The Provision of Surgical Care for Children with Cardiac Disease: The Jamaican Experience – An 18-year Review

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ABSTRACT

The aim of this article is to review the local experience over the last 18 years (1994–2011) in providing surgical intervention for children with heart conditions in Jamaica. Eight hundred and sixty-three children received cardiac surgery during this period, 441 were done with the assistance of visiting overseas teams and 422 by the local surgical teams. The majority of cases receiving cardiac surgery were for congenital heart defects; however, 3% of cases were for rheumatic heart disease. The overall survival rate was 94% for the period 1994 to 2008.

Keywords: Children with heart conditions, Jamaica, surgical intervention, visiting overseas teams

La Provisión de la Atención Quirúrgica a Niños con la Enfermedad Cardíaca – un Estudio de 18 Años

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RESUMEN

El objetivo de este artículo es pasar examen a la experiencia local durante los últimos 18 años (1994–2011) en cuanto a brindar intervención quirúrgica a niños con problemas cardíacos en Jamaica. Ochocientos sesenta y tres niños recibieron cirugía cardíaca durante este periodo. De estas, 441 se realizaron con ayuda de equipos formados por personal médico visitante extranjero, y 422 por equipos de cirujanos locales. La mayoría de los casos que recibieron cirugía cardíaca presentaban defectos cardíacos congénitos. Sin embargo, un 3% de los casos presentaban la enfermedad reumática del corazón. La tasa de supervivencia global fue 94% para el periodo 1994 a 2008.

Palabras claves: niños con problemas cardíacos, Jamaica, intervención quirúrgica, equipos de visitantes extranjeros

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INTRODUCTION

While developing countries have made great strides in improving healthcare in a number of areas, most still do not have adequate services for the care of children with cardiac disease. This is true for Jamaica and therefore, in this article, plans to alleviate the problem are described. It is hoped that this information will assist in speeding up the process to close the gap between the availability and need for surgery, for children (as well as adults) with heart disease.

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Approximately 400 children are born each year with congenital heart disease in Jamaica (1, 2); half of this number will need some corrective procedure, either *via* open heart surgery or catheter intervention. Rheumatic heart disease (RHD) is also still prevalent and contributes to the pool of patients requiring cardiac intervention (3, 4).

Developing a cardiac service in an emerging economy is a daunting task. The challenges are due to limited financial resources, as the health budget tends to be channelled into other areas, especially primary healthcare. Insufficient trained manpower, the lack of drugs, blood, specialized equipment and insufficient intensive care facilities are the sequaelae of the perpetually limited financial resources (5–8). Health administrators find it difficult to justify financing cardiac services because doing so would impose such a major financial burden that decisions would have to be

made about where to reduce service in other areas. Service reductions would have to be made in programmes that target infectious diseases, gastroenteritis, nutritional disorders and other areas that contribute to high perinatal and high infant mortality, as well as the control of chronic non-communicable diseases in adults. These conditions are more prevalent than paediatric heart diseases; they therefore demand interventions such as expansion of vaccination programmes, directing resources to improve the prevention and management of infections, and prevention of nutritional deficiencies. Also, they tend to be more cost-effective to treat, as much more patients/persons benefit from the interventions.

The available options for providing care for children who need cardiac surgery include:

- development of an autonomous programme, as has been done at the Bustamante Hospital for Children (BHC), and to a limited extent, the University Hospital of the West Indies (UHWI)
- facilitating surgery by visiting overseas teams working with the local teams
- transfer of patients overseas

A combination of these options is presently employed. Each of these options has pros and cons that lend themselves to differing degrees of usage in a given setting. Sending patients for treatment overseas is an expensive in-depth exercise that only benefits a few patients and does not create a foundation on which to build self-dependence. Having foreign teams travel to Jamaica to treat heart conditions offers a better return on investment and has the additional advantages of training local staff and providing needed medical equipment and medications. While it is a better alternative than referring patients to foreign countries, it too assists only a limited number of patients. An autonomous home-based cardiac surgery programme is the best option and it is in this direction that we have embarked. Significant contribution to patient care utilizing other methods remain and will realistically continue to contribute for a variety of reasons, such as the complexity of cardiac lesions and personal preference.

