

REVIEW ARTICLE

Economic Analysis of the Treatment of Heart Disease Patients in India: A Survey and Plans to Resolve

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ABSTRACT

Background: India is the most populous country in the world and has a high prevalence of non-communicable diseases. The treatment of heart disease is very difficult because of lesser number of cardiac hospitals in India; less number of cardiologists, cardiac surgeons and cardiac anaesthetists; and cost is very high. In the present survey, we tried to find out the cost of treatment of heart disease in India, what are the factors for the increase cost and what corrective measures could be adopted to resolve the issue.

Method: The data and information were collected from literatures, internet Google search and authors' experience.

Result: The cost of heart surgery and catheterisation procedures in India is very high and ranges from 60000 to 30-40 lakhs rupees. The cost is higher in private hospitals. The cost of treating heart disease is cheaper in Government hospitals. Very few Government hospitals are doing limited heart surgeries and catheterization procedures at free of cost. However, the numbers of hospitals are very few resulting long waiting time. The hospitals for heart surgery and procedures are mainly at tier 1 and 2 cities.

Conclusion: Cardiovascular disease imposes a substantial economic burden on patients, families, and the healthcare system in India. Although the country performs a large number of cardiac procedures annually, access to affordable and timely treatment remains inadequate. Expansion of cardiac infrastructure, comprehensive insurance coverage, indigenous production of medical devices, and stronger preventive healthcare programmes are essential to reduce costs and improve outcomes for patients with heart disease.

KEYWORDS

• Cost of Heart Disease in India • Cardiac Surgery • Cardiac Catheterisation Laboratory Procedures • Economic Analysis • Government Hospital • Private Hospital • Health Insurance

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INTRODUCTION

India is the most populous country in the world and has a high prevalence of non-communicable diseases. The treatment of heart disease is very difficult because of lesser number of cardiac hospitals in India; fewer cardiologists, cardiac surgeons and cardiac anaesthetists; and the cost is very high. Hence, the patient has to wait from weeks to years. Cardiac disease treatment delayed means either the patient has to suffer with compromised daily works or has to have a sudden emergency and death.

In this survey, we tried to find out the cost of treatment of heart disease in India, the factors for the increase costs and suggest corrective measures that could be adopted to resolve the issue.

AIM

1. To study the cost of treatment of heart diseases in India and identify the factors that contribute to increased costs.
2. To suggest corrective measures that could be adopted to mitigate the financial burden of patients.

METHODS

The data and information were collected from extensive literature search of PubMed, Google Scholar, internet Google search and authors' experience. The search was confined to India only.

RESULTS

In the South Asian region, India has been found to perform the maximum number of cardiovascular surgeries with >200,000 cases annually, the figure quoted by the JTCVS Open in 2018.^{1,2} In spite of the high volume of cases being performed, there is still a huge gap found between demand and supply as far as cardiac surgery is concerned.

Requirement of specialised setup and a specialised team:

Unlike most of the general surgical cases, almost all the patients undergoing cardiac surgery require multidisciplinary management from the preoperative period until discharge and postoperative care of these patients requires the presence of a dedicated Intensive Care Unit. The centre must be

equipped to manage any complication that might arise in the perioperative period. The conduct of cardiac surgery requires the contribution of a number of highly trained specialised healthcare professionals, including the cardiac surgeon, the cardiac anaesthetist, the cardiologist, nursing staff experienced in cardiac surgeries, perfusionists, intensivists and physiotherapists. Tier 1 cities in India house most of the bigger cardiac centres, though the Tier 2 and Tier 3 cities are catching up in recent years. But it would be a while before good and well-equipped centres are equally distributed throughout the country. The vast majority of India's rural population has to travel far from home, forgoing daily wages for the unforeseeable future in order to get themselves or their family members operated for a cardiac condition. Most, if not all, cardiac conditions require a long period of postoperative follow-up, patients from rural areas have to travel long distances again for just follow-ups as there is a scarcity of peripheral cardiac centres.

