Study and Evaluate the Financial Feasibility of Proposed CGHS Health Packages

By

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Dissertation submitted for the partial fulfillment of the
MBA Hospital and Health Management

Academic year, 2014-2016

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Dissertation

At

Global Hospital, Hyderabad

Study and evaluate the financial feasibility of proposed CGHS health packages

By

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Under the guidance of

Col (Dr.) Ashok Kaushik

MBA Hospital and Health Management

2014-16

The IIHMR University, Jaipur

INSTITUTE OF HEALTH
MANAGEMENT RESEARCH
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IIHMR UNIVERSITY

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Dr. Sonalika Singh, student of MBA Hospital and Health Management (MBA-HM) from The IIHMR University, Jaipur has undergone dissertation/internship training at Global Hospital, Hyderabad from 22nd February to 7th May 2016.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.
The Internship is in fulfillment of the course requirements.

I wish her all success in all his future endeavors.

Col(Dr.) Ashok Kaushik
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On 7th May 2016

From Global Hospital, Hyderabad

She comes across as a committed, sincere & diligent person who has a strong drive and zeal for learning.

We wish her all the best for future endeavors.

7/5/2016

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ABSTRACT

Rationale:

A concern of most private hospitals is the sources of finance for delivering health services, the ability to maintain funding levels, pattern of resource allocation, and the efficiency of services delivered. In a country like India, getting funding for establishing a hospital or a health care facility is an easy task. Once the source of finance is determined, hospital can be commissioned and ran smoothly. But the actual concern is the utilization of resources of the hospital. Despite the level of resources devoted by a hospital, there is a growing gap between available resources and their efficient utilization.

As the competition between private hospitals is very high, the patient load of the hospital is quite low. Thus the management came up with a proposal of starting few procedures under CGHS. Before getting empanelled for any such schemes, it is essential to check whether starting these procedures will be profitable to the organization or not. For this, financial feasibility has to be evaluated.

Objective:

1) To carry out financial feasibility of proposed health packages under CGHS across two departments of the hospital.

Methodology:

The dissertation has been conducted for a medium scale hospital, so as to find the financial feasibility of few procedures to be started under CGHS. The study involved collecting data from various departments to find the direct cost attributable to the procedures. Based on this data recommendations were made on their financial feasibility.

Key findings:

S.No.	CGHS Procedures	2002	2014
1	Laparoscopic Cholecystectomy	17.10%	23.60%
2	Laparoscopic Inguinal Hernia	-	5.79%
3	Laparoscopic Appendectomy	9.04%	17.50%
4	PCNL	8.43%	16.90%
5	ESWL	32.44%	47.52%
6	URSL	14.90%	-

Green: Highly recommendable procedures (Margin more than 15%)

Yellow: Decision up to the management (Margin between 5-15%)

Conclusion:

Laparoscopic Cholecystectomy, Laparoscopic Inguinal Hernia (2014), PCNL (2014), ESWL procedures are found to be profitable and are recommended to be started under the scheme.

Laparoscopic Inguinal Hernia, Laparoscopic Appendectomy (2004), PCNL (2004), ESWL & URSL are marginally profitable and the decision is up to the management to decide its viability.

ACKNOWLEDGEMENT

"A Great achievement solution dawns with an idea, grows with our effort and attains fulfilment with our will power". In our effort towards the realization of my dissertation, I have drawn on the guidance of many people for which I'm glad to acknowledge.

My institute – Institute of Health Management Research (IIHMR), Jaipur and its education deserves the foremost appreciation for providing me the opportunities to understand my individual capabilities. Of course, the entire faculty at IIHMR had facilitated the endeavour. I acknowledge the contribution of my mentor **Col (Dr.) Ashok Kaushik** (Dean, Academics and Student Affairs, IIHMR) whose detailed suggestions have vastly enhanced the quality of my work.

I got the opportunity to pursue my dissertation from Global Hospital, Hyderabed. It was an opportunity to work with one of the best health care service providers.

I would like to thank my mentor & guide **Dr. Ananth Mohan Pai** , General Manager-Medical Services, Global Hospital, Hyderabad for providing an opportunity to carry out the dissertation and utilizing the facilities available. Without his valuable guidance and consistent support, this dissertation would not have got underway.

I'm thankful to **Ms Radhika**, HOD- Billing, **Ms. Anitha P**, HOD- Pharmacy and **Ms. Prerana Swain**, Deputy manager-HR, Global Hospital, Hyderabad for being my mentor and project guide for the entire period of my dissertation, for helping me improve the quality of my work and for helping me identify areas where I lack and work upon them.

I'm also thankful to all those who have directly or indirectly encouraged me to complete this project.

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2) LIST OF ABBREVIATIONS:

CGHS: Central Government Health Scheme

OT: Operation Theatre

Lap chole: Laparoscopic Cholecystectomy

Lap ing hernia: Laparoscopic Inguinal Hernia

PCNL: Percutaneous nephrolithotomy

URSL: Ureteroscopic Lithotripsy

ESWL: Extracorporeal shock wave lithotripsy

Rs: Rupees

UCP: Unit cost price

I/V: Intravenous

ICU: Intensive Care Unit

NDPS: Narcotic drugs & psychotropic substances

ECG: Electro Cardiogram

TITLE: STUDY AND EVALUATE THE FINANCIAL FEASIBILITY OF PROPOSED CGHS HEALTH PACKAGES

3. INTRODUCTION:

With increasing population and awareness among the new generation, demand for hospital services is growing rapidly. The public hospitals and government are struggling to keep up with this demand. Public hospitals and chronic care both need serious reform, and there are ways to achieve it. One of the ways to cope up with such situation is funding 'packages of care' for people with chronic diseases or complex conditions. The government pays the empanelled private/corporate hospitals for the procedures performed on the patients covered under the various schemes. This solution provides early and best treatment to the suffering patients and reduces the burden on both, the patient as well as the government.

According to the central government health scheme (CGHS), a package is defined as a lump sum cost of inpatient treatment for which a patient has been referred by a competent authority or CGHS to the empanelled hospital or diagnostic center. This package includes all the charges pertaining to a particular procedure including registration charges, admission charges, room tariff, drug charges (up to a certain predefined amount), operation charges, operation theatre charges, cost of disposable surgical charges, anesthetic charges, procedure charges, surgeon/assistant surgeon fee, nursing charges, ICU/ICCU charges, monitoring charges, doctor/consultant visit charges, dressing charges, and cost of all sundries used during hospitalization from the time of admission of a patient to the time of discharge.

In corporate hospitals there are few particulars that are excluded from the package. These particulars are medical record charges, dietician charges, investigation charges, drugs and disposables exceeding the predefined amount, room tariff if the length of stay exceeds the predefined days.

If a patient is referred to private/corporate hospital by government organizations like CGHS, the hospital has to strictly adhere to the package as no extra charge can be levied on the patient or the organization, irrespective of any unforeseen reason or complication.

As a number of patients undergo surgeries with such packages, many a times situation arises in which the hospital and the staff can not adhere to the package and the cost of treating the patients goes much higher than the actual package. The additional cost incurred in such cases is charged from the patient in case the patient pays by cash/himself. But in cases of CGHS patients, the cost has to be endured by the hospital and proves to be a loss of revenue. So, before accepting patients on such schemes, the hospital has to analyze the financial feasibility of various packages to maximize the returns and reduce the burden caused by them due to any unforeseen reason.

The advantages of these packages are:

1) It ensures uniformity of expenses to all the patients.
2) It enables the hospitals to get cost settlements done more easily.
3) It is convenient for the patient as he knows how much the expenditure would be for that particular procedure.

4) It is convenient for the company for approval/clearance for the surgery as they have already decided the amount for various packages and have to credit only that amount in hospital's account without any hassle.
5) Hospitals can maximize their returns on laparoscopic surgeries by providing ample training to the staff, standardizing the equipment, by wisely using custom kits.

There are few disadvantages of these packages:

1) If any complication arises during the surgery, the company/ organization will still credit only the predefined amount of the package in the hospital's account. It will not consider any extra cost of manpower, consumables and infrastructure and this cost will have to be endured by the hospital.
2) The government takes up to 90 days to credit the package amount to the hospital's account, which again is a loss for the hospital.

4. LITERATURE REVIEW:

4.1. According to a study[(1)],in 1995 the Committee of Enquiry into National Health Insurance (NHI) recommended that formally employed individuals and their employers be required to fund at least a minimum package of hospital cover for workers and their dependents. This has recently been echoed in a Department of Health policy paper on social health insurance. This research aims to define and cost a minimum package of essential hospital care for competing (public and private) health insurers in South Africa. CRITERIA FOR PACKAGE DEFINITION: Based on the objectives implicit in the NHI Committee report, the following criteria were used to define the essential package: (i) the extent to which there was another appropriate responsible party who should pay for treatment; (ii) the degree of discretion in deciding whether or not to provide treatment (roughly equivalent to 'urgency'); and (iii) the cost and effectiveness of treatment.

Result: On the basis of the above criteria, 396 out of 598 possible interventions were included in the package. Using local mine hospital and private sector utilization rates and mine hospital cost data, it was estimated that the essential inpatient package would cost around R502 per enrollee per year, using 1998 prices, for a working age population and their dependents. Age-sex standardized outpatient care costs in the mine hospital population studied were estimated at R183 per person per year. It was therefore estimated that the total inpatient and outpatient hospital package would cost around R685 per person per year.

Conclusions**:** The results presented in this paper are intended to inform the process of defining a national essential hospital benefit package. Assuming that contributions were proportionally related to income, and that costs should not exceed 6% of wages, the package should be affordable to all of those earning above R20,000 per year. Significant additional work is required, firstly at a technical level to assess the appropriateness of the prioritization approach used here and secondly to take the debate around essential hospital benefits to broader political and public forums.

4.2. Established in 2005[(2)], Afghanistan's Essential Package of Hospital Services (EPHS) provides a framework for the provision of secondary health services within the hospital system. It defines the standardized package of services at each hospital level (district, provincial and regional); provides a guide for all stakeholders for how these hospitals should be staffed, equipped and provided with drugs and other supplies; and promotes a health referral system that integrates the primary health care system (delivered through the Basic Package of Health Services) with the hospital system. The National Health Accounts 2008-2009 (NHA) show that 29% of Afghanistan's total health expenditures occur at the hospital level (public and private hospitals), and that 26% of Ministry of Public Health (MoPH) expenditures are devoted to public hospitals. Although the MOPH has a system to track the costs of individual EPHS hospital costs, this information is not regularly reported. The 2008-09 NHA recommended conducting a costing study of the EPHS to evaluate its distinct inpatient and outpatient services to better understands where resource gaps exist and how more cost-efficient services can be delivered. In response to the NHA recommendation, the

MOPH Health Economics and Financing Directorate (HEFD) prepared this report to document the actual costs and key utilization and service indicators from a sample of nine EPHS implementing hospitals in Afghanistan. This information was be used by the MOPH to inform policies and decision making regarding hospitals in Afghanistan.

Key findings of the report are:

- For the most part, EPHS hospitals appear to be reasonably well-staffed with medical professionals. In fact, in many instances, EPHS provincial hospitals have more doctors and, in some cases, more nurses/midwives than advised by the PHS standards—although several provincial hospitals fall short of the advised nurse/midwife per bed ratio. However, EPHS staffing standards apply to 150-bed provincial and 350-bed regional hospitals. These standards should be revised to better accommodate different hospital sizes so that staffing decisions are appropriate and efficient. Approaches for recruiting and retaining nurses and midwives in rural provinces should also be considered.

- The cost findings point to a need to devote a greater proportion of spending to pharmaceuticals. On average, the hospitals included in the study devoted only 11% of total costs to pharmaceuticals. EPHS should aim to relieve patients' out-of-pocket (OOP) spending burden through improved drug supply management and increased allocation of expenditures for drugs.

5. NEED FOR STUDY:

A concern of most private hospitals is the sources of finance for delivering health services, the ability to maintain funding levels, pattern of resource allocation, and the efficiency of services delivered. In a country like India, getting funding for establishing a hospital or a health care facility is an easy task. Once the source of finance is determined, hospital can be commissioned and ran smoothly. But the actual concern is the utilization of resources of the hospital. Despite the level of resources devoted by a hospital, there is a growing gap between available resources and their efficient utilization. These resources include everything starting from infrastructure, equipments to the manpower.

As the competition between private hospitals is very high, the patient load of some hospitals can be quite low; hence no proper utilization of resources of the hospital.
The government came up with a system of packages in collaboration with the private hospitals
The benefit of this system to the government is that there is distribution of its burden to these private hospitals. The private hospitals also gets benefitted from this as their resources are utilized efficiently owing to the increased patient load, hence the work load. In addition, they create a novel mechanism of engaging with the private sector and contribute to improvements in the performance of public hospitals. For example, schemes in the states of Kerala and Andhra Pradesh are providing public hospitals with additional sources of financing, which is now being used to upgrade hospital infrastructure and introduce new services.[(3)]

The government decides the amount of packages that will be paid to the private partners to perform the particular procedures. These tariffs are decided by analyzing the cost incurred by the government and the hospitals have to abide by it, performing the entire procedure or the treatment under this prefixed tariff.

As the patient load is decreasing in the hospital and there is no optimum utilization of resources, the management came up with a proposal of starting few procedures under government schemes like CGHS. Before getting empanelled for any such schemes, it is essential to check whether starting these procedures under such schemes will be profitable to the organization or not. For this, financial feasibility has to be evaluated. The basic purpose of feasibility study is to determine if a project will be viable for the organization. In this study the direct cost incurred during particular procedures will be calculated and compared with the government tariffs. Only after the analysis of this study proves the new projects profitable, the hospital can get empanelled and start accepting patients under this scheme.

The study will also give the contribution of each cost head in the package and will help to identify where all extra cost is incurred so that measures can be suggested to reduce the cost of that particular cost head, if any.

6. RESEARCH QUESTION:

1) Are the proposed CGHS health packages financially feasible for Global Hospital, Hyderabad?
2) How much is the difference between the costs incurred by the hospital and the package rates approved by the scheme?

7. OBJECTIVE:

To carry out financial feasibility of proposed health packages under CGHS across two departments of the hospital.

8. HYPOTHESIS:

The proposed CGHS health packages are not financially feasible for Global Hospital, Hyderabad.

9. RESEARCH METHODOLOGY:

Study design: Retrospective study

Study Area: Global Hospital, Hyderabad

Study population: All the patients who underwent specific surgeries (surgical gastroenterology and urology) in the month of January, February and March 2016.

Sampling Method: Purposive sampling for Laparoscopic Cholecystectomy and for the rest entire population has been taken as sample.

Sample Size: 55 (29- gastroenterology and 26- urology)

Sampling Criteria: Three surgeries each of surgical gastroenterology and urology were selected. These surgeries are:

1. Laparoscopic appendectomy (sample size-9)
2. Laparoscopic inguinal hernia repair (sample size -10)
3. Percutaneous nephrolithotomy (PCNL) (sample size -7)
4. Ureteroscopic Lithotripsy (URSL) (sample size -7)
5. Extracorporeal shock wave lithotripsy (ESWL) (sample size -12)
6. Laparoscopic cholecystectomy (sample size -10)

The cash vouchers of all the surgeries which took place in 3 months were retrieved for 1st five procedures and used as sample. For laparoscopic cholecystectomy, 10 cases were selected from all the cash bills.

Exclusion criteria:

1) Insurance/ credit bills were excluded.
2) Bills with different procedures in addition to the above specified six procedures were excluded.

Data collection time: 22nd February to 7th May 2016

Data collection tools:

1) All the cash vouchers from billing department.
2) Kranium software (HIS).

Data Collection Techniques:

1) After retrieving the patient details from the medical record department, all the cash bills were collected from the billing department. These bills were then analyzed for all the drugs and consumables used.
2) Manpower cost was analyzed with the help of Human Resource Department. The manpower includes:
    - Anesthetists

- Nurses
- OT technicians

Firstly the cost per hour of the entire manpower and then the cost per procedure were calculated.

3) The costs of all the biomedical equipments used during and after the procedure were used to find out the cost of equipments per hour incurred to the hospital and hence cost per procedure was calculated.
4) For the electricity usage of the OT, the units consumed by the OT lights and air conditioners per hour were calculated and then for the particular procedures and included in the final costing.
5) Lease contract of the hospital was used to find out the amount paid every month. The cost per square foot was calculated using the total built up area and hence the infrastructure cost for both, major and minor OTs was calculated.

10. OBSERVATIONS AND ANALYSIS:

10.1. LAPAROSCOPIC CHOLECYSTECTOMY (Sample size-10)

10.1.1. MATERIAL COST:

The bill break-up of the drugs and consumables used during the procedure for all the 10 samples were taken from the billing department. The drugs and consumables were segregated into 8 sub groups to analyze the contribution of each sub group in total material cost. The unit cost price (UCP) of the drugs and consumables were taken from the central pharmacy store and purchase department.

- The average unit cost price of all the drugs and consumables used for this procedure was Rs 2530.
- The average UCP of each sub group was:

S.NO.	DRUGS & CONSUMABLES	AVERAGE COST (Rs)
1	CANNULAS AND CATHETERS	194
2	LIGATING & SUTURING MATERIALS	768
3	OTHER CONSUMABLES	538
4	IV FLUIDS	159
5	ANAESTHESIA DRUGS	154
6	ANTIBIOTICS	57
7	IV DRUGS	553
8	ORAL DRUGS	107
	TOTAL	**2530**

Table 10.1.1: Average UCP of drugs and consumables

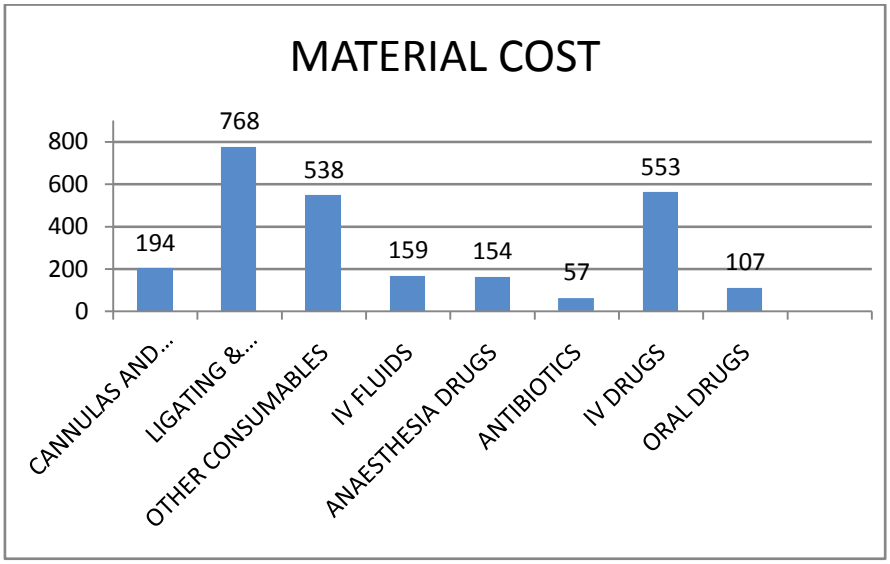

Fig. 10.1.1. Material cost

The contribution of each sub-head in the average material cost was:

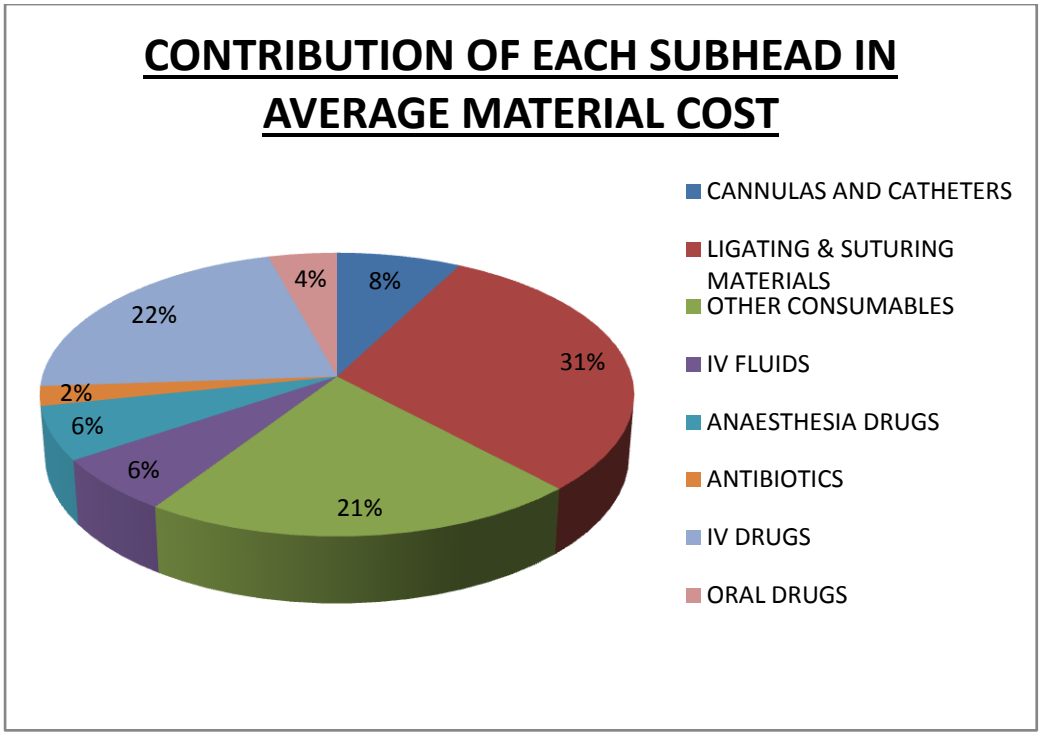

Fig. 10.1.2: Contribution of each subhead in average material cost

The maximum contribution was of ligating and suturing material (31%) followed by other general consumables (21%) and the least contribution was of antibiotics (2%).

10.1.2. MANPOWER COST

Manpower is of 3 types:

- Anaesthetists
- Nurses
- OT technicians

I. Anaesthetist cost: The hospital has a tie up with Axon Anaesthesia Association which provides the entire 7 anaesthetist to the hospital. The hospital pays a lump sum amount of Rs 20.3 lakhs per month to them. To calculate this cost, firstly per hour cost of an anaesthetist was calculated using the lump sum amount paid to Axon Anaesthesia Association and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of anaesthetists used during the surgery.

Total number of anaesthetists – 7

Available hours of an anaeathetist per day – 10 hours

Total available hours in a month – 1,820 hours (considering 26 working days)

Cumulative salary – Rs 20.3 lakhs

Cost = Sum total of salary of all the anaesthetists/ Total number of available hours

= 20,30,000 / 1820

= Rs 1,115.4 / hour/ anaesthetist

The average duration of Lap Chole is 1 hour 30 minutes.

Therefore,

Anaesthetist cost = 1115.4 X 1.5

= Rs 1,673 per surgery

II. Nursing cost: To calculate the nursing cost, firstly per hour cost of a nurse was calculated using the cumulative salaries of all nurses and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of nurses used during the surgery.

Total number of nurses in OT- 17

Available hours of a nurse per day – 8 hours

Total available hours in a month – 3,536 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 4,46,373/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 4,46,373 / 3536

= Rs 126.24/ hour/ nurse

The average duration of Lap Chole is 1 hour 30 minutes and number of nurses used is 2.

Therefore,

Nursing cost = 2 X 126.24 X 1.5

= Rs 378.72 per surgery

III. OT technician cost: To calculate this cost, firstly per hour cost of an OT technician was calculated using the cumulative salaries of the entire OT technician and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of technicians used during the surgery.

Total number of technicians in OT- 7

Available hours of a technician per day – 8 hours

Total available hours in a month – 1,456 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 1,58,524/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 1,58,524/ 1,456

= Rs 108.9/ hour/ technician

The average duration of Lap Chole is 1 hour 30 minutes and number of technicians used is 1.

