

Cost analysis of treating cardiovascular diseases in a super-specialty hospital

Atul Kumar

All India Institute of Medical Sciences (AIIMS)

Vijaydeep Siddharth (✉ vijaydeep@aiims.edu)

All India Institute of Medical Sciences (AIIMS)

I B Singh

All India Institute of Medical Sciences (AIIMS)

Rajiv Narang

Cardio-Thoracic (CT) Centre of All India Institute of Medical Sciences

Research Article

Keywords: Cardiovascular diseases, Cost analysis, Health Care Costing, Time driven activity-based costing, Traditional costing

Posted Date: May 19th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-519698/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Version of Record: A version of this preprint was published at PLOS ONE on January 5th, 2022. See the published version at <https://doi.org/10.1371/journal.pone.0262190>.

Abstract

Background Cardiovascular care is expensive; hence, economic evaluation is required to estimate resources being consumed and to ensure their optimal utilization. There is dearth of data regarding cost analysis of treating various diseases including cardiac diseases from developing countries. The study aimed to analyze resource consumption in treating cardio-vascular disease patients in a super-specialty hospital.

Methods An observational and descriptive study was carried out from April 2017 to June 2018 in the Department of Cardiology, Cardio-Thoracic (CT) Centre of All India Institute of Medical Sciences, New Delhi, India. As per World Health Organization, common cardiac diseases i.e. Coronary Artery Disease (CAD), Rheumatic Heart Disease (RHD), Cardiomyopathy, Congenital heart diseases, Cardiac Arrhythmias etc. were considered for cost analysis. A total of 100 admitted patients (Ward & Cardiac Care Unit) of cardiovascular diseases were enrolled in the study using prevalence-based sampling. They were followed up till discharge. Traditional Costing and Time Driven Activity Based Costing (TDABC) methods were used for cost computation.

Results Per bed per day cost incurred by the hospital for admitted patients in Cardiac Care Unit, adult and pediatric cardiology ward was calculated to be INR 28,144 (US\$ 434), INR 22,210 (US\$ 342) and INR 18,774 (US\$ 289), respectively. Inpatient cost constituted almost 70% of the total cost and equipment cost accounted for more than 50% of the inpatient cost followed by human resource cost (28%). Per patient cost of treating any cardiovascular disease was computed to be INR 2,47,822 (US \$ 3842).

Conclusion Cost of treating Rheumatic Heart Disease is the highest among all CVDs followed by Cardiomyopathy and other CVDs. Cost of treating cardiovascular diseases in India is less than what has been reported in developed countries. Findings of this study would aid policy makers considering recent radical changes and massive policy reforms ushered in by the Government of India in healthcare delivery.

Highlights

- **What is already known about this subject?** Not much is known about the cost analysis of cardiovascular disease, especially in developing countries (data is scarce). It is well known fact that cardiovascular diseases are costly to treat, but the pertinent question is how much?
- **What does this study add?** This study provides with the cost estimates for treating most common cardiovascular diseases.
- **How might this impact on clinical practice?** Finding of this study may be used by government and private packages especially for reimbursement purposes and for assurance-based model of healthcare delivery. It can be used for healthcare planning.

Introduction

Globally an estimated 17.7 million people died from cardiovascular diseases (CVDs) in 2015 representing 31% of all deaths and over 75% of these deaths take place in low and middle income countries.(1) India is having the highest burden of CVDs in the world and as per World Health Organization (WHO) estimates Non Communicable Diseases (NCDs) accounts for 60% of total deaths in India out of which CVD tops the list of with 43.34%.(2) A study estimating the burden of cardiovascular diseases in India revealed that from 1990 to 2016 prevalent cases of cardiovascular diseases increased from 25.7 to 54.5 million.(3)

Increasing NCDs coupled with increasing injuries have resulted in a significant increase in health spending in India causing loss to national income.(4) CVDs not only impact the well-being of an individual but also holds back the economic growth of the country due to increased healthcare expenditure and diminished productivity from disability, premature death, and absenteeism. WHO has estimated that India has spent approximately \$236 billion over a period of 10 years between 2005-2015 on management of CVDs. (5,6)(7) It imposes a considerable burden on regions with relatively low per capita health budgets.(8)

Rapid scientific and technological advancement has tremendously increased the cost of managing CVDs.

