

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Study On Linen Costs and Utilisation in A Tertiary Care Hospital.

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### ABSTRACT

A sick person coming in the hospital gets tremendously influenced and soothed by the aesthetics or cleanliness of the surroundings and the linen. On the contrary, dirty linen tends to result in psychological dissatisfaction. The Linen and Laundry service is an important utility service which not only helps contain the hospital infections but also contributes to the image of the hospital. While it may not be an option that comes to mind for many, one place that savings can frequently be found is through linen management. Linen utilization is a near-invisible budget item, but it can painfully pinch already tight budgets. Having systems in place can help track and benchmark scrubs that are being stolen, trashed, or even hoarded. This data combined with your controls and staff education can help you manage your linen costs. Many hospitals had discovered that linen used in the hospital consumes approximately 2 % of total expenses. With this as **Aim**, a study was conducted to know the average linen consumption in a General ward and the ICU at a large tertiary care teaching hospital per day and the cost of disposed linen at the end of 6 month period. Observations of facilities, Procedures adopted of distribution, Flow pattern of work, and Overview of documents. In our study, the Average Length Of Stay of the General ward came out to be 7 days and, per bed per patient linen consumption was 4.487 kg/bed/patient. The Average Length Of Stay for the ICU came out to be 3 days and, per bed per patient linen consumption were 9.816 kg/bed/patient. The cost of linen washing per bed per patient of the ward and ICU was Rs. 56/bed/patient and Rs. 123 /bed/patient respectively.

**Keywords:** Linen Utilization, Cost per Kg per Bed-day, Laundry, Laundering System, Bed Occupancy

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## INTRODUCTION

Today's rapidly changing and uncertain health care environment has created the need for continuous assessment of hospitals the way they are running. Efficiency in the provision of medical care has become more important than ever before. The ultimate challenge for any organization is to achieve success in this turbulent environment. For most organizations success means that the organization has been successful in its mission. In the changing scenario, the hospital management will have to make strides to bring excellent skills in the management for meeting the increasing cost of maintenance of hospitals, maintaining expectations of people in specialized care and most important rapid technological strides in the medical arena. [1]

Linen & Laundry services constitute one of the most important supportive services in a hospital. Globalization, privatization, need for quality assurance in health care institutions, increase in knowledge, expectations, needs, demands and requirements of clientele and staff are some of the factors which make the laundry services of utmost importance in health care organizations.[2]

Laundry System: The word "Laundry" is derived from Latin, 'Lauderer,' meaning a person who washes clothes. All reusable linen is thoroughly cleaned with bleaching powder/ caustic soda and disinfected using disinfectants depending upon the type of linen in hospitals. Most private hospitals today rely on outside central laundries to provide the processing of their linens. It's not uncommon to see operating budgets of hospital Linen Distribution Departments running \$1 to \$2 million annually. It's also not uncommon to see savings potential in these departments of 10% to 20%. Many of these hospitals have not maximized their savings opportunity as it relates to the distribution and utilization of linens. In the linen management world, metrics play a key role in determining whether or not a Linen Distribution Department, and hospital, is operating at peak performance and getting the most out of their linen buck. [3]

Methods of Laundering Business:[4]

- The Contract system: Hospital owns the linen but has no means of laundering. They hire contractor whose job is to collect linen and after laundering deliver it to the hospital.
- The Rental system: Hospital hires laundered linen from contractor.
- Cooperative system: Single laundry caters for a number of Hospitals.
- In-plant system: Hospital owns and runs its own mechanical laundry services
- Linen requirement for hospitals.

### Linen Requirement For Hospitals:

Linen required in different areas constituting following items: Indoor adult wards: 1) Bed sheets 2) Draw sheets 3) Pillow covers 4) Blankets 5) Patient's clothes 6) Patient's towels. Ordinarily linen is changed daily or at times more than once daily if necessary, for e.g. Intensive care patients, incontinent patient, oozing of blood, soiling due to vomiting, diarrhea etc. Blankets are not changed. In many hospitals linen is changed alternate day, twice in a week or even less frequently. For daily change, one requires six sets of linen. Circulation pattern of these sets is as follows, 1) One set which is being used by the patient 2) One set which was removed on the same day for sending to laundry 3) One set i.e. previous day's set in the laundry for washing 4) One set in the linen cupboard of the ward for next day's use. 5) Two sets for work and emergency requirement. [5]

Traditionally, for laundering purpose, linen is measured in terms of weight rather than in numbers or size of articles. Linen requirements of general hospitals vary from 3.5 to 7 kg per bed per day in western countries. The average for general hospitals in India is about 3.5 kg per day. It should be determined more definitely by analysis of requirements by each hospital. The above figures are for purposes of laundering processes and are for dry weight. On an average the percentage by weight of different types of linen are as follows: [6]

- Flatwork (sheets) – 70 per cent
- Rough finish (towels, OT and labour room linens) – 22 per cent
- Hand finished 8 per cent.

