UTILIZATION OF OT IN BOKARO GENERAL HOSPITAL

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By

Vani Sri

Under the Supervision and Guidance of

Dr Vinod Kumar SV

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भारतीय इस्पात प्राधिकरण मर्यादित
बोकारो इस्पात संयंत्र
इस्पात भवन
बोकारो इस्पात नगर 827 001
जिला – बोकारो (झारखंड)
ग्राम बोकारो स्टील टैलक्स- 0628 201
फैक्स. न० 06542 240227

STEEL AUTHORITY OF INDIA LTD
BOKARO STEEL PLANT
ISPAT BHAWAN
BOKARO STEEL CITY 827001
DISTRICT- BOKARO (JHARKHAND)
GRAM, BOKARO STEEL TELEX 0628-201
FAX NO. 06542-240227

Bokaro General Hospital

(Clinical Est.Rgstr. Act No: 2035500836)

TO WHOM IT MAY CONCERN

This is to certify that Dr. Vani Sri in partial fulfillment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMRUniversity, Jaipur has successfully completed her intership at Bokaro General Hospital, Bokaro Steel City from April 15th , 2024 to July 6th 2024.

Date:

Place:

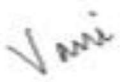
Head of the Organization

Name of the Organization

कैरल शर्मा
CAROL SHARMA
सहायक महाप्रबन्धक (अ०प्र०)
AGM (HOSPITAL ADMN.)
बोकारो जेनरल अस्पताल
BOKARO GENERAL HOSPITAL

DECLARATION BY STUDENT

I hereby declare that this dissertation titled utilisation of OT in Bokaro General Hospital, Bokaro Steel City is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.



(Signature)

Name of Student : Vani Sri

Date :

CERTIFICATE

This is to certify that the dissertation titled Utilisation of Operation Theatres in Bokaro General Hospital is a record research work undertaken by Dr. Vani Sri in partial fulfillment of the requirements for the award of the degree of MBA Hospital and Health Management from IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific and analytical

Dr. Vinod Kumar S.V

IIHMR UNIVERSITY, JAIPUR

Date :

School Dean

IIHMR UNIVERSITY, JAIPUR

Date :

ABSTRACT

Title : UTILIZATION OF OT IN BOKARO GENERAL HOSPITAL, Bokaro steel city, Jharkhand.

Author Name : Vani Sri

Advisor Name : Dr. Vinod Kumar S.V

Keywords : Resource utilisation hours, operation theatre, utilisation,

Background : Operating theatres (OTs) are critical components of hospital infrastructure and play a key role in patient care. These are specialized facilities designed to perform surgical procedures under sterile conditions, equipped with modern medical equipment and staffed by qualified medical professionals. The importance of OT in a hospital spans multiple dimensions, including patient outcomes, hospital efficiency, and overall health care delivery.

Effective use of operating theatres(OTs) is critical to optimal hospital performance, affecting patient outcomes, staff satisfaction, and overall healthcare costs. This study aims to investigate the various factors influencing the use of OT and identify the most common causes of delays.

Objective :

• To calculate and determine the utilization rate of the operating theatre in Bokaro General Hospital.

• To understand the most common cause of delay in surgery.

• To provide suggestions for maximizing the use of the Operating Theatre according to the findings.

Methodology : An **Observational** Prospective study was carried out at Bokaro General Hospital, which is a 600 bedded hospital for 8 weeks .

All over there were 648 cases which were done during this time period,(i.e from April 15th – June 15th) including the Sundays.

Inclusion Criteria – In the sample size for this study only those OT happening on workdays i.e from Monday to Saturday and starting from 9am to 3pm were included. A Random Sampling Method was used for this study and a sample size of 614 out of 648 of total OT's. 14 Days in the month of April, 26 days in the month of May and 13 days in the month of June.