COST OF THE SURGERY

The cost of the surgery varies between hospitals and depends upon the type of surgery being performed, the equipments necessary (valves, grafts, pacemakers, stents etc.), the length of ICU stay and the requirement of advanced management options like Left Ventricular Assist Device (LVAD), Intra Aortic Balloon Pulsation (IABP) and Extra Corporeal Membrane Oxygenation (ECMO). The average cost for a coronary artery bypass grafting (CABG) surgery in a corporate hospital in Tier 1 cities is roughly estimated at around 6 lakhs.³ Valve surgeries cost almost twice as much in Tier 1 cities. For the majority of India's population, such centres, as well renowned as they are, are simply not affordable which brings them to the doors of Government hospitals, where the waiting time for surgeries is so long that some patients succumb to their illness before they're even called in for surgery.

Factors Affecting Heart Surgery Costs in India

Let's look at how the cost of heart surgery in India is influenced by numerous factors:

1. Hospital Type

Undoubtedly, the charges for a surgery in a private hospital, especially the larger corporate hospitals would be much higher than the cost of getting the same done in a Government

hospital. Some Government hospital provide limited free of cost surgery and procedures. However, patient has to purchase few items from outside markets with their own expenditure.

Table 1: Cost differences between Government and private hospitals³

Hospital Type	CABG Cost Range (INR)
Government Hospital#	60,000 – 1.5 lakh
Private Tier-2 Hospital	1.7 lakh – 3.5 lakh
Private Tier-1 Hospital	4 lakh – 6 lakh

3. Type of Heart Procedure

Table 2: Average costs for various cardiac procedures in Private hospitals⁴

Type of Heart Surgery	Heart Surgery Cost (Approx.) (private hospital) in INR
Coronary Artery Bypass Grafting (CABG)	Rs 1.8 Lakh to Rs 3.6 Lakh
Angioplasty and Stent Placement Surgery	Rs 1.5 Lakh to Rs 3.2 Lakh
Heart Valve Repair/Replacement Surgery	Rs 2.4 Lakh to Rs 5.7 Lakh
Aorta Graft Surgery	Rs 5.6 Lakh to Rs 11.5 Lakh
Implantation of Pacemaker or Cardioverter Defibrillator Surgery	Rs 2.4 Lakh to Rs 4.5 Lakh
Pericardiectomy	Rs 1 Lakh
Septal Myectomy	Rs 2 Lakh to Rs 4 Lakh
Heart Transplant Surgery	Rs 18 Lakh to Rs 25 Lakh
Implantation of Ventricular Assist Devices or Total Artificial Heart Surgery	Rs 45 Lakh to Rs 80 Lakh
ASD Closure Surgery	Rs 2 Lakh to Rs 3 Lakh
TAVI	Rs 14 lakh to Rs. 25 lakhs

Table 3: Cost of various procedures at AIIMS, Delhi^{5#}

Procedure	Cost (Approximate) in INR # (General ward cost after revision)
CABG (with IABP)	1,10,000
Bentall procedure	2.1 lakhs
Valve cost (Mechanical)	1,15,000
Valve Cost (Bio prosthetic)	2.7 lakhs
ASD / VSD	60000
Shunt	60000
Fontan	1.8 lakhs
Intracardiac repair	60000
Heart transplant	1,20,000
Stent	25000 – 30000 (per stent)
Pacemaker (single chamber)	60000 – 1.25 lakhs
ICD	2 – 3 lakhs
TAVI	14 lakhs

*CABG: Coronary Artery Bypass Grafting, IABP – Intra-aortic Balloon Pulsation, ASD – Atrial Septal Defect; VSD – Ventricular Septal Defect, TAVI – Transcatheter Aortic Valve Implantation; # Rs 26900/- Cost is added to private ward admission, more details is available in reference number 5

*CABG – Coronary Artery Bypass Grafting, #some Government hospitals provide free of cost with terms and conditions

2. Location: The choice of city also decides the total expenses incurred. Tier 1 cities like Delhi,

Mumbai are more expensive than Tier 2 cities, which in turn are more expensive than Tier 3 cities.⁴

4. Surgery Type

Redo surgeries, combined procedures, minimally invasive surgery, and robotic cardiac surgery generally incur higher costs.

5. Expertise and Reputation of The Surgeon

Highly experienced surgeons and internationally accredited centres often charge higher professional fees.

