

A STUDY OF SELECT DETERMINANTS FOR HOSPITAL STAY AMONG SURGICAL PATIENTS IN A TERTIARY CARE HOSPITAL

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Abstract— Average length of stay is the time interval between date of admission and date of discharge. It is important to keep length of stay in best possible minimum to improve the efficiency of the systems and enhancing patient satisfaction without compromising quality of care.

The aim of the research was to study the select determinants of hospital stay among surgical patients in a tertiary care hospital. Retrospective record analysis was carried out, Data concerning inpatient admission, date of surgery, duration of stay, date of discharge, operation theatre utilization and equipment utilization were collected from 1st December 2015 to 29th February 2016. The study sample consisted of all patients who underwent surgery in the month of December, January and February, 1983 patients. Data analyzed through SPSS software. Semi-structured questionnaires used to identify factors affecting length of stay and responses were analyzed using thematic analysis framework. Results were average length of stay among male patients was 10.20 days (\pm SD 12.3) and female patient was 9.14 days (\pm SD 12.0). Among different departments surgical oncology and plastic surgery patients had considerably longer length of stay 31.5 days (\pm SD 23.7) and 11 days (\pm SD 18.3) respectively. Comparison of average length of stay among cash and credit patients shows statistical significant difference among ophthalmology, plastic surgery, urology and surgical oncology where $p < 0.005$ and Correlation between waiting period and average length of stay was highly significant among cash and credit patients where p value is < 0.001 . OT utilization was optimum and equipment utilization was considerably fair. The study concluded that average length of stay and waiting period for surgery among surgical oncology and plastic surgery patients is considerably longer. The important factors identified for prolonged length of stay and waiting period for surgery are non-availability of OT (s), non-availability of equipment, patient co -morbidity and delay in approval of insurance. The present study highlights that there is a significant association between waiting period for surgery and average length of stay.

Keywords— Average length of stay, Cash patients, Credit patients, waiting period.

I. INTRODUCTION

Hospital utilization statistics plays an important role in managerial operation and one of the main indicators is length of stay. Length of Stay is the interval between date of admission and date of discharge. Average length of stay is used to assess efficiency, hospital resource utilization and quality of care.

Appropriate hospital stay, which is considered well organized, and customized to the patients actual needs helps to improve hospital efficiency this also reduces waiting period of patients, and not only reduces waiting lists but also satisfies financial constraints without compromising the quality of care. It is important to administrator and clinicians to reduce the inappropriate hospital stay for patients. An inappropriate hospitalization day recognized as an important indication of the misuse of healthcare services and indicates inefficient utilization of hospital resources. Reducing the time spent in hospital reduces the cost per patient and allows more patients to be treated in given period. Moreover, a shorter stay in hospital allows treatment to be shifted from expensive inpatient care to less expensive outpatient care. In a 500-bedded hospital, reducing ALS from 15 days to 10 days helps to serve 6000 additional patients in a year. Ward wise, unit wise,

disease wise, doctor wise and specialty- wise studies of ALS are more useful than overall ALS for the hospital.

The average length of stay (ALOS), which is an important indicator of hospital efficiency, depends on a number of factors. The primary factors determining ALS depends on case-mix, Case severity and the current treatment practices determined by physicians and technology available in the medical diagnostic procedures. For example, chronic and severe episodes of diseases have considerably longer length of stay where as communities with a high proportion of infectious diseases tend to have shorter ALS. Primary factors affecting LOS cannot be controlled by hospital. Scheduling of operations and investigations or diagnostic procedure are secondary factors which affects ALOS; reimbursement procedures in the hospital; healthcare environment which is important for recovery during post operative hospitalization care; institutional structure for taking care of certain chronic illnesses where continuous care is not required but LOS will be more.

If the ALOS is more, due to secondary factors, it shows improper or inefficient use of hospital resources and it is indication of inefficiency. Among the secondary factors influencing the ALOS above mentioned, scheduling of surgical procedures in the hospital and the physician behavior are the two

factors in which hospital has control.

