

Study to Assess Linen and Laundry System in Jaypee Hospital, Noida

By

Prachi Rawat

*Dissertation submitted in partial fulfillment of the requirements of the degree
MBA Hospital and Health Management*

Academic year, 2017-2019



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TO WHOMSOEVER MAY CONCERN

This is to certify that **Dr. Prachi Rawat**, student of MBA Hospital and Health Management from The IIHMR University, Jaipur has undergone internship training at **Jaypee Hospital, Noida** from **12th February 2019 to 6th May 2019**.

The Candidate has successfully carried out the study on **Assessment of linen and laundry system in Jaypee Hospital** assigned 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 her future endeavors.

A handwritten signature in blue ink, appearing to read 'Ashok Kaushik'.

Col.(Dr.) Ashok Kaushik

Dean, Academics and Student Affairs

The IIHMR University, Jaipur

A handwritten signature in blue ink, appearing to read 'Neetu Purohit'.

Dr. Neetu Purohit

Associate Professor

The IIHMR University, Jaipur

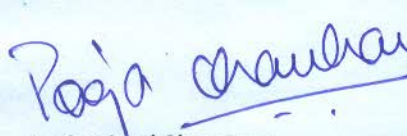
Dated: 06-05-2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Prachi Rawat** from IIMR University, Jaipur, has successfully completed internship in **Quality & System** with Jaypee Healthcare Limited from **12th February 2019 to 06th May 2019**. She was found sincere & hard working during this tenure.

We wish her all the best for her future endeavours.

For Jaypee Healthcare Limited


Authorized Signatory
Human Resources



THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled '**A study to assess linen and laundry system in Jaypee Hospital Noida**', submitted by Dr. Prachi Rawat Enrollment No. IIHMR-U/01/2017-19/0625 under the supervision of Dr. Neetu Purohit for award of MBA in Hospital and Health Management in Health and Hospitals of the University carried out during the period from 12th Feb 2019 to 6th May 2019 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.



Signature

ACKNOWLEDGMENT

Success of any project is never due to an individualistic effort. It requires the active participation of many members to lead to a satisfying conclusion. My dissertation project is no different.

First I would like to extend my heartfelt gratitude to the Deputy General Manager (Quality) at Jaypee Hospital, Dr. Sarbani Mukherjee for providing me the opportunity to undergo my Summer Training in the esteemed organization. Words fall less for the guidance that she has provided at each step and the opportunities given for the judicious learning by allotting the project and always being open for constructive discussions.

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The completion of this undertaking would not have been possible without the wholehearted support of all the staff of Laundry and Purchase Department of Jaypee Hospital.

I would also like to extend a note of thanks to my guide at The IIHMR University, Dr. Neetu Purohit for being available whenever I needed her guidance and support.

ABSTRACT

Laundry service is responsible for providing adequate, clean and constant supply of linen to all users. An efficient and reliable laundry service is of utmost importance to the hospital. Therefore proper evaluation of laundry system becomes imperative. This study was performed at Jaypee Hospital, Noida for a period of 3 months. The objectives of this study included calculating the amount of linen loss in last four years, forecasting the condemnation of linen for the following year (2019), cost analysis of laundry system, calculating the amount of discarded linen in past two year and determining the ideal quantity per order of the top four mostly used linen items in the hospital. The study performed is a descriptive study and both primary research and secondary research was used for data collection. The primary data was collected through direct observation of the laundry process cycle and preparing a checklist for the same. The shadowing trip with the linen staff was conducted in order to understand the entire laundry procedure and linen distribution system. Secondary research was performed using hospital databases, online researches and various reports published by leading government and private healthcare organisations. After analysis, the reason behind linen loss was identified and suggestions were introduced for the same, operational cost of linen and laundry system was calculated and direct and indirect cost were identified, and ideal quantity level for each linen item were to assist in deciding what would be the best optimal order quantity at the company's lowest price.

Keywords: linen and Laundry, cost analysis, condemnation, pilferage, economic order quantity.

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ABBREVIATIONS:

- HAI- Hospital Acquired Infection.
- OT- Operation Theatre
- IPD- In Patient Department
- EOQ- Economic Order Quantity
- GRN- Good Receipt Note
- PO- Purchase Order
- PR- Purchase Requisition
- MA- Moving Average Forecasting technique
- HLAC- Healthcare Laundry Accreditation Council

1. INTRODUCTION

In the healthcare industry, priority is always set on the patients. Every healthcare office and hospital has the goal of making sure their patients are comfortable and ultimately, that they are healthy.

In order to achieve this goal, hospitals must make sure to provide the highest quality linens to their patients. Not only must these linens be of high quality so they are comfortable, they also must be properly and professionally cleaned to make sure any germs or possible toxins have been removed. Thus, ensuring a comfortable and satisfactory experience from patient to patient.

Laundry service is responsible for providing clean, adequate and constant supply of linen to all users. An efficient and reliable laundry service is of utmost importance to the hospital. In today's healthcare facilities, patient expect linen to be changed daily. An adequate supply of clean linen is sufficient for the comfort and safety of the patient thus becomes important.

Modern hospitals are matrix organization with a high investment in terms of capital, labor and resources. It is essential for the hospital administration to provide right material of right quality at the right time. Hospitals that set up In- house laundry operations generally make the decision without carefully identifying and accounting for total linen and laundry costs.

It is a known fact that the patient outcome is a result of efficient and appropriate medical, nursing and allied care along with provision of clean linen, safe environment, congenial atmosphere and good interpersonal relationship. The support services for patient care are indispensable for any healthcare facility to perform in true perspective and facilitate the patient care process.

IMPORTANCE OF EFFICIENT HOSPITAL LAUNDRY SERVICES:

An effective laundry service in a hospital has the following advantages:

- Provides psychological satisfaction to the patients and improves the aesthetics.
- Efficient laundry service reflects a positive image of the hospital and is an important public relations variable.
- It reduces the incidence of HAI by preventing infected laundry from becoming a source of infection.

- It facilitates provision of quality healthcare services.

Linen loss is a huge issue in the healthcare industry. According to HLAC (Healthcare Laundry Accreditation Council), only 25% of linen replacement cost is because of linen reaching the end of its useful life. That means 75% of linen replacement costs are due to theft, ambulance transfers from hospitals to nursing homes, unexplained loss (discarded in trash) or misuse.