Therefore,

OT technician cost = 108.9 X 1.5

= Rs 163.35 per surgery

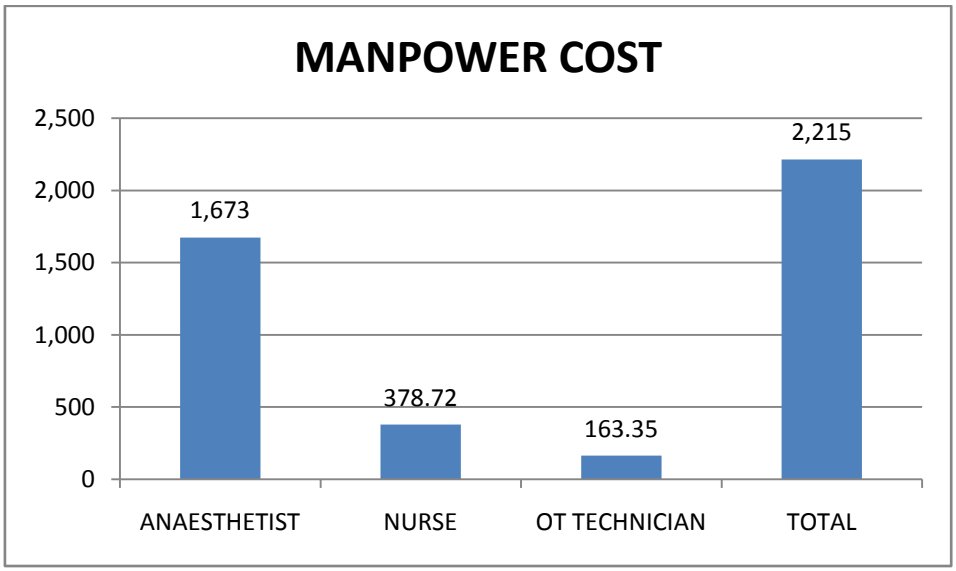

Fig. 10.1.3: Manpower cost

It was seen that the cost of anaesthetist was Rs 1,673, cost of nurses was Rs 378.7 and cost of OT technicians was Rs 163.3.
The total manpower cost was Rs 2,215.

10.1.3. INFRASTRUCTURE COST:

The hospital is on lease and pays an amount of Rs 16 lakhs per month for the building. The total built up area of the hospital is 71,056 square feet.

Per square feet cost of the hospital = 16,00,000 / 71,056

= Rs 22.52 per square feet

For major OT

The area of major OTs is approximately 638.82 square feet (27.3 feet X 23.4 feet)

Therefore the cost of infrastructure for major OT = 638.82 X 22.52

= Rs 14,386.2 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 1,438.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 2,158/-

For minor OT

The area of minor OTs is approximately 288 square feet (18 feet X 16 feet)

Therefore the cost of infrastructure for major OT = 288 X 22.52

= Rs 6,485.8 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 648.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 972.9/-

- As the procedure takes place is any of the OTs, the average cost of infrastructure would be:

  = (2,158 + 972.9)/2

  = Rs 1,565.4 per procedure

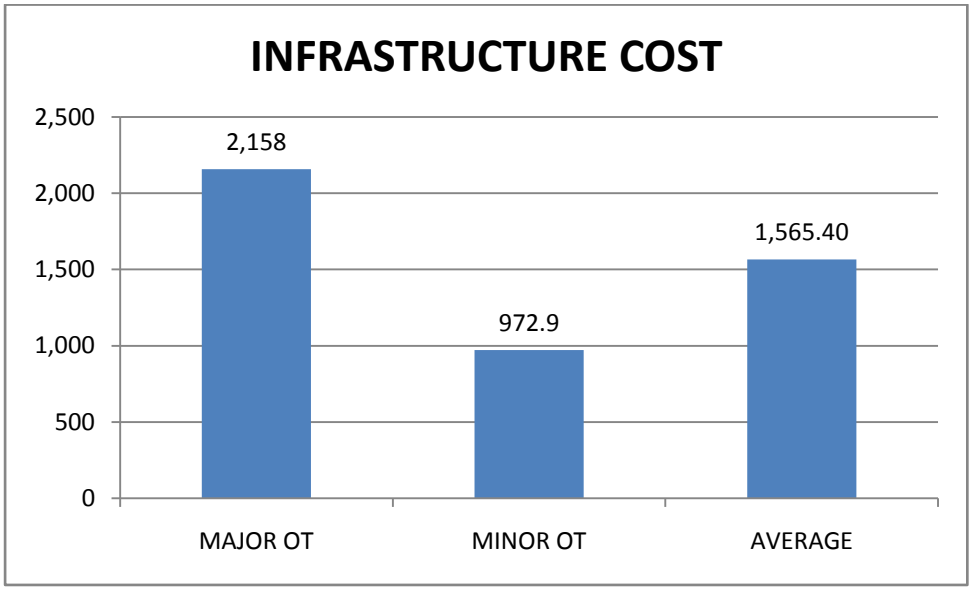

Fig. 10.1.4. Infrastructure cost

As calculated the cost of infrastructure in case of major OT was Rs 2,158 and Rs 973 in case of minor OT. As the surgery takes place in both OTs average was calculated which was Rs 1,565.4 per procedure.

10.1.4. ELECTRICITY CONSUMPTION:

I. Major OT

The air conditioner consumes 30 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 30 X 8.42

= Rs 252.6 per hour

The OT lights consumes 0.65 units per hour

Therefore per hour consumption is = 0.65 X 8.42

= Rs 5.5 per hour

Total per hour consumption = 252.6 + 5.5 = 258.1

The duration of surgery is 1.5 hours,

Therefore total electricity consumption = 258.1 X 1.5

= Rs 387.2 per surgery

II. Minor OT

The air conditioner consumes 19 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 19 X 8.42

= Rs 160 per hour

The OT lights consumes 0.2 units per hour

Therefore per hour consumption is = 0.2 X 8.42

= Rs 1.7 per hour

Total per hour consumption = 160 + 1.7 = 161.7

The duration of surgery is 1.5 hours

Therefore total electricity consumption = 161.7 X 1.5

= Rs 242.6 per surgery

- As the procedure takes place is any of the OTs, the average cost of electricity would be:

= (387.2 + 242.6)/2

= Rs 315 per procedure

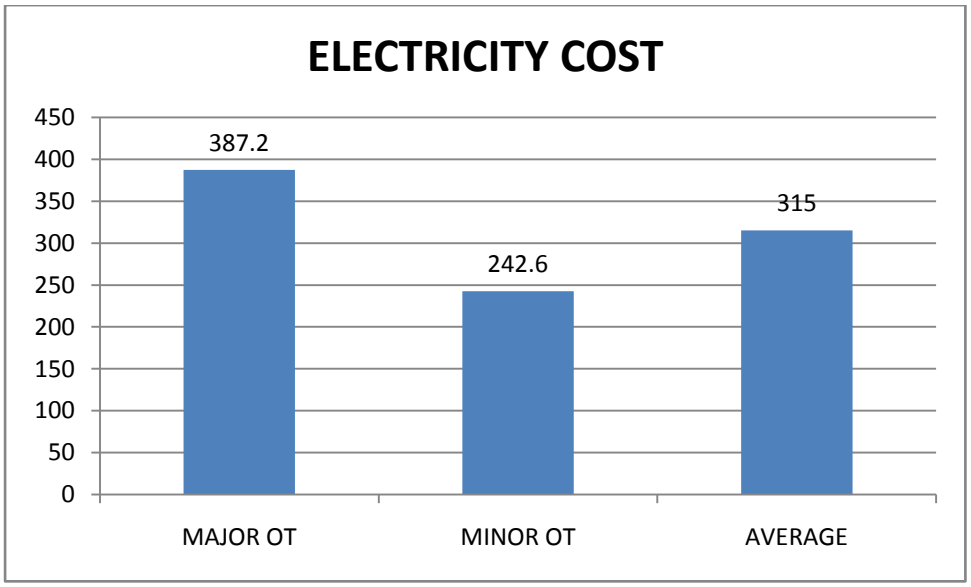

Fig. 10.1.5: Electricity cost

The electricity consumption in major OT was Rs 387.2 and Rs 242.6 in minor OT. As the surgery takes place in any of the OTs average has to be taken and it was Rs 315.

10.1.5. EQUIPMENT COST

There are a number of biomedical equipments used for a patient during the surgery as well as after the surgery (in ICU & wards). The costs of these equipments have to be added in the total cost of the package. After making a list of all the equipments used during and after the surgery, the maintenance cost (AMC & CMC) was added to the purchase cost to determine the total cost. The life of any biomedical equipment is taken to be 8 years. The cost was spread uniformly in 8 years to find per day cost (for ICU/ward equipments) and per hour cost (for OT equipments).

OT EQUIPMENTS

I. OT lights:

Total cost = Rs 15,00,000 (with no maintenance cost)

Per day cost = 1500000 / 8 X 300 (taking 300 working days in a year)

= Rs 625

Cost per hour = 625/10 (total available hour =10)

= Rs 62.5

Cost of OT lights for laparoscopic cholecystectomy = 62.5 X 1.5 = Rs 94

II. OT table:

Total cost = Rs 15,00,000 (with no maintenance cost)
Cost per day = 1500000 / 8 X 300 (taking 300 working days in a year)
= Rs 625

Cost per hour = 625/10 (total available hour =10)
= Rs 62.5

Cost of OT table for laparoscopic cholecystectomy = 62.5 X 1.5
= Rs 94

III. Anaesthesia work station:

Total cost = Rs 23,20,000 (with Rs 65,000 per year as AMC)
Cost per day = 2320000 / 8 X 300 (taking 300 working days in a year)
= Rs 967

Cost per hour = 967/10 (total available hour =10)
= Rs 96.7

Cost of anaesthesia work station for laparoscopic cholecystectomy = 96.7 X 1.5
= Rs 145

IV. Medical monitor:

Total cost = Rs 4,50,000 (with no maintenance cost)
Cost per day = 450000 / 8 X 300 (taking 300 working days in a year)
= Rs 188

Cost per hour = 188/10 (total available hour =10)
= Rs 18.8

Cost of medical monitor for laparoscopic cholecystectomy = 18.8 X 1.5
= Rs 28

V. Laparoscopic unit:

Total cost = Rs 35,00,000 (with no maintenance cost)
Cost per day = 3500000 / 8 X 300 (taking 300 working days in a year)
= Rs 1458

Cost per hour = 1458/10 (total available hour =10)
= Rs 145.8

Cost of laparoscopic unit for laparoscopic cholecystectomy = 145.8 X 1.5
= Rs 219

VI. Harmonic scalpel:

Total cost = Rs 14,00,000 (with no maintenance cost)
Cost per day = 1400000 / 8 X 300 (taking 300 working days in a year)
= Rs 583

Cost per hour = 583/10 (total available hour =10)
= Rs 58.3

Cost of harmonic scalpel for laparoscopic cholecystectomy = 58.3 X 1.5
= Rs 87

VII. Diathermy: Total cost = Rs 8,00,000 (with no maintenance cost)
Cost per day = 800000 / 8 X 300 (taking 300 working days in a year)
= Rs 333

Cost per hour = 333/10 (total available hour =10)
= Rs 33.3

Cost of diathermy for laparoscopic cholecystectomy = 33.3 X 1.5
= Rs 50

VIII. Patient warmer:

Total cost = Rs 1,20,000 (with no maintenance cost)
Cost per day = 120000 / 8 X 300 (taking 300 working days in a year)
= Rs 50

Cost per hour = 50/10 (total available hour =10)
= Rs 5

Cost of patient warmer for laparoscopic cholecystectomy = 5 X 1.5
= Rs 8

ICU/ WARD EQUIPMENTS

I. Bed:

Total cost = Rs 2,76,000 (with Rs 12,000 per year as CMC)
Cost per day = 2760000 / 8 X 300 (taking 300 working days in a year)
= Rs 115

Duration of stay = 3 days
Total cost of bed = 115 X 3
= Rs 345

II. ICU monitor:

Total cost = Rs 2.50,000 (with no maintenance)

Cost per day = 250000 / 8 X 300 (taking 300 working days in a year)

= Rs 104

Duration of stay = 3 days

Total cost of monitor = Rs 104

S. No.	EQUIPMENTS	COST PER SURGERY
1	OT lights	94
2	OT table	94
3	Anaesthesia work station	145
4	Medical monitor	28
5	Laparoscopic unit	219
6	Harmonic scalpel	87
7	Diathermy	50
8	Patient warmer	8
9	Bed	345
10	ICU monitor	104
	TOTAL	**1174**

Table: 10.1.2: Total equipment cost per surgery

The total cost of all equipments is Rs 1,174/-

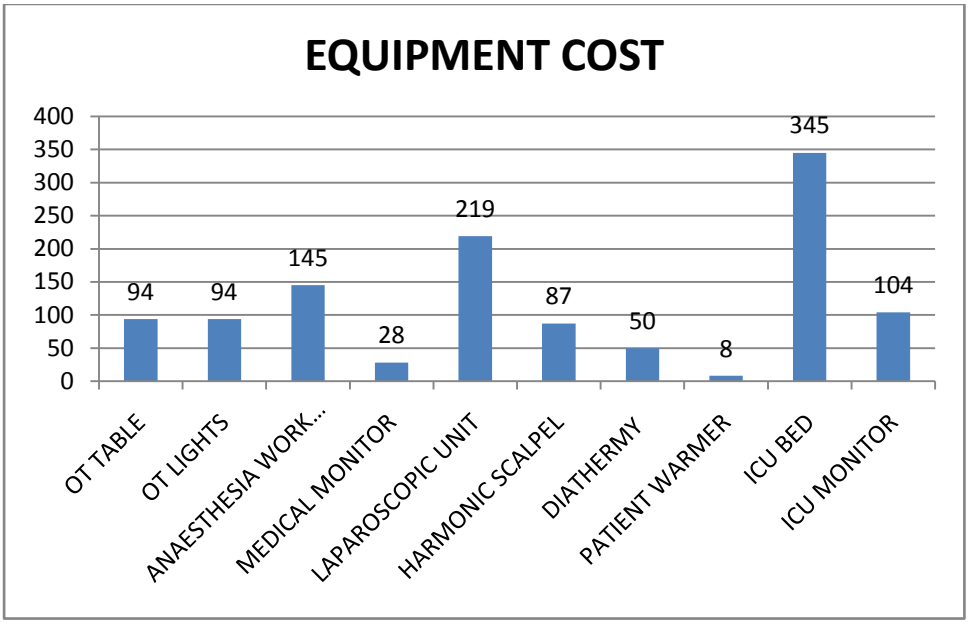

Fig. 10.1.6. Equipment cost

The contribution of cost of individual equipment in the total equipment cost is:

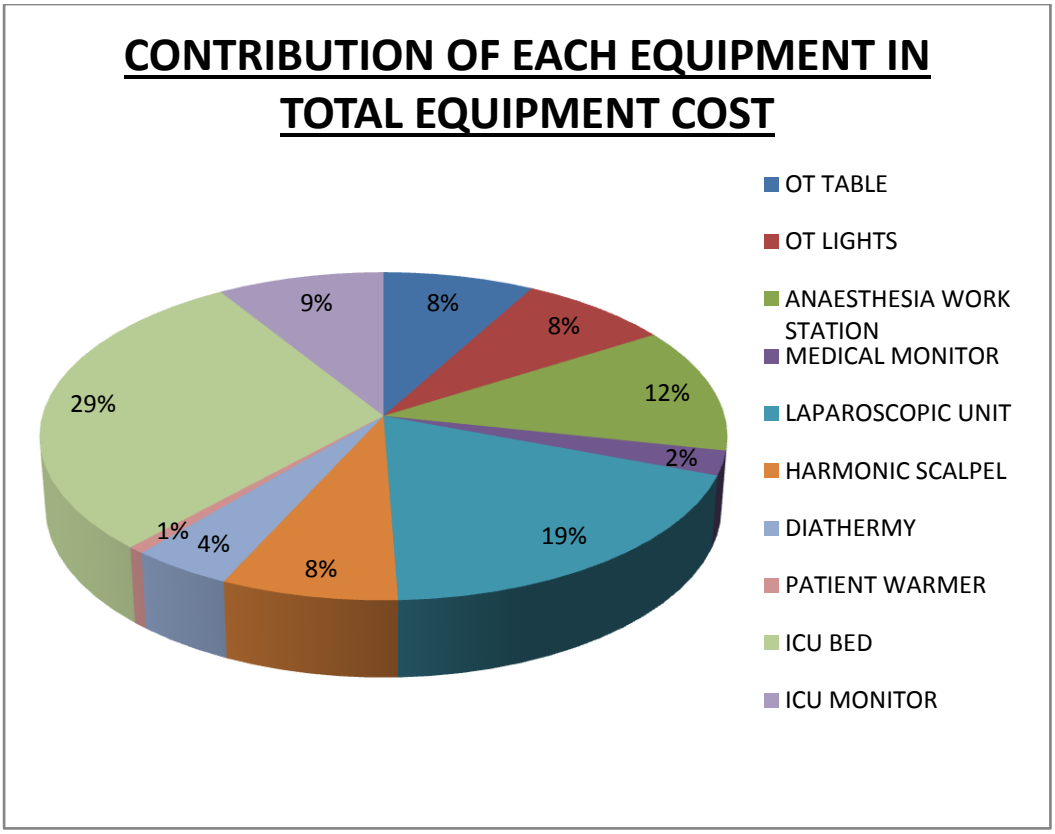

Fig. 10.1.7: Contribution on each equipment in total equipment cost

The bed contributes the maximum (29%) in the equipment cost followed by laparoscopic unit (19%). The lowest cost as seen was of patient warmer (1%).

- The total direct cost of the laparoscopic cholecystectomy package is:

S. NO.	COST HEAD	COST (Rs)
1	Drugs and consumables	2,530
2	Manpower	
	• Anaesthetist	1,673
	• Nursing Cost	378.72
	• OT technician	217.8
3	Infrastructure	1,565.40
4	Electrical consumption	315
5	Equipment cost	1,174
	Total	**7,854**

Table. 10.1.3. Total direct cost

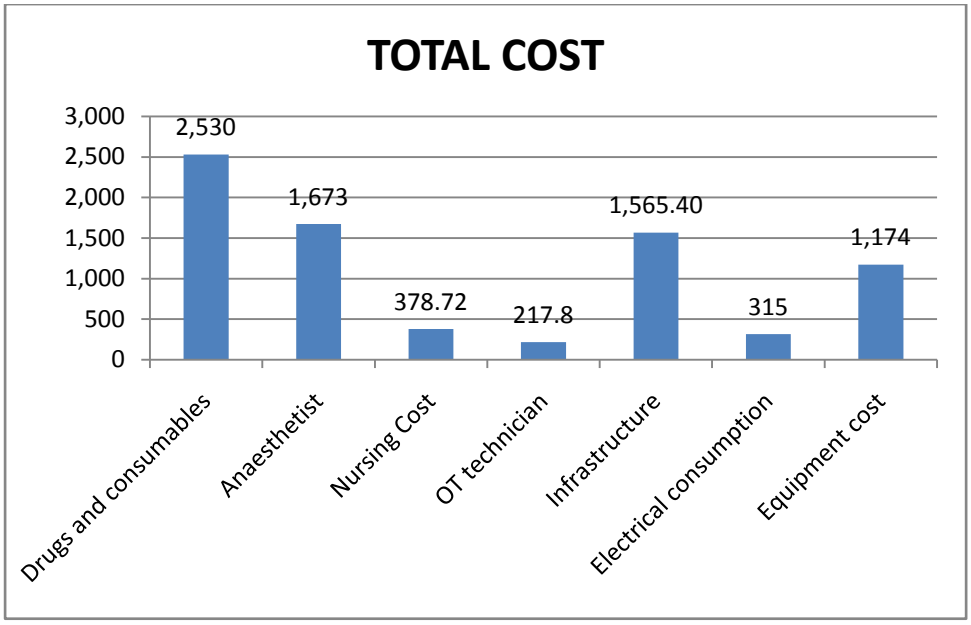

Fig. 10.1.8: Total cost

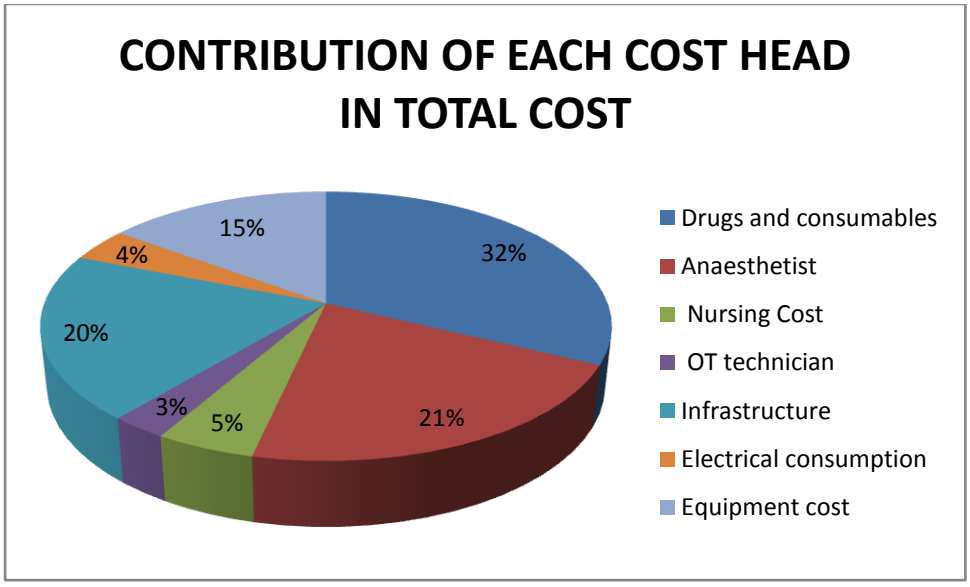

Fig. 10.1.9: Contribution of each cost head in total cost

The maximum contribution in direct cost is by drugs and consumables (32%) followed by anaesthetist cost (21%) and the least cost is cost of OT technicians.

10.2. INGUINAL HERNIA (Sample size-10)

10.2.1. MATERIAL COST:

The bill break-up of the drugs and consumables used during the procedure for all the 10 samples were taken from the billing department. The drugs and consumables were segregated into 8 sub groups to analyze the contribution of each sub group in total material cost. The unit cost price (UCP) of the drugs and consumables were taken from the central pharmacy and purchase department.

- The average unit cost price of all the drugs and consumables used for this procedure was Rs 3781/-.
- The average UCP of each sub group was:

S.NO.	DRUGS & CONSUMABLES	AVERAGE COST(Rs)
1	CANNULAS AND CATHETERS	302
2	LIGATING & SUTURING MATERIALS	740
3	OTHER CONSUMABLES	1464
4	IV FLUIDS	166
5	ANAESTHESIA DRUGS	182
6	ANTIBIOTICS	208
7	IV DRUGS	541
8	ORAL DRUGS	179
	TOTAL	**3781**

Table: 10.2.1: Average UCP of drugs and consumables

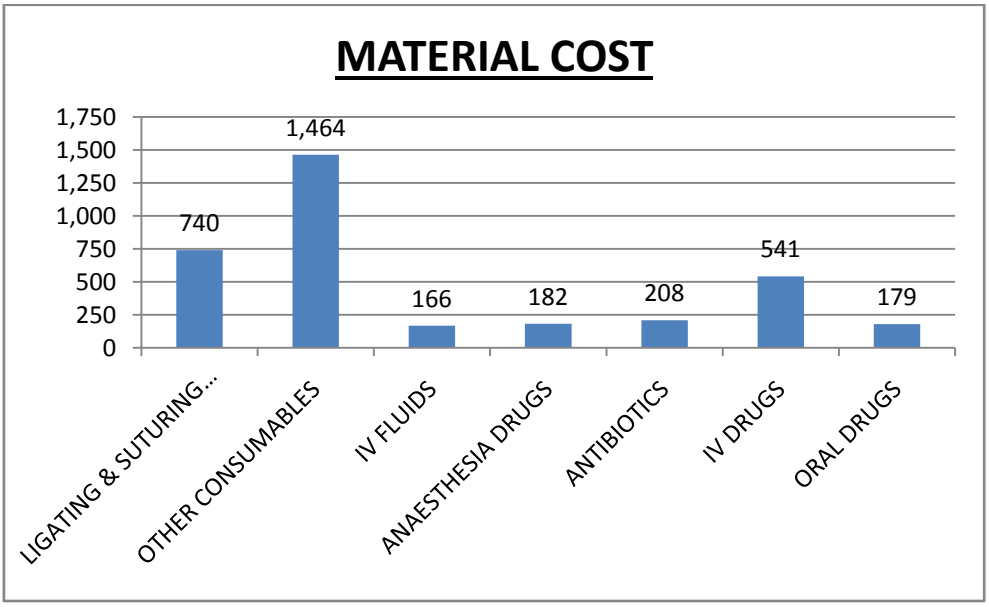

Fig. 10.2.1: Material cost

The contribution of each subpart in the average material cost was:

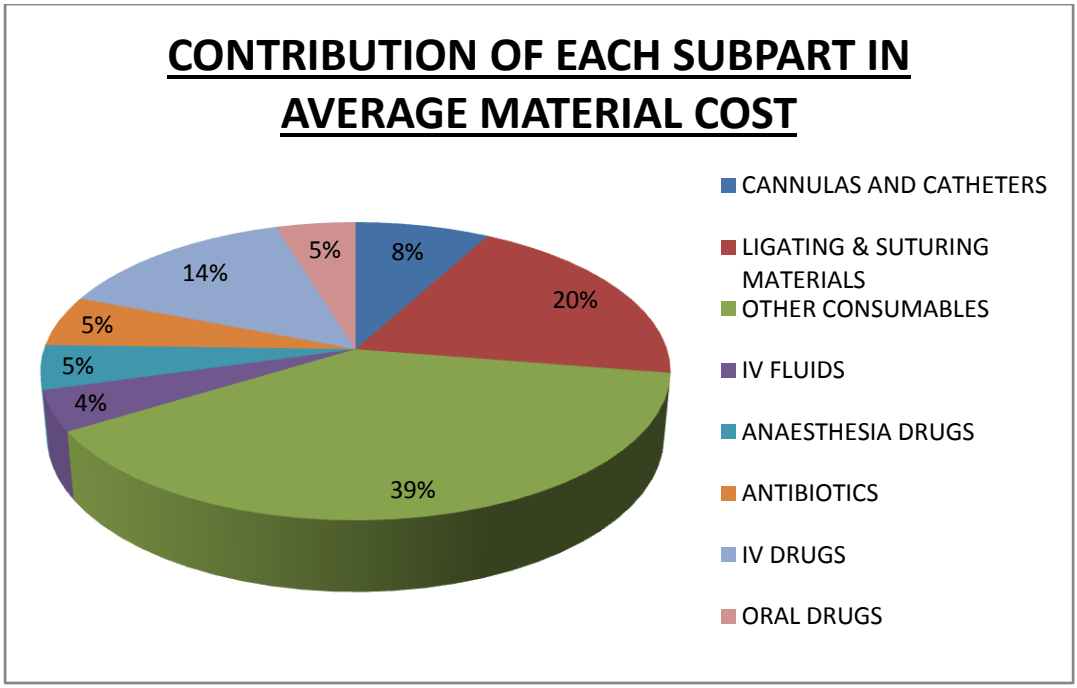

Fig.10.2.2: Contribution of each subhead in average material cost

The maximum contribution was of general consumables (39%) followed by ligating & suturing materials (20%) and the least contribution was of intravenous fluids (4%).

