

2.3 PILOT INTERVENTIONS

The costing system at Sri Jayawardenapura General Hospital was studied in detail in order to assess the strengths and weaknesses of the current costing system at this hospital. The experience was then used to guide the formulation of a costing system subsequently piloted in the Teaching Hospital Kurunegala (THK) and the Base Hospital Kuliyaipitiya (BHK) in the Kurunegala District.

This hospital-based costing system has been running in these two hospitals since January 2007. Although the exercise has not been carried out long enough to conclude on the continued viability of cost collation formats at the respective hospitals or to refine the costing processes, responses from the hospitals and RDHS offices are positive and encourage the continuation of the exercise. As a result, the Ministry has decided to scale up to the Provincial exercise in the North Western Province for the next 3 years.

The EBM study also addressed the costing of the health system from a different perspective: disease management costing. The same two hospitals in Kurunegala are used for this purpose. In addition, the Colombo North Teaching Hospital (CNTH), Ragama, was used for the study on disease-management costing. Besides determining the costs incurred by the hospitals for the treatment of selected diseases, this study was helpful in demonstrating the versatility of hospital costing methodology, as to how it could be adopted widely in disease specific costing.

Aim

Strengthen managerial functions of the hospitals through the development of a managerial cost accounting system.

Objective

Develop methodologies for hospital-based and disease-based cost accounting.

2.3.1 STRATEGY & APPROACH

A. COST ACCOUNTING FOR ECONOMIC DECISION MAKING

A managerial cost accounting system that could provide regular cost estimates could create a base for planning and hospital and ward level decision making, in Sri Lankan hospitals in the future.

- Scarcity of funds, *at national and hospital levels*, results in the competing for budgetary funds. The ability of the MOH to demand greater funding for health sector activities depends on its ability to cost services it sees as essential in safeguarding and improving the health status of the population, and to project the rise of such costs in the future on a systematic basis.
- A greater public-private mix could be facilitated by knowing the cost of providing public sector services. This would allow for the evaluation of programs such as outsourcing, leasing of equipment and hiring out public sector theatres for private practice after working hours.
- At hospital level, the competition between different specializations and wards, to introduce equipment and

procedures in keeping with the demands of health transition, have to be weighed in the context of their outcomes, and other competing demands and their outcomes, given the need for rationing in the context of limited budgetary allocations. Even within a ward, costing could become important in attempting to curtail wastage, through comparisons between wards regarding utility and resource utilization.

A number of questions at national and hospital level could be answered if only the Sri Lankan health system had a systematic managerial cost accounting system in place.

Questions that could be answered by Managerial Cost Accounting

At national level

- How should the national health budget be prepared for the following year?
- How should the actual national health budget be distributed between institutions, in order to gain:
 - ✓ The best possible health outcomes?
 - ✓ Efficiency?
 - ✓ Equity?
- How should investment funding be allocated between different institutions and programmes?
- Can we determine the optimal size of hospitals (i.e. scale efficiencies) in the context of Sri Lankan hospitals?
- Does by-passing and over crowding affect costs as well as efficiency and welfare?
- Are health allocations being used thriftily, efficiently and equitably?
- Can we assess the feasibility of incorporating alternative financing mechanisms such as insurance and paying wards, in meeting the expenditure of public sector service provision?

At Institutional level

- How should the institutional budget be prepared for the following year?
- What is the institutional funding gap given that budgetary estimates are not met?
- How should the actual institutional budget allocation be distributed between units and programmes, in order to gain:
 - ✓ The best possible health outcomes?
 - ✓ Efficiency?
 - ✓ Equity?
- How should investment funding be allocated between units and procedures?
- How can pharmaceutical requirements be estimated systematically for the following year?
- Are there differences in efficiency between units?
- Can the efficiency levels of units be improved?
- How can we curtail costs in specific units, wards and programmes?
- Are adopting new procedures or introducing new equipment cost-effective?
- Are current management, service and supply practices cost-effective, or should we experiment with measures such as outsourcing?
- How do the public sector costs of selected procedures compare with private sector charges?
- Can hospital auditing be used to examine if funds have been wasted, misused or misappropriated?
- Can individual patients be made aware of the hospital costs they have incurred even if they do not have to bear these costs?

