



## Study of In-Patient Costing at a Tertiary Care Teaching Hospital of North India

Authors

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### Abstract

*By understanding the costs of various activities, managers can improve the efficiency of hospital departments, as well as hospital system as a whole. Hospital management has a responsibility to the community to provide health services that the community needs at an acceptable level of quality and at the least possible cost. Cost finding and analysis can help departmental managers, hospital administrators and policy makers to determine how well their institutions meet these public needs.*

*The study revealed that Total average cost for per Inpatient per day was Rupees 2238. Manpower cost constituted the maximum proportion 63% of the total average cost i.e Rupees 1419 followed by utility cost 23% i.e Rupees 620 and material cost 9% i.e Rupees 199. The study establishes that manpower cost constitute the maximum proportion of the total average inpatient cost. There is a need for hospital managers to frame strategies for effective and efficient use of manpower so that inpatient cost can be marginalized to save resources which can be utilized for patient betterment scheme and to provide subsidized care to the poorer section of society.*

**Keywords:** Cost, Hospital, Manpower Cost, Utility cost, Material cost.

### Introduction

The advent of technology in medicine has been accompanied with quality consciousness and cost consciousness. Hospital management has a responsibility towards the community to provide health care services that the community needs of an acceptable level and quality at a least possible price.<sup>(1)</sup>

By understanding the costs of various activities, managers can improve the efficiency of hospital departments, as well as hospital system as a whole. Hospital management has a responsibility to the community to provide health services that the community needs at an acceptable level of quality and at the least possible cost. Cost finding and analysis can help departmental managers,

hospital administrators and policy makers to determine how well their institutions meet these public needs.<sup>(2)</sup>

Moreover knowledge of costs can assist in planning of future budgets and in establishing a schedule of charges for patient services. Finally cost accounting and analysis are also of value to management in ensuring that costs do not exceed available revenues and subsidies. They are the best techniques available for accomplishing this.<sup>(2)</sup> Every year around 60,000 patients are admitted in SKIMS, a tertiary care teaching hospital. Most of the facilities provided by the hospital to the patients are on nominal charges. In view of enormous patient load, the present study "Inpatient costing" was undertaken with the aim to estimate and analyze the Inpatient cost incurred in totality so that the study results could be used to establish the relation between the real cost of providing services and the user fee paid by patients for the corresponding services.

### Objectives

1. To study the Material Cost incurred per patient per day.
2. To study the cost of Manpower incurred per patient per day.
3. To estimate cost of utility services per patient per day.

### Materials and Methods

A prospective study was carried out in inpatient departments of Sher-i-Kashmir Institute of Medical Sciences, SKIMS, Srinagar from 1<sup>st</sup> October 2014 to 30<sup>th</sup> September 2015 (for a period of one year) . Inpatient area for study included two general wards i.e. General surgery and General medicine and two super specialities i.e. Gastroenterology and Neurosurgery.

#### To study the Material Cost incurred per patient per day.

Study population included 10% of total bed strength of each selected ward. In order to ensure that patients are followed uniformly, the study beds were fixed by simple random sampling and

followed for patient admissions during the study period.

The study beds were visited on daily basis and materials consumed each day were assessed by following ways:

- Interviewing the patient and all the concerned on duty.
- By viewing inpatient records to assess the material used by patient on daily basis.

The researcher used to visit the wards every day and the material (drugs/disposables/general consumables) consumed were entered on predesigned performa.

The material was broadly classified into three group's i.e.

1. Drugs
2. 2. Disposables
3. General consumable. items e.g. Investigation forms, Admission files, Antiseptics, Soaps, Gauze, Cotton etc.

Cost of drugs and disposables utilized and purchased from hospital was calculated by taking the rate list from the drug and pharmacy department and the central drug store. Cost of drugs and disposables brought from outside the market was calculated by asking for the bill brought from the market. General consumable items cost was directly calculated by seeing the consumption register of the store and cost of item was calculated.

#### To study the Manpower Cost per patient per day

In order to study the cost of manpower per patient per day, Human resources providing patient care in inpatient area were broadly classified into two groups

1. Full time care givers
2. Part time care givers

Full time care givers include

- a) Staff nurses
- b) Nursing auxiliary staff
- c) Sanitation worker
- d) Security personal

In order to calculate the cost incurred by the subgroup, cumulative salary of all the members

for one month were worked out. The data was entered on a predesigned performa. Following formulas were used to apportion the cost by full time care given per patient per day.