Individually, patients with CVDs incur more than twice the medical costs as compared to a patient without CVD of same age and sex.(9) Cardiovascular care is expensive; hence, economic evaluation is required to estimate resources being consumed and to ensure their optimal utilization.(10) It will facilitate rational allocation of resources and informed decision making to formulate effective policies.(11)

The information obtained from cost analysis helps the healthcare institutions to operate more cost effectively, monitor and control costs, improve quality of care, and aid in management decision making, particularly cost containment by making costing profile of procedures more accurate.(12) There is dearth of data regarding cost analysis of treating various diseases including cardiac diseases from developing countries. Thus, the present study is an attempt to analyze the cost of managing admitted cardio-vascular disease patients in a superspeciality hospital.

Methodology

An observational and descriptive study was carried out from April 2017 to June 2018 in the Department of Cardiology, Cardio-Thoracic Centre (CTC) of All India Institute of Medical Sciences, New Delhi, India. All India Institute of Medical Sciences is one of the leading healthcare institute in the country and CTC began functioning in 1982 with 200 hospital beds for Cardiology and Cardiothoracic & Vascular Surgery patients. It has all the facilities required for comprehensive cardiac care including a catherization laboratory, cardiac anesthesia, cardiac radiology, cardiac biochemistry, cardiac pathology, nuclear medicine, stem cell facility, organ retrieval & banking organization, blood transfusion services etc. It has four general wards, 8 Operating rooms, two intensive care units having 34 beds, eight ICU beds exclusively for the neonatal & infant intensive care, five cardiac catheterisation laboratory and one coronary care unit (CCU). CTC runs various super-specialty clinics (Coronary Clinic, Prosthetic valve Clinic, Hypertension Clinic, Arrhythmia/ Pacemaker Clinic, Heart Failure Clinic, Aortic disease Clinic).

This study was conducted as part of post graduate residency programme in the Department of Hospital Administration after obtaining necessary approval from the Institute Ethics Committee for Post Graduate Research vide IEC/PG-685/19.01.2017, RT31/16.02.2017. Study did not involve any patients and ethical guidelines as deemed appropriate for this study were adhered. It entailed identifying various cost centres, classifying costs and tracing all costs related to treating cardiovascular diseases through detailed and thorough perusal of various records including inpatient records to ascertain resource consumption during hospitalisation.

CVDs such as Coronary Artery Disease (CAD), Rheumatic Heart Disease (RHD), Cardiomyopathy, Congenital heart diseases, Cardiac Arrhythmias etc. were included in the study as classified by WHO and as per the expert guidance. (13) A total of 100 admitted patients of various CVDs were enrolled in the study using prevalence-based sampling and were followed up till discharge. Patients who were admitted for less than 24 hours, admissions through emergency department were excluded from the study. There was no interaction or involvement of any patient or public.

'Process mapping' of various patient care services during the hospital stay was conducted. It was done through direct observations and in-depth discussions with the key informants i.e. faculty members, resident doctors and nurses etc. Since the availability of data was a challenge due to lack of robustness in record keeping practices, combination of methodology utilizing using Traditional Costing and Time Driven Activity Based Costing (TDABC) were used for cost computation. Replacement method of cost computation employing Cost Inflation Index (As notified under the Finance Act) was adopted for arriving at the current day cost from the historical costs of various capital assets (CII in the year 2010 - 11 was 167, while for the year 2017- 18, it was 280, hence, CII factorial increase was calculated to be 1.89). Annualised cost was calculated for various cost centres and subsequently per bed per day cost was arrived. (Table 1)

Capital Cost

Building and its maintenance cost: Measurement of the patient care areas (in sqm) were taken from the engineering department for the purpose of calculation of construction cost as per Central Public Works Department (CPWD) Manual 2007 (CII multiplication index 2.29). It was estimated that life of the building would be 100 years and therefore, an annual depreciation of 1% would be a reasonable estimation of the annual cost of the building. As per repair & service cost index as on 24/04/2018 issued by office of Director General, CPWD regulation, the maintenance rate for engineering works was Rs 6668.56/- per Sq.m. per year for the hospital building. No cost has been attributed to the land since the land belongs to the Government of India.