6. Hospitalisation Duration

Patients requiring prolonged ICU stays or management of complications experience significantly increased treatment costs.

7. Usage of Various Equipment And Tools

The use of imported prosthetic valves, stents, grafts, pacemakers, Implantable Cardioverters Defibrillators (ICD), ECMO circuits, Left Ventricular Assist Devices (LVAD), and advanced monitoring equipment substantially increases overall expenditure

Most health insurance plans in India usually foot the bill for heart surgery expenses. This

typically includes:

1. Hospitalisation Expenses.
2. OPD Expenses
3. Pre-Hospitalization Costs
4. Post-Hospitalization Expenses
5. Modern Treatments

However, important gaps remain. Insurance frequently provides inadequate coverage for:

- Long-term cardiac rehabilitation
- Physiotherapy
- Home-based nursing care
- Long-term medications
- Transportation expenses
- Accommodation for accompanying family members
- Loss of wages
- Follow-up consultations beyond the covered period

Presently Government of India is providing up to 5 lakh rupees for heart surgery and catheterisation lab procedure to poor patients and age >70year per family annually under Ayushman Bharat Yajona (PM-JAY). The new born patients' heart disease treatment is also covered by the Janani Shishu Suraksha Karyakaram (JSSK) to all at public hospitals. Some state Governments have also health schemes to support the expenditure. Very few Government hospitals are doing limited heart surgeries and cardiology procedures at free of cost. However, the money is limited and confined to hospital stay period only. Other expenditures and extra costs have to be spent by the family. The benefits are available for poor and economically weaker section only. The middle income population face a huge financial burden and they have to spend by themselves only.

Additional Economic Challenges⁴

Several additional factors contribute to the financial burden of cardiac care:

- Not all hospitals perform complex procedures such as heart transplantation, LVAD implantation, congenital cardiac surgery, redo-surgery and Transcatheter Aortic Valve Implantation (TAVI).
- Critically ill patients often require costly inter-hospital transport by advanced

cardiac ambulances or air ambulance services.

- Delayed referrals increase disease severity and treatment costs.
- Out-of-pocket expenditure remains high despite government insurance schemes.
- Rural patients face disproportionately higher indirect costs due to travel and accommodation.

DISCUSSION

This survey demonstrates that both open cardiac surgery and percutaneous cardiac interventions impose a substantial economic burden on patients and their families in India. Although advances in cardiac surgery and interventional cardiology have significantly improved survival and quality of life, the high cost of treatment remains a major barrier to timely healthcare access.

The expense of cardiac treatment begins well before the actual procedure. Patients incur considerable costs for diagnostic investigations, including echocardiography, coronary angiography, CT or MRI imaging, laboratory tests, and repeated specialist consultations. Many patients also require prolonged preoperative medical therapy while waiting for definitive treatment, further increasing out-of-pocket expenditure.³

The availability of comprehensive cardiac services remains limited, particularly in rural areas and smaller cities. Advanced cardiac centres with catheterization laboratories, cardiac operating theatres, intensive care units, and multidisciplinary teams are concentrated mainly in metropolitan cities. Consequently, many patients must travel long distances to seek treatment, resulting in additional expenses for transportation, accommodation, food, and loss of daily wages for both patients and caregivers.⁶⁻¹¹

Government hospitals provide cardiac surgery at significantly lower costs than private hospitals; however, limited infrastructure and workforce shortages lead to prolonged waiting periods. During this interval, many patients experience progressive deterioration of cardiac function, recurrent hospital admissions, reduced quality of life, and, in some cases, death before receiving definitive treatment.

Delayed intervention may also increase operative risk and overall healthcare costs.

Private hospitals offer shorter waiting times and wider availability of advanced technologies but remain unaffordable for a large proportion of the population. The use of expensive imported devices such as prosthetic valves, coronary stents, pacemakers, implantable cardioverter-defibrillators (ICDs), ventricular assist devices (LVADs), and extracorporeal membrane oxygenation (ECMO) systems further increases treatment costs.

Although health insurance schemes have improved access to cardiac care, important gaps remain. Many insurance policies do not adequately cover preoperative evaluation, outpatient consultations, transportation, accommodation, cardiac rehabilitation, long-term physiotherapy, prolonged follow-up, or indirect costs such as loss of income. These uncovered expenses continue to impose significant financial hardship, especially on poor and economically disadvantaged middle income families.