II. REVIEW OF LITERATURE

The below shown literature reviews are some of the studies conducted by different people, they have conducted study on length of stay of surgical patients and factors affecting length of stay of patients. Some of the studies have shown factors affecting length of stay which are different in each study, example: Study conducted by Amrita et al in 2015 says that LOS is prolonged in elderly patients, females, malnourished, illiterates and insured patients and not explained the factors for delay. Other studies conducted by Gabr Hala in 2012 identified factors like premature admission, delay in surgical decisions and discharge planning for inappropriate stay. Another study conducted by Ilesanmi Stephen Olayinka et al in 2014 to assess the factors affecting length of stay among surgical patients, the factors identified with prolonged length of stay are types of surgery, emergency surgery, and blood transfusion and these factors are non-modifiable. In the study, the author suggested that future research is needed to identify hospital related and modifiable factors responsible for prolonged LOS of surgical inpatients. The above studies showing variable factors identified for length of stay across different health sectors. Some of the studies have not shown factors affecting length of stay. By reviewing below given literatures, present study was conducted. It is important to identify hospital related factors, so that it can be controlled and helps to reduce length of stay.

Hum yu et al. (1983) conducted study on the determinants of length of stay. The study focuses on factors affecting the length of hospital stay for appendectomy, cholecystectomy and caesarean patients. Study design was Retrospective; the study conducted in university hospital where 1003 in patient's medical record for appendectomy, cholecystectomy and caesarean section analyzed. Findings were Average length of stay among cholecystectomy, and patients in the caesarean section showed statistically significant differences and ALS among appendectomies shows no statistical significant difference. Common factors affecting the length of stay for all three procedures are complications after surgery, age, and day on which patient underwent surgery. Other factors for appendectomy are age, character of surgery, multiple diagnoses. Factors for cholecystectomy other than mentioned above are type of accommodation, route of admission and multiple diagnoses, residential areas and type of accommodation are the factors in caesarean section. The study concluded that length of stay was statistically significant longer when the surgical operations had complications. Further study is strongly suggested to know the other factors where statistically significant difference was not found.

Reed et al. (2004) conducted study on Length of stay for vascular surgical patients and system to decrease the same. Objective of this study was to develop and evaluate a system to reduce LOS for vascular surgery. Data collected for 3 years beginning on January 1, 2000, date of admission and date of discharge from the hospital records and data regarding patient who underwent surgical procedures were collected From January 1st to December 31st 2000, to reduce LOS among vascular surgical some methods were incorporated which includes critical pathway, constant review by nurses and manager, feedback system. Addition to all these methods an officer was appointed on January 1, 2001, who is responsible to communicate with patients and families about discharge planning during their hospitalization. The study found that LOS was 8.5 days, 5.9 days and 5.6 days in 2000, 2001 and 2002 respectively. LOS decreases among each diagnostic procedure from 2000 to 2002 and statistically significant where p value less than 0.001 to 0.3. Study conclude that there was decrease in LOS by 31 % to 33% by appointing responsible LOS officer with major activities for decreasing LOS with no negative impact on patient care and also saves revenue to the hospital.

Dutta et al. (2005) conducted descriptive analysis of Bed Utilization in the Gynecological Ward of a District Hospital in West Bengal to determine hospital utilization statistics and their indicators. 331 admitted patients in the hospital considered for the study. Study design was observational and carried out for 6 months. The study found that admissions during study period were 14.4% and bed turnover rate was 22.1% for emergency beds and 13.8% for Out Patient beds, which is shorter than emergency beds. Bed occupancy rate was 61.3% and Length of Stay is 19.9 days in the Out Patient Department beds, 6.2 days in the emergency beds, and overall length of stay combining both was 14.7 days. The length of stay in the Out Patient beds was considerably longer because most of the patients admitted to these beds had major operations. One of the study conducted by Saha et al shows length of stay 28.86 days. However, when compare to other studies the length of stay found in the present study is lower. Kiran et al. (2006) conducted a descriptive study on utilization of beds in a 492-bedded hospital from January to March 2003. Data concerning admission date, discharge date and LOS was collected for the year 2002 using pre designed proforma. The study found that number of inpatient admissions was 11,440 during the year 2002, among which males patients were 56% and female 44%. In the month of July LOS was 2.7 days except for that month LOS 6 to 12 days in Surgery Department. Bed occupancy rate was highest 113.7 in month of January, and in the month of July, bed occupancy rate was optimum that is 4.1. Bed turnover rate was lowest 1.9 in months of November and December. Average length of stay in the Orthopaedics Department was 9-13 days. Because