Cost of equipment, fixtures, and its maintenance Cost: A list of equipment used in the Cath lab, CCU and inpatient wards was populated, and its procurement cost was collected from hospital stores section. Straight-line method of depreciation (useful life 10/ & 7 years) was used to arrive at an annualized equipment cost. As per the prevailing practices five percent of the total procurement cost of an equipment was taken as maintenance cost and same was added to the annualized equipment cost to arrive at the total cost of equipment or an asset. For catheterization lab procedures, activity-based costing was utilized, while for CCU and wards, traditional method of costing was used.

Operational Cost

Human Resource: Monthly gross salary was computed for various categories of staff. Time spent by various categories of staff during Cath lab procedures was decided in consultation with key informants (Consultants, Residents and Nursing Officers), thereafter, apportioning was done. While, in CCU and ward, the gross monthly salary of different manpower under various categories was computed by considering the actual number of manpower multiplied by the gross salary in that category.

Medicines, surgical and other consumables: Treatment file of each enrolled patient was studied for ascertaining consumption of various consumables. Consumption pattern of various items i.e. general items, surgical items, stationary, linen store etc. over a period of six months was generated from hospital MIS database of the respective areas. Unit cost of each item was taken from the hospital stores and cost of various items consumed over a period of six months was calculated.

Air Conditioning & electricity costs: Cost for total tonnage of refrigeration (TR), Air handling unit (AHUs), condenser and chiller pumps, cooling tower was taken from engineering services division. Operational cost was taken based on its tonnage of refrigeration and electricity consumed per day including labor, spares, and material. Wattage and usage of various electrical appliances and fixtures was ascertained. Total number of units consumed in 24 hours by all the appliances and fixtures was calculated and total cost was arrived at.

Support Services Cost: Reference costs for support services was taken from the various studies carried out inhouse by the Department of Hospital Administration at AIIMS, New Delhi. Total per day load of dirty linen (in kg) of various categories generated from patient care areas under study was calculated with the help of Nursing Officer In charges and laundry supervisor. Cost of washing per kilogram of dirty linen was taken as Rs 23.22.(14) Cost of serving one meal in the general ward was estimated to be Rs. 86.77, while unit cost of breakfast was taken as 15% of the cost of a meal.(15) Cost of sterilizing items was estimated to be Rs. 33.9 per bed per day.(16) The number of total medical gas outlets for each patient care area was calculated and Rs 25.56 was taken as cost per manifold point.(17) Cost for managing biomedical waste management per day per bed was calculated. Additional 10% cost was added to the overall cost under the administrative head. All costs were calculated in INR and US \$ (1US \$ = 64.8 INR)

Results

Cardiology department provides services to patients from various parts of the country and neighboring countries as well. It has an OPD of 42000 patients, 9500 inpatient admissions per year (Average length of stay of 6.6 days) and more than 7000 cardiac interventions (More than 30 different types of cardiac procedures) were carried out in the year 2016-17. Most common CVD was CAD, which constituted more than 50 percent of the admitted patients. (Table 2) A total of 100 admitted patients were enrolled in the study for calculating cost of various kinds of cardiac illnesses. (Table 3)

Costs were computed distinctly for the Cardiac Care Unit (CCU), adult and pediatric ward owing to variation equipment being used, manpower allocation, and consumption of various consumables. Median length of stay in case of CCU, adult and pediatric ward was observed to be one day (1-9 days), five days (1-26 days) and six days (2-57 days), respectively. Cost per bed per day incurred by the hospital for admitted patients in CCU, adult and pediatric cardiology ward was calculated to be INR 28,144 (US\$ 434), INR 22,210 (US\$ 342) and INR 18,774 (US\$ 289), respectively. Overall, per patient cost of managing any cardiovascular illness in hospital was computed to be INR 2,25,293 (US \$ 3476) and cost after including administrative overheads was estimated to be INR 2,47,822 (US \$ 3824). (Table 4)