B. COST ACCOUNTING APPROACH

The present accounting methods used in Sri Lankan hospitals do not provide sufficient information for hospital managers in planning and control of hospital services.

Managerial cost accounting systems determine, record, and report the resources consumed in providing services in total and on a per unit basis when combined with utilization data. Such a cost accounting system provides the necessary information to be used as an analytical tool by hospital managers.

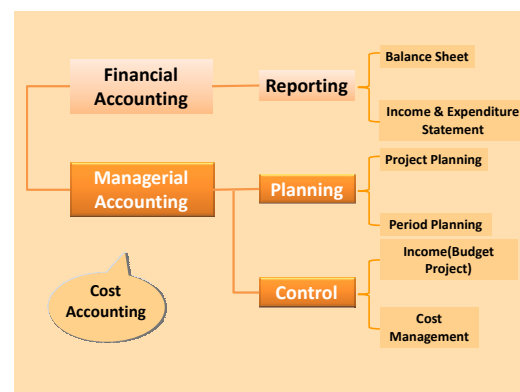


FIGURE 2- 5: FINANCIAL & MANAGERIAL ACCOUNTING

Cost accounting by departments can be implemented by adopting a managerial accounting system at the hospital level. “Department-based cost accounting” tabulates actual expenses and analyzes costs per medical department or per hospital ward. Cost information derived through department-based costing is versatile, and can be adapted to a standard cost accounting method for selected standardized treatment procedures.

2.3.2 HOSPITAL-BASED COSTING

A. WHAT IS THE STEP-DOWN COST ACCOUNTING?

Step-down cost accounting involves three levels of classification: from the more general to the more specific in allocating costs to final Cost Centres. A Cost Centre can be defined as “*a production or service location, function, activity or item of equipment for which costs are accumulated*”.

The analysis of hospital costs was designed to accumulate costs by department or Cost Centre. The Cost Centres demarcated in this analysis are of three types: *overheads; intermediate and final*.

The ‘step-down’ approach is used, whereby costs are allocated to Cost Centres starting with each Cost Centre’s direct costs and then apportioning the indirect costs, making sure that each cost is ultimately allocated to the relevant final Cost Centre.

► Overhead Cost Centre

It provides services to the entire hospital system. Its costs are shared among the patient-related cost centres

► Intermediate Cost Centre

It provides support to the final cost centres, e.g. diagnostic services

► Final Cost Centre

It provides final services directly to patients, e.g. wards, outpatient clinics.

B. ADOPTING HOSPITAL COSTING

Using the financial and clinical information for the fiscal year 2005, an appropriate step down cost accounting

Implementation stages

1. Establish cost centres
2. Establish data collection systems
3. Integrate clinical and financial data
4. Analyse the cost data

procedure was developed and then adopted in the Base Hospital Kuliapitiya (BHK) and Teaching Hospital Kurunegala (THK) in January 2007. The methodologies adopted in the two hospitals were very similar. Resource Book I: Costing provides details on the methodologies and results, highlighting some minor differences in methodology between the two hospitals.

B.1 ESTABLISH COST CENTRES

The structure of each hospital service delivery system was examined in order to list out all the potential cost centres. These were then interlinked using a flow chart: wards and units that did not provide their services to other wards and units were identified as final cost centres while those that served all the other units were categorized as overheads with the remainder being classified as intermediate cost centres. In THK and BHK there were 118 and 56 cost centres respectively.

B.2 ESTABLISH A SYSTEM FOR DATA COLLECTION

1. Develop a standardised data entry sheet and modify it for each Cost Centre.
2. Decide on a person to be in charge of entering data at each Cost Centre.
3. Discuss and agree on the data entry methods, and start collecting data at each Cost Centre.
4. Using the payroll information from the GPS of the District Office, calculate personal emoluments at each Cost Centre.