RECOMMENDATIONS

Based on the findings of this survey, the following measures are recommended to improve the affordability, accessibility, and quality of cardiac care in India:

1. Promote Low-Cost Cardiac Equipment

The government should encourage indigenous research and manufacturing of cardiac devices such as heart valves, coronary stents, pacemakers, implantable cardioverter-defibrillators (ICDs), ventricular assist devices (LVADs), and extracorporeal membrane oxygenation (ECMO) equipment and reduce dependence on imported devices through public-private partnerships and government incentives.

2. Strengthen Health Insurance Coverage

Public and private health insurance schemes should be expanded to provide comprehensive coverage for cardiac care, including diagnostic investigations, surgery, intensive care, medications, rehabilitation, and long-term follow-up.

3. Provide Affordable or Free Cardiac Care

Government funding for cardiac services should be increased to provide free or highly

subsidized treatment for economically weaker sections of the population, and the number of government cardiac centres should be expanded to reduce waiting times and improve equitable access at district level.

4. Support Patient Transportation and Family Accommodation

Establishment of financial assistance programmes for transportation of patients requiring referral to tertiary cardiac centres and provision of affordable accommodation and food facilities for accompanying family members, particularly for patients travelling from rural and remote areas would reduce the economic burden on the patient's family.

5. Strengthen Cardiac Healthcare Infrastructure

The number of cardiac hospitals, catheterization laboratories, cardiac intensive care units, and operating theatres should be increased, especially in Tier-2 and Tier-3 cities and training programmes for cardiologists, cardiac surgeons, cardiac anaesthesiologists, perfusionists, intensivists, and specialized cardiac nurses should be expanded. Some organisations are setting up charitable cardiac hospitals in India. The information related to this free services spread all over the country and people must know about it.

6. Promote Public Awareness and Prevention of heart disease

Nationwide awareness campaigns on cardiovascular risk factors, including hypertension, diabetes, obesity, tobacco use, unhealthy diet, and physical inactivity should be conducted and the public must be educated on the importance of regular health check-ups and early medical consultation for symptoms suggestive of heart disease. The people should adopt healthy life style, regular physical activity, cardio gym, yoga and cardio protective foods.

7. Improve Early Diagnosis and Screening

Screening programmes for hypertension, diabetes, dyslipidemia, rheumatic heart disease, and congenital heart disease should be strengthened through primary healthcare centres. Diagnostic investigations such as electrocardiography, echocardiography, stress testing, and coronary angiography at regional hospitals should be made available at reasonable costs.

8. Strengthen Organ Donation and Heart Transplant Services

- Increase public awareness regarding organ donation through sustained education campaigns.
- Strengthen the organ donation and transplantation network through organizations such as the National Organ and Tissue Transplant Organization (NOTTO) and State Organ and Tissue Transplant Organizations (SOTTOs).
- Improve donor identification and organ retrieval systems to increase heart donation rates.
- Provide financial support for heart transplantation, lifelong immunosuppressive medications, and post-transplant follow-up to improve long-term patient outcomes.

Implementation of these recommendations would reduce the financial burden of cardiac care, improve access to timely treatment, and ultimately decrease cardiovascular morbidity and mortality in India.

Limitations of the survey: The literature search are extensively done in English language for Indian scenario. The cost of cardiac surgery and catheterisation lab procedures are shown based on the available data only. The exact cost of the surgery and cardiology procedures may be different. The policy of Government's financial support and Insurance coverages may change from time to time.

CONCLUSION

Cardiovascular disease imposes a substantial economic burden on patients, families, and the healthcare system in India. Although the country performs a large number of cardiac procedures annually, access to affordable and timely treatment remains inadequate. High treatment costs, unequal distribution of specialized centres, prolonged waiting times, and incomplete

insurance coverage continue to limit access to treatment. Expansion of cardiac infrastructure, comprehensive insurance coverage, indigenous production of medical devices, and stronger preventive healthcare programmes are essential to reduce costs and improve outcomes for patients with heart disease.

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