The Early Days

Closed heart procedures (ligation of patent ductus arterious and mitral valvotomy) were being done in Jamaica from 1953 (9). Cardiac catheterization commenced in 1959. The first open heart operation to be done on the island was the repair of an atrial septal defect in a 17-year old girl in 1968 (10). Prior to performing the procedure, staff underwent an intense two-year period of preparation at the Ripple Experimental Laboratory, University Hospital of the West Indies. The laboratory was transformed into an open heart operating theatre suite where the medical team, using a dog model, honed their skills. The following years were to see a robust autonomous local programme, the experience of which has been well documented (9). As is typical of the pattern of establishing a cardiac programme in developing countries, there have been multiple setbacks due to malfunctioning equipment and financial constraints. One of the main setbacks was the lack of a functioning cardiac catheter laboratory during the years 1985–1993 when the only catheter laboratory on the island, located at the UHWI, was shut down. As a result, open heart surgery procedures for congenital disease came to a halt. Consequently, the only remaining option for children requiring open heart surgery was to seek care from cardiac centres in North America and the United Kingdom (UK).

The New Era

The UHWI cardiac catheter laboratory was refurbished in 1994 and this was to begin a new era of cardiac surgery care in Jamaica (10). During this era, visiting missions to perform procedures and to refresh and update the skills of the local team were utilized. An open heart surgery programme was established at the BHC where, in November 2000, the local team performed the first open heart surgery on a nine-year old girl with an atrial septal defect (10).

The visiting teams remain an important component of the paediatric cardiac care delivery system. During the periods when the visiting teams are present, otherwise limited resources are made available to the teams. This includes the increased availability of theatre space, intensive care unit (ICU) beds, perfusion and monitoring equipment. During the rest of the year, operating room space, ICU beds and equipment have to be shared with other non-cardiac procedures and in the care of critically ill patients from various surgical and medical specialties. Generally, the more complex cardiac lesions were undertaken when the visiting team was present as more equipment, ICU beds and supportive staff, as well as more expertise, were available. An added benefit of the visiting teams is the often charitable donations of much needed equipment to facilitate surgery and the intensive care of patients. These include oxygenators for the cardiopulmonary bypass machine, monitors, medications and arterial blood gas cartridges among other equipment and supplies.

Between 1994 and 2011, seven visiting teams made 41 visits to Jamaica (Table 1). The chief contributing teams included the United States of America (USA)-based Caribbean Heart Menders Association, Jamaica Children Heart Fund and the UK-based Chain of Hope. Four hundred and forty-one cases were managed during this period by the visiting teams while 422 were repaired by the local team.

Data on postoperative mortality within the first month were assessed after surgery for the period January 1994 to December 2008. For the local team, deaths were 5.1% (15/294) of patients who received surgery, compared to the death of 7.1% (19/268) of the patients who had surgery performed by the visiting teams. The higher mortality seen with visiting teams is most likely due to the fact that the more complex cases were done. Since 2003 to the present, most of the paediatric cases on the island are performed at the

Table 1: Paediatric cardiac surgery cases performed in Jamaica during the period January 1994 to December 2011 for children ages 18 years and under

	Visits	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Cases**
NEBRA	01	05																		**05**
COH	16			14	24	14			[10]		[16]	[20]	[16]	(25)	(22)	(15)	[14]	[17]	[18]	**225**
UB	02			03	03															**06**
ICHF	01		15																	**15**
CHMA	11				13	12	10	05	09		[10]	[08]			[07]	[09]	[14]	[18]		**97**
CHIF	01																		[16]	**16**
JCHF	09												[08]	(13)	07	{15}	09	07		**59**
Total V	**41**	**05**	**15**	**17**	**40**	**26**	**10**	**05**	**19**	**00**	**26**	**28**	**24**	**38**	**36**	**39**	**37**	**42**	**34**	**441**
Total L		30	31	21	26	34	11	20	13	18	16	18	13	07	05	09	35	51	64	**422**
Total V + L		**35**	**46**	**38**	**66**	**60**	**21**	**25**	**32**	**18**	**42**	**46**	**37**	**45**	**41**	**48**	**72**	**93**	**98**	**863**

Total cases with visiting teams – 441 (263 at BHC, 178 at UHWI)
Total cases done by local team – 422
Combined total cases done with visiting teams and by local team – 863

Visiting teams: CHIF – Congenital Heart Institute of Florida, USA; CHMA – Caribbean Heart Menders Association, Florida, USA; COH – Chain of Hope, United Kingdom (UK); ICHF – International Children's Heart Foundation, University of Tennessee, Memphis; JCHF – Jamaica Children Heart Fund, Florida, USA; NEBRA – Team from Nebraska, USA; UB – University of Brooklyn, USA
V – visiting team, L – local team
Brackets – cases done at Bustamante Hospital for Children (BHC) with visiting teams: [ ] – 1 visit, ( ) – 2 visits, { } – 3 visits
Non-bracketed numbers – cases done at the University Hospital of the West Indies (UHWI) with visiting teams

Bustamante Hospital for Children. In addition, the complexity of the lesions being done by the local surgical team has also increased.