Clinical Data to be Collected and Entered

1. Drugs, Surgical consumable items and Dressings consumed by the in-patients at the Ward and OT.
2. The same consumed by the outpatients and clinic patients.
3. Chemicals and X-ray films consumed by the patients for laboratory investigation, X-ray and Scanning.
4. Number of in-patients per medical specialty in mixed Wards
5. Number of in-patients by original Ward at ICU.
6. Number of Laboratory test conducted for Haematology, Biochemistry, Microbiology and Pathology Units.
7. Number of X-ray cases per Ward or Clinic
8. Number of Physiotherapy patients per Ward or Clinic
9. Number of scanning patients per Ward or Clinic
10. Number of ECG patients per Ward or Clinic

B.3 INTEGRATE CLINICAL AND FINANCIAL DATA

1. Send cost data related to drugs, surgical consumables and dressings consumed for the inpatients at Wards and OT to integrate it with the computer information at Drug Store.

2. Calculate total cost of drugs consumed per Cost Centre, and send the information to the Cost Accounting Centre of the Hospital.
3. The RDHS office sends the information on the personnel emoluments to the Cost Accounting Centre (Financial information including personnel emoluments is available at the Line Ministry Hospital).
4. Apportion indirect costs such as water and electricity to the Cost Centres. The bases for allocation and apportionment can be floor area, number of in-patients, or number of staff at the Cost Centre.

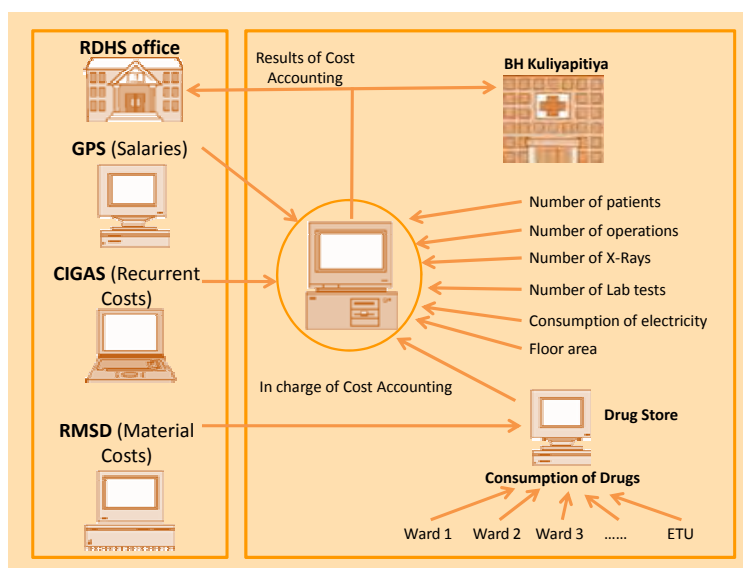


FIGURE 2- 6: INTEGRATED DATA COLLECTION SYSTEM AT THE DISTRICT LEVEL

B.4 STEP-DOWN COST ACCOUNTING

1. Allocate and apportion *direct & indirect* costs to Cost Centres
2. Redistribute costs of Overhead Cost Centres to Intermediate and Final Cost Centres
3. Redistribute costs of Intermediate Cost Centres to Final Cost Centre
4. Obtain costs by Final cost Centres

Direct Cost

- Cost that can be directly identified with a job, batch, product or service

Indirect Cost

- All material, labour and other costs that cannot be identified as direct costs

TABLE 2- 1: COST STRUCTURE AT BASE HOSPITAL KULIYAPITIYA

Costs Centre	Final		Intermediate		Overhead		Total	
	000Rs	(%)	000Rs	(%)	000Rs	(%)	000Rs	(%)
Personnel Costs	81,780	67%	32,464	67%	13,496	68%	127,739	67%
Material Costs	37,997	31%	10,234	21%	3,197	16%	51,428	27%
Running Costs	2,013	2%	5,414	11%	3,072	16%	10,498	6%
Depreciation	0	0%	0	0%	-	0%	0	0%
Total	121,790	100%	48,111	100%	19,765	100%	189,666	100%