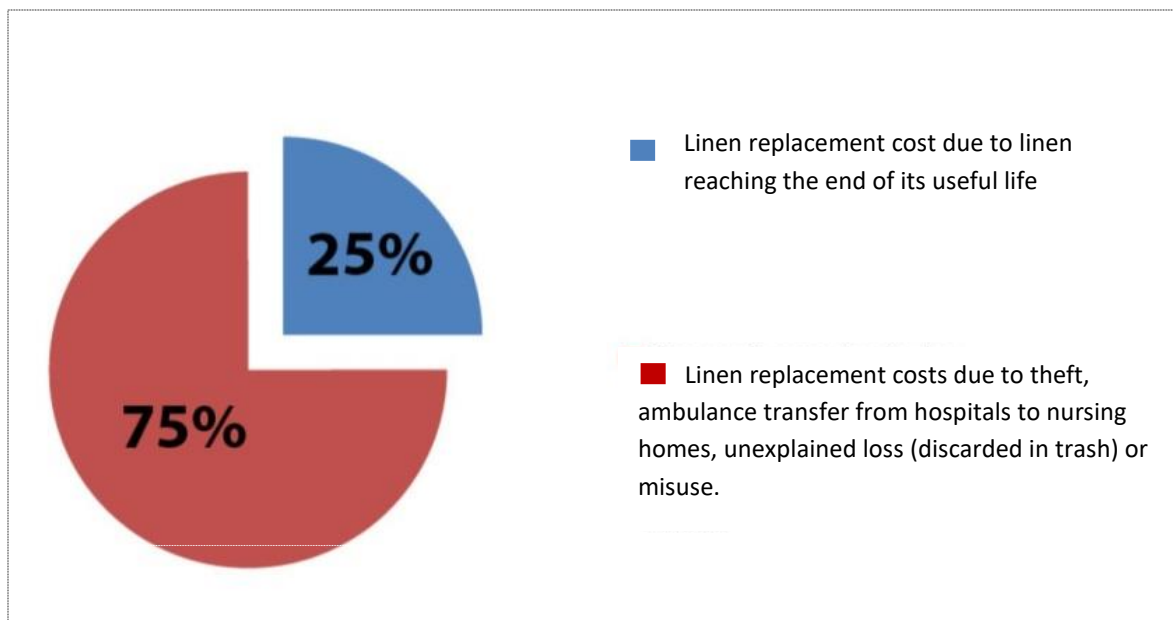


Figure:1 Causes of linen replacement

Linen is a backstage service that is critical for a hospital's functioning. It is an important utility service which not only help contain the hospital infections but also contribute 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.

2. REVIEW OF LITERATURE

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.[1]

Cost finding and cost analysis are the technique of allocating direct and indirect costs. They are also the process of manipulating or rearranging the data or information in existing accounts in order to obtain the costs of services rendered by the hospital. If structured accurately, cost data can provide information on operational performance by cost center. Moreover, knowledge of costs (both unit and total) can assist in planning for future budgets (as an indicator of efficiency) and to establish a schedule of charges for patient services. [2]

A hospital cannot set rates and charges which are realistically related to costs unless the cost finding system accurately allocates both direct and indirect costs to the appropriate cost center. Finally, cost finding and analysis are also of value to management in ensuring that costs do not exceed available revenues and subsidies. It is the best available technique for accomplishing this.[2]

Jon Millar, 2013 in his study “Hospital Linen Management: Saving On Laundry Costs” stated that Laundry Service with financial pressures tops the mind for hospital leadership, it makes sense to capture savings opportunities whenever possible in the hospital environment. Controlling linen use and hospital laundry cost savings is a team effort that involves hospital leadership backing the initiatives, linen management monitoring and educating, and clinical department being mindful of their linen use.

The American Reusable Textile Association reports that 2 percent to 3 percent of a hospital’s budget is spent on laundry services, including all linen and textiles, but some facilities achieve greater savings through efficient processes.

Ricci, Joseph in his study “Best Practices for Reducing Linen Loss, Hotel Business Review”, April 2014; theft or deliberate or inadvertent abuse of textile products are the major causes of their premature removal from service, raising costs.

There are two types of losses- Actual loss refers to intended or unintended theft, abuse and discarding whereas, Artificial loss refers to inaccessible but retrievable inventory; goods are overstocked at the point they are about to be put into service. This wastes storage space and increases vulnerability to theft.[4]

Loelius, Charles. Controlling Linen Loss Is Key to ‘Saving Par,’ American Laundry News, April 17, 2013; stated that when actual losses are consistently identified, you have a clearer picture of how quickly linens wear out, where loss occurs and how to budget for replacements. A sensible replenishment minimum can be developed.

It is estimated that as much as 30% of your linen is lost to abuse, theft, hoarding, the trash or disposed of as Red Bag waste. Therefore, it’s an important endeavor that requires we educate ourselves, as well as our clients, on the value and importance of well-run linen programs.[5]

In the article, “Optimizing Economic Order Quantity,” published by Dave Piasecki in 2001, focused on the economic order quantity. Piasecki mentions that in today’s leading technology, many companies are not taking advantage of the fundamental inventory models. There are various software packages in aiding companies with inventory control, but if the data inputted are inaccurate, it may lead to poor results. In order to have suitable results for any inventory model, accurate product costs, activity costs, forecasts, history, and lead times need to be in place. As a result of bad data, companies have had bad experience with some inventory models, and that is one of the reasons they do not take advantage of the EOQ model.

“Origin of the Economic Order Quantity formula; transcription or transformation?” by (Roach 2005), The Economic Order Quantity (EOQ) formula has been used in both engineering and business disciplines. Engineers study the EOQ formula in engineering economics and industrial engineering courses . On the other hand, business disciplines study the EOQ in both operational and financial courses. In both disciplines, EOQ formulas have practical and specific applications in illustrating concepts of cost tradeoffs; as well as specific application in inventory.

The article, “Using Composite Moving Averages to Forecast Sales” by DJ Rob and EA Silver, states that the demand average of two periods can provide a better forecast than

that of a single moving averages. This method is known as the simplest forecasting method.

Standard Textile Co. Inc., 2008; states that facilities with out discard programs are needlessly rewashing 3-5% of their total linen poundage. For example, a nurse takes a clean flat sheet off of the linen cart, and finds out it has a ripped corner. If that sheet, which was never used with a patient, is then thrown into the soiled hamper, it will most likely get washed and delivered back to another unit, continuing the cycle.

A discard program allows the end user to have the ability to remove that item from circulation and alert the laundry to evaluate the status of the item. The laundry can then decide if repairs should be made, the linen can be used for ambulance squads, or if it should be sold to the rag vendor. Facilities with outside laundries can feel the most significant impact of this program. For each pound of linen that is not washed, 100% of the processing cost per pound is saved by that facility. For example, a hospital with out a discard program, processing 2,000,000 pounds of linen each year, could potentially be spending \$19,200 to wash unusable linen.

Aim: The aim of the study is to evaluate linen and laundry system in Jaypee Hospital, Noida.

Objectives: The following objectives were kept in mind while conducting the study:

- To know the amount of linen loss in last four years in Jaypee Hospital.
- To know the amount of discarded linen in past two year.
- To forecast the condemnation of linen for the following year. (2019)
- To calculate the operational cost of laundry of bed linen.
- To determine the ideal quantity per order of the top four mostly used linen items in the hospital.

3. METHODOLOGY

Research Design: Descriptive Study

Inclusion criteria:**For cost analysis:**

- Laundry cost for only bed linen which comprises of Bed sheet, Pillow covers, Pillow protectors, Hand towel, Bath towel and Blankets are included.
- Cost analysis is done on the basis of different types of room available in the hospital like Multi room comprising of either 4 or 5 beds, twin room, single and deluxe room.

For determining the EOQ level:

- Only the top four linen which are mostly used in the hospital are included. They are Bed sheets, Pillow covers, Patient uniform and Nursing uniform

Exclusion criteria:

- Cost of land and building are excluded from the study
- Minor cost like cost of linen carrying bags, gloves, mouth masks etc. are excluded.

Data Collection:

The study included collection of both primary and the secondary data followed by a comprehensive analysis of the data.

Primary Data:

The primary data was collected through direct observation of the laundry process cycle and preparing a checklist for the same. The shadowing trip with the linen staff was conducted in order to understand the entire laundry procedure and linen distribution system.

