

Editorial

**THE SOCIO-ECONOMIC BENEFITS OF A LOCAL CARDIAC CENTRE:  
AN OUTLINE OF THE FUNCTION AND EXPERIENCE OF  
MOHAMMAD BIN KHALIFA BIN SULMAN AL KHALIFA  
CARDIAC CENTRE IN BAHRAIN**

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Modern invasive cardiology and cardiac surgery is expensive and require intensive resource undertakings. The decision to establish a new cardiac centre, encompassing many specialities must therefore be made with a clear idea of the expected cost and potential benefits expected from such services to deliver to the target population.

The Mohammad Bin Khalifa Bin Sulman Al Khalifa Cardiac Centre was opened in October 1992 to make available to the population of Bahrain, all forms of investigative and therapeutic cardiology with subsequent cardiac surgery.

Non-invasive, investigative cardiology and general cardiology services were already available in Bahrain; the new services to be undertaken at the Cardiac Centre included invasive investigation and invasive intervention in the form of percutaneous transluminal coronary angioplasty (PTCA) and balloon valvuloplasty. Some types of palliative "closed heart surgery" are also provided together with "open heart surgery" in the form of cardiopulmonary by pass (CPBP).

The Cardiac Centre has, in the first 22 months of work, undertaken over 1200 cardiac catheterisations, more than 100 PCTA's and almost 300 CPBP operations. It is now appropriate to make an initial assessment of the socio-economic impact which the availability of the facilities of the Cardiac Centre have had on the population and the existing medical services in Bahrain.

**Pre-existing Services**

Prior to the opening of the Cardiac Centre, non-invasive cardiology was available at the Salmaniya Medical Centre

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(SMC), the Bahrain Defence Force Hospital (BDF) as well as some private hospitals. Both the SMC and BDF had active coronary care facilities with 7 and 4 beds and 323 and 200 admissions respectively in the 1991<sup>1</sup>.

Through the Overseas Treatment Committee, more than 300 Bahraini patients were sent to overseas centres per year for the investigation and management of cardiac diseases, many of whom were in need of surgical treatment which also had to be undertaken overseas. At least one relative traveled with the patient, adding to the cost, but at the same time leaving the rest of the family at the end of a long line of communication.

Thus overseas treatment had several drawbacks; delay when urgent or emergency intervention was required, inconvenience, lack of family support, open-ended

expense when palliative surgery was performed and frequent return to that centre was required and, of course, the lack of easy access to the medical or surgical team for advice, support, reassurance and management of complications.

That Bahrain entered the 1990's without interventional cardiology and cardiac surgery attests to the very high standards of the existing cardiology services in the country and their ability to cope with complex late management problems, for if this were not the case, the call for these new specialities would have forced the issue of a local Cardiac Centre much earlier.

With the rising incidence of cardiac diseases in Bahrain, especially ischaemic heart disease, it could be predicted that in the absence of a local Cardiac Centre, there would be an inexorable rise in the number of patients requiring treatment overseas (and thus in the overall cost), as well as the potential for an increase in the number of patients dying before such arrangements could be made. This scenario was clearly unacceptable and in part, was behind the decision to open a Cardiac Centre in Bahrain.

### Cardiac Centre Services

The physical resources of the Cardiac Centre are shown in Table 1, manpower resources in Table 2, and the range of cardiological, cardiac surgical, cardiac anaesthesia and perfusion services available in Table 3.

Table 1: Physical Resources

Resource	Function
Cardiac Catheter Laboratory	Invasive investigation. Cine angiography and angioplasty
Coronary Care Unit	6 cubicalised monitored beds for acute cardiology and post angioplasty patients
Cardiac Operating Room	1 fully equipped theatre
Cardiac Intensive Care	4 fully monitored beds (2 cubicalised) for post-cardiac surgery patients and medical patients requiring ventilation
Cardiac Ward	30 beds for pre and post procedure cardiology and cardiac surgery patients, thoracic and vascular surgery patients
Outpatients Department	4 consultation rooms, dressing room, ECG room
Investigation Laboratory	2 Doppler echo machines, exercise test, Holter monitoring and blood pressure monitoring equipment