Costs Centre	Final		Intermediate		Total	
	000Rs	(%)	000Rs	(%)	000Rs	(%)
1st Allocation Total	121,790	89%	48,111	91%	169,901	90%
Overhead CC	14,911	11%	4,854	9%	19,765	10%
TOTAL	136,701	100%	52,965	100%	189,666	100%

Costs Centre	Final		Total	
	000Rs	(%)	000Rs	(%)
1st Allocation Total	121,790	64%	121,790	64%
Overhead CC	14,911	8%	14,911	8%
Intermediate CC	52,965	28%	52,965	28%
TOTAL	189,666	100%	189,666	100%

C. RESULTS OF COST ACCOUNTING AT THE BASE HOSPITAL KULIYAPITIYA

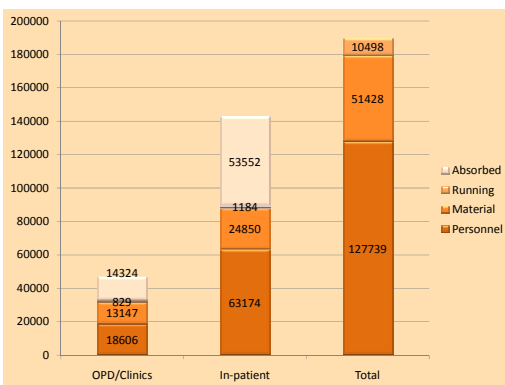


FIGURE 2- 7: TOTAL COST OF FINAL COST CENTRE BY IN-PATIENT AND OUT-PATIENT SECTION

C.1 TOTAL HOSPITAL COST STRUCTURE

Total costs by Final Cost Centres are In-patient 142,760 thousand LKR, and Out-patient 46,906 thousand LKR. Disaggregating costs shows that the major cost element is direct personnel costs (44% inpatient and 40% outpatient care). The other major items are direct medical material costs (17% inpatient and 28% outpatient care), and costs absorbed from overhead and intermediate cost centres (37% inpatient, 31% outpatient). The absorbed costs of inpatient care are a higher percentage because it involves cost absorption from intermediate cost centres such as operating theatre, X-ray and laboratory departments (Figure 2- 7).

Personnel costs are the major share of hospital costs. Focusing on the numbers of staff, staffing patterns and overtime payment is of major importance in order to achieve cost-efficiency.

The second highest category of expenditure is drugs and materials. As identified in the study on the pharmaceutical system carried out as part of the EBM study (details in Chapter 3 of the Resource Book I: Cost Accounting) there are crucial changes that need to be made in the pharmaceutical distribution system to reduce costs.

TABLE 2- 2: NUMBER OF HOSPITAL STAFF BY DESIGNATION

Designation	Hospital Number of Staff		Number of Staff Per 100 beds
Doctor (Dentist)	104	20%	25.8
Nurse (Midwife)	200	39%	49.8
Paramedical	32	6%	8.0
Clerk	19	4%	4.7
Other staff	154	30%	38.3
Total	509	100%	126.6

When introducing department-based cost accounting to a hospital, it is important to focus on understanding and collating the major cost categories accurately since this ensures that a large part of costs are correctly determined, and so applicable in policy and decision making. In the context of personnel costs, the fact that the government has already introduced a computer generated information system, (the Government Payroll System), supports the activity of managerial accounting. Only where multi-task personnel are present, adjustments are needed in apportioning their salaries to the different units while ensuring that their pay is recorded in only one unit, preferably at the unit where they work most.

In considering the impact of staff numbers on hospital costs, it is important to relate the absolute numbers to another denominator, such as the number of hospital staff by number of beds, or average number of inpatients per day.