orthopedic cases hospitalized for a large period since healing takes long time. Throughout the year, length of stay was not constant and it was between 5-11 days Ophthalmology and ENT Departments. The study concluded that bed occupancy rate was low, length of stay was optimum.

Haider et al. (2008) analyzed on Hospital utilization statistics as a measure of functioning of the facility at Rims, Ranchi. Objective of the study was to determine the hospital utilization statistics. The study was observational and retrospective in nature. Overall hospital stay of patient's was 9.5 days. Length of stay of patients was found to be high among Skin & VD patients i. e. 27.38 days it is followed by Pediatric Surgery is 24.73 days whereas Eye department has low average length of stay of patient i.e., 5 days. Length of stay among different departments was varied and it is more in departments dealing with chronic disorders. The study concluded that by studying the pattern of hospital utilization, they can better plan hospital services.

Hala et al. (2012) conducted descriptive study on Factors Affecting Inappropriate Hospital Patient Stay in the Surgical Units at Mansoura University Hospital, Egypt. The aim of the study was to determine the factors affecting inappropriateness of hospital patient stay in the general surgical units. The study sample includes 168 patients. Data concerning to date of admission, date of discharge and date of surgery were collected. The study found that Pre operative patients showed highest percentage of inappropriate stay and postoperative patients showed highest percentage of appropriate stay. The factors affecting inappropriate stay among pre operative patients were 23.11% due to inappropriate /premature admission and 22.33% for delay in surgical decisions and least percentage due to delay in discharge procedures. Factors affecting hospital stay among post-operative surgical patients was due to inadequate outpatient diagnostic approach and least percentage was due to patient waiting for transfer to other care facility. The study concluded that based on findings of the present study the inappropriate use of hospital stay affects bed efficiency among pre-operative and Post-operative patients. In addition, the rate of inappropriateness of hospital patient stay is higher than appropriate patient stay in surgical units at Mansoura University Hospital.

Olayinka et al. (2014) conducted retrospective study on Length of Stay of Surgical Inpatients, and aim of the study was to assess the factors associated with Length of Stay (LOS) of surgical inpatients. Data collected of 404 patients from records, underwent surgery in the month of January to December 2010. The study found that among the study population males were 257 (63%) and median age of patients was 30 years. 63% of patients stayed for a period of 7 days. Overall length of stay of all patients was 11 days. Patients who had emergency surgery, neurological surgery, general anaesthesia and patients

who had blood transfusion had Longer stay and was statistically significant in 141(75%) where $p < .001$, 35(87.5%) where $p = .01$, 188(66.9%) where $p = .02$, and 64(81.0%) where $p < .001$ respectively. The study concluded surgical in patients experienced Prolonged LOS. The factors identified with prolonged length of stay were types of surgery, emergency surgery and blood transfusion and these factors are cannot be controlled. Future research: There is therefore a need for a further research to identify hospital related factors and factors which can be controlled by healthcare system which is responsible for prolonged LOS of surgical inpatients.

Gulzar et al. (2015) conducted cross sectional study on hospital utilization statistics including Bed occupancy rate and length of stay of patients in medical and allied wards of a tertiary care hospital. Study period was for two months, and objective is to determine the ALS and bed occupancy rate of patients. The study found that among 235 available beds admissions were 107. Average bed occupancy rate was 51.33%. Patients who had infectious disease were 55.1%. There was significant association between nature of disease and duration of stay among 32.7% patients who stayed in hospital for up to 3 days. There was a significant association between gender and length of stay and the study shows male predominance, i.e., 54.2% against 45.8% females. The study concluded that bed occupancy rate found to be optimal; the average length of stay of patients appeared to be relatively longer which needs a separate research that may lead the management or administrators to take appropriate action to decrease patient s prolonged length of stay.