Secondary Data:

The sources for collection of secondary data included:

- Jaypee Hospital Database like the database of laundry department, Purchase department, Human Resource department

- Online research for improving and upgrading the laundry services in the hospital was considered.
- Reports of the leading Hospital and healthcare organization were also taken into consideration to improve the laundry services in the hospital.

The data of the study were collected and analyzed using the following methodology:

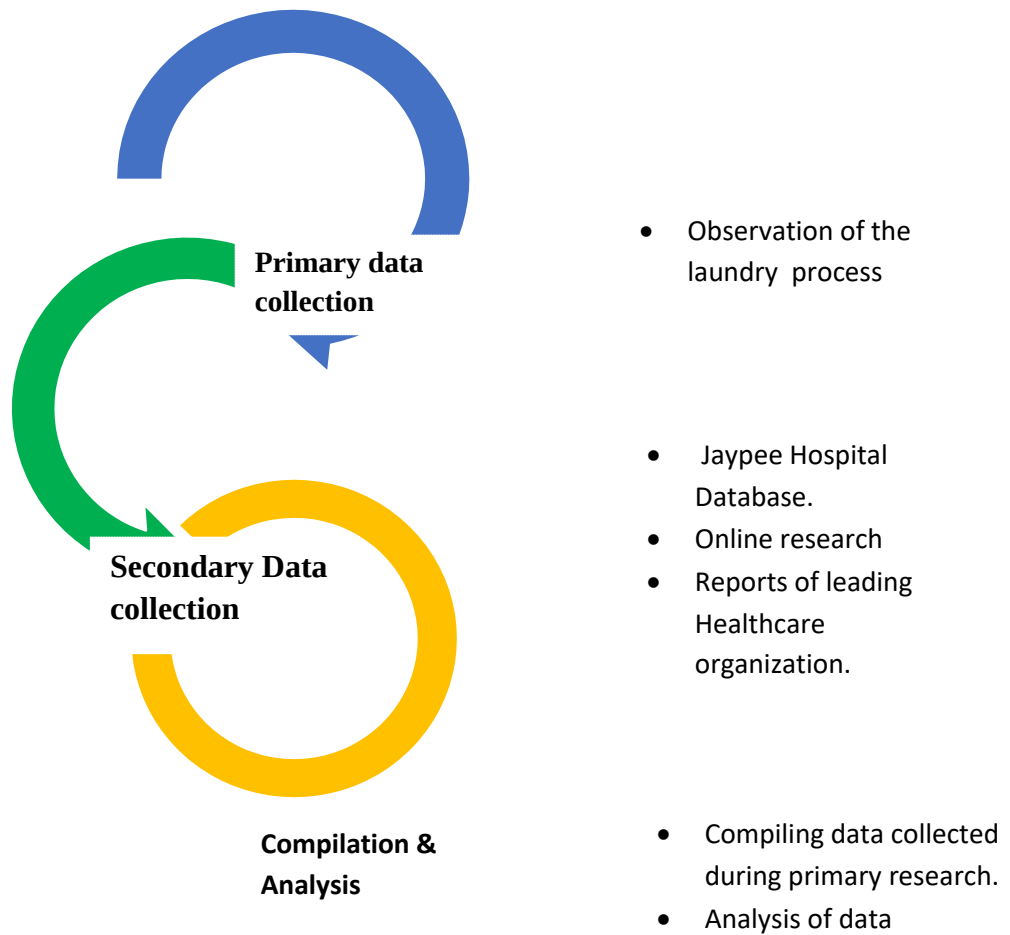


Figure 2: Study Methodology

4. DATA COLLECTION

4.1 LINEN LOSS

For this study the secondary data was collected from the Jaypee hospital Database.

- Total purchase of linen was collected from the year 2014 to March 2019 from the purchase department. It was compiled and calculated to be total of Rs. 1.6 crores approximately.
- After that condemnation data was taken. The hospital had the condemnation report of 2017 and 2018 only. Due to which the only way left to carry forward this study was to take the average of per year and apply it to the previous three years. i.e for the year 2014, 2015 and 2016.
- Current stock of the linen in the laundry department as per March 2019 was calculated and compiled and it turned out to be 5785 in quantity and has the value of Rs. 12 lakhs approximately.
- After this, the amount of linen that were in circulation was calculated (i.e the amount of linen that was being used by the hospital at that time) and it turned out to be 3026 in quantity and has the value of Rs. 29 lakhs approximately. This data was provided by the laundry department itself.

	QTY	TOTAL VALUE
TOTAL PURCHASE FROM 2014-2019 MARCH	73136	16112361.31
CONDEMNATION FROM 2014-2019 MARCH	11440	2809565
CURRENT STOCK IN LAUNDARY AS PER MARCH	5785	1227702.7
LINEN IN CIRCULATION AS PER MARCH	3026	2911558.26

Table1: Data for estimating the rate of pilferage

During the study the whole linen distribution process was observed and analyzed and it was observed that many a times staff believes that the linen is dirty and infected with body fluids and are put in red bags or trash. It was also observed that there was no proper documentation done and maintained at the time of delivering linen to the department or

floor. Which in turn increase the risk of items getting misplaced or stolen. Because there is no authenticity of who is receiving the order and who is delivering. So the person responsible cannot be held accountable if he denies the whole incident.

During the shadowing trip with the linen staff, the area of errors was noted. Without interrupting the process, these direct observations served as the first hand information about the discrepancy in the system.

4.2 Discarded Linen

Jaypee hospital, Noida has a condemnation committee which meets quarterly every year to review the condemnation list proposed by the laundry manager and further inspection of the items are done by the committee members. On discussion and agreement by all the members, the list is approved and condemnation process is started by the condemnation staff.

The condemnation committee has members from various departments like:

1. Chief Operating Officer
2. Laundry Manager
3. Quality Head
4. Bio-Medical Engineering Head
5. Building Maintenance System Head
6. Nursing Head
7. Finance Officer
8. CSSD Head

The data of 2 years 2017 and 2018 was collected as these were the only records available with Laundry Department. The data was compiled and total condemnation of every quarter was calculated.

Months	ACTUAL	3 months MA	5 months MA
Mar-17	584		
Jun-17	271		
Sep-17	443	433	
Dec-17	531	415	
Mar-18	591	522	484
Jun-18	666	596	500
Sep-18	821	693	610
Dec-18	669	719	656
Mar-19	X	745	687
Jun-19	X	669	719
Sep-19	X	X	745
Dec-19	X	X	669

Table 2- Moving average forecasting technique.

On the basis of this, condemnation rate of next year i.e 2019 was forecasted using 5 months Moving Average Forecasting Technique.

Need of condemnation:

- To remove from stock and to destroy/ dispose unserviceable/perished items and items beyond the scope of economical repairs
- To remove the items from the institution
- To follow the practice of clean and healthy environment

4.3 Cost Analysis of Linen and Laundry system

The process of laundry was observed in the laundry department of the Jaypee hospital and all the items and services used in carrying out one wash cycle were recorded in a checklist under the following headings.

- LINEN
- CHEMICALS
- MISCELLANEOUS

Linen included the cost of all the linens provided to the patient i.e bedsheet, pillow cover, pillow protector, hand towel, bath towel and blanket. Since the linen have the shelf life of 300 washes i.e approximately 10 months. The cost of the single use of linen was calculated from this data.

The average number of wash cycle carried out by a single machine in laundry department per day is 10 wash cycles. Minimum of 8 cycles/day and maximum of 12 cycles/day

Cost of chemicals was calculated using the unit price which was taken from the Purchase department of the hospital.