Table 2: Manpower Resources

Cardiology	4 consultant 4 residents 7 technicians
Cardiac Surgery	2 consultants 2 registrars
Cardiac Anaesthesia	2 consultants 1 senior technician 1 trainee technician
Clinical Perfusion	2 clinical perfusionists
Nursing	a) 1 principal nursing officer 3 nursing officers  b) Theatre: 1 head nurse 6 staff nurses  c) Catheter Laboratory: 1 head nurse 3 staff nurses  d) Intensive Care: 1 head nurse 16 staff nurses  e) Coronary Care: 1 head nurse 15 staff nurses  f) Cardiac Ward: 1 head nurse 23 staff nurses  g) Outpatients: 1 head nurse 2 staff nurses
Community Care	2 nurses
Physiotherapy	3 physiotherapists
Dietetics	1 dietitian
Clerical	6 clerks
Secretarial	5 secretaries
Administration	Cardiac Centre Director 1 Administrator

Table 3: Cardiac Centre Services

Cardiology	1 Cardiac catheterisation 2 Coronary angioplasty 3 Balloon valvuloplasty 4 Pacemaker implantation 5 Exercise testing 6 Holter monitoring 7 Ambulatory blood pressure
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	monitoring
	8 Transthoracic and trans-oesophageal echocardiography
Cardiac Surgery/ Anaesthesia	1 Adult and paediatric open heart surgery 2 Palliative surgery for congenital heart disease 3 Thoracic and Vascular surgery
Clinical Perfusion	1 Cardiopulmonary bypass 2 Circulatory support (intra-aortic balloon pumping) 3 Isolated limb perfusion

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Cardiology outpatients' clinics are held on 4 days a week and cardiac surgery once a week. In addition there is a monthly (bimonthly from September 1994) paediatrics/cardiac surgery combined clinic where paediatric patients, both medical and post-operative, are seen. Data for attendances at these three clinics are shown in Figures 1,2, and 3 respectively. Two anticoagulant clinics are also held each week, one of which is part of the cardiac surgery clinic for review of valve replacement patients.

Cardiology, cardiac surgery and cardiac anaesthesia function as an integrated team. After investigation and cardiological review, selected patients are again reviewed with the surgeons at a weekly case conference, except in urgent or emergency situations where discussion and decisions are made at any time. This kind of work practice allows for group responsibility for patient management as well as academic discussion and enhances the overall care the patient receives.

It should be emphasised that the criteria for accepting patients for investigation and/or surgery are very much in line with those applicable in major Cardiac Centres. Investigation is symptom driven, selection for operation based on operability, clinical status and prognosis. Our oldest CPBP patient to date was 83 years old, and the youngest just 7 months old. Patients are not refused operation on the basis of high operative risk if prognosis and quality of life will be significantly improved after successful surgery. Rather, after full discussion at consultant level and frank discussion of the risks and potential benefits, the decision to have investigation and/or surgery has rightly, been left to the patient (and his or her relatives).

Although this policy tends inevitably to lead to a higher than optimal operative mortality and morbidity, we consider it critical that our patient selection criteria match those of the best centres in the world for if the Cardiac Centre accepted only low risk patients, then the mortality and morbidity figures would look very good, but the demand for overseas treatment would remain and the Centre would be failing a large proportion of those for whom it was created. This would clearly compromise one of the basic premises for the development of the Centre and is of course unacceptable.

### **Socio-economic impact of the Cardiac Centre**

The investment made in the Cardiac Centre has two basic financial elements; the capital investment in the structure and equipment and the recurrent costs of staff, consumables, maintenance, replacement equipment and service development.

The establishment cost of the centre including staffing are known accurately, but it will be some while before the average cost for each basic cardiology or surgical admission can be assessed with the same precision. This is due to variability in the case mix, insufficient total numbers to allow for the effect

of prolonged hospital stay (after complications), and the fact that our services are not yet fully developed. When such figures are known, then the direct costs per patient can be used to formulate future budget requirements.

Such definitive cost analysis may also be used to compare cost efficiency of the Cardiac Centre to charges levied at overseas centres to which patients had been previously sent, thus allowing determination of any overall cost saving or deficit.

However, all these expenditures have to be viewed in relation to the overall benefit which individuals and society in general derive from the facilities offered. Clearly it is not in the interests of society to have people unable to work due to chronic illness. Loss of income leads to personal and family hardship and has a bad effect on the economy as individual spending is curbed.