C.2 RUNNING COSTS OF THE HOSPITAL

Utilities are the largest portion of running costs, which includes cost of electricity, water and telephones. Total costs of utility services are likely to rise with patient numbers as well as with the sophistication of the hospital's facilities. The vast differences are likely to be the result of differences in utilization. Therefore, thrifty usage of utilities is important as a means of cost containment.

TABLE 2- 3: DETAILS OF RUNNING COST

Account	Running Cost (Thousand LKR)	
Repairs, Maintenance	2,432	1.3%
Utility services	6,889	3.6%
Other services	1,178	0.6%
Total	10,498	5.5%

C.3 RELATIONSHIP BETWEEN CLINICAL STATISTICS AND HOSPITAL COSTS

Hospitals prepare clinical information on an annual basis. In implementing cost accounting, it is necessary to obtain more regular and detailed information: per month, per disease, per cost centre. Such detailed information can be obtained by slightly improving the present recording system of clinical data. The availability of such detailed information would be useful for hospital administration if it is combined with corresponding financial information, since this would facilitate the calculation of unit costs.

TABLE 2- 4: CLINICAL INFORMATION & HOSPITAL COST

Description	Clinical Statistics	Annual Expenditure (thousand LKR)	Average Unit Cost (LKR)
Physiotherapy	14,701	824	56
ECG	12,342	930	75
Radiology	11,049	2,129	193
Ultra sound scan	2,597	1,675	645
Operations	9,551	20,627	2,160
Laboratory tests	223,484	5,151	23

Above table shows the annual expenditure per department as well as the unit cost per case. The unit costs were calculated by simply dividing the relevant cost by the corresponding output (when calculating the unit cost of the Operation Theatre, expenditure of the Operation Theatre was divided by the total number of major and minor surgeries carried out. The types of surgery can vary widely from General Surgery, Gynaecology, Orthopaedics, ENT to Eye operations). As a result, the unit cost of the Operation Theatre is likely to be significantly higher in a hospital that carries out more advanced operations. While more detailed information relating to the duration of operations, number of staff involved and the sophistication of the procedures undertaken would allow for more disaggregated and specific cost estimates, these average values are still useful in highlighting cost differences in hospital activities.

C.4 UNIT COST PER PATIENT AND PER DAY PER PATIENT BY SPECIALITIES

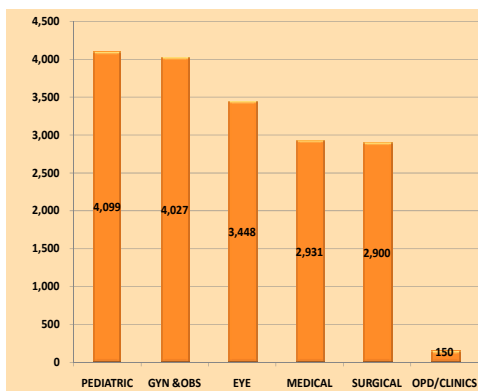


FIGURE 2- 8: COST PER PATIENT

When examining the cost per patient per day, it is important to consider costs from the viewpoint of *fixed costs and variable costs*.

Fixed costs are the costs that need to be borne regardless of an increase or a decrease in the number of patients. In this report, Personnel cost and Overheads cost are fixed

costs. Comparing fixed unit costs across wards or hospitals therefore

must explicitly focus on utilization rates (that are meaningful). Unless we do so we are unable to conclude whether high unit costs are a reflection of high expenditure or low utilization rates: the source of the high cost being of fundamental importance in determining appropriate policy for the future.

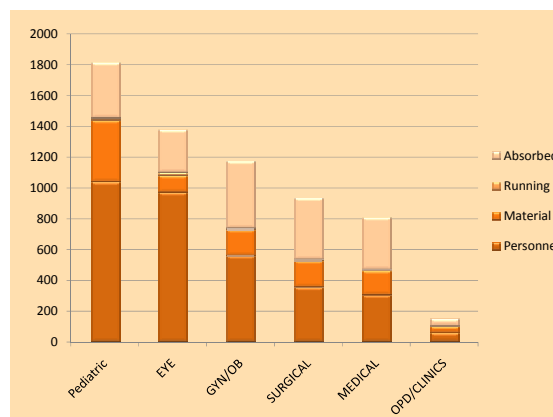


FIGURE 2- 9: COST PER PATIENT PER DAY

Variable costs on the other hand increase or decrease in proportion to the number of patients. In this report, the cost of drugs and materials, electricity and water expenses incorporated in running costs, and the paramedical costs, are termed variable costs. In the case of variable expenses direct comparison of per unit costs is meaningful.