Miscellaneous included the manpower cost, Machinery cost, AMC, electricity, water and gas supply cost which forms the major portion of the Total cost.

Since the cost calculated was for 50 kgs of linen as the machine considered in the study wash up to 50 kgs of linen in one wash cycle. Therefore, to estimate the cost of only the bed linen requires the cost to be break down into per kg cost (as seen in Table)

After that the linens were weighed and the cost estimation was done accordingly.

	S.NO	DIRECT COST	QTY/Month	Volume in 1 pack in (ml)	PURCHASE COST/item	Purchase cost/ml	Required quantity/wash for 60kg machine	cost/wash
LINEN	1	Bed sheets			115.5			0.39
	2	Pillow covers			89.25			0.30
	3	Pillow protectors			147			0.49
	4	Blankets			393.75			1.31
	5	Bath Towel			288.75			0.96
	6	Hand Towel			68.25			0.23
CHEMICALS	7	Super Bright 999L Oxy bleach liquid	4	25000	119.93	0.005	300	1.44
	8	Super Bright HD Ultra detergent	5	25000	84.16	0.003	240	0.81
	9	Super Bright Whitener	4	25000	72.94	0.003	180	0.53
	10	Super Bright sour	4	25000	53.8	0.002	200	0.43
	13	Super Bright EL	7	5000	229.79	0.046	50	2.30
	14	Super Bright EL-81	7	5000	240.86	0.048	90	4.34
	15	Super Bright EL-C	6	5000	125.8	0.025	150	3.77
	16	Super Bright Bleach	4	40000	22.42	0.001	600	0.34
	17	Super Bright Softner	1	50000	87.52	0.002	250	0.44
	19	Super Bright Opal Detergent	4	25000	56.05	0.002	240	0.54
	11	Spot-X cleaning of lipstick/ Nail Polish	1	5000	241.49	0.048	variable	
	12	INK-GO Ink Stain Remover	2	5000	235.41	0.047	variable	
	18	Rust-X Stain Remover	1	5000	117.69	0.024	variable	
MISCELLANEOUS	20	Measuring jar (500 ML)			56.25			0.19
	21	Electricity (3.5 lac/ month)						1167
	22	Gas (20 lac/month)						6667
	23	Water (500rs/1000L) (15000L/day used)						750
	24	Machine						
	25	washer extractor		1	684222			38
	26	domestic stack dryer		1	168300			9
	27	flat work iron		1	5959668			331
	28	automatic folder		1	2511036			140
	29	air vaccum pump		1	146124			8
	30	AMC for 17 machines			90000/mon.			88
	31	Manpower/ month			250000			833
							TOTAL	10050

Table 3: Data entry for cost estimation of laundry services

4.4 Economic Order Quantity level

The Jaypee hospital HIS was used to collect the relevant operational data for past two years which could help in determining the Economic order quantity level for the mostly used linen items.

That are:

- Bed sheets
- Pillow covers
- Patient uniform
- Nursing uniform

EOQ Formula

The EOQ formula is calculated by minimizing the total cost per order by setting the first order derivative to zero. The components of the formula that make up the total cost per order are the cost of holding inventory and the cost of ordering that inventory.

Components of the EOQ Formula:

D: Annual Quantity Demanded

Q: Volume per Order

S: Ordering cost (Fixed Cost)

C: Unit Cost (Variable Cost)

H: Holding Cost (Variable Cost)

I: Carrying Cost

Ordering Cost:

The number of orders that occur annually can be found by dividing the annual demand by the volume per order. The formula can be expressed as:

$$\text{Number of Orders} = \frac{D}{Q}$$

For each order with a fixed cost that is independent of the number of units, S, the annual ordering cost is found by multiplying the number of orders by this fixed cost. It is expressed as:

$$\text{Annual Ordering Cost} = \frac{D}{Q} \times S$$

Holding Cost

Holding inventory often comes with its own costs. This cost can be in the form of direct costs incurred by financing the storage of said inventory or the opportunity cost of holding inventory.

$$\text{Annual Holding Cost} = \frac{Q}{2} \times H$$

Total Cost

Summing the two costs together gives the annual total cost of orders.

$$\text{Annual Total Cost} = \frac{D}{Q} \times S + \frac{Q}{2} \times H$$

$$EOQ = \sqrt{\frac{2SD}{H}}$$

Data was collected from purchase and Human Resource department in order to calculate ordering cost and the actual demand of each item.

5 RESULTS

5.1 Linen loss

FROM 2014- 2019 MARCH	QTY	TOTAL VALUE FROM 2014- 2019 MARCH	PER YEAR	PER MONTH	PER DAY
LINEN LOSS	52885	9163535.35	2290883.8	190906.9865	6363.566

Table 4: Rate of pilferage from 2014 to 2019

The following analysis was made from the data collected:

The amount of pilferage or loss of linen which have no record of their whereabouts is about 52,885 in number from 2014- 2019 till march.

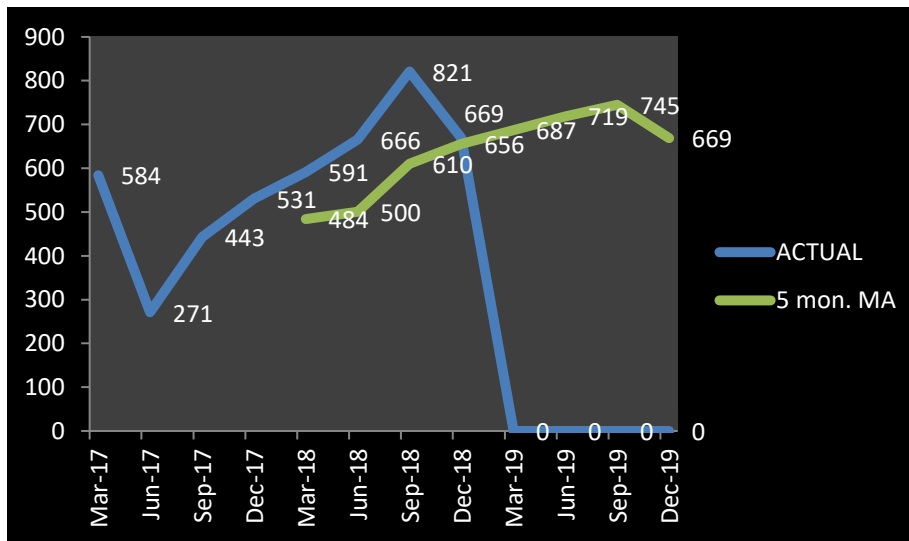
This amount was calculated after adding the amount condemnation of linen done from 2014- March 2019, current stock of linen and linen in circulation as per march 2019. This amount was then subtracted from total purchase of linen done from 2014 till March 2019.