Equipment cost accounted for the maximum expenditure followed by human resource cost, both together accounted for more than 70 percent of the per bed per day cost. After analyzing results of the direct costs, it was observed that more than 65% of the cost is attributable to hospitalization. Interventional/diagnostic procedures cost is more than 18% while medication treatment represented only 1.5 % of the total direct costs. (Figure 1)

Congenital heart disease is the most expensive to be treated followed by rheumatic heart disease, cardiomyopathy and so on. (Table 5) Treatment cost of RHD is on a higher side because of the increased length of stay. In cases of cardiomyopathies, cost of treatment was higher because of the costly intra cardiac devices.

Discussion

A study done in India found that prevalence of CVDs increased in all states of India, and coronary artery diseases tops the list among CVDs followed by stroke, while rheumatic heart disease decreased by 10-8% from 1990 to 2016, and similar findings have been observed in the current study.(18) The cost of patient care is galloping with the advancement of technology and cost of consumables. Hence, it is realized that the cost of patient care along with the required procedures during the hospitalization should be known to policymakers to have standardized approach and devise packages or revise existing packages, for various CVDs.

The findings of this cost analysis will be helpful in health planning and in rational allocation of finite resources especially in developing countries. With rapid transition of Indian Healthcare delivery system from predominantly out of pocket based to assurance based with public sector funding, these estimates may prove to be particularly useful in coming up with package cost for treating various CVDs under Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (Flagship scheme of Govt of India for providing cashless treatment to more than 500 million beneficiaries through public and private sector hospitals).(19)

Cost analysis of cardiac diseases is extremely significant, because of it being the leading cause of morbidity and mortality. However, cost analysis in a developing country is fraught with major challenge of data availability which leaves scope for much to be desired.(20–22) In this study, the comprehensive cost i.e. both direct and indirect cost (Building and equipment cost) of treating CVD patients in a hospital setting for the year 2017-18 was estimated to be US \$ 3476. According to a study conducted in USA, the total mean direct medical care costs for patients with established cardiovascular disease (CVD) was \$18,953 per patient per year with inpatient costs being 42.8% (\$8114) of total costs.(23) While, cost per CVD hospitalization in 2012 in Sanghai, averaged US \$ 2236.29 with the highest being for chronic rheumatic heart diseases (US \$ 4710.78).(24) Cost of treating CVDs in developed countries appears to be much higher compared to what has been observed in this study. A study carried out in Brazil, the cost of hospitalizations for heart failure and myocardial infarction was estimated to be R\$ 3,085.15 per patients which is lower, when compared to this study.(25) Findings of our study is similar to a study which reported a total direct cost of €3198 per patient (1 Euro = 81.69), with largest part of the expenses (79%) attributable to hospitalization (ward), while laboratory investigations and medical treatment accounted for 17% and 4%, respectively.(26)

In China, a retrospective study was conducted to ascertain the direct medical costs among 10000 inpatients of coronary heart diseases. It revealed that the average hospitalization expenses were \$6791.38 and top three expenses were medical consumables, procedure charges and drugs.(27) A study conducted in Iran in year 2016, the average total cost per patient was observed to be US\$1881, with hospitalization cost as the major cost center.(28) A study on assessment of the direct cost of treatment of ischemic heart disease from a tertiary care hospital of Pakistan, revealed mean total cost of care to be PKR 3,59,975.00. Majority of the cost expenses were contributed by the procedure cost (Rs 2,73,574), followed by laboratory and diagnostic cost (Rs. 37684); hospital stay cost (Rs. 27,697) and medication cost (Rs 21,019), which is similar to the present study.(29) Similar findings were observed in a study carried out in Iran where highest level of expenditure under direct medical costs were observed on angiography, hospitalization and drug supply.(30)

