

# Establishing a children's orthopaedic hospital for Malawi :An assessment after 5 years

A. Youssef<sup>1</sup>, W.J. Harrison<sup>2</sup>

1.Trinity Western University

2.Beit Cure International hospital

Correspondence: W.J. Harrison Email: jimh@curehospital.mw

## Abstract

Beit Cure International Hospital (BCIH) is a specialist orthopaedic hospital providing surgical services to the children of Malawi. The hospital started treating patients in late 2002, and this analysis represents an attempt to assess the impact of the hospital, and develop strategies for future partnerships and development.

Analysis was made of all the 563 case files of new patients treated operatively in the fifth year of hospital services.

Data recorded included district and region of origin of patient, diagnosis, age and sex.

Patients were treated from all 3 regions, with almost 50% coming from Southern region.

Club foot, burn contracture, and genu varus were the most common diagnoses.

Half the children were infants up to 5 years of age, while 60% were male.

The underlying reasons behind these findings are analysed and their implications in terms of future hospital strategy are discussed.

## Introduction

BCIH is a 66-bed teaching hospital, specialising in surgical treatment for the orthopaedic needs of children and adults of Malawi and surrounding countries. This service attends to the needs of children with physical disabilities regardless of their ethnic background, religious affiliation or ability to pay.

Since its establishment in 2002 until 2007, Malawi's Beit CURE International Hospital (BCIH) saw approximately 23,000 out-patients - 4,600 of whom underwent operations. The conditions treated at BCIH include a wide range of orthopaedic pathologies such as: club foot, angular limb deformities, burn contractures and chronic osteomyelitis.

The hospital conducts monthly mobile clinics to identify children around the country who can be served by the hospital, while providing follow-up care to those who have already received surgery. The peripheral clinic programme is conducted mainly in partnership with existing structures in Ministry of Health Central and District hospitals.

Care of paediatric patients is provided without charge, and the hospital also admitted paying adults in order to generate income to sustain free paediatric services, and to broaden the clinical services observed by trainees.

BCIH also has a teaching component including post-graduate Orthopaedic Surgical training, and administration of the Orthopedic Clinical Officer training program. The former utilises the College of Surgeons of East Central and Southern Africa (COSECA) curriculum, and the latter programme trains qualified paramedics (Medical Assistants) to work as orthopedic physician extenders.

BCIH is a non-denominational Christian mission hospital offering, without obligation, Christian counselling and prayer to guardians and patients. Patients from all faith backgrounds

are welcomed without discrimination. This study was conducted to obtain an idea of the hospital's progress in its first five years of operation. The study gives a background upon which to plan future strategies of care.

## Materials and Methods

The aim of the study was to analyse the service offered by BCIH in terms of its geographical coverage, age and sex of patients, and types of pathology treated operatively.

The study was conducted by collecting data from 563 medical files of new paediatric patients admitted for the year of 2006 – the fifth year of clinical operation of the hospital. Private patients were not analysed. The data was compiled using Microsoft Excel and included the sex, age, district, country and diagnosis of each patient.

One of the main objectives of this project was to determine the number of patients who came from each district of Malawi. Those numbers were then grouped into the three regions of Malawi: Northern, Central, and Southern as determined by a map of the country. The number of international patients (solely Mozambique) was also included. The hospital staff make regular trips to Mzuzu Central hospital, operating on some 75 children per year there. This data was not included, but only data on patients operated in BCIH.

As part of the data analysis, the top 12 diagnoses were identified and ranked.

Age of patients was analysed in the following age-group categories: 0-5yrs, 6-11yrs, 12-17yrs, and 18+yrs.

## Results

In total, 56 recorded patients came from Northern Malawi (10% of 2006 patients), 199 recorded patients came from Central Malawi (35%), 269 patients came from Southern Malawi (48%), 32 patients from Mozambique (6%), and 7 more patients from Malawi whose region is unidentified (1%).