**Cost of F.T.C.G per patient per day:-**

Cumulative salary budget of FTCTG for one day

No of beds in the Ward

Part time care givers included were those staff members who dedicate considerable time for their additional duties like administrative, teaching, supervision etc.

This group included a. Clinical faculty

b. Resident doctors c. Nursing supervisor

d. Sanitary supervisor e. security supervisor

An observational study was carried out for a period of one month and activity sampling of the group was done to assess the time spent on patient care activities per day by visiting the ward each day.

**Cost of PTCG per patient per day**

Cumulative salary paid per Hour X Hours spent on patient care per day

Number of beds in Ward

**To study cost incurred on utilities per patient per day**

Major utility services which were studied include water, electricity, Manifold services, laundry services, CSSD services and dietary services.

To study the cost of electricity and water per patient per day average cost of these utilities per square feet was calculated after obtaining relevant data engineering section.

Following formula was used to apportion the cost of electricity and water per patient per day.

**Cost of Electricity per patient per day**

Avg. Cost of Electricity per Sq. Ft Area X Total Sq. Ft Area of Inpatient Block

Total No. of Beds in Inpatient Care Area

**Cost of Water per patient per day**

Avg. Cost of Water per Sq. Ft Area X Total Sq. Ft Area of Inpatient Block

Total No. of Beds in Inpatient Care Area

**Manifold services**

**Cost of manifold services per patient per day:-**

Cumulative cost of Salary /day + Material cost per day

Total Number of beds in inpatient Area

**CSSD Services**

**Cost of CSSD/patient/day**

=Cumulative cost of salary/day +material cost/day  
Number of inpatient beds

**Laundry Services**

Following formula was used for cost of laundry services per patient per day:-

Cumulative cost of salary/day + Material cost/day  
Total no of bed in Inpatient area

**Dietary Services**

Following formula was used for cost of dietary services per patient per day:-

Cumulative cost of salary/day + Material cost /day  
Total No of bed in Inpatient area

**Observations and Results**

Hospital cost information is derived by relating the inputs of resources in monetary terms to the outputs of services provided by the hospital. Cost information is part of the basic information needed by managers and policy makers for making decisions about how to improve the performance of a hospital, where to allocate the resources within or among hospitals, or to compare the performance of different hospitals to one another. Some of the basic reasons for wanting cost information are to improve efficiency, increase effectiveness, enhance sustainability, and improve quality.

**Material cost per patient per day**

**Table 1-Average Material Cost Per Patient Per Day**

S.No	Material	Cost per patient per day( In Rupees)
1	Drugs	121
2	Disposables	34
3	General consumables	44
4	Total	199

Table 1 reveals that the average material cost per patient per day worked out to be Rs199 per patient per day. Average cost of all the four specialities i.e General Surgery, Gen Medicine, Neurosurgery, GE respectively was calculated and same was

done for the cost of drugs, disposables and general consumables.

Table 1 also reveals clearly that the drug cost is the highest i.e Rs 121 per patient per day amongst the material cost. Disposable cost was lowest i.e Rs.34 per patient per day. General consumables cost amounting Rs.44 per patient per day was higher than the cost of disposables but less than the cost of drugs per patient per day.

**Manpower cost**

As per time spent in the ward by different groups, The observation was divided into two groups i.e F.T.C.G and P.T.C.G. Full time care giver (F.T.C.G) included senior residents, Residents, Staff nurses , Nursing Aids, dressers , store clerks etc. who gave their full time care to the patients of the ward. Whereas Part time care giver (P.T.C.G) included consultants i.e professor, Addln. professor, Associate and Assist professor, Nursing supervisors, sanitation and security supervisors who gave part time care to the patients admitted in the ward.