Presented study has comprehensively considered almost all the cost centers (both direct & indirect) attributing to the expenses in management of CVDs including capital and machinery costs, while most of the studies focus only on direct costs, which sets it apart from other studies and is the major strength of the present study. Most cases of suspected CVDs across the country are referred to tertiary care institutes for diagnosis and treatment, with this study being a hospital-based study, it is possible that referral bias could have played a role. The study sample was limited to patients admitted through the Outpatient Department of Cardiology and did not include the emergency admissions, day care cases and those patients who required surgical treatment under CTVS. However, the findings of this study can be generalized to a similar setting in a developing country especially SAARC region. Similar costing studies, focusing on both direct and indirect costs involved in the management of Cardiovascular diseases with larger sample size should be carried out to increase the generalizability of the findings. It is also equally important to measure economic burden in terms of informal care and loss of productivity, which contributes to half of the economic burden of CVDs.

Conclusion

Cardiovascular disease is a major public health problem in India and is associated with high economic burden. Coronary artery disease is the most prevalent disease among the CVDs. Cost of treating Rheumatic Heart Disease is the highest among all CVDs followed by Cardiomyopathy and other CVDs. Cost of treatment in CVDs in developed countries is reported to be higher compared to what has been observed in this study. The results of the study would be valuable to health policy makers considering recent radical changes and large-scale policy reforms ushered in by the Government of India in healthcare delivery system.

Declarations

Ethics approval and consent to participate: This study was conducted as part of post graduate residency programme in the Department of Hospital Administration after obtaining necessary approval from the Institute Ethics Committee for Post Graduate Research vide IEC PG-685/19.01.2017, RT31/16.02.2017 of All India Institute of Medical Sciences, New Delhi, India. No consent to participate was taken for studying medical records of the discharged patients and studying medical records involved data pertaining to resource utilisation (impersonal information). It is pertinent to mention that study did not involve any direct or indirect with patients.

Consent for publication: Not applicable

Availability of data and materials: Not Applicable

Competing interests: None

Funding: None

Authors' contributions

Study Conceptualisation: A.K, V.S, I.B.S., R.N.

Data Collection and analysis: A.K.

Research article drafting: V.S.

Reviewing Manuscript: A.K, V.S, I.B.S., R.N.

Acknowledgements: None

References

1. World Health Organisation (WHO). Cardiovascular diseases (CVDs). 17 May . 2017. [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)): Last accessed on 20.04.2021
2. World Health Organization (WHO). Non communicable Diseases Country Profiles. Genève: WHO Press, 2014. 2014;1–210. Accessible from: <https://www.who.int/nmh/publications/ncd-profiles-2014/en/>: Last accessed on 20.04.2021
3. Prabhakaran D, Jeemon P, Sharma M, Roth GA, Johnson C, Harikrishnan S, et al. The changing patterns of cardiovascular diseases and their risk factors in the states of India: The Global Burden of Disease Study 1990–