10.2.2. MANPOWER COST

Manpower is of 3 types:

- Anaesthetists
- Nurses
- OT technicians

I. Anaesthetist cost: The hospital has a tie up with Axon Anaesthesia Association which provides the entire 7 anaesthetist to the hospital. The hospital pays a lump sum amount of Rs 20.3 lakhs per month to them. To calculate this cost, firstly per hour cost of an anaesthetist was calculated using the lump sum amount paid to Axon Anaesthesia Association and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of anaesthetists used during the surgery.

Total number of anaesthetists – 7

Available hours of an anaeathetist per day – 10 hours

Total available hours in a month – 1,820 hours (considering 26 working days)

Cumulative salary – Rs 20.3 lakhs

Cost = Sum total of salary of all the anaesthetists/ Total number of available hours

= 20,30,000 / 1820

= Rs 1,115.4 / hour/ anaesthetist

The average duration of inguinal hernia is 2 hours.

Therefore,

Anaesthetist cost = 1115.4 X 2

= Rs 2,230 per surgery

II. Nursing cost: To calculate the nursing cost, firstly per hour cost of a nurse was calculated using the cumulative salaries of all nurses and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of nurses used during the surgery.

Total number of nurses in OT- 17

Available hours of a nurse per day – 8 hours

Total available hours in a month – 3,536 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 4,46,373/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 4,46,373 / 3536

= Rs 126.24/ hour/ nurse

The average duration of inguinal hernia is 2 hours and number of nurses used is 2.

Therefore,

Nursing cost = 2 X 126.24 X 2

= Rs 505 per surgery

III. OT technician cost: To calculate this cost, firstly per hour cost of an OT technician was calculated using the cumulative salaries of the entire OT technician and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of technicians used during the surgery.

Total number of technicians in OT- 7

Available hours of a technician per day – 8 hours

Total available hours in a month – 1,456 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 1,58,524/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 1,58,524/ 1,456

= Rs 108.9/ hour/ technician

The average duration of inguinal hernia is 2 hours and number of technicians used is 1.

Therefore,

OT technician cost = 108.9 X 2

= Rs 217.8 per surgery

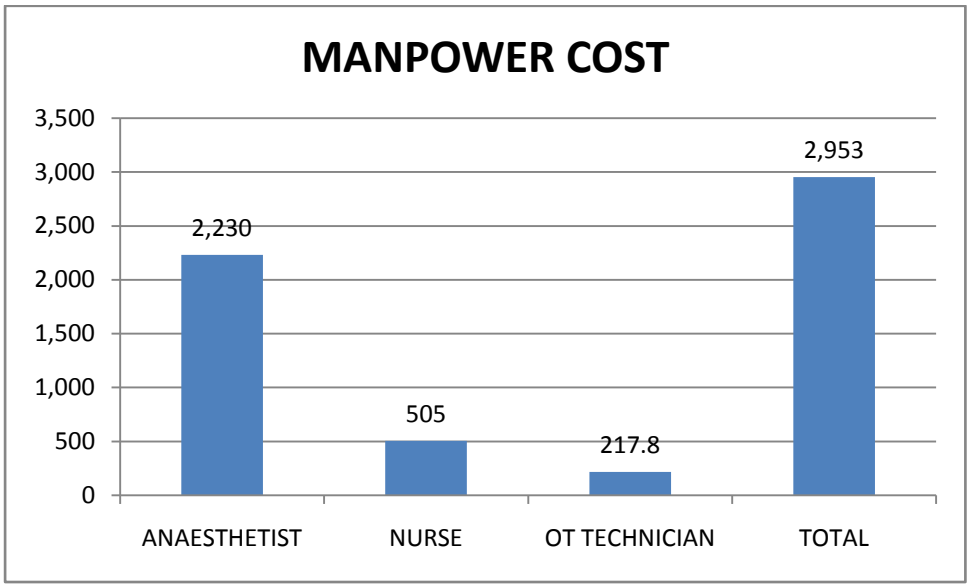

Fig.10.2.3: Manpower cost

It was seen that the cost of anaesthetist was Rs 2,230, cost of nurses was Rs 505 and cost of OT technicians was Rs 217.8.
The total manpower cost was Rs 2,953.

10.2.3. INFRASTRUCTURE COST:

The hospital is on lease and pays an amount of Rs 16 lakhs per month for the building. The total built up area of the hospital is 71,056 square feet.

Per square feet cost of the hospital = 16,00,000 / 71,056

= Rs 22.52 per square feet

For major OT

The area of major OTs is approximately 638.82 square feet (27.3 feet X 23.4 feet)

Therefore the cost of infrastructure for major OT = 638.82 X 22.52

= Rs 14,386.2 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 1,438.6/-

The duration of the surgery is 2 hours, therefore cost of OT = Rs 2,877.2/-

For minor OT

The area of minor OTs is approximately 288 square feet (18 feet X 16 feet)

Therefore the cost of infrastructure for major OT = 288 X 22.52

= Rs 6,485.8 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 648.6/-

The duration of the surgery is 2 hours, therefore cost of OT = Rs 1,297.2/-

- As the procedure takes place is any of the OTs, the average cost of infrastructure would be:

  = (2877.2+ 1297.2)/2

  = Rs 2,087.2 per procedure

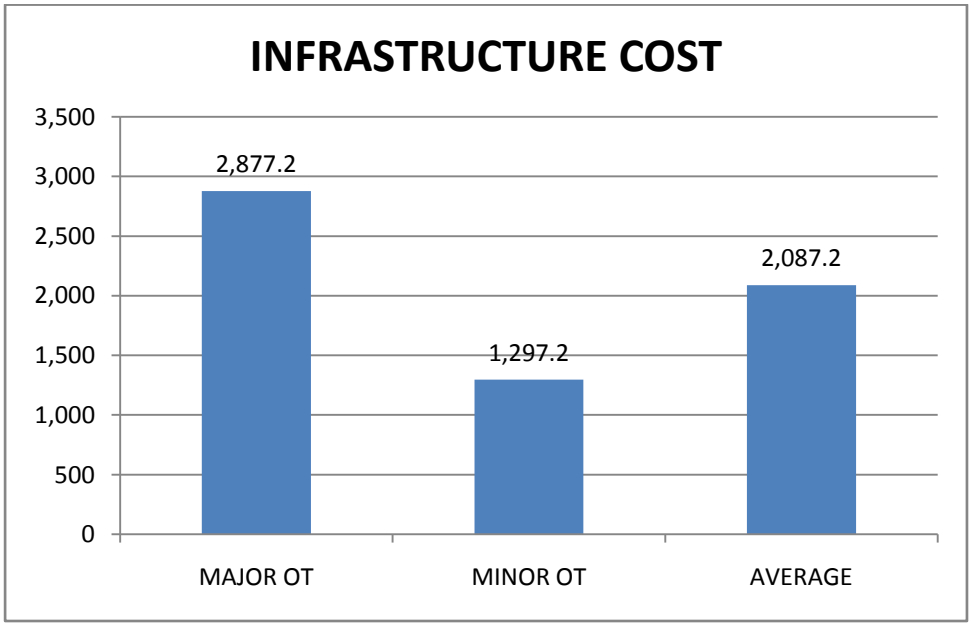

Fig. 10.2.4: Infrastructure cost

As calculated the cost of infrastructure in case of major OT was Rs 2,877.2 and Rs 1,297.2 in case of minor OT. As the surgery takes place in both OTs average was calculated which was Rs 2,087.2 per procedure.

10.2.4. ELECTRICITY CONSUMPTION:

I. Major OT

The air conditioner consumes 30 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 30 X 8.42

= Rs 252.6 per hour

The OT lights consumes 0.65 units per hour

Therefore per hour consumption is = 0.65 X 8.42

= Rs 5.5 per hour

Total per hour consumption = 252.6 + 5.5

= 258.1

The duration of surgery is 2 hours,

Therefore total electricity consumption = 258.1 X 2

= Rs 516.2 per surgery

II. Minor OT

The air conditioner consumes 19 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 19 X 8.42

= Rs 160 per hour

The OT lights consumes 0.2 units per hour

Therefore per hour consumption is = 0.2 X 8.42

= Rs 1.7 per hour

Total per hour consumption = 160 + 1.7

= 161.7

The duration of surgery is 2 hours

Therefore total electricity consumption = 161.7 X 2

= Rs 323.4 per surgery

- As the procedure takes place is any of the OTs, the average cost of electricity would be:

  = (516.2+ 323.4)/2

  = Rs 419.8 per procedure

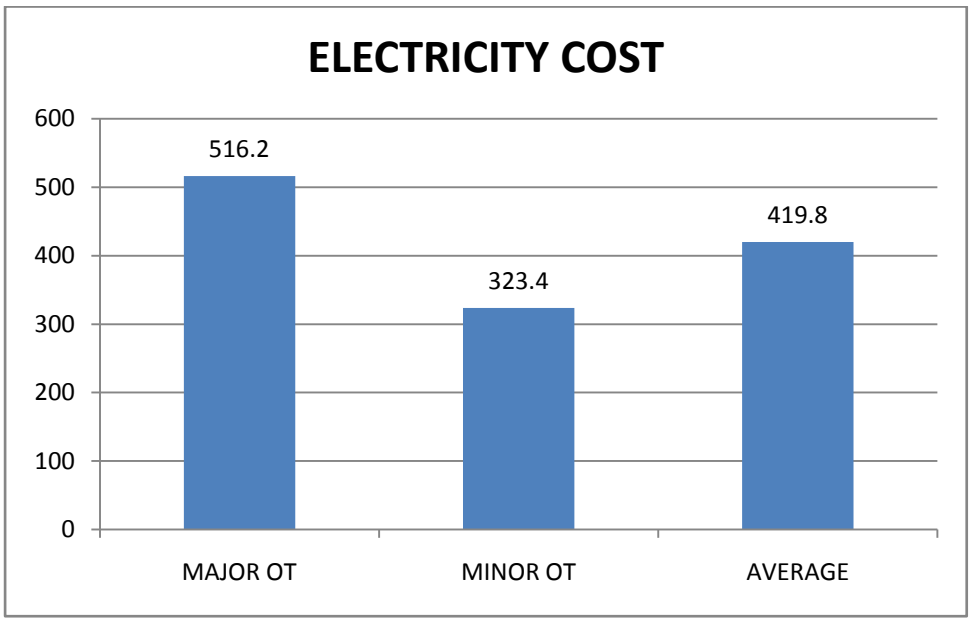

Fig.10.2.5: Electricity cost

The electricity consumption in major OT was Rs 516.2 and Rs 323.4 in minor OT. As the surgery takes place in any of the OTs average has to be taken and it was Rs 419.8.

10.2.5. EQUIPMENT COST

There are a number of biomedical equipments used for a patient during the surgery as well as after the surgery (in ICU & wards). The costs of these equipments have to be added in the total cost of the package. After making a list of all the equipments used during and after the surgery, the maintenance cost (AMC & CMC) was added to the purchase cost to determine the total cost. The life of any biomedical equipment is taken to be 8 years. The cost was spread uniformly in 8 years to find per day cost (for ICU/ward equipments) and per hour cost (for OT equipments).

OT EQUIPMENTS

I. OT lights:

Total cost = Rs 15,00,000 (with no maintenance cost)

Per day cost = 1500000 / 8 X 300 (taking 300 working days in a year)

= Rs 625

Cost per hour = 625/10 (total available hour =10)

= Rs 62.5

Cost of OT lights for inguinal hernia = 62.5 X 2

= Rs 125

II. OT table:

Total cost = Rs 15,00,000 (with no maintenance cost)

Cost per day = 1500000 / 8 X 300 (taking 300 working days in a year)

= Rs 625

Cost per hour = 625/10 (total available hour =10)

= Rs 62.5

Cost of OT table for inguinal hernia = 62.5 X 2

= Rs 125

III. Anaesthesia work station:

Total cost = Rs 23,20,000 (with Rs 65,000 as AMC)

Cost per day = 2320000 / 8 X 300 (taking 300 working days in a year)

= Rs 967

Cost per hour = 967/10 (total available hour =10)

= Rs 96.7

Cost of anaesthesia work station for inguinal hernia = 96.7 X 2

= Rs 193.4

IV. Medical monitor:

Total cost = Rs 4,50,000 (with no maintenance cost)

Cost per day = 450000 / 8 X 300 (taking 300 working days in a year)

= Rs 188

Cost per hour = 188/10 (total available hour =10)

= Rs 18.8

Cost of medical monitor for inguinal hernia = 18.8 X 2
= Rs 37.6

V. Laparoscopic unit:

Total cost = Rs 35,00,000 (with no maintenance cost)
Cost per day = 3500000 / 8 X 300 (taking 300 working days in a year)
= Rs 1458

Cost per hour = 1458/10 (total available hour =10)
= Rs 145.8

Cost of laparoscopic unit for inguinal hernia = 145.8 X 2
= Rs 291.6

VI. Harmonic scalpel:

Total cost = Rs 14,00,000 (with no maintenance cost)
Cost per day = 1400000 / 8 X 300 (taking 300 working days in a year)
= Rs 583

Cost per hour = 583/10 (total available hour =10)
= Rs 58.3

Cost of harmonic scalpel for inguinal hernia = 58.3 X 2
= Rs 116.6

VII. Diathermy:

Total cost = Rs 8,00,000 (with no maintenance cost)
Cost per day = 800000 / 8 X 300 (taking 300 working days in a year)
= Rs 333

Cost per hour = 333/10 (total available hour =10)
= Rs 33.3

Cost of diathermy for inguinal hernia = 33.3 X 2
= Rs 66.6

VIII. Patient warmer:

Total cost = Rs 1,20,000 (with no maintenance cost)
Cost per day = 120000 / 8 X 300 (taking 300 working days in a year)
= Rs 50

Cost per hour = 50/10 (total available hour =10)
= Rs 5
Cost of patient warmer for inguinal hernia = 5 X 2
= Rs 10

ICU/ WARD EQUIPMENTS

I. Bed:

Total cost = Rs 2,76,000 (with Rs 12,000 as CMC)
Cost per day = 2760000 / 8 X 300 (taking 300 working days in a year)
= Rs 115

Duration of stay = 3 days
Total cost of bed = 115 X 3
= Rs 345

II. ICU monitor:

Total cost = Rs 2.50,000 (with no maintenance)
Cost per day = 250000 / 8 X 300 (taking 300 working days in a year)
= Rs 104

Duration of stay = 3 days
Total cost of monitor = Rs 104

S. No.	EQUIPMENTS	COST PER SURGERY
1	OT lights	125
2	OT table	125
3	Anaesthesia work station	193.4
4	Medical monitor	37.6
5	Laparoscopic unit:	291.6
6	Harmonic scalpel	116.6
7	Diathermy	66.6
8	Patient warmer	10
9	Bed	345
10	ICU monitor	104
	TOTAL	**1415**

Table 10.2.2: Total equipment cost per surgery

- Total cost of all equipments = Rs 1,415/-

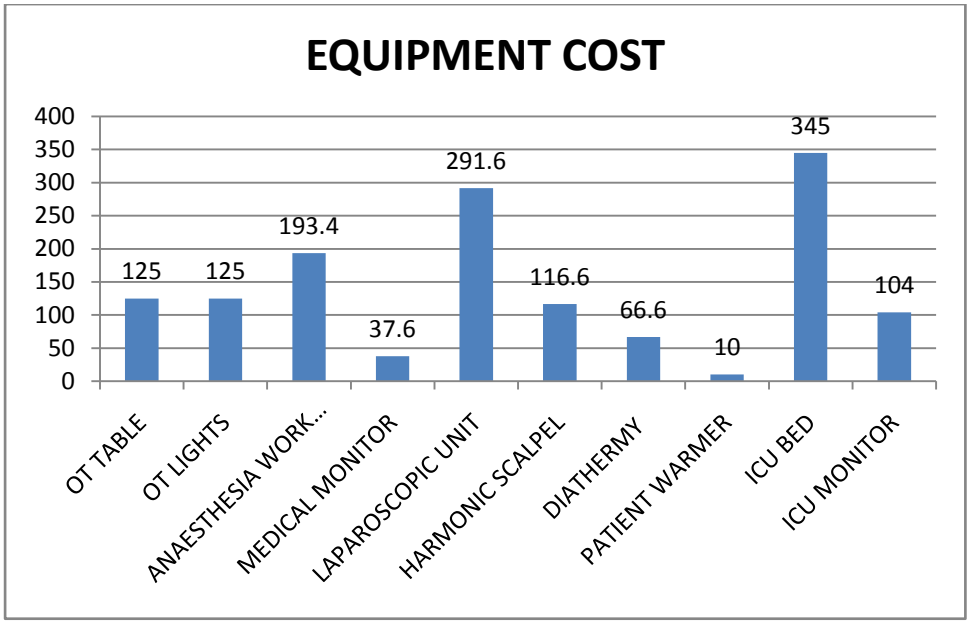

Fig. 10.2.6: Equipment cost

The contribution of cost of individual equipment in the total equipment cost is:

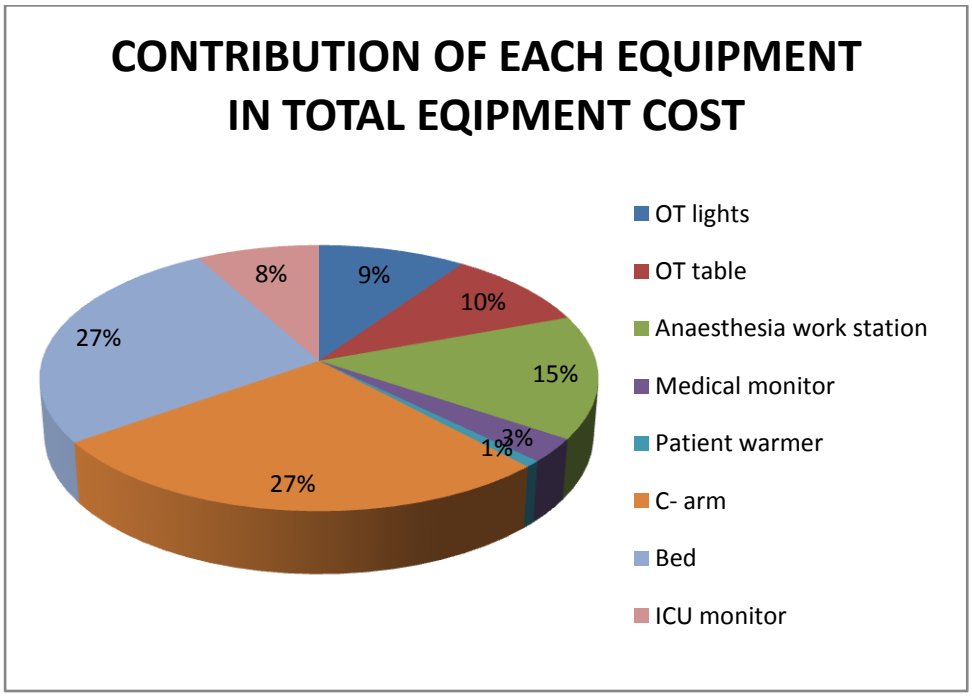

Fig.10.2.7: Contribution on each equipment in total equipment cost

The C-arm contributes the maximum (27%) in the equipment cost followed by bed cost (27%). The lowest cost as seen was of patient warmer (1%).

➢ The total direct cost of the inguinal hernia package is:

S. NO.	COST HEAD	COST (RS)
1	Drugs and consumables	3782.4
2	Manpower	
	• Anaesthetist	2,230
	• Nursing Cost	505
	• OT technician	217.8
3	Infrastructure	2,087.20
4	Electrical consumption	419.8
5	Equipment cost	1,415
	Total	10,657.2

Table. 10.2.3: Total direct cost

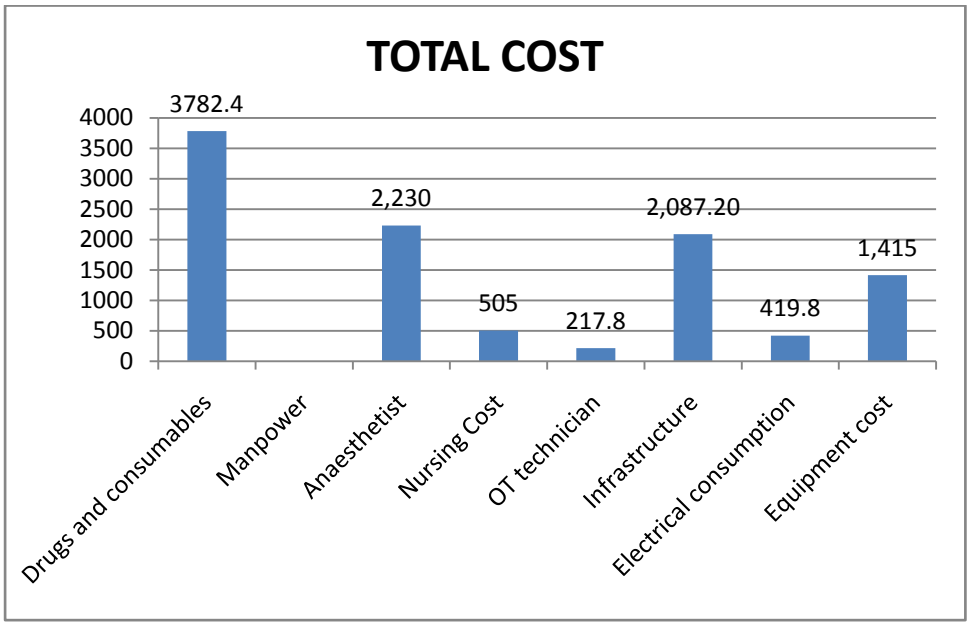

Fig. 10.2.8: Total cost

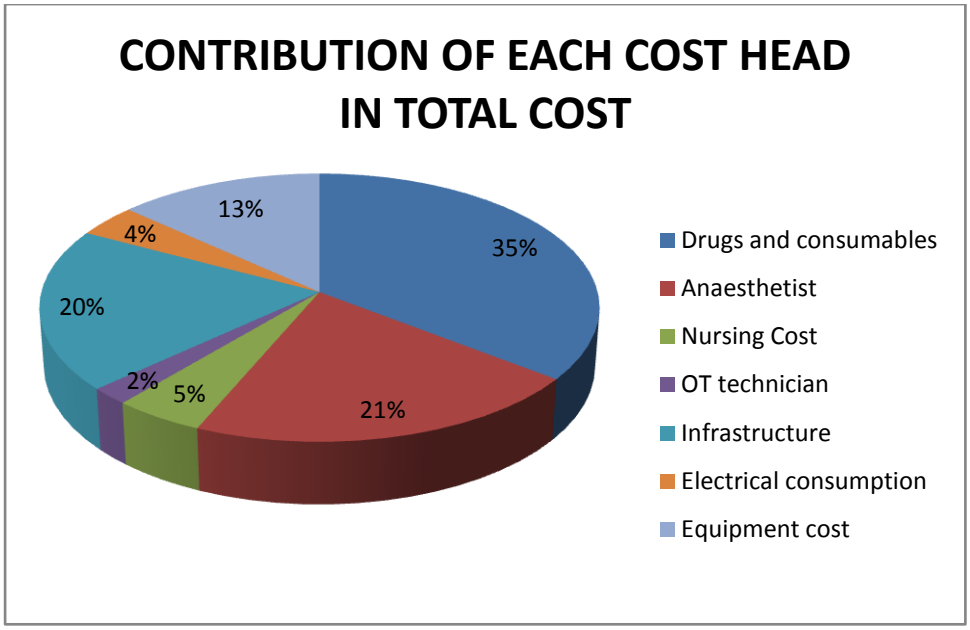

Fig. 10.2.9: Contribution of each cost head in total cost

The maximum contribution in direct cost is by drugs and consumables (35%) followed by anaesthetist cost (21%) and the least cost is cost of OT technicians (2%).