The cost analysis shows that the cost per patient in the Paediatric (Rs.4,099) and the GYN&OBS (Rs.4,027) is high. This is due to the provision of intensive nursing to infant patients.

With regard to the cost per patient per day based on medical specialties, the costs at the Paediatric and the Eye department are high. Although the total cost of both the Paediatric and the Eye departments are low, the cost per patient per day is higher compared with that of other medical specialties. This is because the number of patients is low and average length of stay short.

Results of Cost Accounting at the Teaching Hospital Kurunegala

The method adapted in this hospital was very similar to that used in the Base Hospital Kuliyaipitiya. Step-down cost accounting can be applied to the large-scale hospitals although gaining a comprehensive grasp of the costs involved in consumption of drugs and surgical and dressing items is a challenge.

The Teaching Hospital Kurunegala has 46 wards with the total bed strength of 1,355. In 2005, the total number of outpatients reached to 350,000 while 191,000 were admitted to the wards. The bed occupancy rate constantly exceeds its maximum capacity.

In the same year, its total medical expenditure amounted to nearly Rs.900,000 thousand. The total cost by Final Cost Centres was InpatientRs.691,000 thousand, and Outpatient Rs. 208,000 thousand.

The average unit cost of paramedical cost centres is highest at the Operation Theatre, 10 times more than the average unit cost obtained at the Ultrasound Scan Unit. The unit costs for paramedical units are useful and can be used in disease-management costing.

TABLE 2- 5: CLINICAL INFORMATION & HOSPITAL COST AT PARAMEDICAL COST CENTRES

Description	Clinical Statistics	Annual Expenditure (thousand LKR)	Average Unit Cost (LKR)
Physiotherapy	54,066	5,280	98
ECG	64,535	3,047	47
Radiology	67,939	13,310	196
Ultra sound scan	7,160	2,391	334
Operations	28,756	93,567	3,254
Laboratory Exam.	427,090	25,324	59

The cost per patient per day in the NTC (National Thalassaemia Centre), Dialysis Unit and CCU (Coronary Care Unit) is high due to the intensive treatment that does not involve long stays.

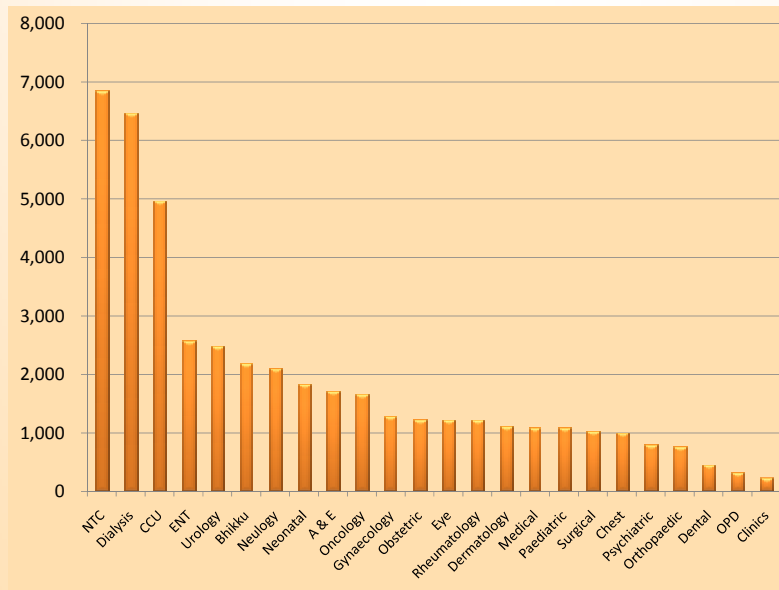


FIGURE 2- 10: COST PER PATIENT PER DAY

2.3.3 ESTIMATING THE TREATMENT COST OF SELECTED DISEASES

A. PURPOSE

Analysis of the cost of management of diseases is a major step towards appropriate resource allocation and it is an important part of costing strategy:

