGA, 13%). Echocardiography emerged as the most reliable and

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accessible diagnostic tool, with 95% sensitivity for structural heart defects. Early surgical intervention (within the first year of life) showed a statistically significant improvement in survival and quality of life ($p < 0.01$). The use of multidisciplinary care teams correlated with reduced readmission rates and better growth outcomes.

Discussion

The findings of this study reinforce existing evidence that early detection and intervention significantly enhance outcomes in pediatric patients with CHDs. Echocardiography remains central to timely diagnosis, especially in resource-limited settings. Our results support the incorporation of routine echocardiographic screening in neonatal units, particularly for high-risk neonates.

Furthermore, the positive impact of multidisciplinary teams—including cardiologists, pediatricians, surgeons, nutritionists, and psychologists—highlights the necessity of holistic care models. While surgical outcomes have improved, postoperative surveillance and psychosocial support continue to require emphasis.

The variation in diagnostic age and treatment access across different countries also emphasizes the need for global policy frameworks that address disparities in pediatric cardiac care.

Conclusion

Early diagnosis and timely intervention are key determinants of positive clinical outcomes in pediatric congenital cardiology. Widespread use of echocardiography, implementation of multidisciplinary care models, and standardized follow-up protocols are recommended to optimize long-term prognosis in children with CHDs. Continued research and global collaboration are essential to reduce disparities and promote equitable pediatric cardiac care.

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