

Prenatal Detection of Congenital Heart Disease in Rural Oregon

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Introduction

Prenatal diagnosis of congenital heart conditions has been associated with various favorable outcomes when compared to postnatal diagnosis by reducing the risk of delayed intervention and facilitating planned perinatal care and delivery at a tertiary care center. This is particularly important for rural populations without healthcare facilities equipped to manage the perinatal care of an infant with critical congenital heart disease. Prior to development of intervention with prostaglandins, infants born with severe congenital heart disease outside a tertiary care center were unlikely to survive transport for surgical intervention. Early administration of prostaglandins is greatly facilitated by a prenatal diagnosis, enabling any hospital to be equipped to stabilize an infant prior to transport for surgical intervention, thus improving presurgical morbidity and mortality. Improved access to diagnostics, such as fetal echocardiograms to at risk pregnant persons is essential for developing an equitable healthcare system, as well as improving health outcomes for infants born with congenital heart defects. Access to fetal echocardiograms is limited for a large population in rural Oregon, and with the exception of the Children's Heart Center of Central Oregon, many pregnant people are otherwise required to travel to Portland to undergo the procedure, resulting in a significant barrier to care. The Children's Heart Center of Central Oregon is located in Bend, Oregon and offers fetal cardiology services to all of central and eastern Oregon. By examining rates of prenatal and postnatal diagnosis from the CHCCO and comparing them to national averages, this study analyzes the utility and effectiveness of a regionalized pediatric cardiology center serving a rural population at detecting congenital heart disease prenatally and facilitating care to higher centers.

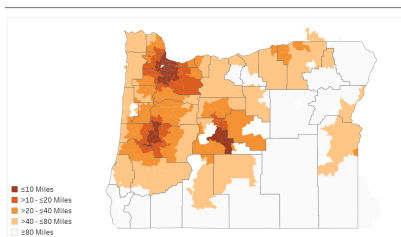
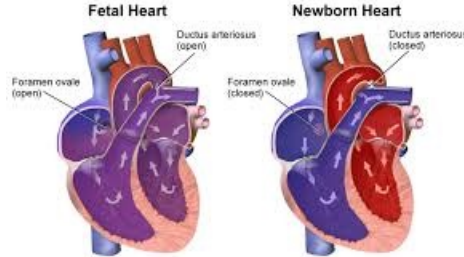


Figure 1. Estimated driving distances to receive pediatric cardiology services in Oregon (The American Board of Pediatrics, 2022).

Methods

Patient data from the Children's Heart Center of Central Oregon was used in a retrospective clinical analysis to determine rates of prenatal and postnatal diagnosis of congenital heart disease within the patient population. Patients diagnosed with Pulmonary Atresia, Tetralogy of Fallot, Hypoplastic Left Heart Syndrome, Critical pulmonary stenosis, Tricuspid atresia, Critical aortic stenosis, Transposition of great arteries, Total anomalous pulmonary venous return, truncus arteriosus, double outlet right ventricle, atrioventricular canal, Shone's complex, and large, hemodynamically significant ventricular septal defects were included in the study. Charts were filtered by the diagnosis coded for during a visit, then further analyzed to determine details of the diagnosis including whether it was prenatal or postnatal, and whether a local fetal echo was performed.



Results

To examine the relationship between receiving a local fetal echo and receiving a prenatal diagnosis, a chi-square test of independent variability was conducted. The relationship between these variables was significant, $\chi^2 (1, N = 63) = 48.11, p < .001$, such that patients diagnosed postnatally were much less likely to have received a local fetal echo. The cohort included 63 patients, and the observed frequencies demonstrate that among patients receiving treatment for severe congenital heart disease at the Children's Heart Center of Central Oregon between the years 2002-2024, 37 (58.7%) had received a prenatal diagnosis of congenital heart disease. The remaining 26 (41.3%) were diagnosed postnatally. It was found that only 65.1% of patients had received a local fetal echocardiogram, and 22 (84.6%) of the 26 patients receiving a postnatal diagnosis did not receive a fetal echocardiogram. See in Figure 2.

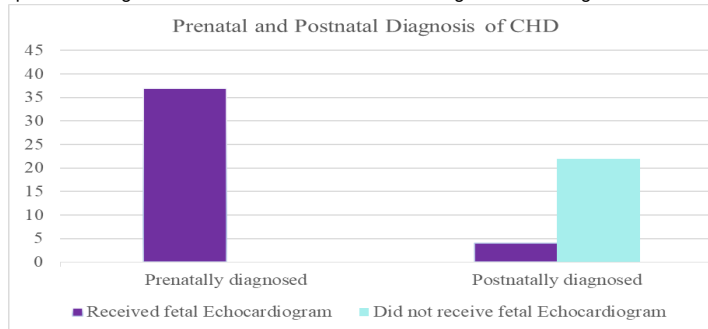


Figure 2. Patients who received a prenatal diagnosis vs a postnatal diagnosis and whether or not a local fetal echocardiogram was performed.

Discussion

Despite advancements in ultrasound technology and updated screening guidelines, the national average prenatal detection rate of CHD is only about 50% (range 34%–65%) (Mattia, 2023). While the rates of prenatal diagnosis in rural Oregon have improved to be on the higher end of the national average, the relative risks associated with receiving a postnatal diagnosis of congenital heart disease at such a great distance from a tertiary care center indicate there is still substantial need for increased accessibility of fetal echocardiograms. Further studies are necessary to determine specific areas of need, however by incentivizing practitioners and sonographers to practice in rural areas and addressing social determinants of health that impair the ability of patients to access prenatal care, fetal echocardiograms can be made increasingly available. Improving the availability of fetal echocardiograms and subsequently increasing the rates of prenatal diagnosis within this region has many implications for infant morbidity and mortality, as well as reducing cost of care by decreasing the risk of critical complications. The Children's Heart Center of Central Oregon continues to greatly improve access to pediatric subspecialty care and offers a successful model of how the distribution of specialty care in rural areas can positively impact health and equity of care. Despite this, increased resource distribution, training of sonographers and practitioners in the area, and improved facilitation of care may be necessary to optimize rates of prenatal diagnosis of congenital heart disease and quality of care.

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