FORMULA = Total Purchase – (Condemnation of linen + Current Stock of Linen +

Linen in Circulation)

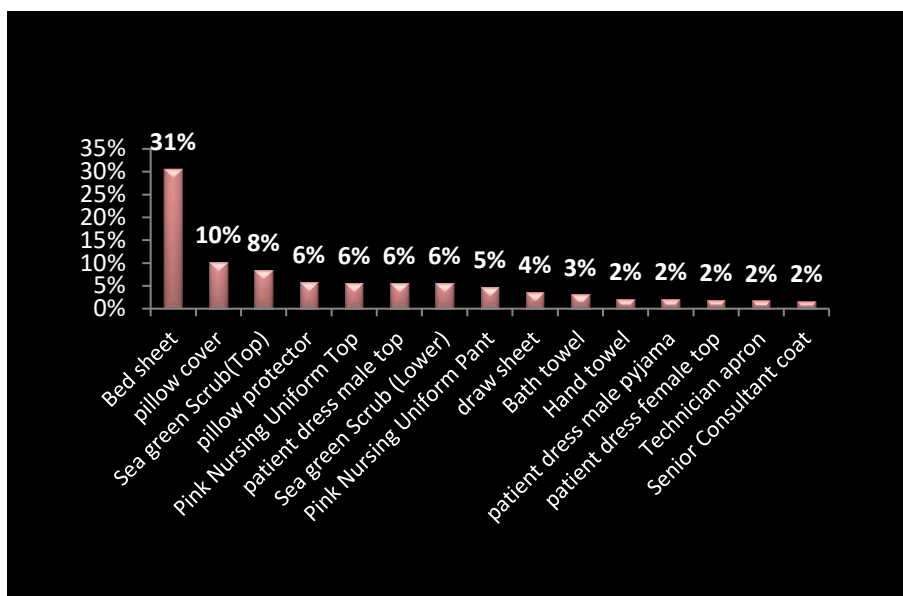
The value of the lost linen costed the hospital around ninety one lakhs sixty three thousand rupees in the last 4.5 years. Which means on an average every year linen worth Rs 22,90,883 goes missing from the hospital. Which accounts for 72 percent of the total linen bought for the hospital in last four years.

5.2 DISCARDED LINEN



The graph shows the condemnation rate for the year 2019 using 5 month Moving Average Forecasting Technique.

Figure 3:-Forecasting for discarded linen for the year 2019



The graph shows that the mostly consumed and condemned linen item is bedsheet i.e 31 % followed by pillow cover 10% followed by scrubs, pillow protector and so on.

Figure 4- Condemnation rate of each linen item

5.3 COST ANALYSIS OF LAUNDRY SYSTEM

	For 50 kg	for 1 kg	for 1 gram
Total cost	10050	201	0.2

Table 5: Division of cost to calculate per kg laundry cost

S.NO	DIRECT COST	MULTI ROOM			TWIN ROOM			SINGLE ROOM		
		Qty	weight (gms)	cost	Qty	weight (gms)	cost	Qty	weight (gms)	cost
1	Bed sheets	2	1000	4k	3	1500	6k	3	1500	10 k
2	Pillow covers	2	200		3	300		3	300	
3	Pillow protectors	2	400		3	600		3	600	
4	Blankets	1	1100		2	2200		2	2200	
5	Bath Towel	0	0		0	0		1	550	
6	Hand Towel	0	0		0	0		1	150	
	TOTAL COST		2700	542.7		4600	924.6		5300	1065.3

Table 5: Cost analysis as per Multi room, Twin room and Single room

Hospital cost information is derived by relating the input 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 decision about how to improve performance of a hospital, where to allocate the resources within hospital or to compare the performance of different hospital to one another.

The study was carried out with the aim to calculate the cost of laundry of bed linens used by an IPD patient per day and the result suggests that the cost incurred was Rs. **542.7** for Multi-room; Rs. **924.6** for Twin room and Rs. **1065.3** for Single and Deluxe rooms.

The difference in the cost of different room is due to the the varying quantity of linen allotted to different rooms.

Multi rooms have been allotted 2 sets of bed sheet, pillow covers and pillow protectors each, whereas no hand towel and bath towel is being provided

Twin rooms have been allotted three sets of bed sheet, pillow covers and pillow protectors each and no hand and bath towel is being provided.

The only cost difference between Twin room and Single room is due to inclusion of One set of hand towel and bath towel each in single room.

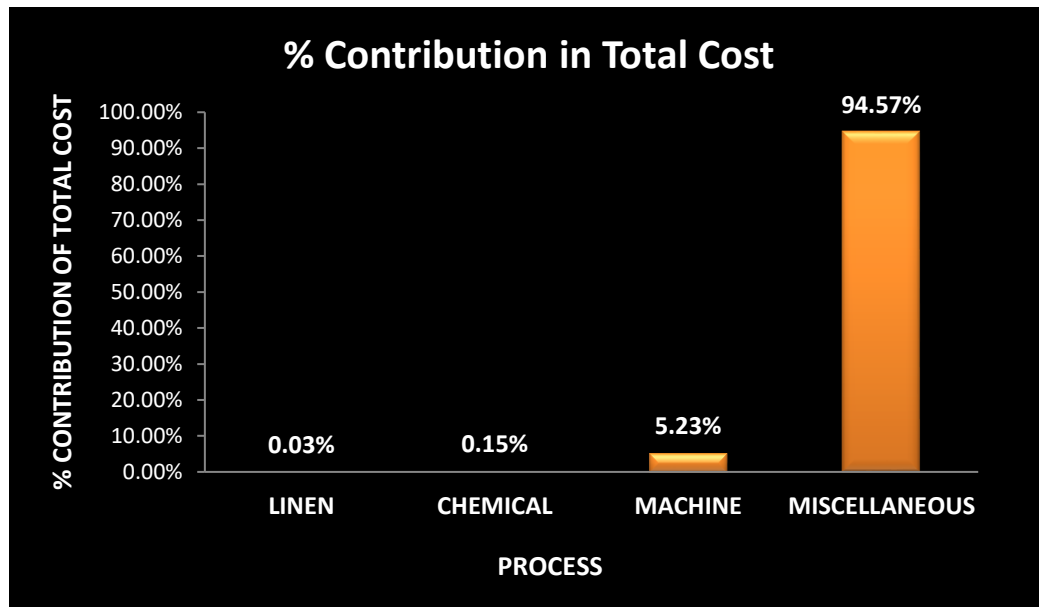


Figure 5- Contribution in the total cost of laundry procedure

The above graph shows the percentage contribution of every part of the laundry process. The graph depicts that the miscellaneous part comprising of indirect cost like (water and electricity cost, gas supply cost, AMC) contributes to about 94% of the total cost. While the machine contribute to around 5% of the total cost.

Therefore, it is evident from the study that electricity cost, water cost, gas supply cost, manpower cost and machinery cost are major input to the laundry department

5.4 ECONOMIC ORDER QUANTITY LEVEL

In case of **BED SHEET**

- **Actual demand (D) = $311 \times 3 = 933$** (as there are 311 functional bed in the hospital and each bed has 3 sets of bed sheet allotted to it. One in use, one in the store and one with the laundry department.)
- Now to determine the **Ordering cost (S)**, following costs were included:
 - Manpower cost (purchase + store) –

There are total of 14 employees in both purchase and store department who are directly related with the work of generating Purchase requisition and then Purchase order and then GRN is made.

The average purchase order made every month is around **1281**.

And the combined salary of all the employee is 6.4 lacs per month.

On calculating the contribution of manpower in order cost is Rs. **500**

- Paper cost
- Electricity cost
- Printing cost

Combing paper cost electricity cost and printing cost for 10 pages on an average. It turned out to be Rs. **22.56**

So, the total ordering cost turned out to be **Rs. 522** approx.