- At a national level, the ability to determine treatment burden of a country depends on the availability of costing data for combining with data on the current epidemiological profile;
- At hospital level, the ability to determine disease based costs would allow for better budgetary practices if the disease costs were combined with historical evidence on hospital utilisation patterns.
- Knowledge of disease costs would be useful in determining appropriate financing mechanisms, for example to test the feasibility of imposing the cost of care of road traffic accidents on insurance companies that could help to supplement government funding of public sector hospitals.

The development of treatment protocols is an important complementary activity since the availability of such protocols could then streamline treatment procedures while costing such protocols would allow for determining optimal treatment care costs.

The Pilot Implementation developed:

- A comprehensive methodology to estimate the cost of treating diseases/surgical procedures
- Appropriate BHT data extraction forms and cots collation formats
- Time study procedures

B. SELECTION OF DISEASES

Five diseases were selected based on their relative importance with respect to the burden of disease and availability/practicality of a sufficient number of cases of an identified level of severity. 40 patients were collected for each condition. See Annex of the Resource Book I: Cost Accounting for the similar recruitment criteria used on Bed Head Tickets (BHTs) and on patients.

TABLE 2- 6: FIVE DISEASES SELECTED FOR COSTING

Selected Disease	Reason
Ischemic Hear Disease	This is a leading cause of hospital mortality and a public health problem in Sri Lanka.
Breast tumour excision	This was selected as a proxy for common surgical procedures. It involves only a limited surgical intervention and a short duration of hospital stay.
Myocardial Infarction	Focusing on Myocardial infarction is important because it allows a variety of treatment procedures to be included in the time study.
Bronchial asthma	Common condition treated at all levels of hospitals in Sri Lanka. Comparison of the management at different hospitals is possible.
Lower segment caesarean section (LSCS)	The procedure has a standardized treatment protocol if the sampling is limited through inclusion and exclusion criteria.

C. COST ALLOCATION PROCEDURE

Cost data derived from the hospital-based costing methodology in addition to other data are applied to arrive at three types of costs associated with the treatment of the conditions.

- Patient based treatment cost
The direct cost comprised cost of consumables and time that was spent entirely on the patient (e.g. drugs, surgical consumables and medical officers' time)
- Hospital stay cost
This element comprised the cost of accommodation for a patient in the ward. This was previously estimated in Base Hospital Kuliypitiya and Teaching Hospital Kurunegala. Unit cost was calculated for each ward as the final step of the step down costing procedure.
- Paramedical cost
This comprised the cost of investigations performed on the patient and the cost of management of a patient in the operating theatre. Unit cost of investigations was estimated using the cost for each para-medical centre calculated in the second step of the step down procedure and the number of investigations performed.

D. RESULTS

- Findings 1: Significant difference in cost of treating ischaemic heart disease
Costing of treatment for ischaemic heart disease was carried out at BHK and THK. The total cost of treating a patient at BHK is about 85% higher than in THK. The greater cost of accommodation results in a significantly higher total cost. The difference in the cost of nebulisation between the two hospitals is about 11 fold.