Amrita et al. (2015) conducted an observational study on factors affecting the average length of stay of the patients in the inpatient department in a tertiary care centre in North India. The study was conducted on 100 patients. The aim of the study was to identify various factors associated with length of stay which may be longer or reduced. Research findings are as follows the mean age of the patients was 56.15 years ($SD \pm 17.70$). Elderly patients show prolonged length of stay. The male: female ratio was 1.6: 1. Among females, length of stay was considerably longer. The LOS was not statistically significant with respect to residence of the patient and marital status. Malnourished patients had longer LOS than adequately nourished patients. LOS was considerably longer among Illiterates. Cash patients had a shorter LOS than insured patients. The study concluded that ALOS is an indicator of the hospital efficiency but primary focus should be on decreasing the inappropriate hospital stay. Prolonged LOS observed among insured patients, elderly patients, females, malnourished and illiterates. On the basis of literature review, the present study found that factors affecting length of stay of surgical patients is highly variable and requires site-specific data for system optimization. Resource utilization for surgical

patients requires detailed study. Hence the present study.

III. OBJECTIVES OF THE STUDY

1. To determine the average length of stay and its determinants among surgical patients admitted to a tertiary care hospital
2. To determine waiting period of patients for surgery and factors influencing it
3. To assess resource utilization for surgeries

IV. METHODOLOGY

1. The study was conducted in a tertiary care hospital. Study period was from January to June 2016 in a 800 bedded tertiary care teaching hospital.
2. A retrospective record analysis was carried out, Data concerning inpatient admission, date of surgery, duration of stay, date of discharge, operation theatre utilization and equipment utilization was collected from 1st December 2015 to 29th February 2016. The study sample consisted of all patients who underwent surgery in the month of December, January and February, N= 1983. Data analyzed through SPSS software.
3. Qualitative component: Key respondent interviews were conducted among surgeons from surgical oncology and plastic surgery department using semi-structured questionnaires to identify factors affecting length of stay. The responses were analyzed using thematic analysis framework by categorizing the same under system, process and patient factors.

V. DESCRIPTIVE ANALYSIS

Total study population was 1983, the analysis of data revealed that Out of 1983 patients, 1038 (52.34%) were males and 945 (47.65%) females. Based on type of patients, 1017 are cash patients and 965 are credit patients.

Table 6. 1 Waiting period for various surgical procedures by department

Department	Waiting period for surgery (days)			
	Mean	Median	± Standard deviation	Inter quartile range
ENT	2.59	1	(3.5)	0-23
General surgery	3.4	2	(4)	0-36
OBG	3.41	2	(4.5)	0-37
Ophthalmology	1.51	1	(1.3)	0-12
Orthopaedics	5.81	3	(7)	0-42
Paediatric surgery	5.19	2	(10.1)	0-76
Plastic surgery	10.22	5	(15.5)	0-83
Surgical gastroenterology	5.05	3	(4.4)	2-17
Surgical oncology	22.7	20.5	(16.4)	1-72
Urology	4.06	2	(5.7)	0-51
Vascular surgery	5.67	3	(6.1)	0-36

Source: Computed by the author

Waiting period for various surgical procedures, where maximum waiting period is seen in Surgical oncology and plastic surgery department are 20.5 days (SD± 16.4), 5 days (SD ± 15.5) days respectively and minimum waiting period is seen in ENT and Ophthalmology are 1 day (SD± 3.5) and 1 day (SD ± 1.3).

Table 6.2 Average length of stay for surgical patients by department

Department	Average length of stay (days)			
	Mean	Median	±Standard deviation	Inter quartile range
ENT	5.94	4	(5.5)	2-32
General surgery	7.59	5	(6.8)	0-42
OBG	8.03	7	(6.1)	0-42
Ophthalmology	3.66	3	(1.8)	1-16
Orthopaedics	16.67	14	(13.9)	1-115
Paediatric surgery	12.44	9	(13.9)	1-98
Plastic surgery	17.13	11	(18.3)	0-102
Surgical gastroenterology	12.05	10	(6.3)	3-29
Surgical oncology	35.9	31.5	(23.7)	2-102
Urology	8.24	6	(9.7)	0-110
Vascular surgery	11.08	8	(10.2)	1-54

Source: Computed by the author

Average length of stay for surgical patients, where maximum average length of stay is seen in Surgical oncology, Orthopedics and Plastic surgery departments are 31.5 days (SD ± 23.7), 14 days (SD ± 13.9) and 11 days (SD ± 18.3) respectively.