**Figure 1: Cost of Manpower (in rupees)**

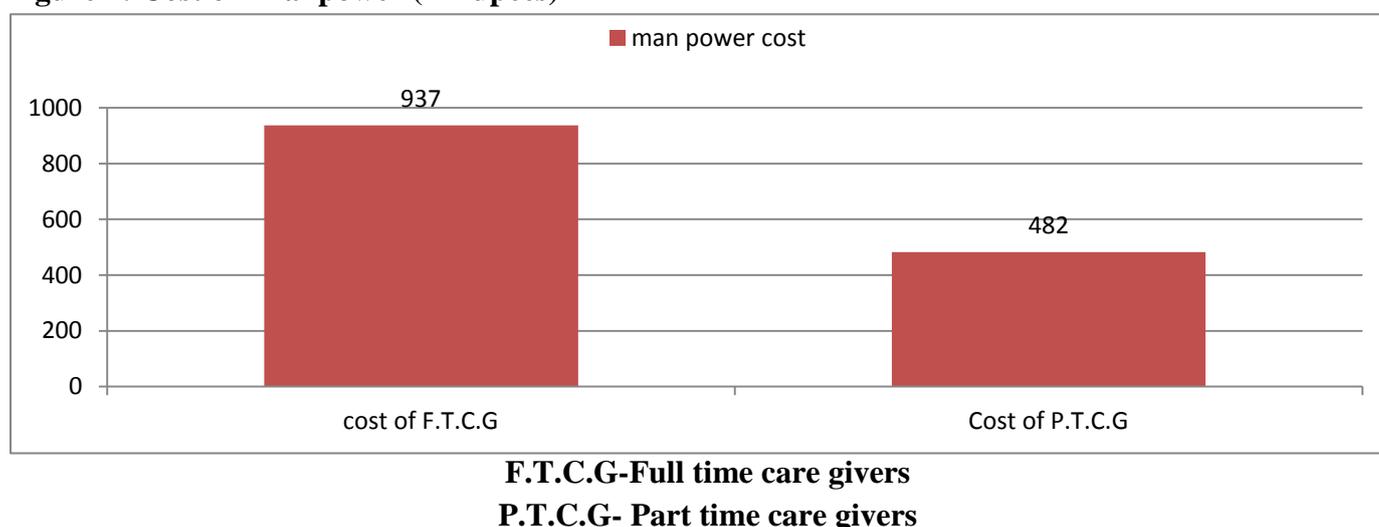


Figure 1 Reveals that the cost of manpower per patient per day was i.e Rupees 937 for the F.T.C.G followed by Rupees 482 for P.T.C.G. After categorizing the manpower into various groups average cost was calculated amounted to Rupees 1419 which is the total manpower cost per patient per day.

**Utility cost**

**Table 2: Showing Cost Of Utility Services (In Rupees)**

S.no	Utility services	Cost of Manpower /pt/ day	Cost of material/ pt/day	Total cost /pt/ day
1	CSSD	43.94	36.19	80.13
2	Linen and laundry	66.50	13.2	79.7
3	Manifold	17.0	21.7	38.7
4	D& T	226.69	70.2	296.86
5	Electricity			124.56
6	Water			0.05
7	TOTAL COST			Rs 620

Table 2 shows that amongst the various utility “Cost” D&T department bears the maximum cost that is Rupees 296.86 per patient per day. On the contrary cost on manifold was the least amounting

to Rupees 38.7 only. CSSD service cost per patient per day was Rupees 80.13 followed by Rupees 79.7 by linen and laundry department.

**Table 3 :** Showing Total Average Inpatient Cost/Patient/Day

S.No	ENTITY	Cost
1)	MATERIAL COST	Rs 199.17
2)	MANPOWER COST	Rs 1419.01
3)	UTILITY COST	Rs 620
4)	TOTAL COST	Rs 2238.18

**Table 4:** Showing Percentage Cost Composition Of Various Cost Centres

s.no	Cost centre	%age cost
1	Drugs	5.42
2	Disposables	1.49
3	Gen consumables	1.97
4	Cost of consultants	11.8
5	Cost of Residents	16.37
6	Cost of Paramedical staff	32.90
7	Cost of supporting staff	2.29
8	CSSD	3.58
9	Linen & laundry	3.56
10	Manifold	1.72
11	D&T	13.26
12	Electricity	5.56
13	Water	0.002
14	Total Cost	100%

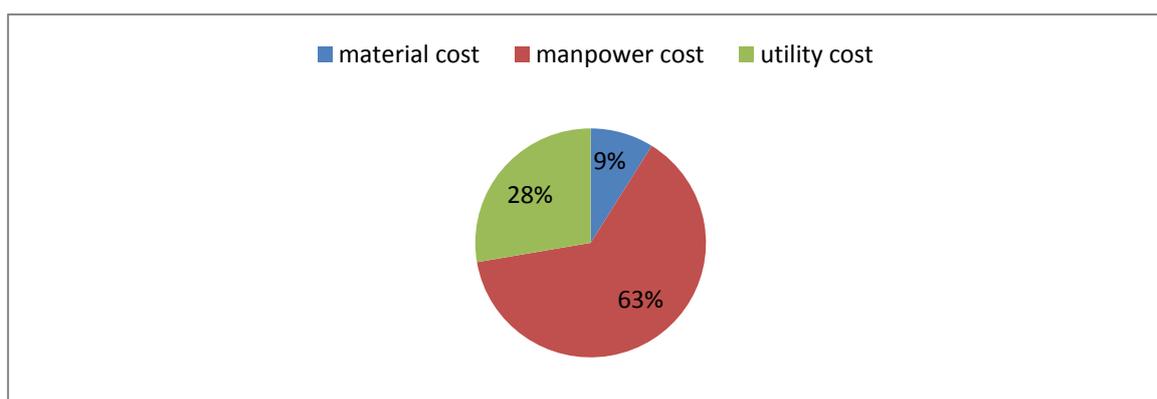
**Figure 2 :-** Showing Total Average Cost For Inpatient Per Day