2016. *The Lancet Global Health*. 2018 Dec 1;6(12): e1339–51.
4. Kastor A, Mohanty SK. Disease-specific out-of-pocket and catastrophic health expenditure on hospitalization in India: Do Indian households face distress health financing? *PLoS ONE*. 2018 May 1;13(5).
 5. American Heart Association. Cardiovascular disease: A costly burden for America - Projections through 2035. American Heart Association. 2017;7.
 6. Deloitte. Cardiovascular diseases in India Challenges and way ahead. International Heart Protection Summit. 2011;(September):1–32.
 7. World Health Organization (WHO). Global Atlas on Cardiovascular Disease Prevention and Control. 2011; (Geneva, Switzerland).
 8. Celermajer D, Chow C. Cardiovascular disease in the developing world: prevalences, patterns, and the potential of early disease detection. *Journal of the American College of Cardiology*. 2012;60(14).
 9. Nichols GA, Brown JB. The impact of cardiovascular disease on medical care costs in subjects with and without type 2 diabetes. *Diabetes care*. 2002 Mar;25(3):482–6.
 10. Michael F. Drummond, Mark J. Sculpher, Karl Claxton, Greg L. Stoddart and GWT. *Methods for the Economic Evaluation of Health Care Programmes*. Fourth Edi. New York: Oxford University Press; 2015. 464.
 11. Edbrooke DL, Stevens VG, Mann a J, Wilson a J. A new method of accurately identifying costs of individual patients in intensive care: the results. *Intensive Care Med*. 1997;23(1997):645–50.
 12. Horngren CT, Datar SM, Rajan M V, Hall P, Columbus B, New I, et al. *Cost Accounting A Managerial Emphasis Fourteenth Edition*. 2012.
 13. Cardiovascular diseases (CVDs) Key facts What are the risk factors for cardiovascular disease? 2018; (May):1–8.
 14. Patnaik S, Harshavardhan R, Singh IB, Gupta S. Costing of laundry services in a tertiary care hospital of Delhi. All India Institute of Medical Sciences, New Delhi; 2010. (Unpublished)
 15. Saxena A. Costing of in-patient dietary services. All India Institute of Medical Sciences, New Delhi; 2010. (Unpublished)
 16. Asangi YR, Arya S, Gupta SK. Costing of Central Sterile Services Department at a tertiary care hospital. All India Institute of Medical Sciences, New Delhi; 2010. (Unpublished)
 17. Kumar P, Gupta S, Sharma D, Batra R. Operating Manifold Services in Hospitals: A costly affair? *GSTF Journal of Nursing and Healthcare (JNHC)*. 2014;1(2):6–14.
 18. Prabhakaran D, Singh K, Roth GA, Banerjee A, Pagidipati NJ, Huffman MD. Cardiovascular Diseases in India Compared with the United States. Vol. 72, *Journal of the American College of Cardiology*. Elsevier USA; 2018. p. 79–95.
 19. Kausar M, Siddharth V, Gupta SK. A study on economic evaluation of an outreach health-care facility in Jhajjar District of Haryana: Service delivery model for increasing access to health care. *Indian journal of public health [Internet]*. 2021;65(1):45–50. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/33753689>
 20. Singh S, Gupta S, Daga A, Siddharth V, Wundavalli L. Cost analysis of a disaster facility at an apex tertiary care trauma center of India. *J Emerg Trauma Shock*. 2016;9(4):133–8.
 21. Gajuryal SH, Daga A, Siddharth V, Bal CS, Satpathy S. Unit cost analysis of pet-ct at an apex public sector health care institute in India. *Indian Journal of Nuclear Medicine*. 2017;32(1).
 22. Siddharth V, Kumar S, Vij A, Gupta SK. Cost Analysis of Operation Theatre Services at an Apex Tertiary Care Trauma Centre of India. *Indian Journal of Surgery*. 2013 Apr 12;

23. Nichols GA. Medical care costs among patients with established cardiovascular disease. *The American journal of managed care*. 2010;16(3): e86–93.
24. Wang S, Petzold M, Cao J, Zhang Y, Wang W. Direct Medical Costs of Hospitalizations for Cardiovascular Diseases in Shanghai, China. *Medicine*. 2015;94(20): e837.
25. Silva MP, Candido Araújo AK, Azevêdo Dantas DN, Carvalho de Oliveira DR, Rosendo da Silva RA, Nascimento Kluczynik CE, et al. Hospitalizations and hospital cost from cardiovascular diseases in Brazil. *International Archives of Medicine*. 2016;1–7.
26. Parissis J, Athanasakis K, Farmakis D, Boubouchairopoulou N, Mareti C, Bistola V, et al. Determinants of the direct cost of heart failure hospitalization in a public tertiary hospital. *International Journal of Cardiology*. 2015; 180:46–9.
27. Ding JM, Zhang XZ, Hu XJ, Chen HL, Yu M. Analysis of hospitalization expenditures and influencing factors for in patients with coronary heart disease in a tier-3 hospital in Xi'an, China A retrospective study. *Medicine (United States)*. 2017;96(51).
28. Emamgholipour S, Geravandi S. Economic burden of cardiovascular disease in the southwest of Iran. *International Cardiovascular Research Journal*. 2018;12(1):1–6.
29. Khan M et al. Assessment of Direct Cost of Treatment of Ischemic Heart Disease Patient in Tertiary Care Hospital in Karachi. *Journal of Bioequivalence & Bioavailability*. 2017;09(02):353–8.
30. Imani A, Gharibi F, Dadashi O, Najafi M, Mirbagheri SM. Analysis of Cardiovascular Diseases Costs and Their Effective Factors in Tabriz Hospitalized Patients, 2015. *Jundishapur Journal of Health Sciences*. 2016;8(2).