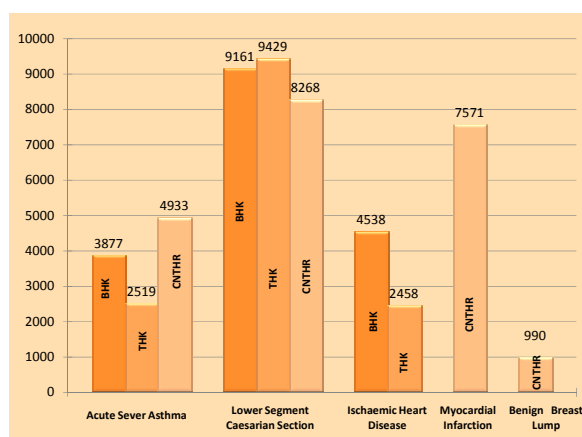


FIGURE 2- 11: DIFFERENCE IN COST OF TREATING 5 DISEASES

- Finding 2: Significant difference in cost of treating Severe Acute Asthma

Cost of treating severe acute asthma in CNTH is 27% and 96% higher than at BHK and THK respectively. The longer duration of stay (nearly three days more than at the other two hospitals) resulted in a higher accommodation cost. Due to the longer duration of stay, the cost of drugs was also higher. These findings may suggest that the patients treated at CNTH, though identified based on similar criteria, may have been more ill than the patients at the other two hospitals. The higher cost of investigations, ECG, X ray and intravenous fluids observed in the treatment costs also supports that impression. Being a larger tertiary care hospital and a referral centre for a larger geographical area, it is possible that the type of patients admitted to CNTH, are different from the patients at BHK and THK in terms of severity of illness. Availability and use of more resources for management of a patient in CNTH, could also have contributed to the higher cost.

- Finding 3: Major cost component is accommodation

A major share of the costs for each of these conditions is borne on accommodation, which in this context encompasses all types of costs: overhead costs, personnel costs of all staff other than medical officers and costs on food, furniture and administration. In the case of the two surgical cases the cost of operating theatre overheads is sizeable. Only in the case of Acute Myocardial infarction at CNTH do drugs register as a major cost component. Greater attention to the cost of accommodation as well as length of stay could be of significance in limiting disease based treatment costs.

TABLE 2- 7: MAJOR COST ELEMENTS IN DISEASE BASED COSTING

Disease	Hospital	Major cost element	Other cost elements over 20%
Severe Acute Asthma	BHK	Accommodation (73.7%)	
	THK	Accommodation (69.4%)	
	CNTH	Accommodation (61.1%)	
Lower Segment Caesarean Section	BHK	Accommodation (50.3%)	Operating Theatre (21.1%)
	THK	Operating Theatre (40.2%)	Accommodation (36.2%)
	CNTH	Operating Theatre (39.3%)	Accommodation (34.3%)
Ischaemic Heart Disease	BHK	Accommodation (76.1%)	
	THK	Accommodation (62.1%)	
Acute Myocardial Infarction	CNTH	Accommodation (36.3%)	Drugs (34.7%)
Surgical Excision of Benign Breast Lump	CNTH	Operating Theatre (65.5%)	

- Finding 4: Variations in Management of the Same Disease
In the absence of disease management protocols, there is a considerable variation in management of the same disease at the different centres. Though treatment of the patient is influenced by many factors that cannot be standardised, availability of a protocol will be helpful to manage patients rationally and efficiently.

E. METHODOLOGICAL REVIEW

The pilot implementation left many valuable lessons behind that the future practices could take into account. In the presence of a comprehensive costing system in hospitals, costing disease management needs to become a routine task in the future.

- Staff Profile
The qualifications and the experience of different grades of medical officers (Specialist, Grade medical officers, and intern medical officers) should be taken into account in valuing the time spent by doctors to reveal the impact of differences in staff seniority and quality on costs.
- Depreciation Costs
The cost accounting executed in THK and BHK used the current financial accounting results, therefore, depreciation of the building, other facilities, and the equipment is not included. As a result, actual unit cost was higher than the unit cost estimates reported in the study. To make the methodology more rigorous, depreciation costs should be taken into account.
- Need for Clinical Protocols
Immediate action should be taken to devise a set of protocols for the treatment of at least all the major diseases/conditions (defined both in terms of epidemiological burden and economic burden to family and nation) afflicting the county's population. With the development of standardised disease management protocols this could further lead to the development of benchmark costing of protocol based disease management.