Table 6.3 Comparison of waiting period for surgeries between cash and credit patients

Departments	Cash		Credit	
	Mean	±SD	Mean	±SD
ENT	2.76	(3.8)	2.24	(3.0)
General surgery	3.49	(4.4)	3.20	(3.1)
OBG	3.33	(4.2)	3.67	(5.3)
Ophthalmology	1.30	(2.0)	1.56	(1.0)
Orthopaedics	6.02	(7.0)	5.58	(7.1)
Pediatric surgery	4.44	(5.7)	6.00	(13.3)
Plastic surgery	7.37	(9.0)	24.74	(28.9)
Surgical gastroenterology	5.30	(5.6)	4.78	(2.8)
Surgical Oncology	15.82	(12.5)	24.49	(16.8)
Urology	3.47	(5.7)	4.69	(5.6)
Vascular surgery	6.93	(8.3)	5.02	(4.6)

Source: Computed by the author

Maximum waiting period is seen for Plastic surgery and surgical oncology is 24.74 days (SD ± 28.9) and 24.49 days (SD ± 16.8) respectively among credit patients and among cash patients waiting period is more in surgical oncology 15.82 days (SD± 12.5).

Table 6.4 Comparison of Average length of stay between Cash and credit patients

Departments	Cash		Credit	
	Mean	+SD	Mean	+SD
ENT	6.16	(6.1)	5.52	(4.3)
General surgery	7.62	(6.9)	7.52	(6.6)
OBG	7.93	(6.1)	8.35	(6.3)
Ophthalmology	2.74	(2.5)	3.91	(1.5)*
Orthopaedics	15.58	(13.5)	17.80	(14.3)
Pediatric surgery	10.88	(9.8)	14.13	(17.2)
Plastic surgery	13.75	(12.0)	34.37	(31.6)*
Surgical gastroenterology	12.60	(7.8)	11.44	(4.7)
Surgical Oncology	26.06	(15.5)	38.48	(24.9)*
Urology	7.22	(10.6)	9.36	(8.6)
Vascular surgery	12.15	(10.5)	10.54	(10.0)

*Statistically significant, p < 0.05

Source: Computed by the author

Average length of stay between cash and cashless patients, where maximum average length of stay seen in 38.48 days (SD ± 24.9) and 34.37 days (SD ± 31.6) in surgical oncology and Plastic surgery respectively among cashless patients. The average length of stay compared between cash and cashless patients among the different departments showing a statistically significant difference in ophthalmology, plastic surgery, urology, and surgical oncology where p value is < 0.005.

Table 6.5 Correlation between waiting period and average length of stay for cash patients

Department	Waiting period (days)		Average length of stay (days)		r value
	Mean	±SD	Mean	±SD	
ENT	2.76	(3.8)	6.16	(6.1)	0.834*
General surgery	3.49	(4.4)	7.62	(6.9)	0.678*
OBG	3.33	(4.2)	7.93	(6.1)	0.783*
Ophthalmology	1.3	(2)	2.74	(2.5)	0.919*
Orthopedics	6.02	(7)	15.58	(13.5)	0.653*
Pediatric surgery	4.44	(5.7)	10.88	(9.8)	0.772*
Plastic surgery	7.37	(9)	13.75	(12)	0.911*
Surgical gastroenterology	5.3	(5.6)	12.6	(7.8)	0.801*
Surgical Oncology	15.82	(12.5)	26.06	(15.5)	0.935*
Urology	3.47	(5.7)	7.22	(10.6)	0.874*
Vascular surgery	6.93	(8.3)	12.15	(10.5)	0.921*