Cost containment in use of linen can be achieved by: [7]

- Proper accounting
- Not storing too much of linen – thefts are common and may be difficult to identify.
- Keeping soiled linen under lock and key to avoid pilferage.
- Keeping clean linen in cupboard to avoid theft
- Not giving away control of linen to labour staff.
- Mending minor damages on time
- Using torn large sheets for other uses after repairing e. g. a) as draw sheets b) for paediatric patients c) Mops etc.

Amount spent on maintaining good linen and laundry services is an investment and not wasteful expenditure.[7]

Most of the private hospitals that outsource their linen processing are on a rental linen program where the laundry owns and “rents” the linen to the hospital. Laundries charge hospitals based on either a per pound basis, by the piece basis or a combination of the two. As discussed above, weighing linens going out (soiled) and coming back (clean) and establishing the acceptable ratio is an essential element to monitor in order to detect loss problems and in taking proactive action to reduce this loss. When a hospital owns their linens (COG) the focus on loss is typically stepped up because linen purchases come to the forefront of the operators and hospital administration. Typically, linen replacement should average anywhere from \$.08 to \$.12 per pound of clean linen. There are factors affecting this metric such as the hospital’s use, or non-use, of disposable items. Another example is scrub wear, where loss can cause havoc if not closely monitored with controls in place such as scrub dispensing machines. [8]

The Linen and Laundry service is an important utility service which not only helps contain the hospital infections but also contributes to the image of the hospital. Clear and crisp linen has a very soothing and assuring effect on the patient’s psyche while dirty linen is bound to cause patients dissatisfaction and negative impressions about the entire hospital. It is, therefore, essential for every hospital to maintain high standards of linen and Laundry service so as to ensure full satisfaction of clients, both external (patients/relatives) and internal (doctors/nurses/technicians). [9]

According to Justin Monson, General Manager for Crothall’s Rome plant, the key to controlling laundry expenses is to shift the mindset from a cost-per pound mentality to a linen utilization mentality, the actual amount of linen used by the hospital. With this as need for the study and the problem that was seen in the hospital, a study was conducted to analyze the amount of linen that gets condemned in a hospital.

**Aim-** To study the linen consumption pattern in one General ward and one ICU at a large tertiary care teaching hospital.

**Objectives- 1)** To study the process of Linen distribution. 2) To study the linen consumption in a General ward and the ICU

## METHODOLOGY

Observations of Procedures adopted for distribution, Flow pattern of linen changing in wards, Overview of documents for purchase and disposal, and Documentation of findings.

In this hospital, linen department has two important subdivisions bulk linen and soiled linen. Bulk linen department deals with procurement and storage of new linen. Soiled linen department deals with receipt of soiled linen from various areas of the hospital, their dispatch to laundry, receipt of fresh linen from the laundry and distribution within the hospital. Repair and stitching and final Condemnation of used linen is also done in the linen department. **Duration of study** – For six months, April-September 2014.



## RESULTS

The process of ordering of new Linen is, initially, the User department prepares the indent and take approval from the HOD (Head of the Department) /ANS (Assistant Nursing Superintendent). Then, the user department forwards it to the Manager / Deputy Manager Operations, after their approval, the Linen stores issue new linen item to the user dept. The ward stock entry and Linen stock ledger are updated. They are put into use for next couple of months to year. Once the linen completes its life, it is decided by the user department to send for disposal. Condemnation is done once every 2 months on Wednesday and Thursday (Wednesday: Wards, Thursday: OTs), under the supervision of Linen Condemnation Committee.

This hospital has Mechanized Laundry in the hospital: In house laundry service where the hospital has its own laundry department. Mechanized laundry is the best service method of linen supply for a large hospital because:-

- Loss and damage to linen is reduced
- Regular and good quality linen supply is ensured
- Safe handling of soiled and infected linen
- Complete control on washing formula for different types of linen thus quality is ensured.

SOP for washing of linen:

**Soiled & Infected Linen:** Sluicing is carried for removing heavy soil at the ward. The linen is treated with hot water and for stain removal & disinfect chemical (bleaching powder) are used depending upon the type of stain at the collection area.

Hot water at 71 degree Celsius the wash cycle is for three minutes. After rinsing the sluiced linen is wash as normal. If sluicing machine is not available, then it can be done manually after using proper PPE.

**Dirty Linen:** Dirty linen (non-infected linen) is washed in the first batch. Before washing linen should be weighed and each batch should weigh less than or equal to the established guidelines of the washing machine. The contents of detergents for each washing cycle are fixed as per standards.

### Condemnation Process at this Setting:

All departments submit the items for condemnation along with condemnation register from their wards. Four copies of item list are made in register then the items are produced before the committee. Items which is in good condition is sent back. Item which can be repaired or modified into some other item are kept for further processing. Plastic items, Rubber items, Mattress, Pillows are sent for incineration. Linen which is non-repairable are sprayed with India ink and then torn in pieces.