While it is undoubtedly true that most interventional cardiology and cardiac surgery is aimed toward relief of symptoms and return of the patient to functional normality, rather than, (except in a small minority), a quantifiable increase in life expectancy, it is also true that functionally normal patients represent a major national asset, both socially and financially.

In the case of the patients who have undergone cardiac surgery since the Cardiac Centre opened, the vast majorities are functionally normal and either working or returned to full activity. For coronary bypass patients the actuarial freedom from late death is 96%; freedom from myocardial infarction 98% and from all cardiac events 94.5% at 18 months follow-up.

Sadly, several patients who were able to work preoperatively, despite their symptoms, have been forced out of employment after operation has returned them to functional normality. This bizarre attitude on the part of employers serves not only to demonstrate their lack of understanding of the efficacy of cardiac surgery, but undermines the national investment in the Cardiac Centre.

It is to be hoped that such attitudes will gradually abate as more and more patients undergo treatment and are able to demonstrate their usefulness to employers and to society in general.

Many patients who develop cardiac pathology become anxious and introspective. This anxiety may permeate the fabric of their social interaction and disrupt the lives of close relatives and friends.

One of the advantages of having a 'local' Cardiac Centre is that during the period of investigation and treatment, the whole family can be involved with the psychological and emotional support of the patient.

We consider cardiac operation for example, to be just one part of the overall return of the patient to functional normality. The process begins with detailed explanation of the procedure, which wherever possible involves close family members. It continues with rapid mobilisation and the early achievement of self-sufficiency in hospital after operation. Reinforcement, encouragement and long-term medical and emotional support are then given in the outpatients department and our community nurses are able to carry this support to the patient's home environment when necessary.

The aim is rapid and complete return to physical and psychological normality. Clearly this form of complete rehabilitation strategy is not available to patients treated overseas and is one of the strongest non-financial arguments in favour of 'local' treatment.

The advantage of this process of communication, encouragement and support for patient and family is even more obvious when a patient develops life-threatening

complications and requires long-term intensive care management. In these situations, the relatives can be with the patient and can be kept informed of the progress (or sometimes the lack of it) on a day by day or even minute by minute basis. Whatever the outcome, they can see what is being done and do not have to rely on long distance phone calls, or second or third hand information from partially informed relatives as is the case with treatment overseas.

Overseas treatment at the expense of the State of Bahrain was of course, available only to Bahraini nationals. Cardiac Centre treatment is available free of charge to the whole population of Bahrain, though the great majority of patients treated to date have been Bahraini. In this respect, the Government of Bahrain has not only demonstrated a generous compassion toward its expatriate work force, but has also been able to appreciate the economic value, in that such patients are able to return to work and further contribute toward the national economy; yet another advantage of an indigenous cardiac centre.

This egalitarian policy has a further quasi-financial advantage. As in almost all other spheres of investment, the costs per patient decreases as the number treated increases. This is particularly true of capital intensive specialities such as cardiac surgery. Thus while treating all Bahrain's residents free of charge increases the overall cost, the cost per patient is lower than would be the case otherwise and expensive capital equipment and highly skilled staff are fully utilised rather than standing idle for part of each working week.

Active clinical and investigative research projects have resulted in five scientific publications to date with three further works under consideration and another three in preparation. This level of academic activity will help establish the Cardiac Centre internationally, increases clinical knowledge and awareness and offers our junior staff the opportunity to participate in, and understand the fundamentals of research.

## **CONCLUSION**

In the first 23 months of activity, the Mohammad Bin Khalifa Bin Sulman Al Khalifa Cardiac Centre has undertaken approximately six times the expected investigative workload and three times the predicted number of open heart operations as well as undertaking thoracic, vascular surgery and closed heart surgery, PTCA and pacemaker implantation. Mortality and morbidity rate are competitive and rates for return to functional normality are excellent.

The cost/benefit equation cannot yet be solved in purely financial terms but from the above, the socio-economic advantages of a local Cardiac Centre should be clear.

## **REFERENCES**

1. Bahrain Health Information Centre. Health Statistical Abstract. Ministry of Health: State of Bahrain, 1991.