- **Unit cost (C)** is Rs 300 as per the information taken from Purchase department.
- **Carrying cost** will be 10% as it includes:

According to Richardso, Helen: Transportation&
Distribution, December, 1995

warehouse expenses	2%
physical handling	2%
clerical and inventory control	3%
deterioration and pilferage	3%
TOTAL CARRYING COST	10%

- **Holding cost will** be 10% of the unit cost i.e Rs. 30

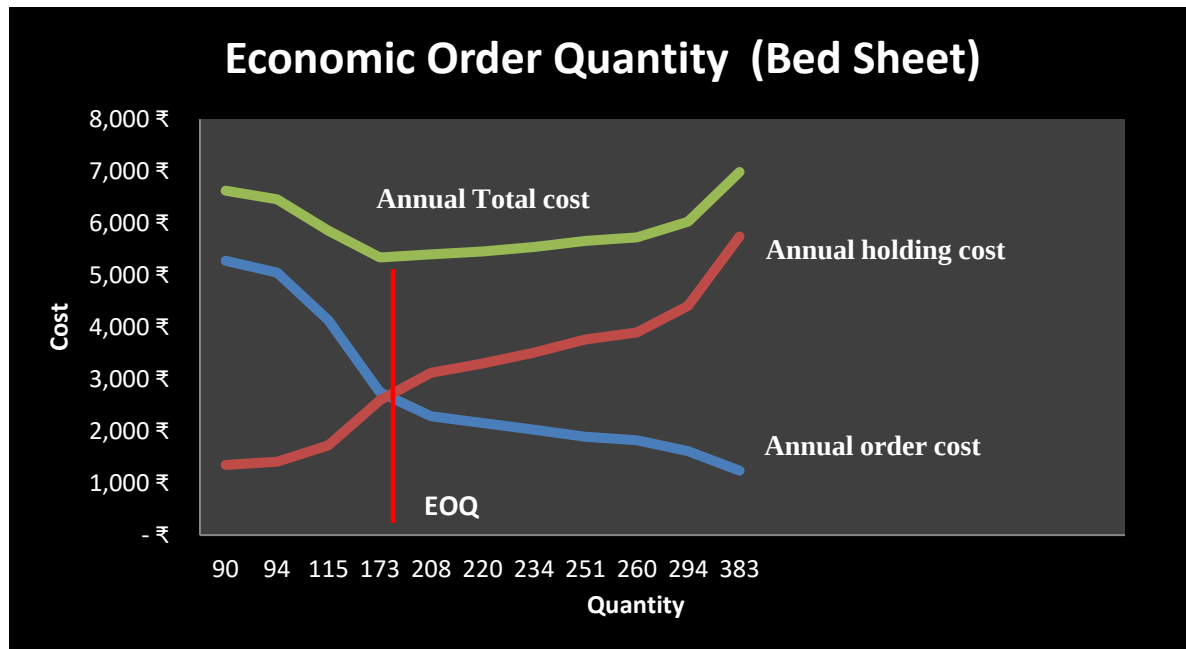


Figure-6 EOQ level for bed sheet

The above graph shows that the EOQ level for bedsheet in Jaypee hospital is 173. At this level we have the minimum holding cost and ordering cost i.e Rs. 2595 and Rs. 2745 each.

PILLOW COVERS

For pillow covers the Volume per order of 2 years is taken.

- **Actual demand (D)** = $311 \times 3 = 933$ same as the bed sheets.
- **Ordering cost (S)** = Rs. 522
- **Unit cost (C)** = Rs. 85
- **Carrying Cost** = 10%
- **Holding Cost** = Rs. 9

On putting the values in the formula, EOQ is calculated to be **328**

However, it was noticed that the volume of order was only reaching maximum to 250 in volume per order.

Therefore to achieve the EOQ level, the hospital needs to order 328 pillow covers to have the minimum holding and ordering cost as shown in the below graph.

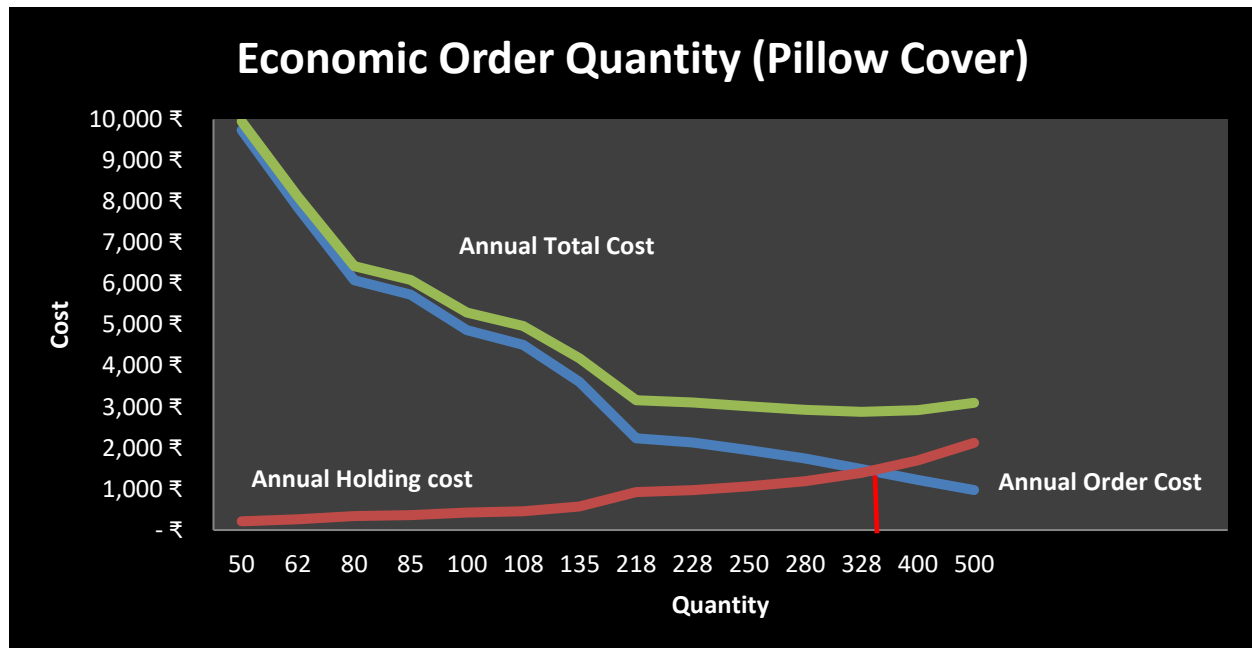


Figure- 7 EOQ level for pillow cover

The above graph shows that the EOQ level for bed sheet in Jaypee hospital is 328. At this level we have the minimum holding cost and ordering cost i.e Rs. 1394 and Rs. 1485 each.

NURSING UNIFORM

For Nursing uniform the Volume per order of 2 years is taken.

➤ Actual demand (D)

- On an average 525 nurses are present in the hospital. Each nurse is allotted with three sets of dresses.

Therefore, demand will be **1575 sets**

- **Ordering cost (S)** = Rs. 522
- **Unit cost (C)** = Rs. 480
- **Carrying Cost** = 10%
- **Holding Cost** = Rs. 48

On putting the values in the formula, EOQ is calculated to be **182**

However, it was noticed that the volume of order was only reaching maximum to 66 in volume per order.

Therefore to achieve the EOQ level, the hospital needs to order 182 nursing uniform to have the minimum holding and ordering cost as shown in the below graph.