10.3. LAPAROSCOPIC APPENDECTOMY (Sample size: 9)

10.3.1. MATERIAL COST:

The bill break-up of the drugs and consumables used during the procedure for all the 9 samples were taken from the billing department. The drugs and consumables were segregated into 8 sub groups to analyze the contribution of each sub group in total material cost. The unit cost price (UCP) of the drugs and consumables were taken from the central pharmacy and purchase department.

- The average unit cost price of all the drugs and consumables used for this surgery was Rs 2370.
- The average UCP of each sub group was:

S.NO.	DRUGS & CONSUMABLES	AVERAGE COST
1	CANNULAS AND CATHETERS	312
2	LIGATING & SUTURING MATERIALS	517
3	OTHER CONSUMABLES	495
4	IV FLUIDS	132
5	ANAESTHESIA DRUGS	151
6	ANTIBIOTICS	240
7	IV DRUGS	456
8	ORAL DRUGS	68
	TOTAL	**2370**

Table 10.3.1: Average UCP of drugs and consumables

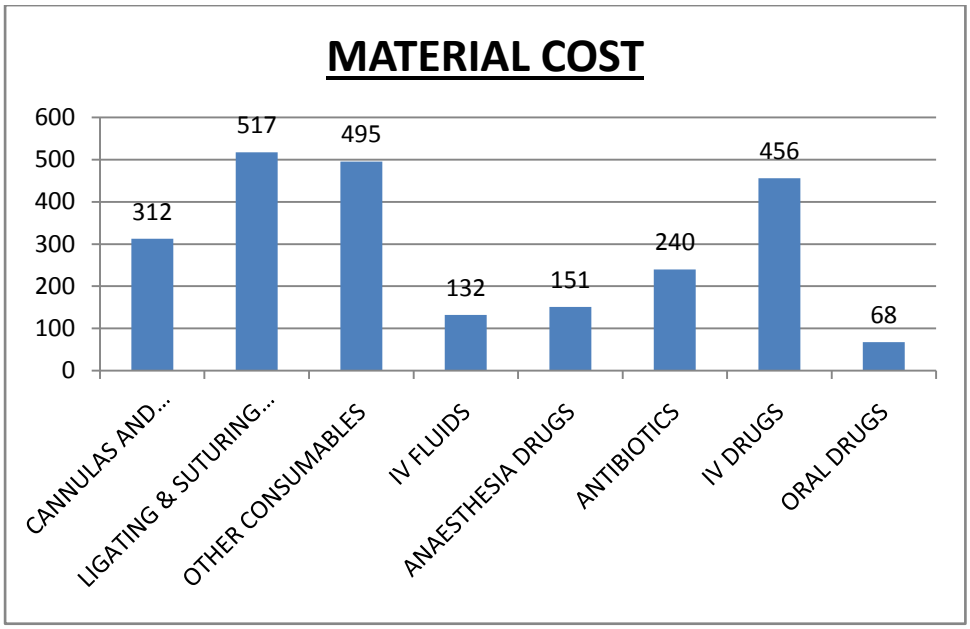

Fig. 10.3.1: Material cost

The contribution of each subpart in the average cost was:

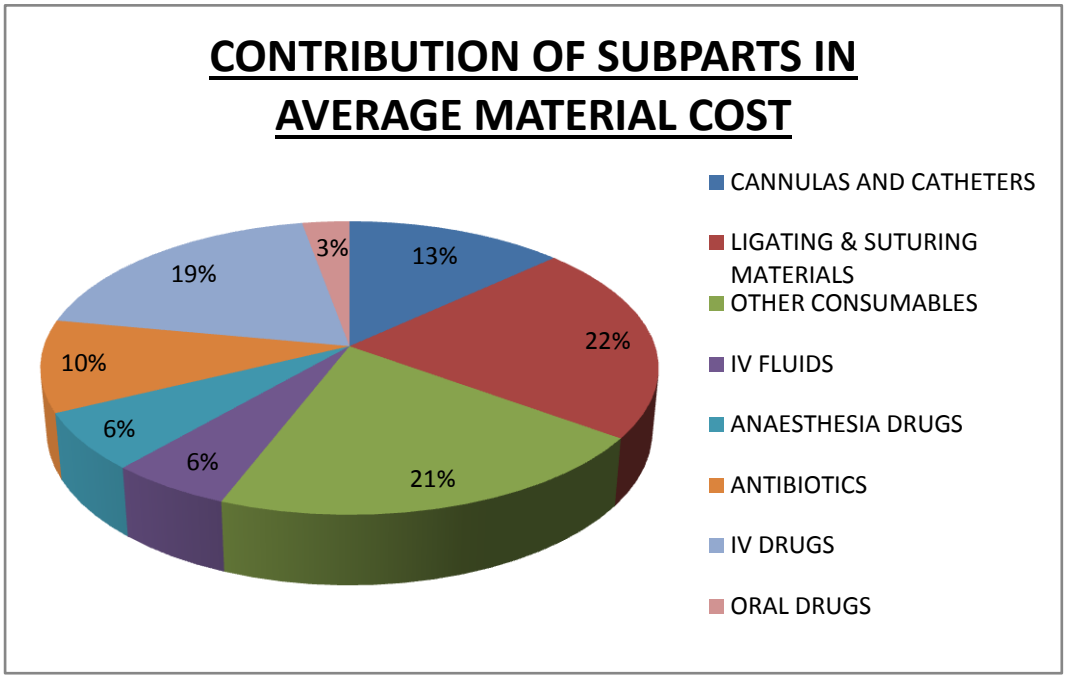

Fig.10.3.2: Contribution of each subhead in average material cost

The maximum contribution was of ligating and suturing material (22%) followed by other general consumables (21%) and the least contribution was of oral drugs (3%).

10.3.2. MANPOWER COST

Manpower is of 3 types:

- Anaesthetists
- Nurses
- OT technicians

I. Anaesthetist cost: The hospital has a tie up with Axon Anaesthesia Association which provides the entire 7 anaesthetist to the hospital. The hospital pays a lump sum amount of Rs 20.3 lakhs per month to them. To calculate this cost, firstly per hour cost of an anaesthetist was calculated using the lump sum amount paid to Axon Anaesthesia Association and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of anaesthetists used during the surgery.

Total number of anaesthetists – 7

Available hours of an anaeathetist per day – 10 hours

Total available hours in a month – 1,820 hours (considering 26 working days)

Cumulative salary – Rs 20.3 lakhs

Cost = Sum total of salary of all the anaesthetists/ Total number of available hours

= 20,30,000 / 1820

= Rs 1,115.4 / hour/ anaesthetist

The average duration of Laparoscopic appendectomy is 1 hour 30 minutes.

Therefore,

Anaesthetist cost = 1115.4 X 1.5

= Rs 1,673 per surgery

II. Nursing cost: To calculate the nursing cost, firstly per hour cost of a nurse was calculated using the cumulative salaries of all nurses and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of nurses used during the surgery.

Total number of nurses in OT- 17

Available hours of a nurse per day – 8 hours

Total available hours in a month – 3,536 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 4,46,373/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 4,46,373 / 3536

= Rs 126.24/ hour/ nurse

The average duration of Laparoscopic appendectomy is 1 hour 30 minutes and number of nurses used is 2.

Therefore,

Nursing cost = 2 X 126.24 X 1.5

= Rs 378.72 per surgery

III. OT technician cost: To calculate this cost, firstly per hour cost of an OT technician was calculated using the cumulative salaries of the entire OT technician and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of technicians used during the surgery.

Total number of technicians in OT- 7

Available hours of a technician per day – 8 hours

Total available hours in a month – 1,456 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 1,58,524/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 1,58,524/ 1,456

= Rs 108.9/ hour/ technician

The average duration of Laparoscopic appendectomy is 1 hour 30 minutes and number of technicians used is 1.

Therefore,

OT technician cost = 108.9 X 1.5

= Rs 217.8 per surgery

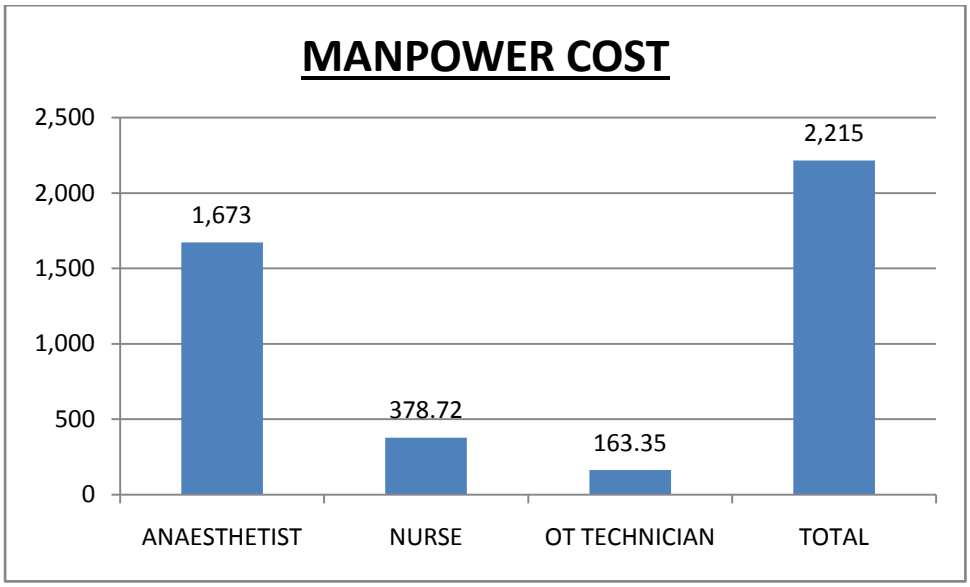

Fig. 10.3.3: Manpower cost

It was seen that the cost of anaesthetist was Rs 1,673, cost of nurses was Rs 378.7 and cost of OT technicians was Rs 163.3.

The total manpower cost was Rs 2,215.

10.3.3. INFRASTRUCTURE COST:

The hospital is on lease and pays an amount of Rs 16 lakhs per month for the building. The total built up area of the hospital is 71,056 square feet.

Per square feet cost of the hospital = 16,00,000 / 71,056

= Rs 22.52 per square feet

For major OT

The area of major OTs is approximately 638.82 square feet (27.3 feet X 23.4 feet)

Therefore the cost of infrastructure for major OT = 638.82 X 22.52

= Rs 14,386.2 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 1,438.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 2,158/-

For minor OT

The area of minor OTs is approximately 288 square feet (18 feet X 16 feet)

Therefore the cost of infrastructure for major OT = 288 X 22.52

= Rs 6,485.8 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 648.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 972.9/-

- As the procedure takes place is any of the OTs, the average cost of infrastructure would be:

  = (2,158 + 972.9)/2

  = Rs 1,565.4 per procedure

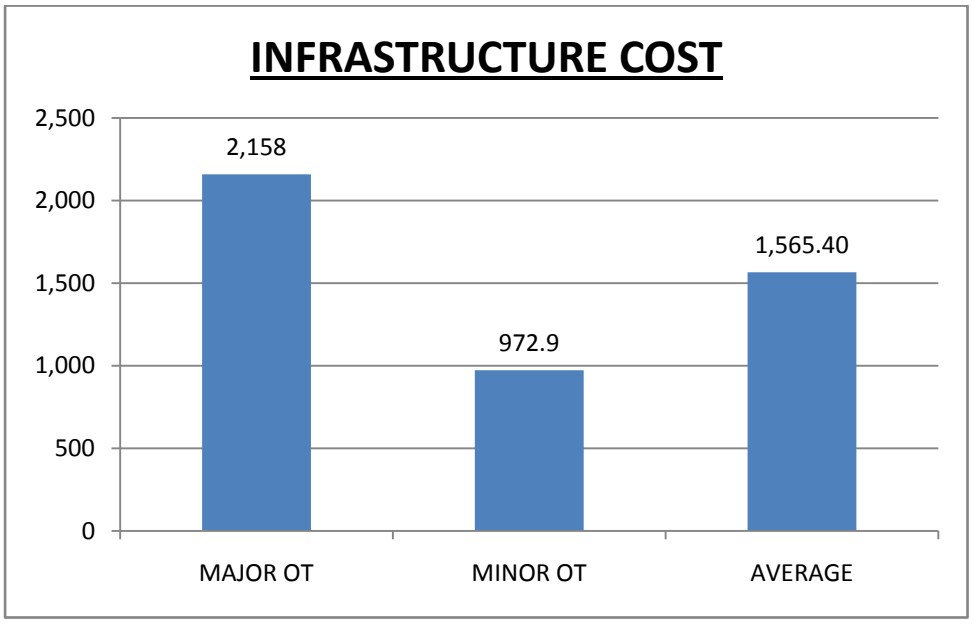

Fig. 10.3.4: Infrastructure cost

As calculated the cost of infrastructure in case of major OT was Rs 2,158 and Rs 973 in case of minor OT. As the surgery takes place in both OTs, average was calculated which was Rs 1,565.4 per procedure.

10.3.4. ELECTRICITY CONSUMPTION:

I. Major OT

The air conditioner consumes 30 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 30 X 8.42

= Rs 252.6 per hour

The OT lights consumes 0.65 units per hour

Therefore per hour consumption is = 0.65 X 8.42

= Rs 5.5 per hour

Total per hour consumption = 252.6 + 5.5

= 258.1

The duration of surgery is 1.5 hours,

Therefore total electricity consumption = 258.1 X 1.5

= Rs 387.2 per surgery

II. Minor OT

The air conditioner consumes 19 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 19 X 8.42

= Rs 160 per hour

The OT lights consumes 0.2 units per hour

Therefore per hour consumption is = 0.2 X 8.42

= Rs 1.7 per hour

Total per hour consumption = 160 + 1.7

= 161.7

The duration of surgery is 1.5 hours

Therefore total electricity consumption = 161.7 X 1.5

= Rs 242.6 per surgery

- As the procedure takes place is any of the OTs, the average cost of electricity would be:

  = (387.2 + 242.6)/2

  = Rs 315 per procedure

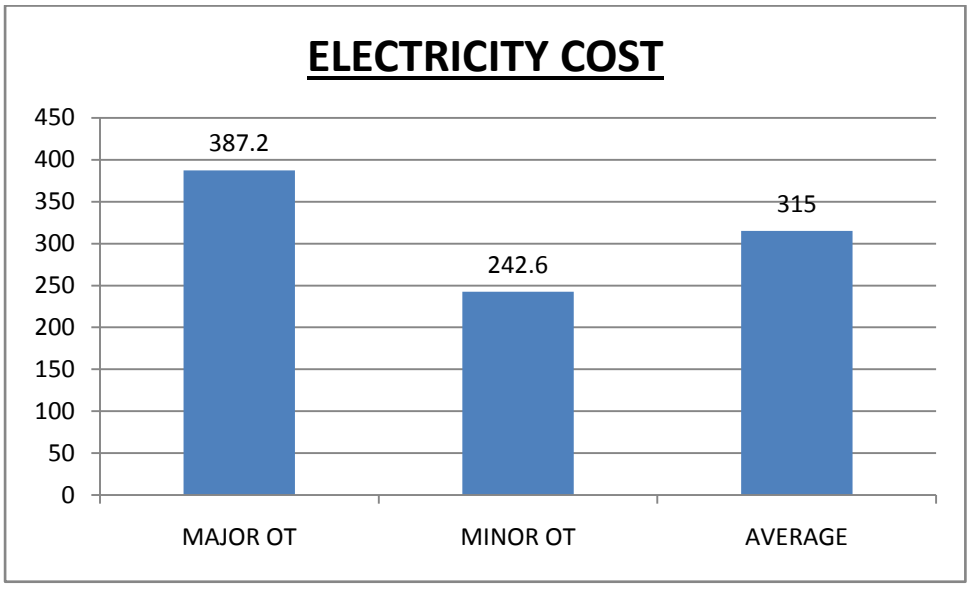

Fig.10.3.5: Electricity cost

The electricity consumption in major OT was Rs 387.2 and Rs 242.6 in minor OT. As the surgery takes place in any of the OTs average has to be taken and it was Rs 315.

10.3.5. EQUIPMENT COST

There are a number of biomedical equipments used for a patient during the surgery as well as after the surgery (in ICU & wards). The costs of these equipments have to be added in the total cost of the package. After making a list of all the equipments used during and after the surgery, the maintenance cost (AMC & CMC) was added to the purchase cost to determine the total cost. The life of any biomedical equipment is taken to be 8 years. The cost was spread uniformly in 8 years to find per day cost (for ICU/ward equipments) and per hour cost (for OT equipments).

OT EQUIPMENTS

I. OT lights:

Total cost = Rs 15,00,000 (with no maintenance cost)

Per day cost = 1500000 / 8 X 300 (taking 300 working days in a year)

= Rs 625

Cost per hour = 625/10 (total available hour =10)

= Rs 62.5

Cost of OT lights for Laparoscopic appendectomy = 62.5 X 1.5

= Rs 94

II. OT table:

Total cost = Rs 15,00,000 (with no maintenance cost)

Cost per day = 1500000 / 8 X 300 (taking 300 working days in a year)

= Rs 625

Cost per hour = 625/10 (total available hour =10)

= Rs 62.5

Cost of OT table for Laparoscopic appendectomy = 62.5 X 1.5

= Rs 94

III. Anaesthesia work station:

Total cost = Rs 23,20,000 (with Rs 65,000 as AMC)

Cost per day = 2320000 / 8 X 300 (taking 300 working days in a year)

= Rs 967

Cost per hour = 967/10 (total available hour =10)

= Rs 96.7

Cost of anaesthesia work station for Laparoscopic appendectomy = 96.7 X 1.5

= Rs 145

IV. Medical monitor:

Total cost = Rs 4,50,000 (with no maintenance cost)

Cost per day = 450000 / 8 X 300 (taking 300 working days in a year)

= Rs 188

Cost per hour = 188/10 (total available hour =10)

= Rs 18.8

Cost of medical monitor for Laparoscopic appendectomy = 18.8 X 1.5 = Rs 28

V. Laparoscopic unit:

Total cost = Rs 35,00,000 (with no maintenance cost)

Cost per day = 3500000 / 8 X 300 (taking 300 working days in a year)

= Rs 1458

Cost per hour = 1458/10 (total available hour =10)

= Rs 145.8

Cost of laparoscopic unit for Laparoscopic appendectomy = 145.8 X 1.5

= Rs 219

VI. Harmonic scalpel:

Total cost = Rs 14,00,000 (with no maintenance cost)

Cost per day = 1400000 / 8 X 300 (taking 300 working days in a year)

= Rs 583

Cost per hour = 583/10 (total available hour =10)

= Rs 58.3

Cost of harmonic scalpel for Laparoscopic appendectomy = 58.3 X 1.5

= Rs 87

VII. Diathermy:

Total cost = Rs 8,00,000 (with no maintenance cost)

Cost per day = 800000 / 8 X 300 (taking 300 working days in a year)

= Rs 333

Cost per hour = 333/10 (total available hour =10)

= Rs 33.3

Cost of diathermy for Laparoscopic appendectomy = 33.3 X 1.5

= Rs 50

VIII. Patient warmer:

Total cost = Rs 1,20,000 (with no maintenance cost)

Cost per day = 120000 / 8 X 300 (taking 300 working days in a year)

= Rs 50

Cost per hour = 50/10 (total available hour =10)

= Rs 5

Cost of patient warmer for Laparoscopic appendectomy = 5 X 1.5

= Rs 8

ICU/ WARD EQUIPMENTS

III. Bed:

Total cost = Rs 2,76,000 (with Rs 12,000 as CMC)
Cost per day = 2760000 / 8 X 300 (taking 300 working days in a year)
= Rs 115

Duration of stay = 3 days
Total cost of bed = 115 X 3
= Rs 345

IV. ICU monitor:

Total cost = Rs 2.50,000 (with no maintenance)
Cost per day = 250000 / 8 X 300 (taking 300 working days in a year)
= Rs 104

Duration of stay = 3 days
Total cost of monitor = Rs 104

S. No.	EQUIPMENTS	COST PER SURGERY
1	OT lights	94
2	OT table	94
3	Anaesthesia work station	145
4	Medical monitor	28
5	Laparoscopic unit:	219
6	Harmonic scalpel	87
7	Diathermy	50
8	Patient warmer	8
9	Bed	345
10	ICU monitor	104
	TOTAL	**1174**

Table.10.3.2:Total equipment cost per surgery

Total cost of all equipments is Rs 1,174/-

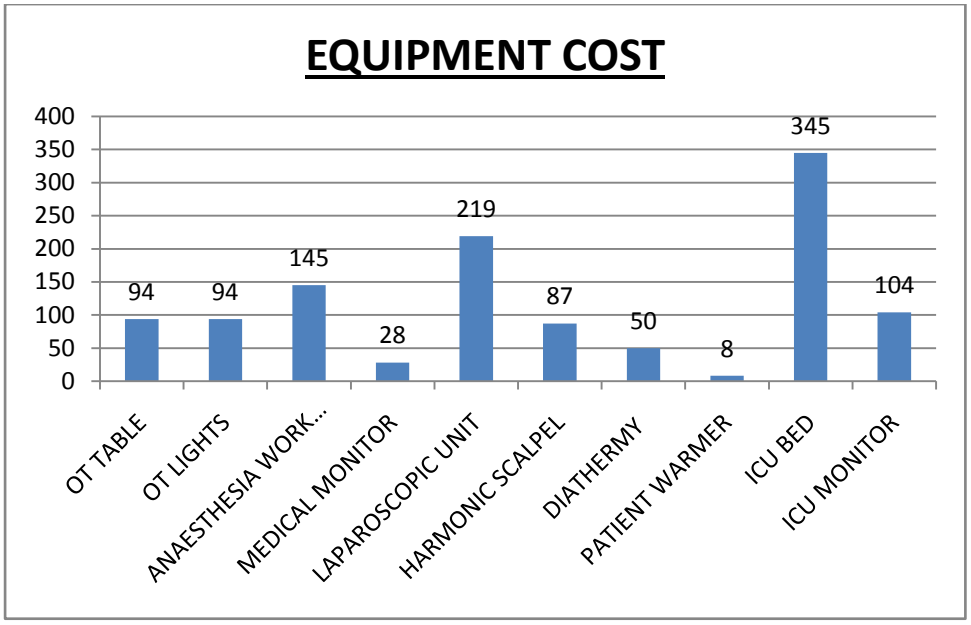

Fig.10.3.6: Equipment cost

The contribution of cost of individual equipment in the total equipment cost is:

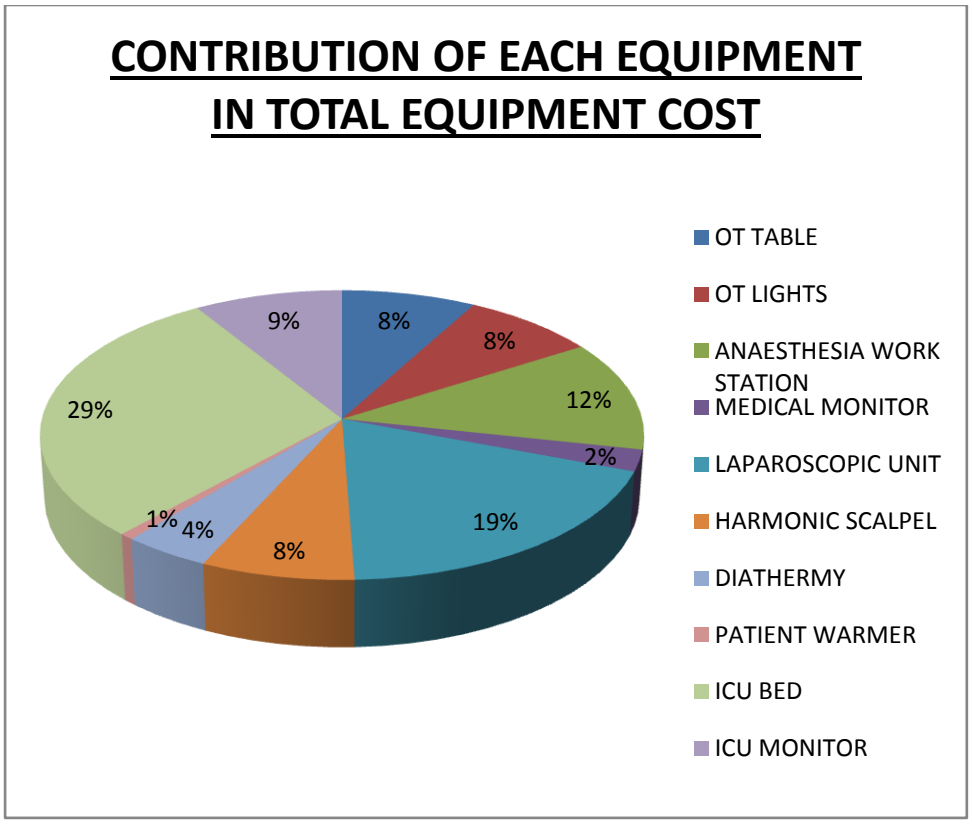

Fig.10.3.7: Contribution on each equipment in total equipment cost

The bed contributes the maximum (29%) in the equipment cost followed by laparoscopic unit (19%). The lowest cost as seen was of patient warmer (1%).