**Table 1:-Total Consumption of Linen during 6 months in One General Ward & one ICU:**

Linen Items	Weight in Grams	Ward(Item Used)	ICU(Total items Used)	Ward(Quantity in Grams)	ICU(Quantity in Grams)
White Bed Sheets	410	3930	6362	1611300	2608420
Colored Bed Sheets	550/700*	3622	5728	1992100	4009600
Draw Sheets	352	6	1242	2112	437184
Pillow Covers	146	2522	3418	368212	499028
Patient Gowns	270	548	2282	147960	616140
Pink Sheets	419	178	668	74582	279892
Pink Pillow	160	138	138	22080	22080
Blankets	1906	12	498	22872	949188
Hamp Cover	260	0	18	0	4680
Moving Screen	1560	6	0	9360	0
Palmet Screen	956	25	0	23900	0
Total		<b>10987</b>	<b>20354</b>	<b>4274478</b>	<b>9426212</b>

\*The average weight of the colored bed sheet used in the ward is 550gm and in the ICU is 700gm.

**Table 2:- Average length of Stay (ALOS) & Bed Occupancy (BO) of General Ward & ICU during study period:**

MONTH	Ward(45 beds)		ICU(17 beds)	
	ALOS	BO	ALOS	BO
April	8	37	3.2	17
May	7	36	3	15
June	7.4	37	3.5	16
July	7.5	38	3	16
August	6.8	37	3.2	15
September	7	38	3.4	17
Average	7.2	37	3.21	16

**DISCUSSION**

Total number of linen used for 6 months in the ward and ICU was 10987 & 20354 respectively. The average number of linen consumption per month of the ward was 1831 and the ICU was 3393. Total quantity of linen consumed for 6 months in the ward and ICU was 4274.478 kg and 9426.212 kg respectively. The average consumption of the ward was 712.413 kg and the ICU was 1571.03 kg. Considering the Bed Occupancy (BO) of the ward was 37 per bed per month consumption was 19.25 kg/bed and per bed per day consumption was 0.641 kg/bed/day. Similarly in ICU the Bed Occupancy was 16 per bed per month and per bed per day consumption was 98.189 kg/bed/month and 3.272 kg/bed/day respectively. The cost of linen washing was 12.50 Rs /kg. The cost of washing and laundering per bed per day of the ward and ICU was 8 Rs /bed/day and 41 Rs / bed /day respectively.

Considering the Average Length Of Stay (ALOS) of the ward was 7 days and, per bed per patient linen consumption was 4.487 kg/bed/patient. The ALOS for the ICU was 3 days and, per bed per patient linen consumption were 9.816 kg/bed/patient. The cost of linen washing per bed per patient of the ward and ICU was Rs. 56 / bed/patient and Rs. 123 /bed/patient respectively.

The most common linen items used in the ward and the ICU were white bed sheets, colored bed sheets, pillow covers and patient gowns. The linen consumption of the ward and ICU during study period was 0.641 kg/bed/day and 3.272 kg/bed/day respectively which was comparable to the Indian standards according to B.M Sakharkar. [6]

The linen consumption was more in the ICU compared to the ward. It was observed that variation in the linen changing policy of the ward and the ICU is an important parameter affecting the consumption pattern. The policy followed in the ward is alternate day changing of linen and in the ICU it is once a day.

The other parameter affecting the linen consumption observed during this study was bed occupancy and bed turnover rate (BTO). BO and BTO was more in the ICU compared to the ward this also causes more consumption. Average length of stay also has significant impact on linen consumption. The cost of linen washing per bed per patient of the ICU was five times more than the ward.

Comparing the ratio between linen weights going out (soiled) against those returned (clean) is a sound way to determine if linens are being misused, discarded, hoarded or theft is occurring. This difference is optimally 9% to 12% in the hospital acute care setting, according to the article “Management by the Numbers 594” by Sarah James and Graham Skinner. An alarming fact is that only 25% of linen loss is due to linen reaching the end of its useful life while 75% is due to theft (ambulance companies), unexplained loss (discard in trash) or misuse, according to the Hospital Laundry Accreditation Council (HLAC). This is critically important if the hospital is operating on a customer owned goods (COG) basis or if the laundry’s linen rental program charges for excess loss. Tracking this metric over time and educating the linen users is essential in controlling these costs.

**Implement a linen committee: [10]**

To truly understand linen costs, your hospital can form a Linen Committee. It will be the Linen Committee’s responsibility to explore any linen related issues, as well as propose and implement solutions. The committee will also be in charge of creating and reviewing linen policies and processes such as bed linen

changes, linen discard, centralized linen, OSHA contaminated linen guidelines, staff education, and linen theft control.

The committee should consist of front line workers who work with linen products every day. The committee should also receive additional hospital support to meet the cost reduction goals.

### **CONCLUSION**

With financial pressures being at the forefront in the minds of hospital leadership, it makes sense to seize saving opportunities whenever possible in the hospital environment. Controlling linen use and cost is a team effort that involves hospital leadership backing the initiatives, linen management monitoring and educating, and clinical departments being mindful of their linen use and conservation.

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