Table 3, Table 4 and Figure 2 reveals that amongst the percentage cost composition of various cost centres revealed that % age cost of paramedical staff was maximum amounting 32.90% of the total cost followed by 16.37% for residents. Drugs constitute 5.42% of the total inpatient cost followed by general consumables i.e 1.97%. Among utility services electricity costs 5.56% and water 0.02%. D&T department constitutes 13.26% followed by 3.58% by CSSD and least for manifold i.e 1.72%. Total average cost for per Inpatient per day was Rupees 2238. Manpower cost constituted the maximum proportion 63% of total average cost i.e Rupees

1419 followed by utility cost 23% i.e Rupees 620 and material cost 9% i.e Rupees 199.

### Discussion

The costing or cost accounting is a branch of accounting information system that records measures and reports information about costs. It refers to technique and process of ascertaining cost and its use in decision making and performance evaluation. For the purpose of this study, costs were broadly calculated under three major cost centres i.e Material cost, Manpower cost and Utility cost. It has been observed in the present study that the total average cost for

inpatient per day was Rupees 2238. Out of total average cost for inpatient per day 63% is for manpower which amounts to Rupees 1419. Material cost which includes drugs, disposables and general consumables amounts to Rupees 199 which constitute 9% of the total average cost for inpatient per day. Utility services constitute 28% of the total average cost for inpatient per day which amounts to Rupees 620.

As per the results of the present study it is revealed that the average total cost for inpatient per day is Rupees 2238 and average material cost per patient per day is Rupees 199 which constitutes 9% of the total average cost for inpatient per day. Amongst the material cost which is 9% the drugs constitute 5.42%, disposables 1.49% and general consumables 1.97%. Comparing the results of the present study with the study conducted by Syed Amin Tabish et al<sup>5</sup> reveals that drugs and chemicals cost 12.81% of the total cost.

Study conducted by Kanakwalli et al<sup>15</sup> in 2015 on costing of inpatient in MICU reveals that the percentage spent on drugs was 5%. In line with present research, study conducted by Yashpal Sharma et al<sup>4</sup> reveals that in a superspeciality hospital in India expenditure on drugs and disposables as 10.5% of the total average cost for inpatient per day. A similar result of 5.5% was shown by Dinesh Kumar Negi<sup>3</sup> in his study.

Total manpower cost for inpatient per day is Rupees 1419 which constitutes 63% of the total average cost for inpatient per day. A study conducted by Serpil Ozcan et al<sup>23</sup> on hospital workforce reveals that health workforce consumes between 70% to 75% of the recurrent budget allocated to health. Supplementing the results of present study researched by Yashpal Sharma et al<sup>4</sup> reveals that the major cost centre which consumed the hospital resource were salaries i.e 40%. Another study by B plaetse Vander et al<sup>7</sup> reveals that salaries constituted 54% of the total cost for patient care. Comparing the results with the study conducted by Syed Amin Tabish et al<sup>5</sup> reveals that public hospitals spend 61.48% on salary and wages. Research by Kant S et al<sup>13</sup>

reveals that percentage of total expenditure on manpower constituted 67.29%.

Utility services constitute an important part of patient care. In the present study the services included were CSSD, linen and laundry, manifold, D&T, electricity and water. In the present study CSSD service cost amounts to Rupees 80.13 which constitutes 3.58% of the total average cost for inpatient per day. Comparing the results of the present study with the study conducted by Yashpal Sharma et al<sup>4</sup> reveals that the CSSD service cost constituted 1.83% of the total cost. In the present study under research Linen and laundry cost amounts to Rupees 79.7 which constitutes 3.56% of the total average inpatient cost per day. Comparing the result of the present study with the study conducted by Yashpal Sharma et al<sup>4</sup> reveals that linen and laundry constituted 1.18% of the total average cost. Another study conducted by Sinha RP et al<sup>11</sup> at AIIMS the cost of linen consumed per bed per day was Rupees 67 which constituted 1.01% of the total cost. Similar result was seen in the study conducted by Dinesh Kumar Negi<sup>3</sup>. Study conducted by Kant S<sup>13</sup> reveals that cost of linen and laundry material and supplies constitute 1.19% of the total average cost. Another study conducted by Amin Tabish<sup>5</sup> reveals that percentage spent on linen and laundry was 1.55%.