Tables

Table 1 Various cost centres included in the study.

CAPITAL COST	OPERATIONAL COST
Cost of Equipment	Salary
Cost of Building	Faculty
Overhead Cost	Residents
Electricity	Nursing Staff
Laundry services	Technical staff
Air-conditioning	Hospital Attendant
CSSD	Sanitary Attendant
Manifold services	Security Guard
Bio-Medical waste management	Overhead Cost
Dietary services	Electricity
Manifold services	Laundry services
Bio-Medical waste management	Air-conditioning
Dietary services	CSSD
Manifold services	Manifold services
	Bio-Medical waste management
	Dietary services
	Maintenance cost
	Hospital supplies
	Surgical store
	Medical store
	General store
	Linen store
	Stationary store
	Investigation
	Laboratory Investigation
	Radiological Investigation

Table 2 Hospital admissions of cardiovascular diseases and study sample

S. No	Disease Group	Total Cardiology Admissions (%)	Study sample (n=100)
1	Coronary artery diseases	4756 (55.65%)	30%
2	Rheumatic heart disease	887 (10.38%)	24%
3	Congenital Heart Disease	638 (7.47%)	14%
4	Cardiac Arrhythmias	637 (7.45%)	7%
5	Cardiomyopathy	576 (6.74%)	14%
6	Others	1052 (12.31%)	11%

Table 3 Socio demographic profile of patients in the study (n=100)

S No.	Parameters	Subgroup	Number (n=100)
1	Gender	Female	35
		Male	65
2	Age	0-18	22
		19-40	22
		41-60	36
		>60	20
3	Region	UP	29
		Bihar	28
		Delhi	23
		Haryana	14
		Other states	6
4	Socioeconomic Status (According to modified Kuppuswamy scale 2017)	Upper	4
		Upper Middle	33
		Lower Middle	42
		Upper Lower	19
		Lower	2

Table 4 Cost of care to the hospital for treating cardiovascular diseases patients

	Cost of care in INR (US\$)	Percentage
Inpatient cost [Per day cost = INR 16991 (ALOS = 10 days)]	169,910 (2,622)	69
Procedure's cost	46,491 (717)	19
Laboratory Investigations	4,633 (71)	2
Medications Cost	3,459 (53)	1
Radiological Investigations	800 (12)	0
Administrative overheads	22,529 (347)	9
Per patient cost of treating CVD illness	247,822 (3,824)	100%

Table 5 Cost to hospital for treating various cardiovascular illnesses in INR(US\$)

Diseases	Median Length of stay	Treatment cost	Inpatient Cost	Medication Cost	Radiological Investigation Cost	Laboratory Investigation Cost
Coronary Artery Disease	2	157,840 (2,435)	96,025 (1,481)	2,595 (40)	219 (3)	3,157 (48)
Rheumatic Heart Disease	11	298,759 (4,610)	249,411 (3,848)	5,297 (81)	380 (5)	7,061 (108)
Congenital Heart Disease	6	311,583 (4,808)	231,855 (3,578)	2,036 (31)	740 (11)	4,830 (74)
Cardiomyopathy	6	273,042 (4,213)	154,037 (2,377)	630 (9)	1,753 (27)	4,534 (69)
Other cardiovascular illnesses	5	260,722 (4,023)	151,208 (2,333)	5,752 (88)	1,630 (25)	3,778 (58)