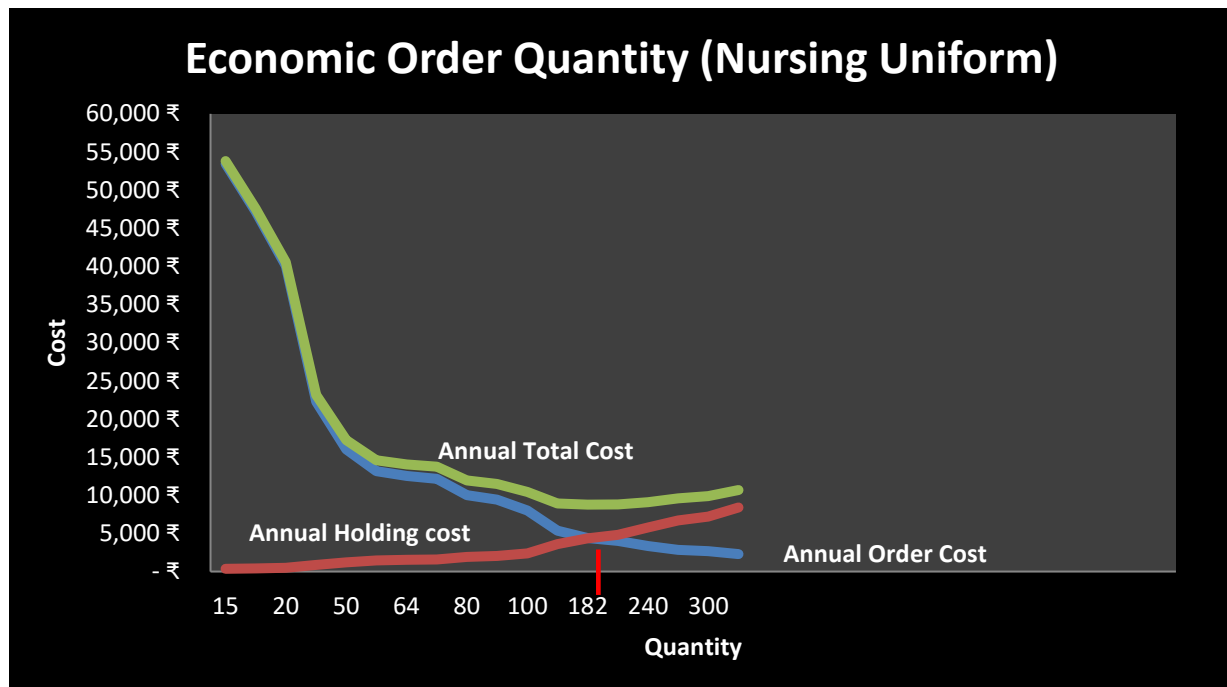


Figure- 8 EOQ level for Nursing uniform

The above graph shows that the EOQ level for Nursing Uniform in Jaypee hospital is 182. At this level we have the minimum holding cost and ordering cost i.e Rs. 4368 and Rs. 4405 each.

PATIENT DRESS

For Patient dress the Volume per order of 1 year is taken.

➤ **Actual demand (D)**

- On an average 2992 In-patients are admitted to the hospital per month.
Each patient is allotted with two sets of dresses.

Therefore, demand will be **5984 sets**

➤ **Ordering cost (S)** = Rs. 522

➤ **Unit cost (C)** = Rs. 550

➤ **Carrying Cost** = 10%

➤ **Holding Cost** = Rs. 55

On putting the values in the formula, EOQ is calculated to be **337**

However, it was noticed that the volume of order was only reaching maximum to 100 in volume per order.

Therefore to achieve the EOQ level, the hospital needs to order 337 patient dresses to have the minimum holding and ordering cost as shown in the below graph.

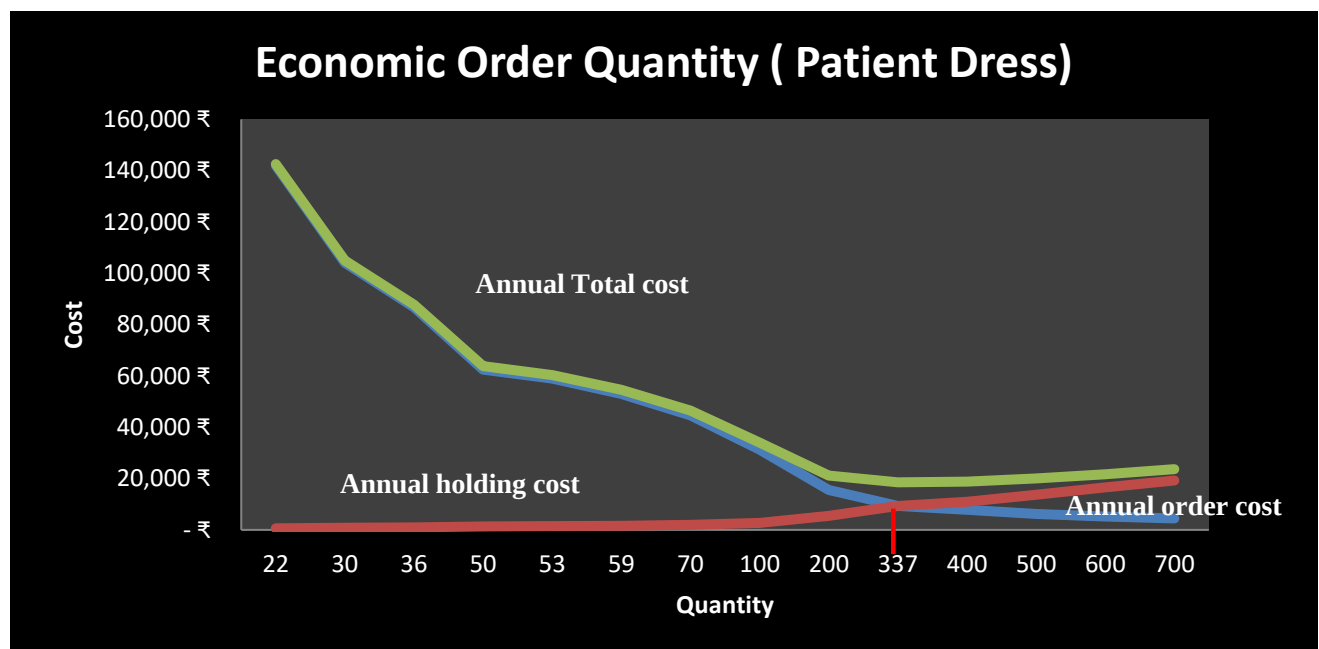


Figure- 9 EOQ level for Patient dress

The above graph shows that the EOQ level for Nursing Uniform in Jaypee hospital is 337. At this level we have the minimum holding cost and ordering cost i.e Rs. 9268 and Rs. 9269 each.

ROOT CAUSE ANALYSIS

- There is no proper policies of Trash audits or any amnesty programs in the hospital to deal with loss and pilferage of linen
- No proper documentation done and maintained at the time of delivering linen to the department or floor. Which in turn increase the risk of items getting misplaced or stolen. Because there is no authenticity of who is receiving the order and who is delivering. So the person responsible cannot be held accountable if he denies the whole incident.
- There is no awareness among hospital staff so as to how to handle linen and whom to report in case of lost linen found
- A lot of times, mishandling of linen into trash is seen as in the case of soiled linen coming from OT after any surgical procedure. These linen are usually blood soaked and are discarded by the staff with other items.