The Districts from which patients derived are shown in Table 1. The Region summary is shown in Table 2.

The top three diagnoses were Clubfoot (1st, 79 total 15% patients), Burn Contracture (2nd, 70 total 12% patients), and Genu Varus (3rd, 58 total 10% patients), The top 12 diagnoses are shown in Table 3.

The age distribution of 2006 patients (Table 4) indicated that half the children were 5 years or younger and 80% were 11 years or younger.

Finally, 224 of the 563 patients were female (40%), and 339 of the 563 patients were male (60%).

## Discussion

The clinical service of BCIH can be measured in terms of the numbers of children operated, quality of care, geographical coverage, range of operative interventions, and impact in stimulating other centres to increase clinical care provision. The teaching role may be assessed by numbers and types of clinicians trained, numbers retained in the country, and ultimately clinical output of those clinicians.

At 5 years it was felt that an analysis of clinical impact would be timely to see what the hospital was doing, and direct future strategy and resource allocation. An assessment on

the impact of training may best be delayed to ten years of hospital service.

The hospital is situated in Blantyre in the Southern Region of Malawi in order to interact with the country's only Medical College. One may expect a natural bias therefore in providing more clinical services in the Southern region than the Central or Northern Regions.

Travelling of hospital staff to distant clinics is expensive in time and money, and for patients the journey to Blantyre to receive surgical care is also more costly.

The results of this analysis appear to bear out this bias in that almost half the surgical patients were from the Southern region, with just 10% from the Northern region. Nevertheless these results should be analysed with caution since population figures show that the Southern region has 46%, Central region 41%, and Northern region just 13% of the national population. Additionally, operations conducted in Mzuzu in the Northern region were not included in this data. Since the time of the study, BCIH has also increased the frequency of clinic trip to the Lilongwe area in Central region to monthly.

Even if the coverage by region can be made equitable, it is a further challenge to provide services to all districts within the regions. Table 1 indicates that this was achieved better in the Southern region than either of the other two regions.

Analysis of the conditions treated is interesting in revealing club foot as the most common diagnosis. This condition arises in approximately 1 in 500 live births in Malawi<sup>1</sup>. Club foot may be treated non-operatively by the Ponseti manipulation and plaster method<sup>2</sup>, which has been shown to have successful outcomes when carried out by specifically trained paramedics<sup>3</sup>. Around the time of this analysis, BCIH allocated resources to re-establish and support the Malawi National Club foot programme, establishing a treatment centre in each of the nation's District hospitals.

In this way many more club foot patients are now being treated non-operatively in the first year of life. However there remains a large cohort of patients too old for Ponseti management (above 18 months), who still require surgical corrections. It is our estimate that a decade of successful national Ponseti programme needs to pass before a significant reduction in the operative club foot workload can be expected.

The second most common condition was burn contractures, mostly of limbs, and especially the hand. In the period of the study, there was no plastic surgeon working in Malawi. The orthopaedic surgeons of BCIH received some 'on-the-job' training from a visiting plastic surgeon to assist them in fulfilling this need. More recently a plastic surgical service has been re-established in Queen Elizabeth hospital, Blantyre, and this may ultimately ease the burden of such cases on BCIH. A public health educational programme alerting the public to the dangers of leaving children unsupervised near open fires is likely to bear the biggest impact in reducing this national health problem.

Angular limb deformities, genu varus and valgus together accounted for 18% procedures. A prospective trial is currently underway and is analysing the aetiology of such deformities, which is currently poorly understood. It may be that this research will yield helpful data in terms of medical management or even dietary advice, which could reduce the number of such cases.

The distribution towards younger patients is useful in considering the targeting of training and awareness programmes to alert the public to the services offered and conditions that may be treated. It also helps the hospital plan its surgical and support structures to provide safely for large numbers of infants.

The male skew may represent a preference of families in presenting male children for medical care. However it may simply reflect a genuine male preponderance in club foot and post-traumatic conditions including burn contractures.