Pearson correlation coefficient * P < 0.001

Source: Computed by the author

Correlation between waiting period and average length of stay and is highly significant among cash patients where p value is <0.001

Table 6.6 Correlation between waiting period and average length of stay for credit patients

Department	Waiting period (days)		Average length of stay (days)		r value
	Mean	+SD	Mean	+SD	
ENT	2.24	(3.0)	5.52	(4.3)	0.821*
General surgery	3.20	(3.1)	7.52	(6.6)	0.823*
OBG	3.67	(5.3)	8.35	(6.3)	0.836*
Ophthalmology	1.56	(1.0)	3.91	(1.5)	0.567*
Orthopaedics	5.58	(7.1)	17.80	(14.3)	0.815*
Pediatric surgery	6.00	(13.3)	14.13	(17.2)	0.912*
Plastic surgery	24.74	(28.9)	34.37	(31.6)	0.977*
Surgical gastroenterology	4.78	(2.8)	11.44	(4.7)	0.911*
Surgical Oncology	24.49	(16.8)	38.48	(24.9)	0.784*
Urology	4.69	(5.6)	9.36	(8.6)	0.857*
Vascular surgery	5.02	(4.6)	10.54	(10.0)	0.726*

Pearson correlation coefficient, * P < 0.001

Source: Computed by the author

Correlation between waiting period and average length of stay and is highly significant among credit patients where p value is <0.001

THEMATIC ANALYSIS

Key respondent interviews were conducted among surgeons from surgical oncology and plastic surgery department using semi-structured questionnaires to identify factors affecting length of stay. The responses were analyzed using thematic analysis framework by categorizing the same under system, process and patient factors.

1. Patient Factors (Patient diagnosis, Co-morbidities, location, type of payment)

- R1 “Poor patients and increased load and All want surgery under Government schemes”
- R3 “Co- morbidities which requires to be stabilized”
- R5 “Social factors”
- R6 “Co-morbidities – like diabetes cardiac abnormalities”
- R7 “Financial issues”

2. System factors (Availability of infrastructure, personnel, and resources)

- R1 “Lesser amount of OT time”
- R2 “In appropriate/ in adequate allocation of OT hours”
- R3 “Non availability of operating time”
- R4 “Lack of OT availability”
- R5 “Number of OT s provided”
- R6 “Lack of OT time”
- R7 “Non availability of adequate OT”

System factors

- R2 “Delay in getting micro motor drill for head and neck cases”
- R4 “Non availability of operating microscope micro instrument, drills and other equipments”
- R5 “Equipment- especially high end like operating microscope”
- R6 “Non availability of equipments”
- R7 “Non availability of proper equipments and OT instruments”

3. Process factors (work flow, process flow)

- R2 “Delayed approval of insurance”
- R1 “Patient waiting for approval”
- R6 “Approval of insurance”
- R7 “Delay in approval of insurance”

Table 6.7 Utilization of operation theatre

Percentage and No. of hours utilized in O.T in the month	December	January	February
No. of hours available	1820	1680	1750
Total no. of hours utilized	1395	1266	1402
Total no. of hours OT un-utilized	425	414	348
O.T Utilization Rate	1395/1820X100 = 77%	1266/1680X100 = 75%	1402/1750X100 = 80%

Source: Computed by the author

Findings

The present study revealed that waiting period for surgery among surgical oncology and plastic surgery patients are considerably longer.

Age: The analysis of data revealed that mean age of patients admitted was 41.33 years (SD \pm 19.905) among cash patients and 49.52 years (SD \pm 19.48) for credit patients.

Gender: The analysis of data revealed that out of 1983 patients, 1038 (52.34%) is males and 945 (47.65%) is females. There was a male predominance in the present study. Average length of stay and waiting period for surgery among male patients are 10.20 (SD \pm 12.3) and 4.88 (SD \pm 8.1) respectively and among female patients are 9.14 (SD \pm 12.0) and 4.38 (SD \pm 7.9) respectively. Gender has no effect on length of stay.