With the growth of paediatric cardiac surgery at the Bustamante Hospital for Children, the average number of cases being done per year on the island has increased. This has resulted in a significant decrease in the backlog of patients awaiting surgery. If this trend continues, there will be a decrease in the gap between the estimated number of patients requiring intervention (200), and those who are able to access much needed surgery. Nonetheless, there still exists a large population of children with limited or no access to cardiovascular surgical care, and the current goal is to reduce this.

The pre-surgery evaluation of cases has evolved over the years. Cardiac catheterization is less frequently performed because, as is the experience internationally, improvement in echocardiography has decreased the number of cases requiring diagnostic catheterization prior to surgery. During missions conducted by visiting teams, and especially over the last five years, catheterization is done mainly for interventional cases, including electrophysiological ablation, percutaneous closure of heart defects such as patent ductus arteriosus and atrial septal defects, as well as valvotomies. Otherwise, the majority of cases requiring diagnostic catheter investigation are performed by the local team all year around. Of note, a small number of cases for surgery and interventional catheterization are from other Caribbean islands, as the expertise does not exist in all of the English-speaking Caribbean Islands. The plan is for the development of local expertise and the offering of this method of cardiac management.

The types of lesions seen in Jamaica are consistent with those seen worldwide. Data on the types of lesions repaired for the period January 1994 to December 2008 are represented in Table 2.

The Chain of Hope, UK, has been the major visiting team. In 2007, they established a branch in Jamaica, Chain of Hope, Jamaica, to facilitate local cardiac surgery and catheterization outside of missions and to build a sustainable local paediatric cardiac service. Their activities have succeeded in increasing the number of local procedures performed as well as public awareness of the burden of paediatric cardiac disease in Jamaica. They have engendered more participation from the government, private sector as well as non-governmental agencies to unite to improve Jamaica's ability to become self-sufficient with regard to delivering paediatric cardiac surgery.

In 2010, a memorandum of understanding was signed between the Ministry of Health, the South East Regional Health Authority, Chain of Hope, UK, and other stakeholders to undertake the building of a self-sustained paediatric cardiac centre at the Bustamante Hospital for Children and to assist with training of staff as well as procurement of equipment for the new unit. The centre will have a ten-bed intensive care unit (the current ICU that serves the hospital has five beds), an operating suite and a cardiac catheterization laboratory which should be completed in 2013. The skills and experiences to be gained from this centre will not only

Table 2: Types and frequency of cardiac lesions presenting for surgery 1994–2008

LESIONS	FREQUENCY	%
PDA	167	27.8
TOF	118	19.7
VSD	78	13.0
AVSD	19	3.2
ASD	62	10.3
Tricuspid atresia	10	1.7
PS	3	0.5
CoA	20	3.3
TGA	8	1.3
DORV	5	0.8
Aortopulmonary window	3	0.5
Total/PAPVR	6	1.0
Valvular lesions	17	2.8
VSD + AR	14	2.3
VSD + PDA	20	3.3
ASD + PS	4	0.7
AVSD + PDA	2	0.3
VSD + PS	3	0.5
ASD + VSD	10	1.7
TGA + Tricuspid atresia	1	0.2
PDA + ASD + VSD	3	0.5
ASD + VSD + PS	3	0.5
Miscellaneous	6	1.0
Acquired heart disease	18	3.0
TOTAL	**600**	**100**

PDA: patent ductus arterious; TOF: Tetralogy of Fallot; VSD: ventricular septal defect; AVSD: atrioventricular septal defect; ASD: atrial septal defect; PS: pulmonary stenosis; CoA: coarctation of the aorta; TGA: transposition of the great arteries; DORV: double outlet right ventricle; PAPVR: partial anomalous pulmonary venous return; AR: aortic regurgitation.

provide benefits for the care of paediatric cardiac patients in Jamaica, but will spill over to other paediatric patient care services. The centre will allow Jamaica to move forward in the quality of its management of cardiac patients as a result of the pooling of minds, skills and resources, as well as the positive motivation that ensues when healthcare personnel provide high level care in a research-driven environment.

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