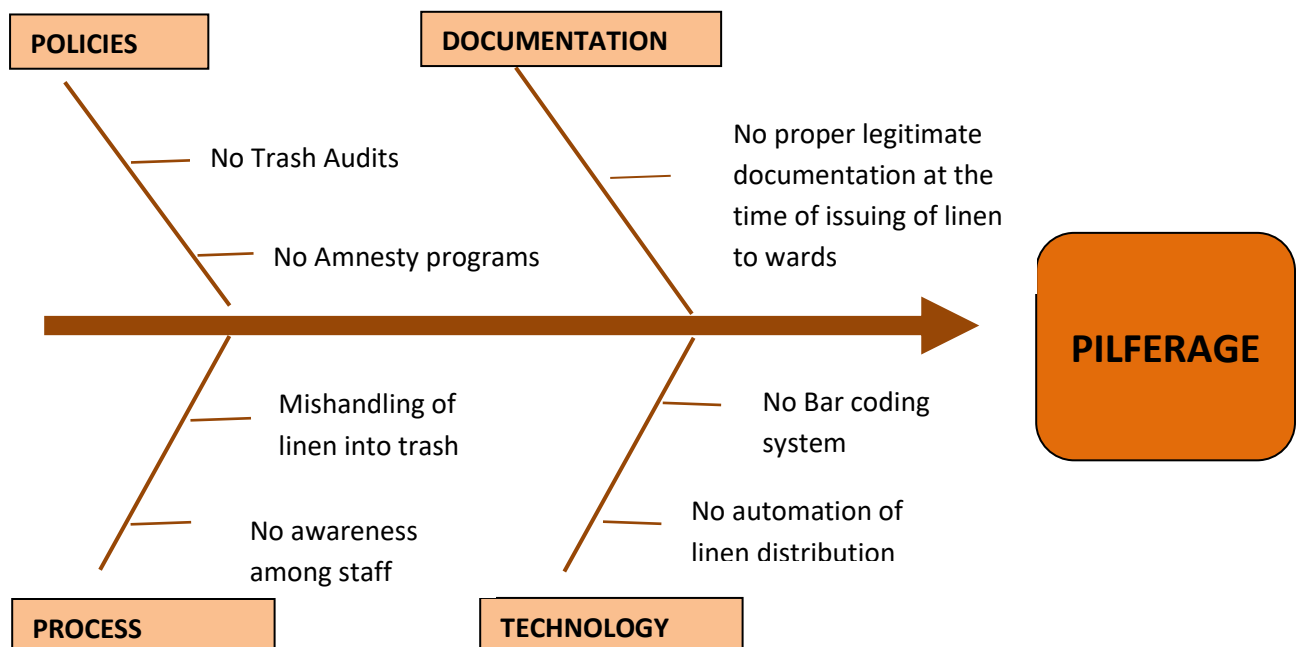


Figure 4- Root cause analysis for the occurrence of loss and pilferage.

SUGGESTION:

➤ **Linen awareness and education program**

- **Linen awareness day:**

A day can be dedicated to Linen awareness day. The purpose of this day will be to educate hospital staff about how the Linen and Laundry department operates. Displays can be presented to demonstrate the importance of linen conservation and the cost associated with it. Each session would include-

- ✓ Introduction to linen service provider.
- ✓ Education on wash process.
- ✓ How specific linen item should be used.
- ✓ Issue of excess linen in patient rooms.
- ✓ Unauthorized scrub use.
- ✓ Discharge bed make-up policy.

- **Linen tip of the month:**

Every month a tip regarding linen handling, proper use of linen etc. can be displayed in the hospital notice board or the areas where it can be noticed by maximum number of staff.

- **Laundry tours:**

Laundry tours can be organized by the linen and laundry department to make the employees aware about the whole operations that take place in the department and also to educate them about the cost of linen loss

- **Pamphlets/ Posters for education:**

Similarly pamphlets can be made available for the staff and the patients to educate them regarding the proper use of linen.

➤ **Proper documentation record**

A proper daily linen exchange format should be prepared and printed and should be followed while delivering linen to every department.

➤ **Trash Audits**

Regular trash audits should be conducted to avoid the disposal of the linen by mistake and also to determine the extent of linen problem. Many a times heavily soiled linen is discarded with other discard able items.

**PLEASE ALWAYS
REMEMBER TO:**

Check linen for objects
before discarding in soiled
bag.

Place adhesive in the
trash, **NOT** in the bed.

Pull adhesives off linen
before placing in the
soiled linen container.

LOST AND FOUND ITEM

All lost and found linen
items should be dropped
at the bag outside laundry
department. And the
anonymity of the person
will be respected.

**If you have any questions
call on #8926 OR Contact
Laundry department**

**LINEN
AWARENESS**



Reject Linen

What is considered reject
linen?

Rejects- clean linen not
appropriate for use such as
stained, damaged or torn
linen.

Any questions about
where to place your
rejects- **Please contact the
linen department**



SOME EXAMPLES FOR LINEN TIP OF THE MONTH

LINEN TIP



Scrubs should only be worn by specific clinical staff within the hospital



- Patients should wear hospital PJ bottoms and hospital gowns – NOT scrubs.
- Patients should never wear scrubs home.

LINEN TIP



USE THE CORRECT BAG!

LINEN bags are for **LINEN**

TRASH bags are for **TRASH**



Towels, washcloths, sheets, blankets, scrubs, etc.



Adhesives/bandages, wipes, disposable pads, gloves

Trash in the laundry can cause ruined linens – and also problems inside the laundering equipment.

Linen Tip of the Month



Don't Trash Linen

- All linen can be laundered.
- Place all soiled linen in leak proof linen hamper bags.
- Trashing linen adds to Hospital expense.

DAILY EXCHANGE RECORD SHEET

LINEN DELIVERY RECORD SHEET					
Time of request (Date, Time)	Time of delivery (Date, Time)	Items requested	Name of the staff delivering	Name of the staff receiving	Signature

Table 7- Daily exchange record sheet for linen department

Use of calibrated scales for receiving and shipping laundry is critical to accurately account for inventory. This helps in distinguishing between Actual loss and artificial loss.

8. CONCLUSION:

It is said that “What gets measured can be managed”. Even after this, loss of linen in medical facilities of all sizes has generally gone unchecked and un-noticed, and it continues to needlessly increase the cost of patient care directly or indirectly. Many managers and administrators believe that satisfying unit needs is more important than trying to halt linen thefts and misuse.

Linen loss figures are difficult to establish unless strong procedural controls and adequate recording methods are incorporated and maintained. Since, hospital has lost almost 91 lakhs rupees in the linen from past 4 years. There is a strong need for the establishment of proper tracking system for the same.

Cost data are not always available from routine data systems, due to lack of good information system and lack of resources devoted to hospital management. Without quality cost data, it is impossible to make accurate projections, improve technical efficiency, control expenditure and enhance accountability of managers. Thus a scientific costing system is a very important tool for management to fulfill these needs and hence, is essential for successful running of the hospital.

With today's uncertain economy, companies are searching for alternative methods to keep ahead of their competitors by effectively driving sales and by cost reduction. Big organization do not stand a chance in today's scenario if they do not have an appropriate inventory control model intact in place. The Economic Order Quantity (EOQ) model have been used for many years, but yet some companies have not taken advantage of it. An Economic order quantity could help in deciding what would be the best optimal order quantity at the company's lowest price.

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