Type of patients: Out of 1983 study population, 1017 are cash patients and 965 are credit patients. Mean waiting period for surgery was 4.14 days (SD \pm 6.055) and average length of stay was 8.93 days (SD \pm 9.736) among cash patients, mean waiting period for surgery was 5.16 days (SD \pm 9.681) and average length of stay was 10.50 days (SD \pm 14.190) among credit patients. When it comes to department wise average length of stay was more among surgical oncology patients was 26.06 days (SD \pm 15.5) in cash patients and 38.48 (SD \pm 24.9) in credit patients and more in plastic surgery department 13.75 days (SD \pm 12.0) among cash and 34.37 days (SD \pm 31.6) among credit patients. Waiting period for surgery was more in surgical oncology patients 15.82 days (SD \pm 12.5) in cash patients and 24.49 days (SD \pm 16.8) in credit patients and waiting period for surgery was more in plastic surgery patients 7.37 days (SD \pm 169.0) in cash patients and 24.74 days (SD \pm 1628.9) in cashless patients. The average length of stay compared between cash and credit patients among different departments showed statistically significant difference in ophthalmology, plastic surgery, urology and surgical oncology departments where p value is < 0.005.

The results of the present study indicated that patients having prolonged waiting period for surgery and average length of stay among surgical patients had some internal factors and are co morbidities like (social factors, disease condition, type of payment) under patient factors, Non-availability of OT and non-availability of equipment under system factors and delayed approval of insurance under process factors.

In the present study OT utilization during the study period December, January and February is 76.64%, 75.35% and 80.11% respectively and utilization of OT during study period is optimum. Scheduling of OT days in the present study is maximum OT days available for General surgery, Orthopaedics, Urology, OBG and Ophthalmology and minimum OT days for surgical oncology and Plastic surgery 3 days each.

Equipment utilization in the present study is

considerably fair. Even though there is breakdown of some equipment during study period, it has not affected the overall utilization as there were back up equipment. Potential time losses in the absence of back up was minimal or nil.

In the present study Correlation between average length of stay and waiting period shows highly significant association among both cash and credit patients where $p < 0.001$. This shows that if waiting period for surgery is more than average length of stay of surgical patients will be longer.

CONCLUSION

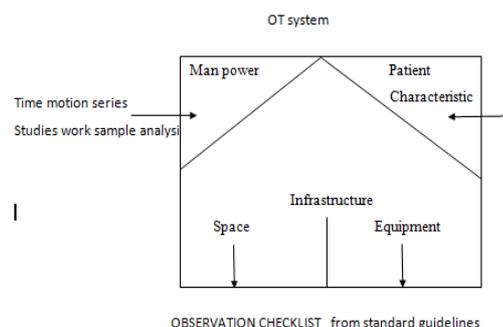
The study concluded that average length of stay and waiting period for surgery among surgical oncology and plastic surgery patients is considerably longer. Prognosis of patients might change due to delay in surgery and contributes to economic burden for patient families. In addition, it may have an adverse impact on bed utilization due to longer period of stay by the same patient. The important factors identified for prolonged length of stay and waiting period for surgery are non-availability OT (s), non-availability of equipment, patient co-morbidities and delay in approval of insurance. The present study highlights that there is a significant association between waiting period for surgery and average length of stay.

RECOMMENDATIONS

1. Out of 11 OTs available 10 are functional. Since management is planning to open non-functional OT preference can be given to surgical oncology and plastic surgery. Out of 6 OT day's additional 2 days can be given to each department to clear back logs, so as to reduce waiting period.
2. Based on the recommendations from departments regarding equipment requirement, it can be listed in the existing financial year requirement and on priority can be approved through prioritization committee and purchase committee.
3. Through proper coordination of billing staff with doctors and investigation department such as lab and radiology to give reports of insurance patients as early as possible so that it can be sent earliest for insurance approval

Future directions

To undertake multi centric study



Source: Computed by the author

Operational research framework for optimizing OT systems influencing average length of stay and waiting time among surgical patients.

To conduct multi centric study

In the present study resource, utilization for surgical patients is limited to OT and equipment utilization. Detailed study is required including manpower and space utilization comparing with standard guidelines.

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