

# A Cost Analysis Study of Inpatient Care Services at a Large Tertiary Care Teaching Institute at New Delhi, India

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## ABSTRACT

A study was carried out at a large tertiary care teaching institute at Delhi to estimate the cost of medicines and surgical consumables to the hospital and the out of cost to in-patients, during the course of their stay at the hospital.

The study was conducted in the year 2007 and a total of 174 cases were included in the study fulfilling the selection criteria. The total length of stay of all the patients under study was 2235 days.

Total average cost incurred on patient care in the indoor unit under study thus calculated came out to be ₹ 1861.31 per bed per day.

The final average figure arrived at for cost to the hospital/bed/day in this study is ₹ 834.74 and cost to the patient/day came to ₹ 1026.57 on account of the Medicines, Surgical consumables and Crystalloids.

The maximum total cost toward patient care came to ₹ 10958.84 for ICU. Whereas the lowest cost of ₹ 175.46 was for the psychiatry.

This study helped us to know that how much it costs in terms of cost per bed per day to treat in-patients in selected specialties and in a general ICU as well.

**Keywords:** Costing, Inpatients, Cost per bed per day, Cost to hospital, Cost to patient.

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## INTRODUCTION

The advent of technology in medicine has been accompanied with quality consciousness and cost consciousness. Hospital management has a responsibility toward the community to

provide healthcare services that the community needs of an acceptable level and of quality at the least possible price.

A study by price Waterhouse Cooper has shown that in the US, the average cost of healthcare has increased by 13.7% in the year 2001.<sup>1</sup> Increase in the need despite the increased cost of healthcare, has at the same time not witnessed the funding to go up proportionately.

India being one of the developing countries of the world, the main health concern is the utilization of resources on a rational basis. The hospitals consume about 80% of total health budget.<sup>2</sup> It is also a known fact that out of the recurring expenditure in the hospitals, the materials consume about 30 to 40% of total budget.<sup>3</sup>

WHO too has addressed the issue of financing the health care delivery system with main objective of considering alternative ways in assuring health for all. It said that costing exercises could be an important tool for estimation and projection of budgetary demands. They concluded that there was lack of information on these aspects in developing countries and stressed the need for strengthening the research capability in this area.<sup>4</sup>

The aim of the study was to do a 'A Cost Analysis Study of Inpatient Care Services at a Large Tertiary Care Teaching Institute at New Delhi, India'. And the objectives were:

1. To identify the major cost centers, under material and supply budget, in different representative indoor units of the study setting.
2. To determine the cost per bed per day, incurred by the hospital at present, with available current Material and supply budgetary allocation in providing in-patient care services.
3. To determine expenses incurred by patients on medical and surgical items during hospital stay per day.

## Methodology

An observational study for 15 days was carried out to understand the study areas and to understand the working. It helped in gaining familiarity with the study area and to established a rapport with the staff working in the area, as well.

Representative Indoor units of a Large Tertiary Care Teaching Institute were identified for this descriptive Observational study, for which Ethical clearance was obtained from the Ethics Committee of the Institute.

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Indoor units were stratified for the study as follows:

- Medical disciplines
- Surgical disciplines
- ICU

Out of these, following representative indoor units were selected:

- Medical disciplines
  - Medicine
  - Pediatrics
  - Dermatology
  - Psychiatry
- Surgical disciplines
  - Surgery
  - Orthopedics
  - Obstetrics and Gynecology
- ICU

### Sample Size

It was decided that for the study the sample size should be 15% of the total bed strength of the hospital.

The bed strength of the hospital was as follows:

- General beds: 807
- ICU beds: 54                      Total = 861

Thus, the sample size came to:

- General beds: 121
- ICU beds: 8                      Total = 129

No. of beds included in the study from different identified indoor units were drawn in Table 1.

Bed nos. were chosen from indoor units applying the principle of:

- Stratified random sampling method—for stratifying indoor units
- Random sampling method—for choosing the bed nos.

All the patients admitted on the identified beds in the indoor unit during study period were included in the study.

Cases admitted during the study period but discharged even after the study period were also included.

But cases admitted on the selected beds, before study period and continuing through the study duration were not included.

Calculation of the cost: a total of 174 (161 + 13) cases were included in the study fulfilling the selection criteria.

**Table 1:** Specialty wise break-up of beds drawn as sample

Sl. no.	Department	No. of bed
1	Medicine	24
2	Obstetrics and gynecology	26
3	Surgery	24
4	Pediatrics	18
5	Orthopedics	12
6	Dermatology	9
7	Psychiatry	8
8	ICU	8
Total		129

Cost incurred by Hospital and patient on Medicine, Surgical consumables and Crystalloids were calculated based on the standards enunciated by the TCS Study<sup>5</sup>:

### Cost to the Hospital<sup>5</sup>

The detail record of consumables were obtained from ward record held with sister-in-charges for the said study duration. For this, study items being used in the IPD (wards) under the head of medical, surgical and crystalloid stores only, were taken into account to calculate the cost to the hospital on consumables in direct in-patient care during their stay.