- The total direct cost of the laparoscopic appendectomy package is:

S. NO.	COST HEAD	COST (Rs)
1	Drugs and consumables	2370.5
2	Manpower	
	Anaesthetist	1,673
	Nursing Cost	378.72
	OT technician	217.8
3	Infrastructure	1,565.40
4	Electrical consumption	315
5	Equipment cost	1,174
	Total	**7693.42**

Table.10.3.3: Total direct cost

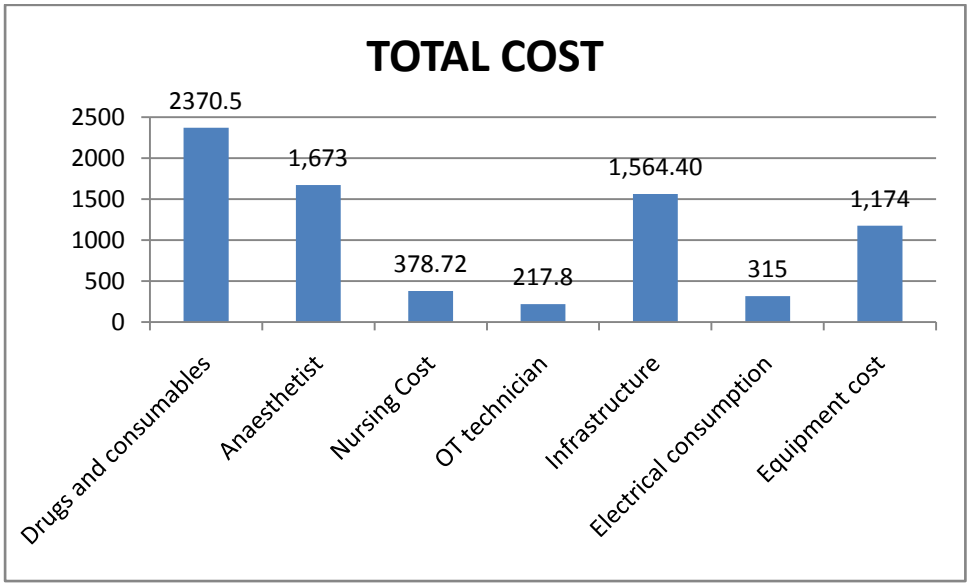

Fig.10.3.8: Total cost

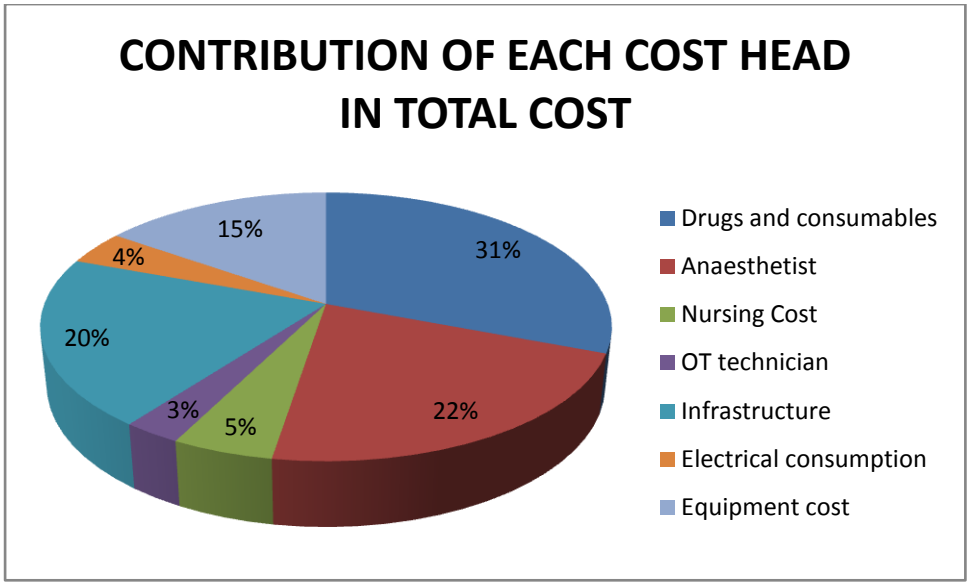

Fig. 10.3.9: Contribution of each cost head in total cost

The maximum contribution in direct cost is by drugs and consumables (31%) followed by anaesthetist cost (22%) and the least cost is cost of OT technicians (3%).

10.4. PERCUTANEOUS NEPHROLITHOTOMY (Sample size-7)

10.4.1. MATERIAL COST:

The bill break-up of the drugs and consumables used during the procedure for all the 7 samples were taken from the billing department. The drugs and consumables were segregated into 8 sub groups to analyze the contribution of each sub group in total material cost. The unit cost price (UCP) of the drugs and consumables were taken from the central pharmacy and purchase department.

- The average unit cost price of all the drugs and consumables used for this surgery was Rs 3493.
- The average UCP of each sub group was:

S.NO.	DRUGS & CONSUMABLES	AVERAGE COST
1	CANNULAS AND CATHETERS	799
2	LIGATING & STENTING MATERIALS	426
3	OTHER CONSUMABLES	507
4	IV FLUIDS	599
5	ANAESTHESIA DRUGS	88
6	ANTIBIOTICS	376
7	IV DRUGS	696
8	ORAL DRUGS	25
	TOTAL	**3493**

Table.10.4.1: Average UCP of drugs and consumables

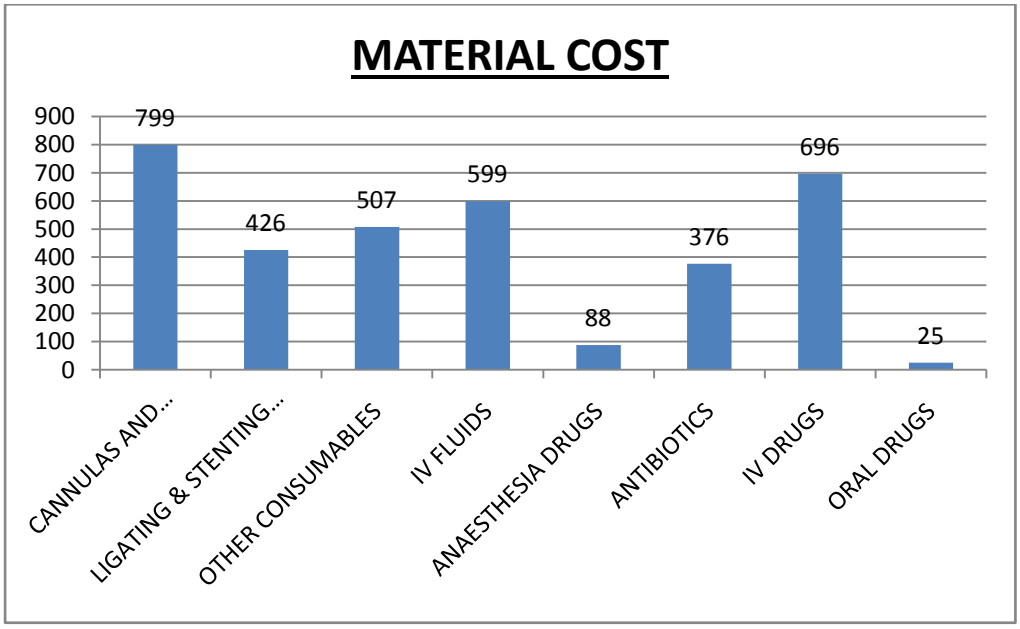

Fig.10.4.1: Material cost

The contribution of each subpart in the average cost was:

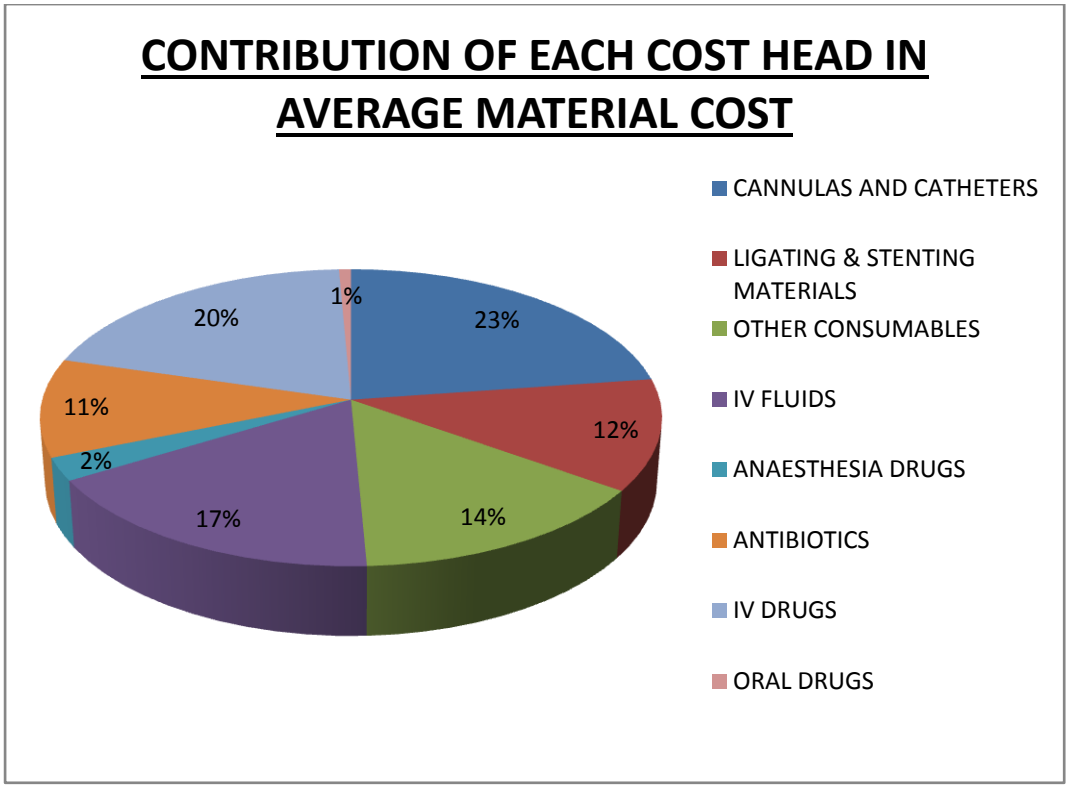

Fig.10.4.2: Contribution of each subhead in average material cost

The maximum contribution was of cannulas and catheter (23%) followed by intravenous fluids (17%) and the least contribution was of oral drugs (1%).

10.4.2. MANPOWER COST

Manpower is of 3 types:

- Anaesthetists
- Nurses
- OT technicians

I. Anaesthetist cost: The hospital has a tie up with Axon Anaesthesia Association which provides the entire 7 anaesthetist to the hospital. The hospital pays a lump sum amount of Rs 20.3 lakhs per month to them. To calculate this cost, firstly per hour cost of an anaesthetist was calculated using the lump sum amount paid to Axon Anaesthesia Association and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of anaesthetists used during the surgery.

Total number of anaesthetists – 7

Available hours of an anaeathetist per day – 10 hours

Total available hours in a month – 1,820 hours (considering 26 working days)

Cumulative salary – Rs 20.3 lakhs

Cost = Sum total of salary of all the anaesthetists/ Total number of available hours

= 20,30,000 / 1820

= Rs 1,115.4 / hour/ anaesthetist

The average duration of PCNL is 1 hour 30 minutes.

Therefore,

Anaesthetist cost = 1115.4 X 1.5

= Rs 1,673 per surgery

II. Nursing cost: To calculate the nursing cost, firstly per hour cost of a nurse was calculated using the cumulative salaries of all nurses and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of nurses used during the surgery.

Total number of nurses in OT- 17

Available hours of a nurse per day – 8 hours

Total available hours in a month – 3,536 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 4,46,373/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 4,46,373 / 3536

= Rs 126.24/ hour/ nurse

The average duration of PCNL is 1 hour 30 minutes and number of nurses used is 2.

Therefore,

Nursing cost = 2 X 126.24 X 1.5

= Rs 378.72 per surgery

III. OT technician cost: To calculate this cost, firstly per hour cost of an OT technician was calculated using the cumulative salaries of the entire OT technician and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of technicians used during the surgery.

Total number of technicians in OT- 7

Available hours of a technician per day – 8 hours

Total available hours in a month – 1,456 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 1,58,524/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 1,58,524/ 1,456

= Rs 108.9/ hour/ technician

The average duration of PCNL is 1 hour 30 minutes and number of technicians used is 1.

Therefore,

OT technician cost = 108.9 X 1.5

= Rs 163.35 per surgery

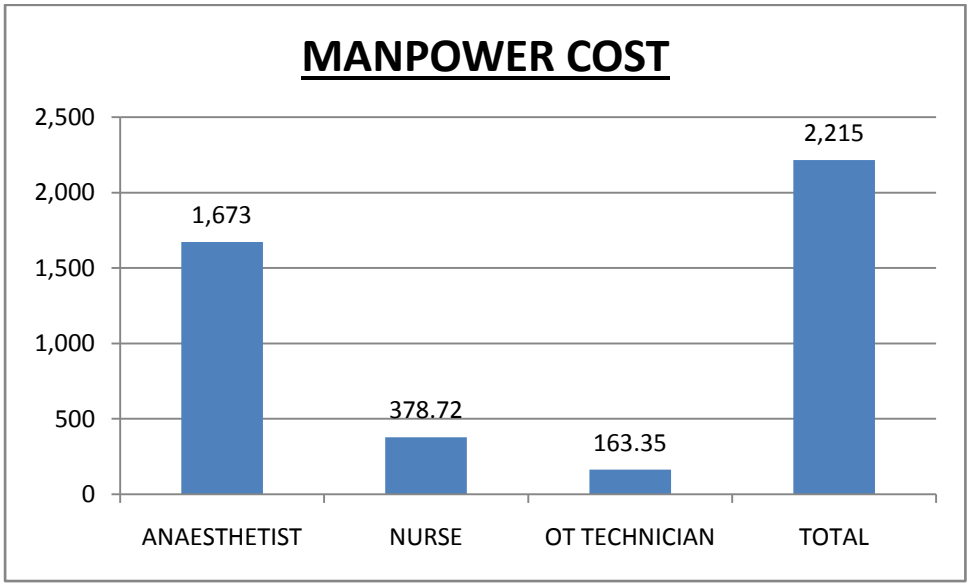

Fig. 10.4.3: Manpower cost

It was seen that the cost of anaesthetist was Rs 1,673, cost of nurses was Rs 378.7 and cost of OT technicians was Rs 163.3.
The total manpower cost was Rs 2,215.

10.4.3. <u>INFRASTRUCTURE COST</u>: The hospital is on lease and pays an amount of Rs 16 lakhs per month for the building. The total built up area of the hospital is 71,056 square feet.

Per square feet cost of the hospital = 16,00,000 / 71,056

= Rs 22.52 per square feet

For major OT

The area of major OTs is approximately 638.82 square feet (27.3 feet X 23.4 feet)

Therefore the cost of infrastructure for major OT = 638.82 X 22.52

= Rs 14,386.2 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 1,438.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 2,158/-

For minor OT

The area of minor OTs is approximately 288 square feet (18 feet X 16 feet)

Therefore the cost of infrastructure for major OT = 288 X 22.52

= Rs 6,485.8 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 648.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 972.9/-

- As the procedure takes place is any of the OTs, the average cost of infrastructure would be:

  = (2,158 + 972.9)/2

  = Rs 1,565.4 per procedure

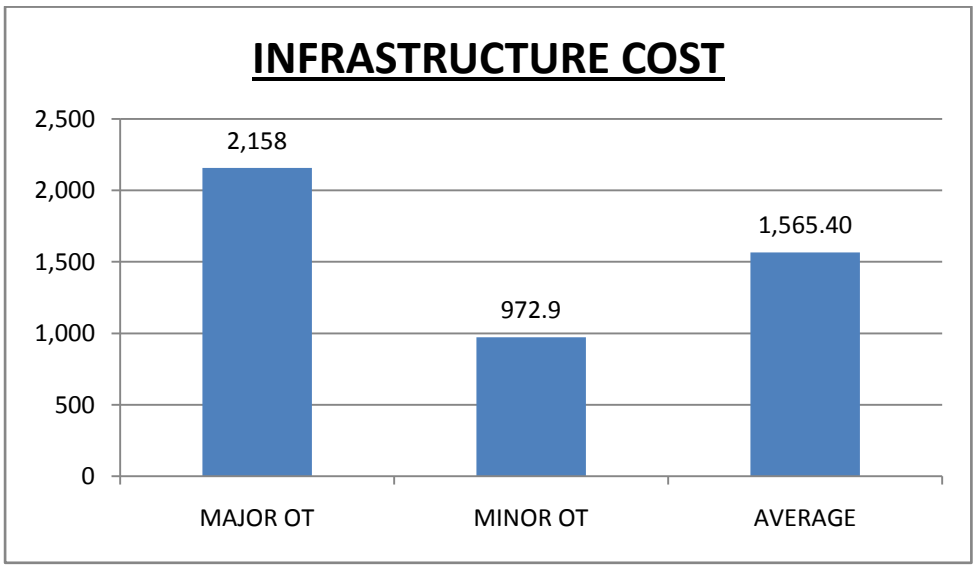

Fig.10.4.4: Infrastructure cost

As calculated the cost of infrastructure in case of major OT was Rs 2,158 and Rs 973 in case of minor OT. As the surgery takes place in both OTs average was calculated which was Rs 1,565.4 per procedure.

10.4.4. ELECTRICITY CONSUMPTION:

I. Major OT

The air conditioner consumes 30 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 30 X 8.42

= Rs 252.6 per hour

The OT lights consumes 0.65 units per hour

Therefore per hour consumption is = 0.65 X 8.42

= Rs 5.5 per hour

Total per hour consumption = 252.6 + 5.5

= 258.1

The duration of surgery is 1.5 hours,

Therefore total electricity consumption = 258.1 X 1.5

= Rs 387.2 per surgery

II. Minor OT

The air conditioner consumes 19 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 19 X 8.42

= Rs 160 per hour

The OT lights consumes 0.2 units per hour

Therefore per hour consumption is = 0.2 X 8.42

= Rs 1.7 per hour

Total per hour consumption = 160 + 1.7

= 161.7

The duration of surgery is 1.5 hours

Therefore total electricity consumption = 161.7 X 1.5

= Rs 242.6 per surgery

- As the procedure takes place is any of the OTs, the average cost of electricity would be:

  = (387.2 + 242.6)/2

  = Rs 315 per procedure

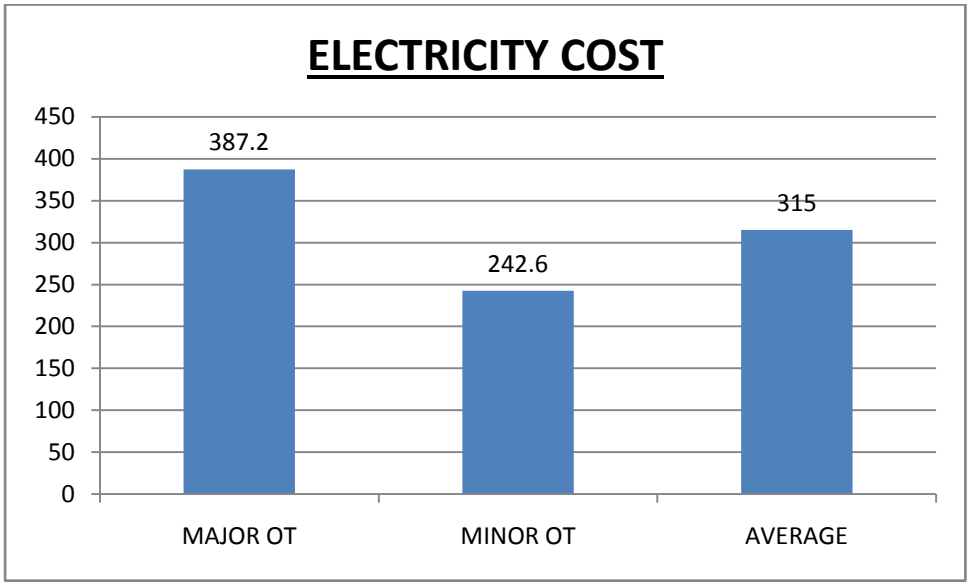

Fig.10.4.5: Electricity cost

The electricity consumption in major OT was Rs 387.2 and Rs 242.6 in minor OT. As the surgery takes place in any of the OTs average has to be taken and it was Rs 315.

10.4.5. EQUIPMENT COST

There are a number of biomedical equipments used for a patient during the surgery as well as after the surgery (in ICU & wards). The costs of these equipments have to be added in the total cost of the package. After making a list of all the equipments used during and after the surgery, the maintenance cost (AMC & CMC) was added to the purchase cost to determine the total cost. The life of any biomedical equipment is taken to be 8 years. The cost was spread uniformly in 8 years to find per day cost (for ICU/ward equipments) and per hour cost (for OT equipments).