Analysis of the first 5 years of service of BCIH provides valuable data for the operating mission, Cure international, and its publication informs the medical community of the work being done. Prior to BCIH most of these children simply never received surgical care and remained disabled.

It is also apparent that the case-load is increasing year-on-year as more patients become aware of what services are available. This leaves BCIH with a challenge on two fronts – developing structures to treat more patients whilst maintaining quality, and generating income to support such expansion. To be realistic a single orthopaedic unit can never supply all the surgical care for a population including some 6.5 million children. Furthermore, given the current global economic climate and the fall in international donor support, it is unlikely that BCIH can expand its free paediatric orthopaedic service. From the outset BCIH has placed strong emphasis on training and on partnership with existing health providers in both the Government and Non-Governmental sectors. This approach of supporting other units to expand orthopaedic services is likely to be the optimal way forward for the country.

The emphasis of BCIH on research should promote better resource allocation as clinical and cost efficiency of treatments are constantly reviewed and developed.

This survey helps in the understanding of current clinical emphasis, which can stimulate research priorities.

It is hoped that a similar review in a further 5 years may point to developments and hopefully collaborative improvements in provision of orthopaedic surgical services to all the nation's children. The impact of training will then also be noteworthy.

## References

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Table 1 Region and district distribution of in-patients

<b>DISTRICT (REGION)</b>	<b>NUMBER</b>
Chitipa (NORTHERN)	1
Karonga (NORTHERN)	2
Likoma (NORTHERN)	1
Mzimba (NORTHERN)	3
Nkhata Bay (NORTHERN)*	49
Rumphi (NORTHERN)	0
<b>NORTHERN TOTAL</b>	<b>56</b>
Ntcheu (CENTRAL)	28
Ntchisi (CENTRAL)	3
Salima (CENTRAL)	32
<b>CENTRAL TOTAL</b>	<b>199</b>
Balaka (SOUTHERN)	22
Blantyre (SOUTHERN)	102
Chikwawa (SOUTHERN)	17
Chiradzulu (SOUTHERN)	9
Machinga (SOUTHERN)	10
Mangochi (SOUTHERN)	32
Mulanje (SOUTHERN)	11
Mwanza (SOUTHERN)	11
Nsanje (SOUTHERN)	13
Thyolo (SOUTHERN)	13
Phalombe (SOUTHERN)	2
Zomba (SOUTHERN)	27
<b>SOUTHERN TOTAL</b>	<b>269</b>
<b>MOZAMBIQUE</b>	<b>32</b>
<b>MALAWI (DISTRICT UNKNOWN)</b>	<b>7</b>
<b>GRAND TOTAL OF SAMPLE</b>	<b>563</b>

Table 2 Percentage of patients from each region

<b>NORTHERN TOTAL</b>	<b>10%</b>
<b>CENTRAL TOTAL</b>	<b>35%</b>
<b>SOUTHERN TOTAL</b>	<b>48%</b>
<b>MOZAMBIQUE</b>	<b>6%</b>
<b>MALAWI (DISTRICT UNKNOWN)</b>	<b>1%</b>

Table 3 Top 12 diagnoses of patients

RANK	Diagnosis	Number	% of Sample
1	Clubfoot	79	15%
2	Burn contracture	70	12%
3	Genu Varus	58	10%
4	Genu Valgus	45	8
4	Chronic osteomyelitis	45	8
5	Syndactyly	18	3
6	Polydactyly	16	3
7	TB	14	2
7	CP	14	2
8	Perthes disease	12	2
9	Windswept deformity	11	2
10	Pseudoarthrosis	8	1
11	Equinus	6	1
11	Exostosis	6	1
12	Blounts	5	1

TABLE 4 Distribution of patients

Age Range	Number	Percentage
0 to 5	283	50%
6 to 11	171	30%
12 to 17	109	19%
18+	6	1%

Table 5 Gender distribution of patients

Sex	Number	Percentage
Female	224	40%
Male	339	60%