In the present study Dietary service constitute 13.26% of the total average cost for inpatient per day. Cost of dietary material consumed per patient per day is Rupees 70.2 and cost of manpower in D&T department is Rupees 226.69. A study conducted by Choudhary et al<sup>14</sup> of dietary service at a tertiary care teaching hospital at SKIMS, Srinagar in 1999 showed that on an average Rupees 64.69 were spent by the hospital on diet per patient per day which included direct material cost, direct labour cost and overheads expenditure. In the present study Manifold service amounts to Rupees 38.7 per inpatient per day which constituted 1.72% of the total average cost for inpatient per day cost. Comparing the result of present study with another study by Syed Amin

tabish et al<sup>10</sup> reveals that on manifold the hospital spends 0.59% per patient per day. Study conducted by Yashpal Sharma et al<sup>4</sup> in 2002 reveals that the percentage spend on manifold constituted 1.91% of the total cost which is in consonance with the present study.

The cost on water was minimal i.e Rupees 0.05 and the cost on electricity is Rupees 124 which constitutes 5.56% of the total average cost for inpatient per day. In line with the present study the study conducted by Yashpal Sharma et al<sup>4</sup> shows that electricity constitutes 4.28% of the total cost. Another study conducted by Dinesh Negr<sup>3</sup> in AIIMS in 2009 reveals that cost spend on electricity as Rs 217 and on water as Rs 5.

Final result of the study reveals that the total average cost for inpatient per day is Rupees 2238. Comparing the result of present study with another study conducted by Yashpal Sharma et al<sup>4</sup> reveals that the cost of inpatient care per bed per day came out to be Rupees 1000 (approx). In line with the finding of present study researched by Unaize Sagheer et al<sup>8</sup> reveals that the cost per hospital bed per day in both medical and mixed speciality ward amounted to Rs 1,848. The average cost borne by the patient was Rupees 1,071 per day. Another study supplementing the present research conducted by Prinja S et al<sup>9</sup> reveals that the cost of universal health care delivery through the existing mix of public and private health institution would be Rupees 1713. Supplementing the finding of present research study by Rajesh Harshwardhan et al<sup>1</sup> reveals that the total average cost incurred on patient care in the indoor unit under study thus calculated came out to be Rupees 1861.31 per bed per day. A study by Susmita Chatterje et al<sup>9</sup> reveals that the inpatient stay cost was Rupees 614 in the tertiary care hospital, Rupees 1,959 in the charitable hospital and Rupees 6,996 in the private hospital.

### Summary and Conclusion

The advent of technology in medicine has been accompanied with quality consciousness and cost consciousness. Hospital management has a respo-

nsibility towards the community to provide health care services that the community needs of an acceptable level and quality at a least possible price.

A prospective type of study undertaken on patients admitted during the study period in preselected wards. For the purpose of this study, costs were broadly calculated under three major cost centres i.e Material cost, Manpower cost and Utility cost.

The average material cost per patient per day worked out to be Rupees 199 per patient per day. The drug cost is the highest i.e Rupees 121 per patient per day amongst the material cost Disposable cost was lowest i.e Rupees.34 per patient per day. General consumables cost amounting Rupees.44 per patient per day was higher than the cost of disposables but less than the cost of drugs per patient per day. The cost of manpower per patient per day was i.e Rupees 937 for the F.T.C.G (full time care giver) followed by Rupees 482 for P.T.C.G (part time care giver). Final result showed that manpower cost of consultant per patient per day amounted to Rupees 265. Utility "Cost" D&T department bears the maximum cost that is Rupees 296.86 per patient per day. On the contrary cost on manifold was the least amounting to Rupees 38.7 only. CSSD service cost per patient per day was Rupees 80.13 followed by Rs 79.7 by linen and laundry department.

Final results of the study revealed that Total average cost for per Inpatient per day was Rupees 2238. Manpower cost constituted the maximum proportion 63% of the total average cost i.e Rupees 1419 followed by utility cost 23% i.e Rupees 620 and material cost 9% i.e Rupees 199.

In conclusion the study establishes that manpower cost constitute the maximum proportion of the total average inpatient cost. There is a need for hospital managers to frame strategies for effective and efficient use of manpower so that inpatient cost can be marginalized to save resources which can be utilized for patient betterment scheme and to provide subsidized care to the poorer section of society.

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