OT EQUIPMENTS

I. OT lights:
   Total cost = Rs 15,00,000 (with no maintenance cost)

Per day cost = 1500000 / 8 X 300 (taking 300 working days in a year)
= Rs 625

Cost per hour = 625/10 (total available hour =10)
= Rs 62.5

Cost of OT lights for PCNL = 62.5 X 1.5
= Rs 94

II. OT table:

Total cost = Rs 15,00,000 (with no maintenance cost)
Cost per day = 1500000 / 8 X 300 (taking 300 working days in a year)
= Rs 625

Cost per hour = 625/10 (total available hour =10)
= Rs 62.5

Cost of OT table for PCNL = 62.5 X 1.5
= Rs 94

III. Anaesthesia work station:

Total cost = Rs 23,20,000 (with Rs 65,000 as AMC)
Cost per day = 2320000 / 8 X 300 (taking 300 working days in a year)
= Rs 967

Cost per hour = 967/10 (total available hour =10)
= Rs 96.7

Cost of anaesthesia work station for PCNL = 96.7 X 1.5
= Rs 145

IV. Medical monitor:

Total cost = Rs 4,50,000 (with no maintenance cost)
Cost per day = 450000 / 8 X 300 (taking 300 working days in a year)
= Rs 188

Cost per hour = 188/10 (total available hour =10)
= Rs 18.8

Cost of medical monitor for PCNL = 18.8 X 1.5
= Rs 28

V. Patient warmer:

Total cost = Rs 1,20,000 (with no maintenance cost)
Cost per day = 120000 / 8 X 300 (taking 300 working days in a year)
= Rs 50

Cost per hour = 50/10 (total available hour =10)
= Rs 5

Cost of patient warmer for PCNL = 5 X 1.5
= Rs 8

VI. C- arm:

Total cost = Rs 42,00,000 (with no maintenance cost)
Cost per day = 4200000 / 8 X 300 (taking 300 working days in a year)
= Rs 1,750

Cost per hour = 1750/10 (total available hour =10)
= Rs 175

Cost of patient warmer for ESWL = 175 X 1.5
= Rs 262.5

ICU/ WARD EQUIPMENTS

I. Bed:

Total cost = Rs 2,76,000 (with Rs 12,000 as CMC)
Cost per day = 2760000 / 8 X 300 (taking 300 working days in a year)
= Rs 115

Duration of stay = 3 days
Total cost of bed = 115 X 3
= Rs 345

II. ICU monitor:

Total cost = Rs 2.50,000 (with no maintenance)
Cost per day = 250000 / 8 X 300 (taking 300 working days in a year)
= Rs 104

Duration of stay = 3 days
Total cost of monitor = Rs 104

S. No.	EQUIPMENTS	COST PER SURGERY
1	OT lights	94
2	OT table	94
3	Anaesthesia work station	145
4	Medical monitor	28
5	Patient warmer	8
6	C- arm	262.5
7	Bed	345
8	ICU monitor	104
	TOTAL	**1290**

Table.10.4.2: Total equipment cost per surgery

Total cost of all equipments = Rs 1,290 /-

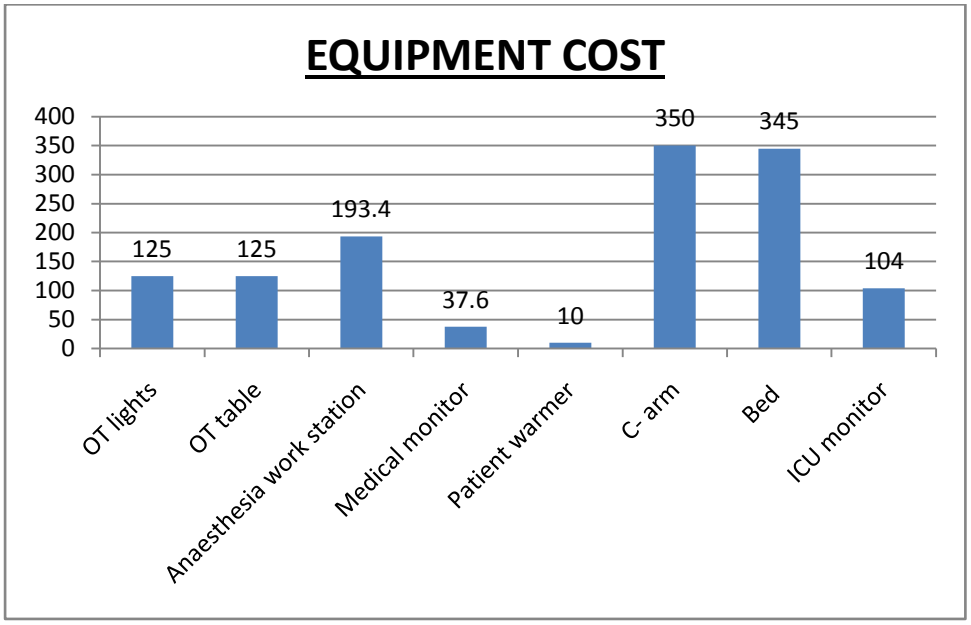

Fig.10.4.6: Equipment cost

The contribution of individual equipment is the total equipment cost is:

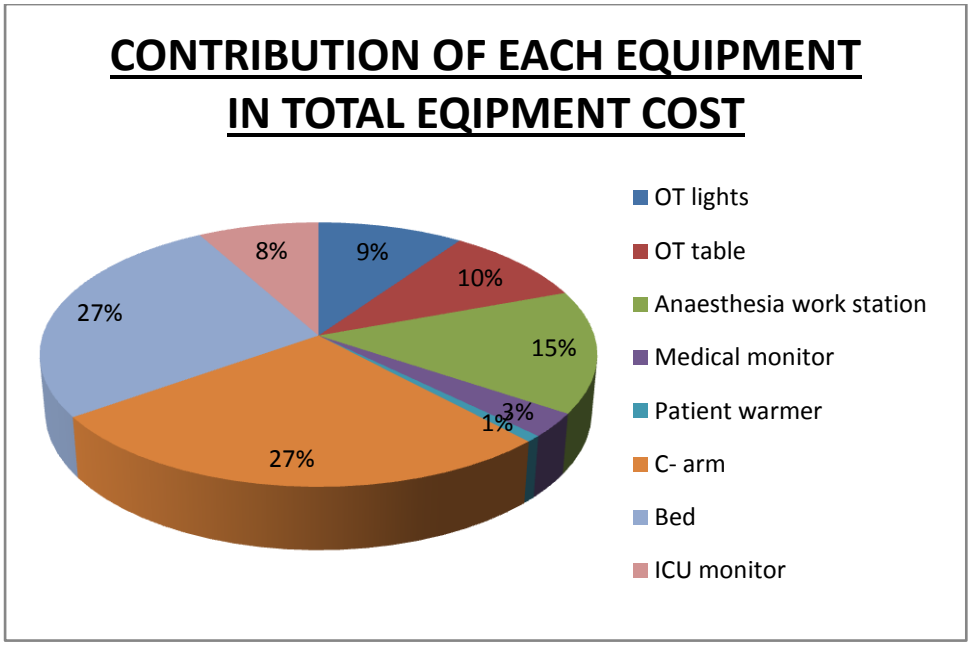

Fig.10.4.7: Contribution on each equipment in total equipment cost

The C-arm contributes the maximum (27%) in the equipment cost followed by bed (27%). The lowest cost as seen was of patient warmer (1%).

- The total direct cost of the PCNL package is:

S. NO.	COST HEAD	COST (Rs)
1	Drugs and consumables	3,493
2	Manpower	
	• Anaesthetist	1,673
	• Nursing Cost	378.72
	• OT technician	163.35
3	Infrastructure	1,565.40
4	Electrical consumption	315
5	Equipment cost	1,290
	Total	**9,616**

Table. 10.4.3: Total direct cost

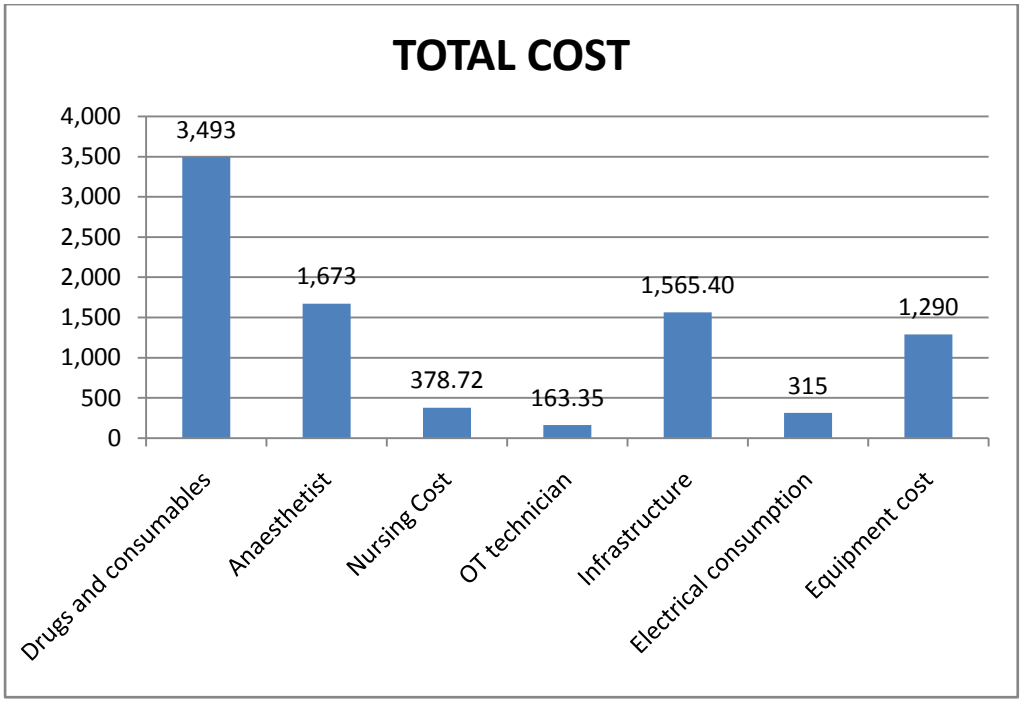

Fig.10.4.8: Total cost

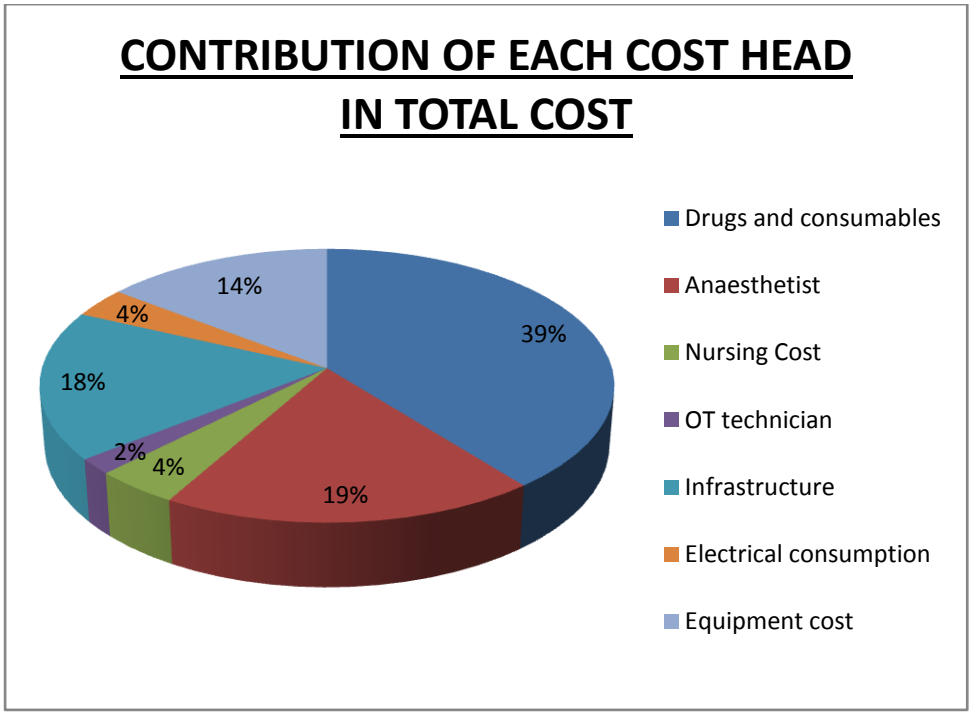

Fig.10.4.9: Contribution of each cost head in total cost

The maximum contribution in direct cost is by drugs and consumables (39%) followed by anaesthetist cost (19%) and the least cost is cost of OT technicians (2%).

10.5. EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (Sample size-7)

10.5.1. MATERIAL COST:

The bill break-up of the drugs and consumables used during the procedure for all the 7 samples were taken from the billing department. The drugs and consumables were segregated into 8 sub groups to analyze the contribution of each sub group in total material cost. The unit cost price (UCP) of the drugs and consumables were taken from the central pharmacy and purchase department.

- The average unit cost price of all the drugs and consumables used for this surgery was Rs 1,190/-.
- The average UCP of each sub group was:

S.NO.	DRUGS & CONSUMABLES	AVERAGE COST
1	CANNULAS AND CATHETERS	160
2	STENTING MATERIALS	153
3	OTHER CONSUMABLES	251
4	IV FLUIDS	146
5	ANAESTHESIA DRUGS	107
6	ANTIBIOTICS	137
7	IV DRUGS	149
8	ORAL DRUGS	13
	TOTAL	**1190**

Table.10.5.1: Average UCP of drugs and consumables

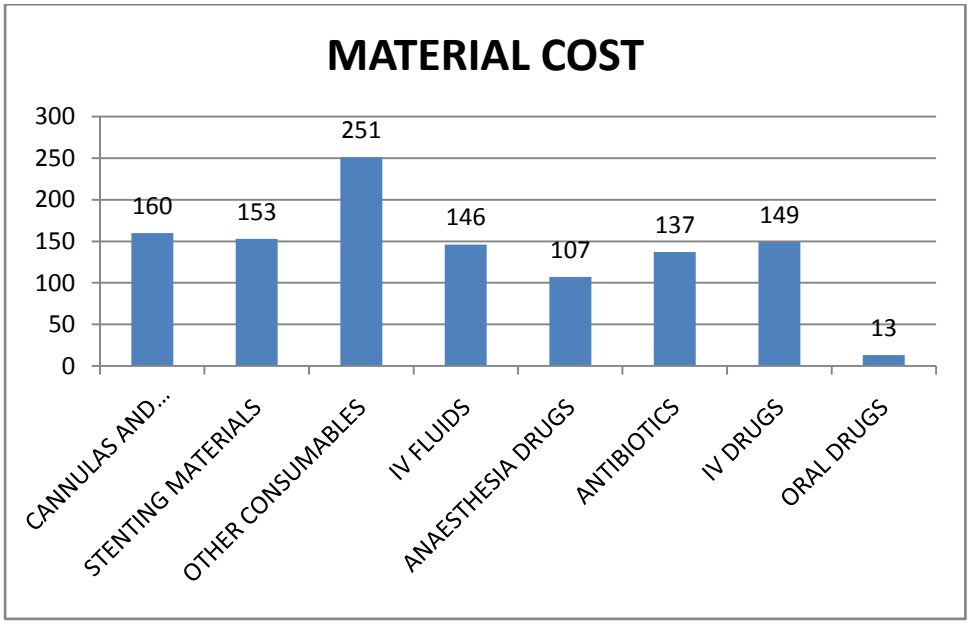

Fig.10.5.1: Material cost

The contribution of each part in the average material cost was:

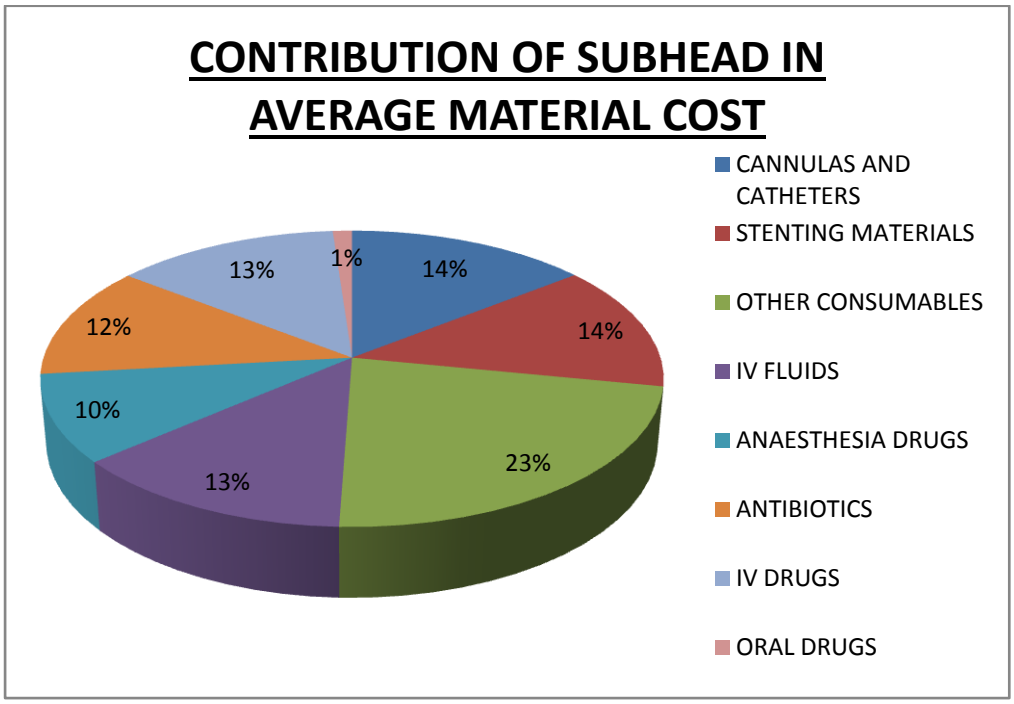

Fig. 10.5.2: Contribution of each subhead in average material cost

The maximum contribution was of general consumables (23%) followed by stenting materials and cannulas & catheters (14% each) and the least contribution was of oral drugs (1%).

10.5.2. MANPOWER COST

Manpower is of 3 types:

- Anaesthetists
- Nurses
- OT technicians

I. Anaesthetist cost: The hospital has a tie up with Axon Anaesthesia Association which provides the entire 7 anaesthetist to the hospital. The hospital pays a lump sum amount of Rs 20.3 lakhs per month to them. To calculate this cost, firstly per hour cost of an anaesthetist was calculated using the lump sum amount paid to Axon Anaesthesia Association and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of anaesthetists used during the surgery.

Total number of anaesthetists – 7

Available hours of an anaeathetist per day – 10 hours

Total available hours in a month – 1,820 hours (considering 26 working days)

Cumulative salary – Rs 20.3 lakhs

Cost = Sum total of salary of all the anaesthetists/ Total number of available hours

= 20,30,000 / 1820

= Rs 1,115.4 / hour/ anaesthetist

The average duration of ESWL is 1 hour 30 minutes.

Therefore,

Anaesthetist cost = 1115.4 X 1.5

= Rs 1,673 per surgery

II. Nursing cost: To calculate the nursing cost, firstly per hour cost of a nurse was calculated using the cumulative salaries of all nurses and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of nurses used during the surgery.

Total number of nurses in OT- 17

Available hours of a nurse per day – 8 hours

Total available hours in a month – 3,536 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 4,46,373/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 4,46,373 / 3536

= Rs 126.24/ hour/ nurse

The average duration of ESWL is 1 hour 30 minutes and number of nurses used is 2.

Therefore,

Nursing cost = 2 X 126.24 X 1.5

= Rs 378.72 per surgery

III. OT technician cost: To calculate this cost, firstly per hour cost of an OT technician was calculated using the cumulative salaries of the entire OT technician and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of technicians used during the surgery.

Total number of technicians in OT- 7

Available hours of a technician per day – 8 hours

Total available hours in a month – 1,456 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 1,58,524/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 1,58,524/ 1,456

= Rs 108.9/ hour/ technician

The average duration of ESWL is 1 hour 30 minutes and number of technicians used is 1.

Therefore,

OT technician cost = 108.9 X 1.5

= Rs 163.3 per surgery

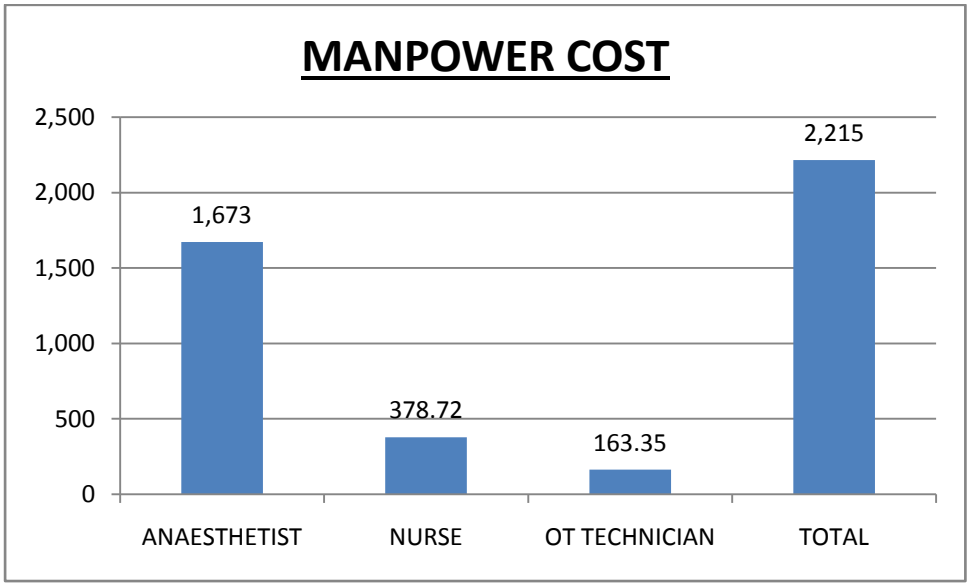

Fig.10.5.3: Manpower cost

It was seen that the cost of anaesthetist was Rs 1,673, cost of nurses was Rs 378.7 and cost of OT technicians was Rs 163.3.

The total manpower cost was Rs 2,215

10.5.3. <u>INFRASTRUCTURE COST</u>: The hospital is on lease and pays an amount of Rs 16 lakhs per month for the building. The total built up area of the hospital is 71,056 square feet.

Per square feet cost of the hospital = 16,00,000 / 71,056

= Rs 22.52 per square feet

<u>For major OT</u>

The area of major OTs is approximately 638.82 square feet (27.3 feet X 23.4 feet)

Therefore the cost of infrastructure for major OT = 638.82 X 22.52

= Rs 14,386.2 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 1,438.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 2,158/-

For minor OT

The area of minor OTs is approximately 288 square feet (18 feet X 16 feet)

Therefore the cost of infrastructure for major OT = 288 X 22.52

= Rs 6,485.8 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 648.6/-

The duration of the surgery is 1.5 hours, therefore cost of OT = Rs 972.9/-

- As the procedure takes place is any of the OTs, the average cost of infrastructure would be:

  = (2,158 + 972.9)/2

  = Rs 1,565.4 per procedure

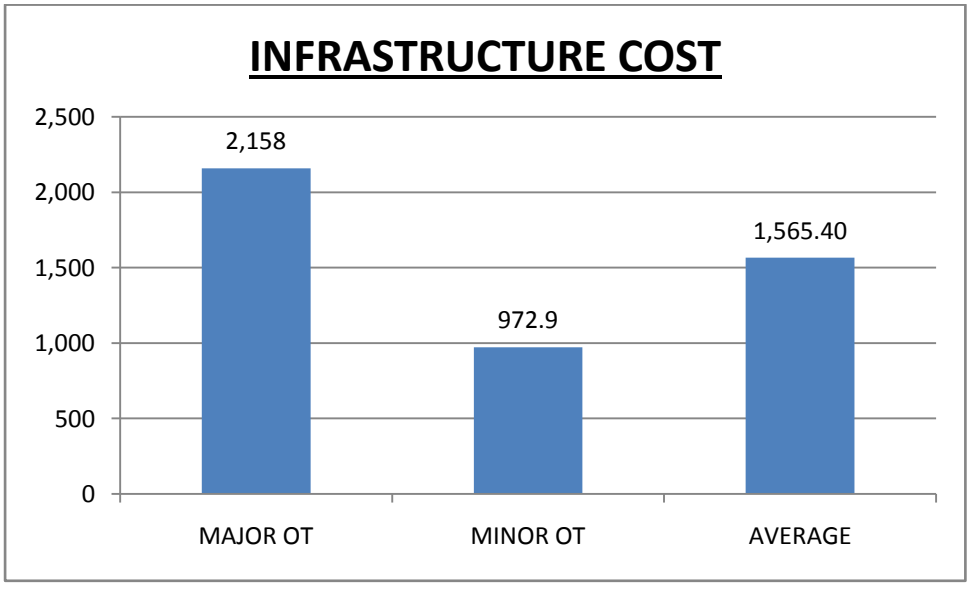

Fig. 10.5.4: Infrastructure cost

As calculated the cost of infrastructure in case of major OT was Rs 2,158 and Rs 973 in case of minor OT. As the surgery takes place in both OTs average was calculated which was Rs 1,565.4 per procedure.