In a ward there are two types of consumables:

1. One which can be directly accounted per patient, e.g. medicines.
2. There are certain common use items which can not be calculated patient wise, e.g. cotton.

Keeping in mind this pattern of use it was decided that the total items under study be calculated as below to arrive at the cost per bed per day.

The total items and their quantity consumed in a particular study ward during the study duration was compiled from records obtained as mentioned above.

It was decided to prepare a list of all the consumables (medical, surgical and crystalloids), based on the Ward Record [LIST: A: Specialty Wise Record of Consumables] for that duration, to calculate the total cost of consumables used in that indoor unit/specialty. Thus, total monthly consumption record was made.

Based on the unit price as per the approved rate list for the said duration available with stores office, as per the rate contract of approved items, total cost was calculated. Total no. of beds in that specialty was multiplied by the bed occupancy rate to ascertain the beds on which the items would have been consumed. Then cost to the hospital per bed per day was calculated, by simple arithmetic calculation for those items, ward/specialty wise, for the study duration.

### Cost to the Patient

Case record/case sheets of all the cases fulfilling above mentioned criteria were. Following steps were followed to calculate the cost to the patient:

- Based on the nurses daily record in the case sheets, Patient specific consumption record was created = list B
- Out of this, items purchased by the patient were identified and separated by comparing the lists A with B

For all the patients under study (department wise), their case sheets were studied in great detail to make out clearly the items which were not present in the consumption list of that ward (prepared as mentioned in the preceding step). The items (medical / surgical) which were not mentioned in the ward record, but were mentioned in the Case Sheets (Nurses Daily Record and Input/output Chart), were presumed to have been purchased by the patients.

**Table 2:** Average length of stay: specialty wise

Sl. no.	Specialty/areas	Total no. of study beds	Study bed as % of total bed	*No. of patient on study beds	*Total no. of days	Average length of stay in days
1	Dermatology	9	27.58%	6	194	32.33
2	Psychiatry	8	30%	7	177	25.28
3	Orthopedics	12	28.57%	18	387	21.5
4	Medicine	24	26.66%	18	257	14.27
5	Pediatrics	18	30.58%	33	362	10.96
6	Surgery	24	28.12%	42	421	10.02
7	Obs and Gyne	26	30.37%	37	370	10
8	ICU	8	14.81%	13	67	5.15

\*No. of patients admitted on these beds during observation period and included as per inclusion criteria; \*\*Total no. of days of hospital stay of all patients; who were included in the study

**Table 3:** Cost to hospital

Sl. no.	Name of the specialty	Cost to hospital per bed per day
1	ICU	3700.39
2	Medicine	1124.14
3	Pediatrics	718.22
4	Surgery	357.01
5	Orthopedics	323.11
6	Dermatology	173.43
7	Psychiatry	143.91
8	Obs and Gyne	137.68

**Table 4:** Cost to patient

Sl. no.	Name of the specialty	Cost to per patient per day in ₹
1	Medicine	160.81
2	Surgery	136.86
3	Orthopedics	270.03
4	Obs and Gyne	76.64
5	Pediatrics	54.35
6	Psychiatry	31.54
7	Dermatology	223.91
8	ICU	7258.45

- The items were thus identified and quantified. Cost incurred by the patient on medical and surgical items was calculated considering the prevailing MRP.
- Expenses incurred by all the patients in the specialty were added = [C] Specialty wise — Out of pocket expenses.
- Total no. of indoor days of all the patients under study were added = [D].
- Then expense incurred by the patients per bed per day, specialty wise, was derived as below:

For example, C/D

All the cost thus obtained as of now were calculated department wise. These were then added up to calculate total cost per bed per day (both the cost to hospital and cost to the patient) on consumables for direct inpatient care. The data thus obtained was reflective of the total cost of inpatient care services at the hospital across the departments.

## Overall Cost

Overall cost was derived by adding the cost to the hospital and cost to the patient. Thus, cost on account of medicines, Surgical consumables and Crystalloids was calculated under following heads:

- Cost to the hospital per bed per day
- Cost to the patient per bed per day
- Total cost per bed per day (for the representative indoor units of the hospital).

## OBSERVATIONS AND DISCUSSION

### Some Incidental Observations

A total of 174 cases were included in the study fulfilling the selection criteria. The total length of stay of all the patients

under study was 2235 days. Specialty wise distribution of beds and cases included in the study and ALS as observed for the different specialty/area under study are shown in Table 2.

### Calculation of Cost to Hospital per Bed per Day

Based on the results of the total cost to the hospital during the period under study, the total no. of beds in the indoor units under study, total no. of study beds, total no. of study cases on those study beds and the duration of study; the cost to hospital per bed per day was calculated.

Based on the observations following above mentioned steps, the cost to hospital per bed per day, as obtained is summarized specialty wise in the following Table 3.