Figures

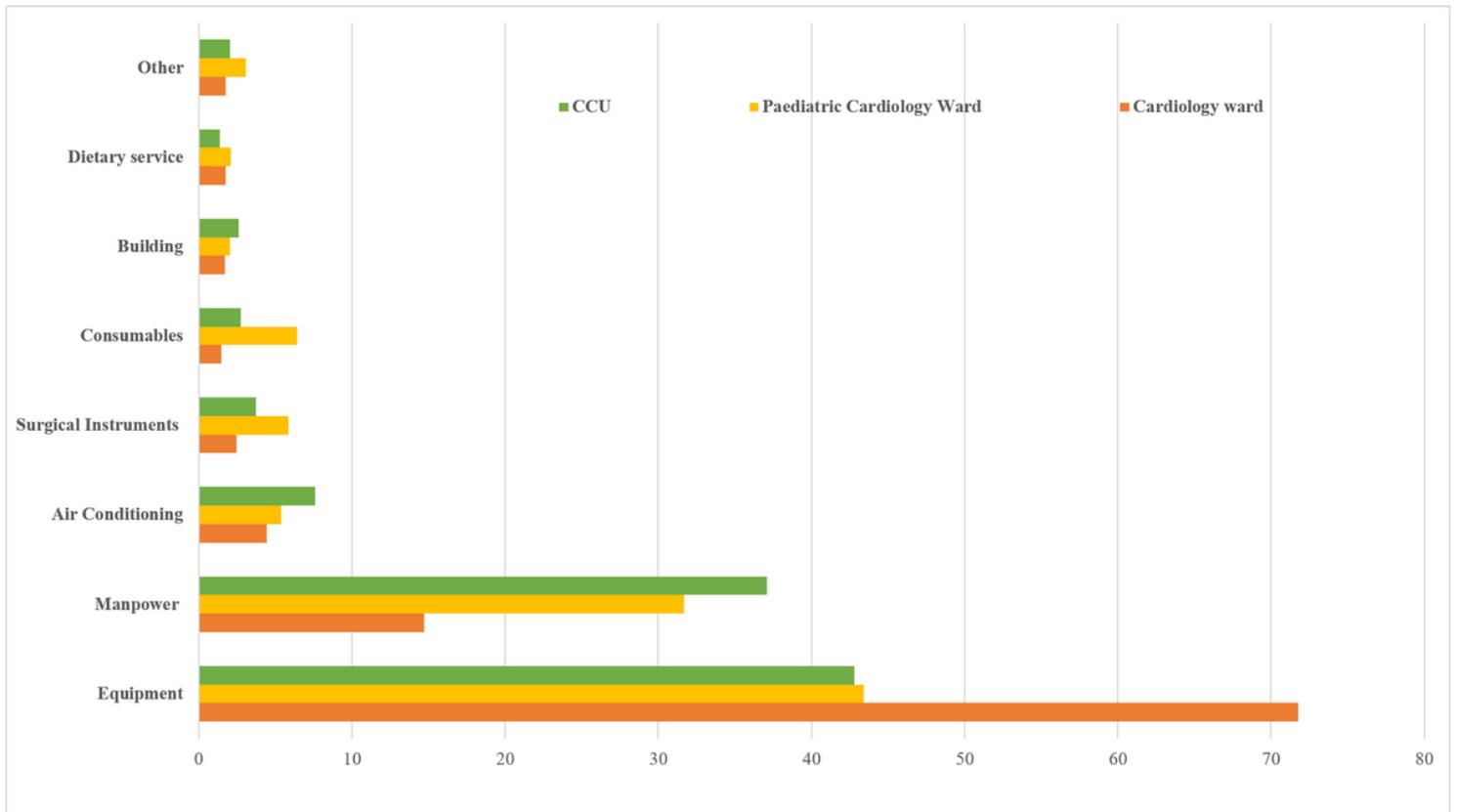


Figure 1

Various cost centers of inpatient cost in percentage (Per bed per day cost)