10.5.4. ELECTRICITY CONSUMPTION:

I. Major OT

The air conditioner consumes 30 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 30 X 8.42

= Rs 252.6 per hour

The OT lights consumes 0.65 units per hour

Therefore per hour consumption is = 0.65 X 8.42

= Rs 5.5 per hour

Total per hour consumption = 252.6 + 5.5

= 258.1

The duration of surgery is 1.5 hours

Therefore total electricity consumption = 258.1 X 1.5

= Rs 387.2 per surgery

II. Minor OT

The air conditioner consumes 19 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 19 X 8.42

= Rs 160 per hour

The OT lights consumes 0.2 units per hour

Therefore per hour consumption is = 0.2 X 8.42

= Rs 1.7 per hour

Total per hour consumption = 160 + 1.7

= 161.7

The duration of surgery is 1.5 hours,

Therefore total electricity consumption = 161.7 X 1.5

= Rs 242.6 per surgery

- As the procedure takes place is any of the OTs, the average cost of electricity would be:

  = (387.2 + 242.6)/2

  = Rs 315 per procedure

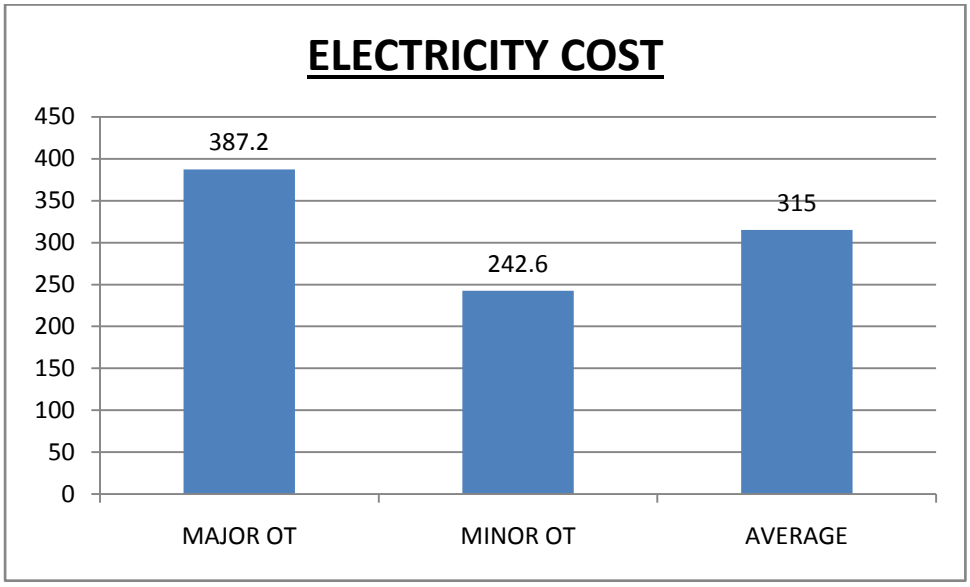

Fig.10.5.5: Electricity cost

The electricity consumption in major OT was Rs 387.2 and Rs 242.6 in minor OT. As the surgery takes place in any of the OTs average has to be taken and it was Rs 315.

10.5.5. EQUIPMENT COST

There are a number of biomedical equipments used for a patient during the surgery as well as after the surgery (in ICU & wards). The costs of these equipments have to be added in the total cost of the package. After making a list of all the equipments used during and after the surgery, the maintenance cost (AMC & CMC) was added to the purchase cost to determine the total cost. The life of any biomedical equipment is taken to be 8 years. The cost was spread uniformly in 8 years to find per day cost (for ICU/ward equipments) and per hour cost (for OT equipments).

OT EQUIPMENTS

I. OT lights:
   Total cost = Rs 15,00,000 (with no maintenance cost)

Per day cost = 1500000 / 8 X 300 (taking 300 working days in a year)
= Rs 625

Cost per hour = 625/10 (total available hour =10)
= Rs 62.5

Cost of OT lights for ESWL = 62.5 X 1.5
= Rs 94

II. OT table:

Total cost = Rs 15,00,000 (with no maintenance cost)
Cost per day = 1500000 / 8 X 300 (taking 300 working days in a year)
= Rs 625

Cost per hour = 625/10 (total available hour =10)
= Rs 62.5

Cost of OT table for ESWL = 62.5 X 1.5
= Rs 94

III. Anaesthesia work station:

Total cost = Rs 23,20,000 (with Rs 65,000 as AMC)
Cost per day = 2320000 / 8 X 300 (taking 300 working days in a year)
= Rs 967

Cost per hour = 967/10 (total available hour =10)
= Rs 96.7

Cost of anaesthesia work station for ESWL = 96.7 X 1.5
= Rs 145

IV. Medical monitor:

Total cost = Rs 4,50,000 (with no maintenance cost)
Cost per day = 450000 / 8 X 300 (taking 300 working days in a year)
= Rs 188

Cost per hour = 188/10 (total available hour =10)
= Rs 18.8

Cost of medical monitor for ESWL = 18.8 X 1.5
= Rs 28

V. Patient warmer:

Total cost = Rs 1,20,000 (with no maintenance cost)
Cost per day = 120000 / 8 X 300 (taking 300 working days in a year)
= Rs 50

Cost per hour = 50/10 (total available hour =10)
= Rs 5

Cost of patient warmer for ESWL = 5 X 1.5
= Rs 8

VI. Endocorporeal shock wave lithotripsy:

Total cost = Rs 29,80,000 (with maintenance cost Rs 60,000 per year)
Cost per day = 2980000 / 8 X 300 (taking 300 working days in a year)
= Rs 1241.6

Cost per hour = 1241.6/10 (total available hour =10)
= Rs 124.1

Cost of patient warmer for ESWL = 124.1 X 1.5
= Rs 186.2

VII. C- arm:

Total cost = Rs 42,00,000 (with no maintenance cost)
Cost per day = 4200000 / 8 X 300 (taking 300 working days in a year)
= Rs 1,750

Cost per hour = 1750/10 (total available hour =10)
= Rs 175

Cost of patient warmer for ESWL = 175 X 1.5
= Rs 262.5

ICU/ WARD EQUIPMENTS

I. Bed:

Total cost = Rs 2,76,000 (with Rs 12,000 as CMC)
Cost per day = 2760000 / 8 X 300 (taking 300 working days in a year)
= Rs 115

Duration of stay = 3 days
Total cost of bed = 115 X 3
= Rs 345

II. ICU monitor:

Total cost = Rs 2.50,000 (with no maintenance)

Cost per day = 250000 / 8 X 300 (taking 300 working days in a year)
= Rs 104

Duration of stay = 3 days
Total cost of monitor = Rs 104

S. No.	EQUIPMENTS	COST PER SURGERY
1	OT lights	94
2	OT table	94
3	Anaesthesia work station	145
4	Medical monitor	28
6	Patient warmer	8
7	Endocorporeal shock wave lithotripsy	186.2
8	C- arm	262.5
9	Bed	345
10	ICU monitor	104
	TOTAL	**1266.7**

Table. 10.5.2: Total equipment cost per surgery

Total cost of all equipments = Rs 1,226.7/-

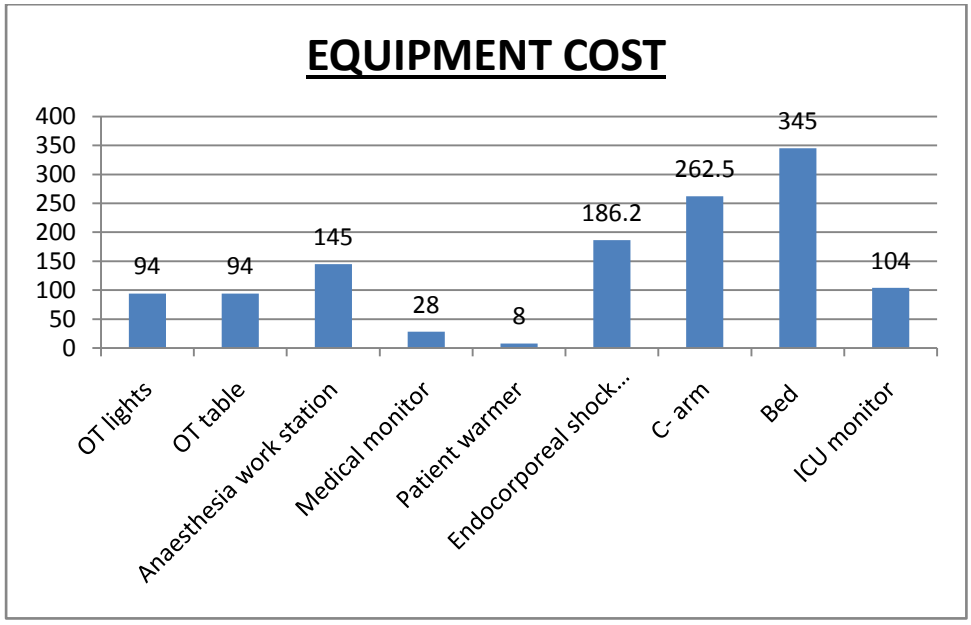

Fig.10.5.6: Equipment cost

The contribution of each individual equipment cost in total equipment cost was:

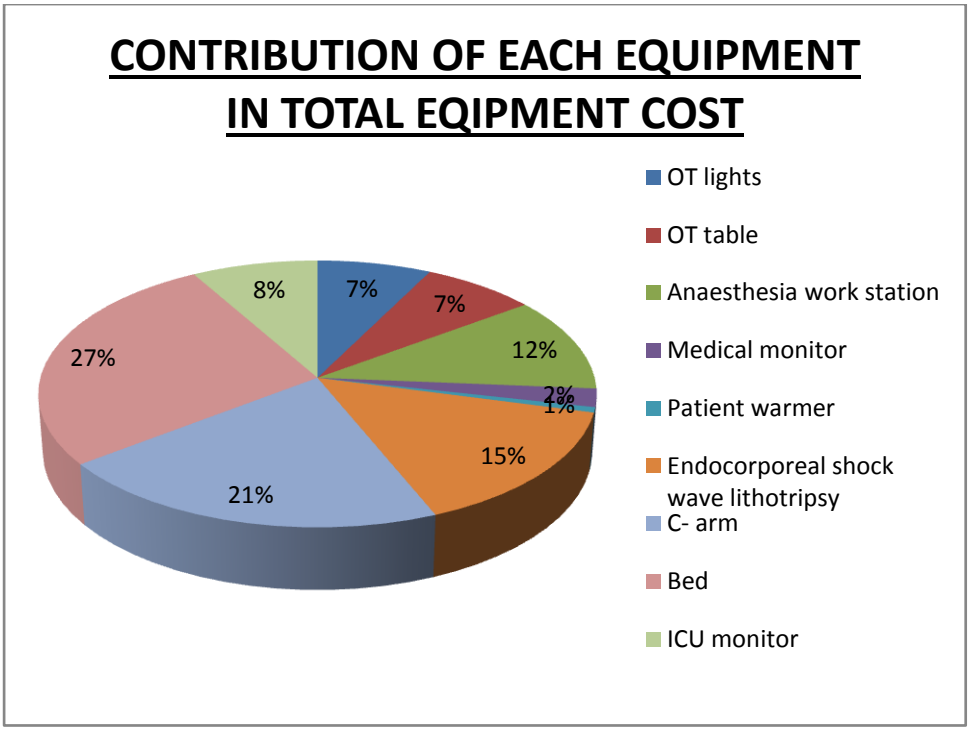

Fig.10.5.7: Contribution on each equipment in total equipment cost

The bed contributes the maximum (27%) in the equipment cost followed by C-arm (21%). The lowest cost as seen was of patient warmer (1%).

- The total direct cost of the ESWL package is:

S. NO.	COST HEAD	COST (Rs)
1	Drugs and consumables	1,190
2	Manpower	
	Anaesthetist	1,673
	Nursing Cost	378.72
	OT technician	163.3
3	Infrastructure	1,565.40
4	Electrical consumption	315
5	Equipment cost	1,226.7
	Total	**6,512**

Table.10.5.3: Total direct cost

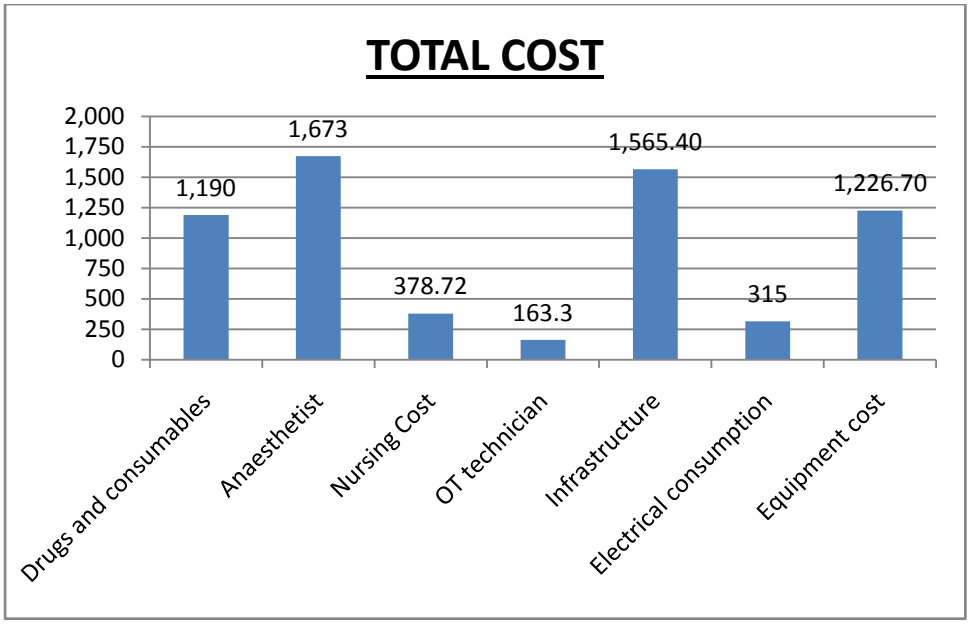

Fig.10.5.8: Total cost

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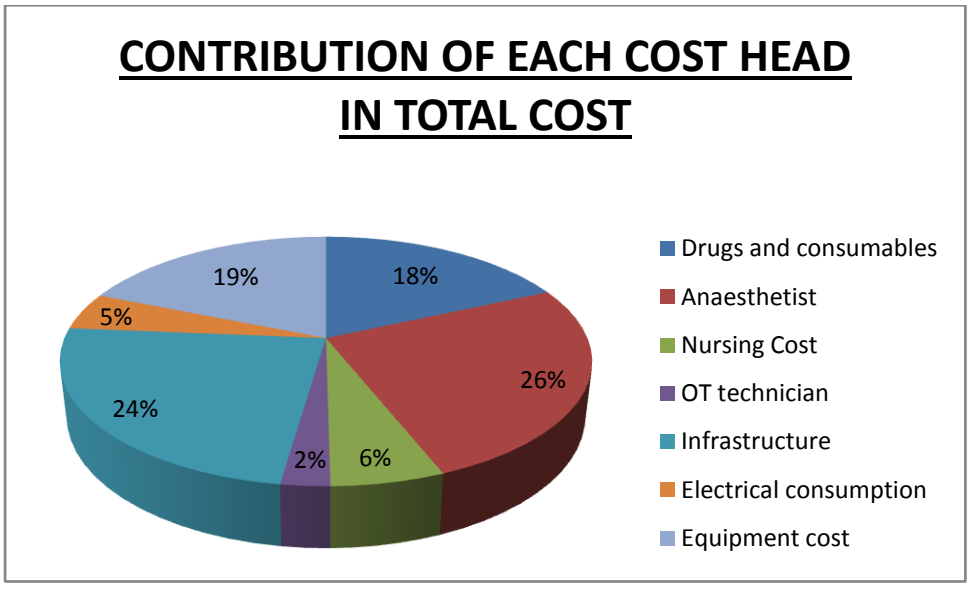

Fig.10.5.9: Contribution of each cost head in total cost

The maximum contribution in direct cost is by anaesthetist (26%) followed by cost of infrastructure (24%) and the least cost is cost of OT technicians(2%).

10.6. URETEROSCOPIC LITHOTRIPSY (Sample size-12)

10.6.1. MATERIAL COST:

The bill break-up of the drugs and consumables used during the procedure for all the 12 samples were taken from the billing department. The drugs and consumables were segregated into 8 sub groups to analyze the contribution of each sub group in total material cost. The unit cost price (UCP) of the drugs and consumables were taken from the central pharmacy and purchase department.

- The average unit cost price of all the drugs and consumables used for this surgery was Rs 1141.
- The average UCP of each sub group was:

S.NO.	DRUGS & CONSUMABLES	AVERAGE COST (Rs)
1	CANNULAS AND CATHETERS	268
2	STENTING MATERIALS	573
3	OTHER CONSUMABLES	521
4	IV FLUIDS	184
5	ANAESTHESIA DRUGS	111
6	ANTIBIOTICS	227
7	IV DRUGS	173
8	ORAL DRUGS	24
	TOTAL	**1141**

Table.10.6.1: Average UCP of drugs and consumables

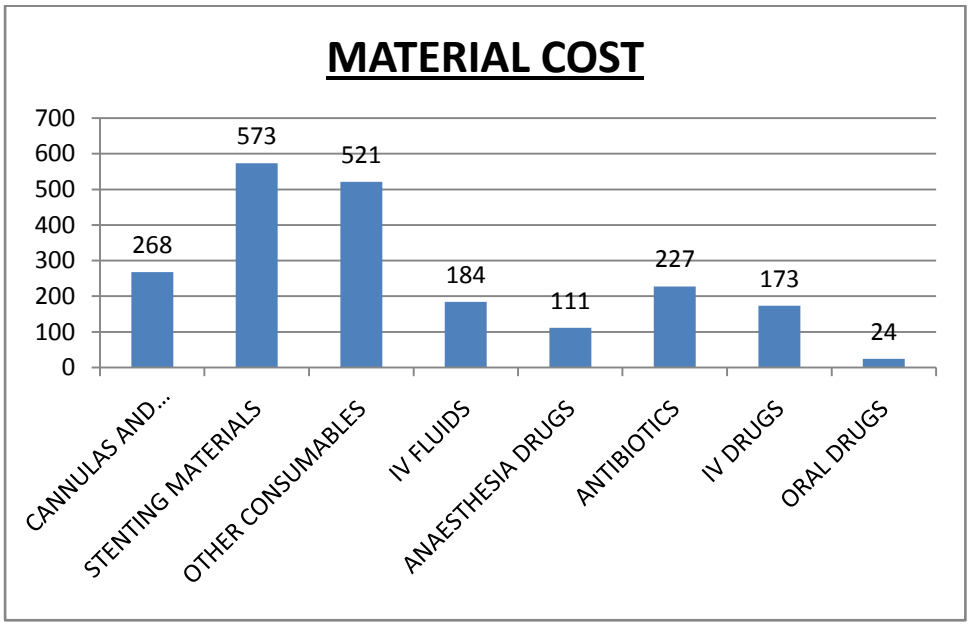

Fig.10.6.1:Material cost

The contribution of each subpart in the average cost was:

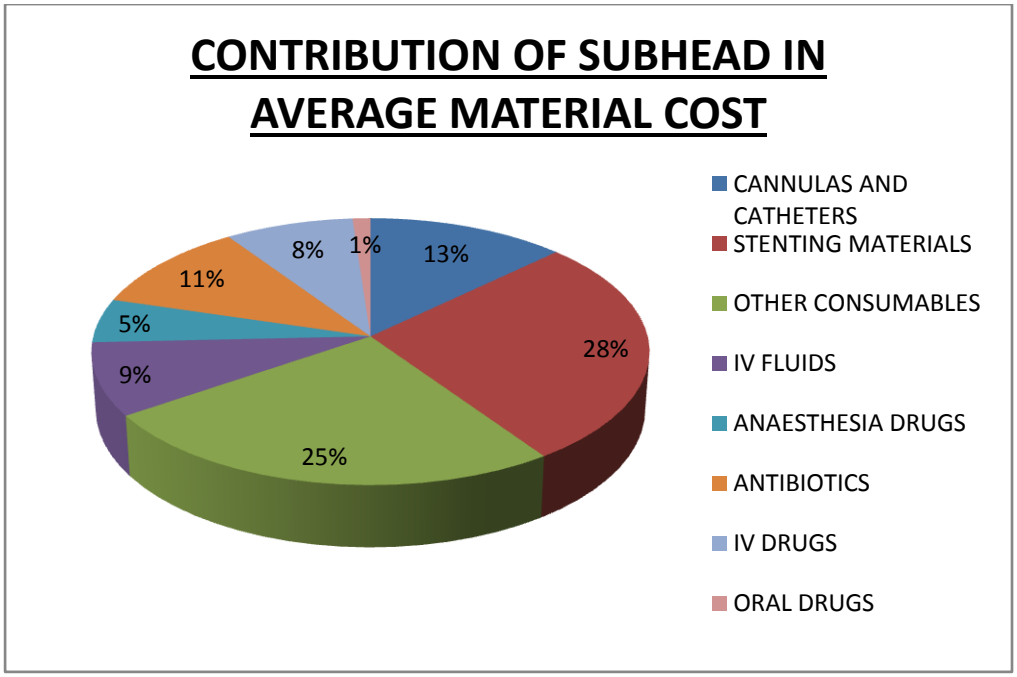

Fig.10.6.2: Contribution of each subhead in average material cost

The maximum contribution was of stenting material (28%) followed by other general consumables (25%) and the least contribution was of oral drugs (2%).

10.6.2. MANPOWER COST

Manpower is of 3 types:

- Anaesthetists
- Nurses
- OT technicians

I. Anaesthetist cost: The hospital has a tie up with Axon Anaesthesia Association which provides the entire 7 anaesthetist to the hospital. The hospital pays a lump sum amount of Rs 20.3 lakhs per month to them. To calculate this cost, firstly per hour cost of an anaesthetist was calculated using the lump sum amount paid to Axon Anaesthesia Association and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of anaesthetists used during the surgery.

Total number of anaesthetists – 7

Available hours of an anaeathetist per day – 10 hours

Total available hours in a month – 1,820 hours (considering 26 working days)

Cumulative salary – Rs 20.3 lakhs

Cost = Sum total of salary of all the anaesthetists/ Total number of available hours

= 20,30,000 / 1820

= Rs 1,115.4 / hour/ anaesthetist

The average duration of ureteroscopic lithotripsy is 2 hours.

Therefore,

Anaesthetist cost = 1115.4 X 2

= Rs 2,230 per surgery

II. Nursing cost: To calculate the nursing cost, firstly per hour cost of a nurse was calculated using the cumulative salaries of all nurses and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of nurses used during the surgery.

Total number of nurses in OT- 17

Available hours of a nurse per day – 8 hours

Total available hours in a month – 3,536 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 4,46,373/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 4,46,373 / 3536

= Rs 126.24/ hour/ nurse

The average duration of ureteroscopic lithotripsy is 2 hours and number of nurses used is 2.

Therefore,

Nursing cost = 2 X 126.24 X 2

= Rs 505 per surgery

III. OT technician cost: To calculate this cost, firstly per hour cost of an OT technician was calculated using the cumulative salaries of the entire OT technician and the total available hours in a month and then multiplying this cost with the duration of the surgery and the number of technicians used during the surgery.

Total number of technicians in OT- 7

Available hours of a technician per day – 8 hours

Total available hours in a month – 1,456 hours (considering 26 working days)

Cumulative salary of all OT nurses- Rs 1,58,524/-

Cost = Sum total of salary of all nurses/ Total number of available hours

= 1,58,524/ 1,456

= Rs 108.9/ hour/ technician

The average duration of ureteroscopic lithotripsy is 2 hours and number of technicians used is 1.

Therefore,

OT technician cost = 108.9 X 2

= Rs 217.8 per surgery

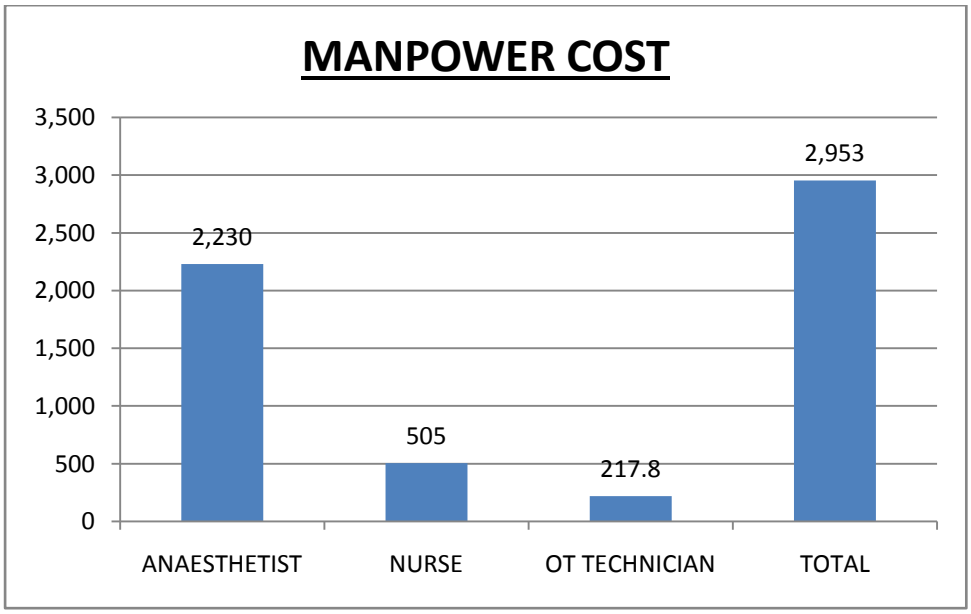

Fig.10.6.3: Manpower cost

It was seen that the cost of anaesthetist was Rs 2,230, cost of nurses was Rs 505 and cost of OT technicians was Rs 217.8.
The total manpower cost was Rs 2,953.