ICU emerged out as the most cost intensive indoor unit under study followed closely by medicine and pediatrics.

### Calculation of out of Pocket Cost to Patient Per Day

Based on the results of the total cost to the patient during the period under study and the total duration of stay for the respective specialty; the cost to patient per day was calculated.

The cost thus obtained, i.e. out of pocket cost per patient per day specialty wise is being summarized in the following Table 4.

ICU emerged out as the most and very cost intensive indoor unit under study. However, it is pertinent to mention here that the Casualty and OT were out side the scope of study.

The final average figure arrived at for cost to the hospital/bed/ day in this study is ₹ 834.74 and cost to the patient/day

**Table 5:** Specialty wise break-up of total cost

Sl. no.	Specialty	Total cost per bed/day
1	ICU	10958.84
2	Medicine	1284.95
3	Pediatrics	772.58
4	Orthopedics	593.14
5	Surgery	493.87
6	Dermatology	397.34
7	Obs and Gyne	214.32
8	Psychiatry	175.46

came to ₹ 1026.57 on account of the Medicines, Surgical consumables and Crystalloids. Sharma YP (1997) in his study observed that the Total cost (direct and indirect) for inpatient care in the specialty of medicine was between ₹ 875 to 950 for the hospital.

Kannaraj V in a study of Neonatal Services at AIIMS in 1996 calculated the daily Neonatal Intensive Care Unit bed cost of ₹ 1408 per day which reflects the direct cost and overhead both.

Peter MC did a costing study in which he observed the ward cost for 159 patients staying 738 inpatient days, to be \$ 58,280.

### Total Cost of Medicines, Surgical Consumables and Crystalloids for Providing Medical Care in Different Specialties

All the cost thus obtained as of now were calculated department wise in two heads, i.e. cost to hospital and cost to patient. To arrive at the total cost, these two components were added (both the cost to hospital and cost to the patient). The data thus obtained was reflective of the total cost of inpatient care in the hospital across the departments.

The total cost per patient per day thus arrived are shown in the following Table 5.

The specialties of ICU, medicine and pediatrics emerged as biggest component as far as total cost is concerned.

Total average cost incurred on patient care in the indoor unit under study thus calculated came out to be ₹ 1861.31. The maximum total cost toward patient care came to ₹ 10958.84 for ICU. Whereas the lowest cost of ₹ 175.46 was for the psychiatry.

### Relative Proportion of Cost to Hospital and Out of Pocket Expenditure Borne by the Patients in Total Cost — Specialty Wise

From the costs calculated so far, calculations were made to ascertain relative percentage of expenditure borne by the hospital and the patients to avail medial care in different

**Table 6:** Percentage of cost borne by hospital and patient

Sl. no.	Specialty	Cost borne by the hospital (%)	Cost borne by the patient (%)
1	Pediatrics	92.96	7.03
2	Medicine	87.48	12.51
3	Psychiatry	82.02	17.97
4	Surgery	72.28	27.71
5	Obs and Gyne	64.24	35.76
6	Orthopedics	54.47	45.52
7	Dermatology	43.64	56.35
8	ICU	33.76	66.23

specialities. The hospital was providing 92.96% of cost toward patient care in the specialty of pediatrics, whereas for medicine it was 87.48% of total cost followed by psychiatry which was 82.02%. Results are presented in the following Table 6.

At the same time, the cost being borne by the patients was highest, i.e. 66.23% in the ICU followed by dermatology and orthopedics which were 56.35 and 45.52% respectively.

### CONCLUSION

A total of 174 cases were included in the study fulfilling the selection criteria. The total length of stay of all the cases under study in days summed up to 2235 days in the indoor units under study.

The overall ALS across the specialty under study turned out to be 16.19 days.

Total average cost incurred on patient care in the indoor unit under study thus calculated came out to be ₹ 1861.31 per bed per day. The maximum total cost toward patient care came to ₹ 10958.84 for ICU. Whereas the lowest cost of ₹ 175.46 was for the psychiatry.

Cost to hospital per bed per day came to be highest for the ICU at ₹ 3700 followed by the specialty of medicine at ₹ 1124 whereas it came to ₹ 143 for psychiatry, the lowest.

At the same time the out of pocket cost to patient was again highest for the ICU at ₹ 7258 followed by dermatology at ₹ 223. It was minimum for the specialty of psychiatry again, at ₹ 31.

### REFERENCES

1. The Factors Fuelling Rising Healthcare Cost, Price Waterhouse Cooper, April 2002.
2. Bukhari I. A cost accounting in hospital, Journal of Health and Population, Perspective and Issues 1990;13.
3. Gupta S, Kant S. Hospital Stores Management, An Integrated Approach 2004.
4. Bukhari IA. Developing a methodology for undertaking cost studies in an indian hospital. Dissertation for PGDHHSA, London.
5. Design of a costing system, AIIMS, TCS, 1987.