10.6.3. <u>INFRASTRUCTURE COST</u>: The hospital is on lease and pays an amount of Rs 16 lakhs per month for the building. The total built up area of the hospital is 71,056 square feet.

Per square feet cost of the hospital = 16,00,000 / 71,056

= Rs 22.52 per square feet

For major OT

The area of major OTs is approximately 638.82 square feet (27.3 feet X 23.4 feet)

Therefore the cost of infrastructure for major OT = 638.82 X 22.52

= Rs 14,386.2 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 1,438.6/-

The duration of the surgery is 2 hours, therefore cost of OT = Rs 2,877.2/-

For minor OT

The area of minor OTs is approximately 288 square feet (18 feet X 16 feet)

Therefore the cost of infrastructure for major OT = 288 X 22.52

= Rs 6,485.8 per day

As the OT is functional for only 10 hours per day,

Cost of OT per hour = Rs 648.6/-

The duration of the surgery is 2 hours, therefore cost of OT = Rs 1,297.2/-

- As the procedure takes place is any of the OTs, the average cost of infrastructure would be:

  = (2877.2 + 1297.2)/2

  = Rs 2,087.2 per procedure

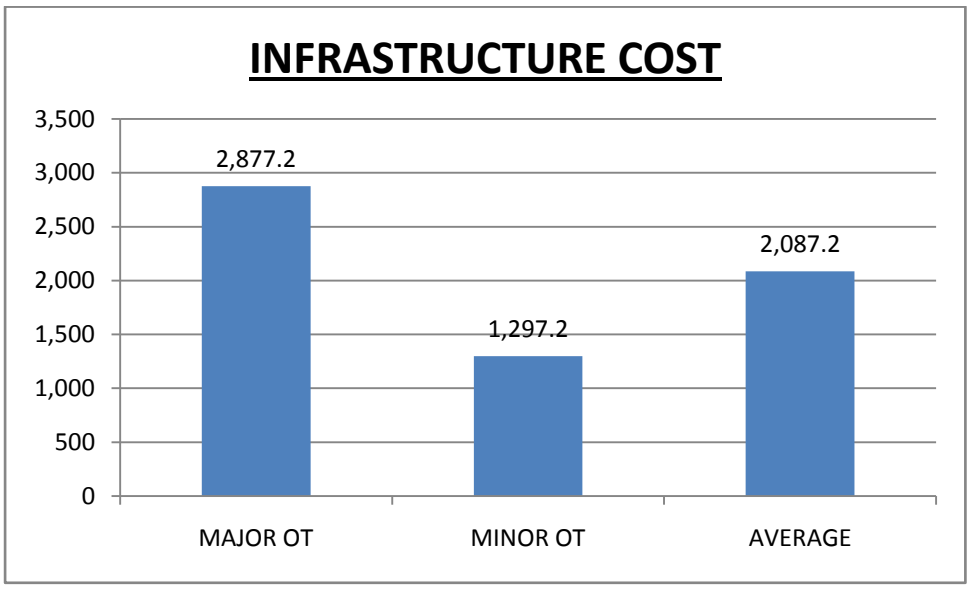

Fig.10.6.4: Infrastructure cost

As calculated the cost of infrastructure in case of major OT was Rs 2,877.2 and Rs 1,297.2 in case of minor OT. As the surgery takes place in both OTs average was calculated which was Rs 2,087.2 per procedure.

10.6.4. ELECTRICITY CONSUMPTION:

I. Major OT

The air conditioner consumes 30 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 30 X 8.42

= Rs 252.6 per hour

The OT lights consumes 0.65 units per hour

Therefore per hour consumption is = 0.65 X 8.42

= Rs 5.5 per hour

Total per hour consumption = 252.6 + 5.5

= 258.1

The duration of surgery is 2 hours

Therefore total electricity consumption = 258.1 X 2

= Rs 516.2 per surgery

II. Minor OT

The air conditioner consumes 19 units per hour.

The rate per unit is Rs 8.42/-

Per hour consumption = 19 X 8.42

= Rs 160 per hour

The OT lights consumes 0.2 units per hour

Therefore per hour consumption is = 0.2 X 8.42

= Rs 1.7 per hour

Total per hour consumption = 160 + 1.7

= 161.7

The duration of surgery is 2 hours

Therefore total electricity consumption = 161.7 X 2

= Rs 323.4 per surgery

- As the procedure takes place is any of the OTs, the average cost of electricity would be:

  = (516.2+ 323.4)/2

  = Rs 419.8 per procedure

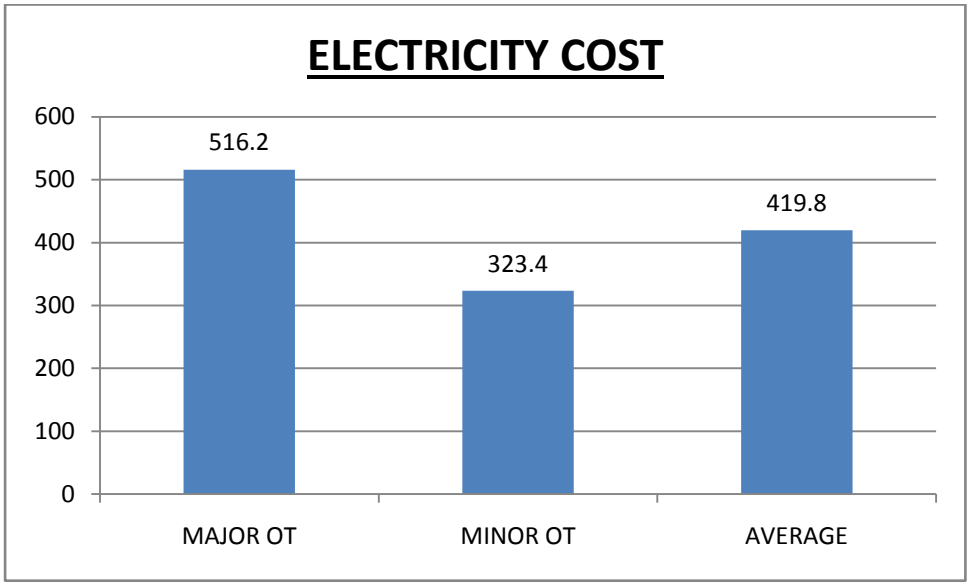

Fig.10.6.5: Electricity cost

The electricity consumption in major OT was Rs 516.2 and Rs 323.4 in minor OT. As the surgery takes place in any of the OTs average has to be taken and it was Rs 419.8.

10.6.5. EQUIPMENT COST

There are a number of biomedical equipments used for a patient during the surgery as well as after the surgery (in ICU & wards). The costs of these equipments have to be added in the total cost of the package. After making a list of all the equipments used during and after the surgery, the maintenance cost (AMC & CMC) was added to the purchase cost to determine the total cost. The life of any biomedical equipment is taken to be 8 years. The cost was spread uniformly into 8 years to find per day cost (for ICU/ward equipments) and per hour cost (for OT equipments).

OT EQUIPMENTS

I. OT lights:
   Total cost = Rs 15,00,000 (with no maintenance cost)

Per day cost = 1500000 / 8 X 300 (taking 300 working days in a year)
= Rs 625

Cost per hour = 625/10 (total available hour =10)
= Rs 62.5

Cost of OT lights for ureteroscopic lithotripsy = 62.5 X 2
= Rs 125

II. OT table:

Total cost = Rs 15,00,000 (with no maintenance cost)
Cost per day = 1500000 / 8 X 300 (taking 300 working days in a year)
= Rs 625

Cost per hour = 625/10 (total available hour =10)
= Rs 62.5

Cost of OT table for ureteroscopic lithotripsy = 62.5 X 2
= Rs 125

III. Anaesthesia work station:

Total cost = Rs 23,20,000 (with Rs 65,000 as AMC)
Cost per day = 2320000 / 8 X 300 (taking 300 working days in a year)
= Rs 967

Cost per hour = 967/10 (total available hour =10)
= Rs 96.7

Cost of anaesthesia work station for ureteroscopic lithotripsy = 96.7 X 2
= Rs 193.4

IV. Medical monitor:

Total cost = Rs 4,50,000 (with no maintenance cost)
Cost per day = 450000 / 8 X 300 (taking 300 working days in a year)
= Rs 188

Cost per hour = 188/10 (total available hour =10)
= Rs 18.8

Cost of medical monitor for ureteroscopic lithotripsy = 18.8 X 2
= Rs 37.6

V. C- arm:

Total cost = Rs 42,00,000 (with no maintenance cost)

Cost per day = 4200000 / 8 X 300 (taking 300 working days in a year)
= Rs 1,750

Cost per hour = 1750/10 (total available hour =10)
= Rs 175

Cost of patient warmer for ureteroscopic lithotripsy = 175 X 2
= Rs 350

VI. Patient warmer:

Total cost = Rs 1,20,000 (with no maintenance cost)
Cost per day = 120000 / 8 X 300 (taking 300 working days in a year)
= Rs 50

Cost per hour = 50/10 (total available hour =10)
= Rs 5

Cost of patient warmer for ureteroscopic lithotripsy = 5 X 2
= Rs 10

ICU/ WARD EQUIPMENTS

I. Bed:

Total cost = Rs 2,76,000 (with Rs 12,000 as CMC)
Cost per day = 2760000 / 8 X 300 (taking 300 working days in a year)
= Rs 115

Duration of stay = 3 days
Total cost of bed = 115 X 3
= Rs 345

II. ICU monitor:

Total cost = Rs 2.50,000 (with no maintenance)
Cost per day = 250000 / 8 X 300 (taking 300 working days in a year)
= Rs 104

Duration of stay = 3 days
Total cost of monitor = Rs 104

S. No.	EQUIPMENTS	COST PER SURGERY
1	OT lights	125
2	OT table	125
3	Anaesthesia work station	193.4
4	Medical monitor	37.6
6	Patient warmer	10
8	C- arm	350
9	Bed	345
10	ICU monitor	104
	TOTAL	**1290**

Table.10.6.2: Total equipment cost per surgery

Total cost of all equipments = Rs 1,290/-

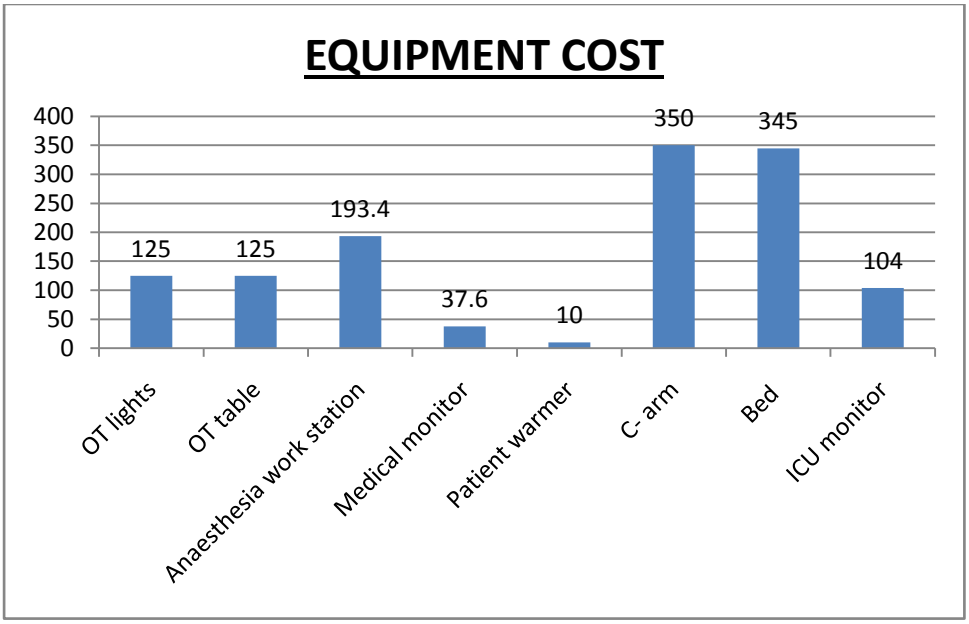

Fig.10.6.6: Equipment cost

The contribution of cost of individual equipment in total equipment cost was:

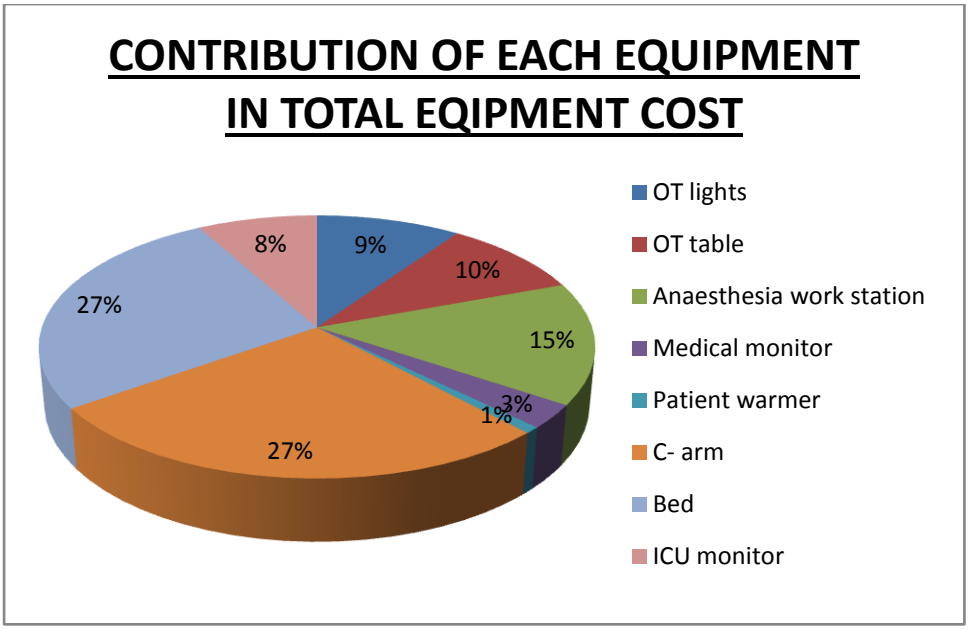

Fig. 10.6.7: Contribution on each equipment in total equipment cost

The bed and C-arm contributes the maximum (27% each) in the equipment cost. The lowest cost as seen was of patient warmer (1%).

- The total direct cost of the URSL package is:

S. NO.	COST HEAD	COST (Rs)
1	Drugs and consumables	1,441.3
2	Manpower	
	• Anaesthetist	2,230
	• Nursing Cost	505
	• OT technician	217.8
3	Infrastructure	2,087.2
4	Electrical consumption	419.8
5	Equipment cost	1,290
	Total	**8,191**

Table.10.6.3: Total direct cost

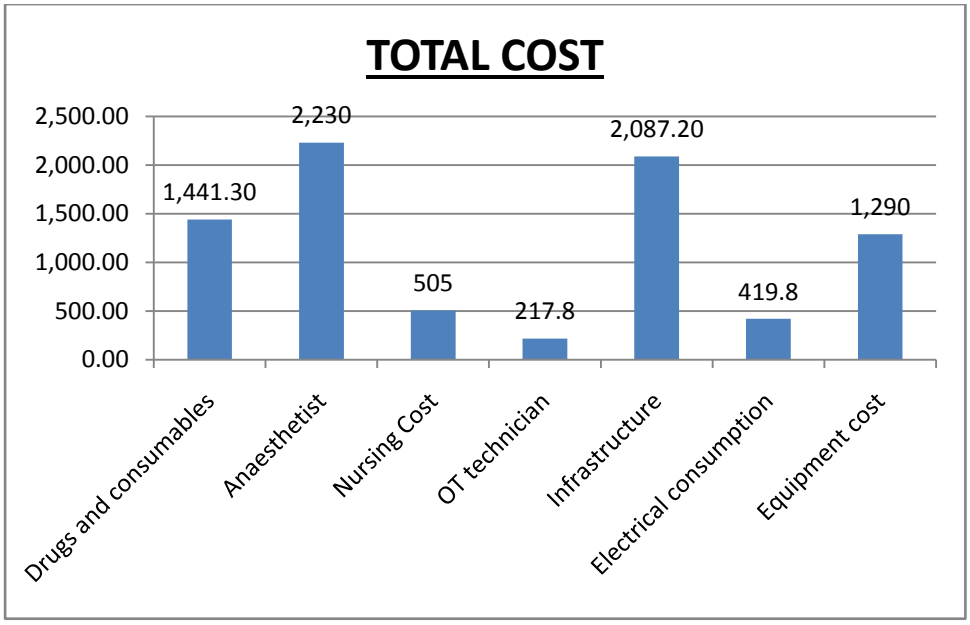

Fig.10.6.8: Total cost

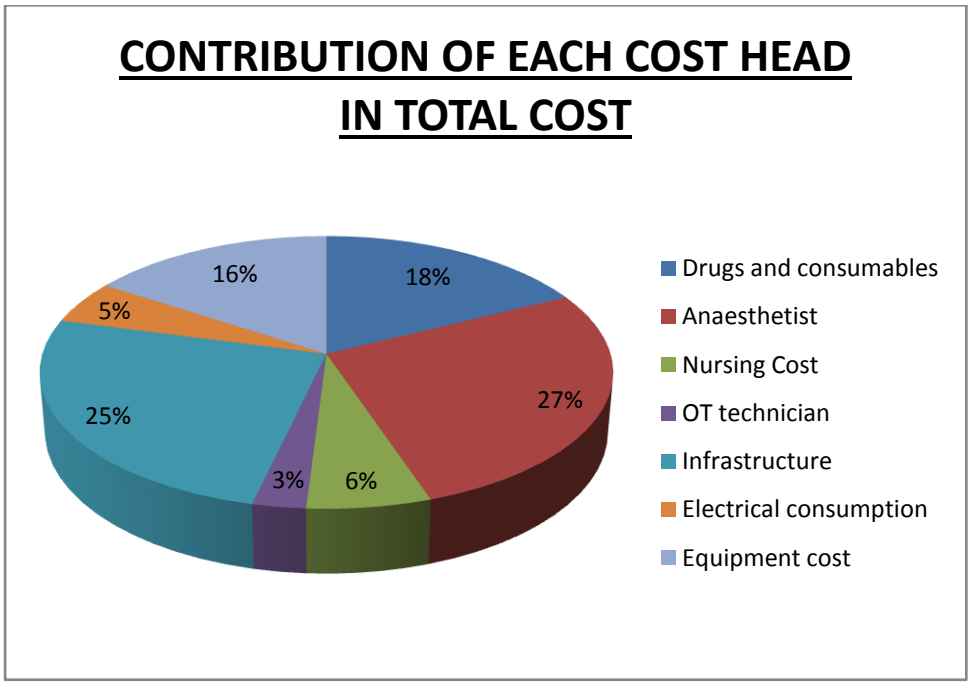

Fig.10.6.9: Contribution of each cost head in total cost

The maximum contribution in direct cost is by anaesthetist (27%) followed by infrastructure cost (25%) and the least cost is cost of OT technicians (3%).

11. RESULTS:

1. The total direct cost incurred for laparoscopic cholecystectomy is Rs 7,854/-. According to CGHS 2002 & 2014, the tariff for the same is Rs 16,400 & Rs 18,975.

   This will include the surgeon cost and all other indirect cost. Assuming surgeon's cost to be 20% and indirect cost 15%.

CGHS tariff	2002	2014
Package tariff	16400	18975
Direct cost	7854	7854
Surgeon's cost	3280	3795
Indirect cost	2460	2846
Margin	2806	4480
Margin percentage	**17.1%**	**23.6%**

Table.11.1: Results of Laparoscopic Cholecystectomy

After including all cost, the profit percentage for the hospital is 17.1% & 23.6%
And it will add to the top line of the hospital also, so this procedure is financially feasible for the hospital and can be started.

2. The total direct cost incurred for laparoscopic inguinal hernia is Rs 10,657/-. According to CGHS 2014, the tariff for the same is Rs 18,000/-.
   This will include the surgeon cost and all other indirect cost. Assuming surgeon's cost to be 20% and indirect cost 15%.

CGHS tariff	2014
Package tariff	18000
Direct cost	10657
Surgeon's cost	3600
Indirect cost	2700
Margin	1043
Margin percentage	**5.79%**

Table.11.2: Results of Laparoscopic Inguinal Hernia

After including all cost, the profit percentage for the hospital is 5.79%
Though the margin is less, it will add to the top line of the hospital, so it can be started by the hospital.

3. The total cost incurred for laparoscopic appendectomy is Rs 7,854/-. According to CGHS 2002 & 2014, the tariff for the same is Rs 13,750 & Rs 16,200.
   This will include the surgeon cost and all other indirect cost. Assuming surgeon's cost to be 20% and indirect cost 15%.

CGHS tariff	2002	2014
Package tariff	13750	16200
Direct cost	7693	7693
Surgeon's cost	2750	3240
Indirect cost	2063	2430
Margin	1244	2837
Margin percentage	**9.04%**	**17.5%**

Table.11.3: Results of Laparoscopic appendectomy

After including all cost, the profit percentage for the hospital is 9.04% & 17.5%
The margin of 2002 tariff is less but it will add to the top line of the hospital, so it can be started by the hospital.

4. The total cost incurred for PCNL is Rs 9,616/-. According to CGHS 2002 & 2014, the tariff for the same is Rs 17,000 & Rs 20,000.

This will include the surgeon cost and all other indirect cost. Assuming surgeon's cost to be 20% and indirect cost 15%.

CGHS tariff	2002	2014
Package tariff	17000	20000
Direct cost	9616	9616
Surgeon's cost	3400	4000
Indirect cost	2550	3000
Margin	1434	3381
Margin percentage	**8.43%**	**16.9%**

Table.11.4: Results of PCNL

After including all cost, the profit percentage for the hospital is 8.43% & 16.9%
The margin of 2002 tariff is less but it will add to the top line of the hospital, so it can be started by the hospital.

5. The total cost incurred for ESWL is Rs 6,512/-. According to CGHS 2002 & 2014, the tariff for the same is Rs 20,000 & Rs 37,260.

This will include the surgeon cost and all other indirect cost. Assuming surgeon's cost to be 20% and indirect cost 15%.

CGHS tariff	2002	2014
Package tariff	20000	37260
Direct cost	6512	6512
Surgeon's cost	4000	7452
Indirect cost	3000	5589
Margin	6488	17707
Margin percentage	**32.44%**	**47.52%**

Table.11.5: Results of ESWL

After including all cost, the profit percentage for the hospital is 32.44% & 47.52%

The margins of both tariffs are quite high, so it is highly recommended to start this procedure under CGHS scheme by the hospital.

6. The total cost incurred for URSL is Rs 8,191/-. According to CGHS 2002, the tariff for the same is Rs 16,350. The difference is Rs 8,159.

This will include the surgeon cost and all other indirect cost. Assuming surgeon's cost to be 20% and indirect cost 15%.

CGHS tariff	**2002**
Package tariff	16350
Direct cost	8191
Surgeon's cost	3270
Indirect cost	2453
Margin	2436
Margin percentage	**14.9%**

Table: 11.6: Results of URSL

After including all cost, the profit percentage for the hospital is 14.9%
And it will add to the top line of the hospital also, so this procedure is financially feasible for the hospital and can be started.

12. CONCLUSIONS:

Laparoscopic Cholecystectomy, Laparoscopic Inguinal Hernia (2014), PCNL (2014), ESWL procedures are found to be profitable and are recommended to be started under the scheme.

Laparoscopic Inguinal Hernia, Laparoscopic Appendectomy (2004), PCNL (2004), ESWL & URSL are marginally profitable and the decision is up to the management to decide its viability.

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