Exclusion Criteria – All the OT's not falling under the above inclusion criteria were excluded i.e 19 OT's done on Sunday and 15 OT's which were not falling under the resource utilization Time for OT's i.e (9am-3pm) was excluded. A total of 34 OT was not taken into the sample size.

Results : In the total surgeries performed under the study period, 84% of the surgeries were performed by the departments Gynae & Ob. ,OT dedicated to minor surgeries,General Surgery & Ortho Department. The OT which is dedicated to perform minor surgeries usually performs surgeries under LA. The cases usually come from surgical OPD during their designated timings. Gynae and Ob. performs the most no. of surgeries with LSCS, followed by TAH and Dilation and curettage.

New OT 1: Utilized % - 62. Not Utilized% - 38. This OT has a relatively high utilisation rate with 62% of the resources being properly utilized.

OT 1 has a utilization rate of 53% whereas 47% resources remained unconsumed. OT 2 had a utilisation rate of 61% while 39% of the resources remained underutilised. OT 2 has been mainly dedicated to Gynae and Ob. with Dilation and curettage being the most common procedure with Total intravenous anaesthesia being induced for the same. The major surgeries include TAH (Total Abdominal Hysterectomy) and vaginal hysterectomy and Total pelvic repair.

OT 3 has a utilisation rate of 45.5% where as 54.5%., whereas OT 4 has been dedicated to general surgery with cholecystectomy and Appendectomy being the most performed surgery under the influence of general anaesthesia.

OT 5 has the least utilisation with 37.3%.

Conclusion : It clearly shows that the scheduling of the OT needs improvement. Operation theatre (OT) scheduling is essential for improving patient care outcomes, guaranteeing effective resource usage, streamlining hospital operations, and increasing overall operational efficiency. To optimize the use of OTs, reduce waiting times, and expedite the surgical process, effective scheduling entails carefully organizing and overseeing surgical processes.

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I would like to take this opportunity to express my deep sense of gratitude to all those people without which this project would not have been successful.

First and foremost, I would like to thank, IIHMR who have me the golden opportunity to do this wonderful project.

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Dr. Vani Sri

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ABBREVIATIONS

EHR	Electronic Health Record
ENT	Ears, Nose and Throat
GCRI	Gujarat Cancer and Research Institute
LA	Local Anaesthesia
LSCS	Lower Segment Cesarean Section
OB	Obstetrics
OR	Operating Room
OT	Operation Theaters
TAH	Total Abdominal Hysterectomy
VH, PFR	Vaginal Hysterectomy , Pelvic Floor Repair

Table 1 : List of Abbreviations

DISSERTATION REPORT

UTILIZATION OF OPERATION THEATRES IN BOKARO GENERAL HOSPITAL.

CHAPTER 1-INTRODUCTION

Operation theatres (OTs), they are also known as operating rooms (ORs), are the important components of any hospital, they serve as the venues where surgical procedures are performed. Their design, management, and utilization put an impact not only the quality of care provided to patients but also the financial performance of the hospital.

Operation theatres are important to a hospital's clinical and financial success. They are also important for providing high-quality surgical care, attracting patients, and generating the revenues. By efficiently managing OTs, investing in advanced technology, and expanding surgical services, hospitals can improve their financial performance while delivering high quality patient care. Despite the challenges, the benefits of well-managed OTs outweigh the costs, making them an important part of modern healthcare facilities.

Clinical Significance

Quality of Care: OTs are fully equipped with state-of-the-art medical technology, which also features its highly trained surgical teams. This would mean the best possible care to patients during surgeries and leads to better clinical outcomes and better patient satisfaction.

2. Range of Varied Procedures: A well-equipped OT can conduct a range of surgeries, beginning with the minor one and ending on intricate operations. Ambidexterity within this area allows the hospital to cater to a wide base of patients.

3. Effective Control of Infection: OTs are designed in such a way that the chances of infections are reduced due to efficient sterilization plans and rigid systems, not to forget controlled environments that again impact patient safety.

Financial Impact

Revenue Generation: OTs are the major revenue-generating centers of most hospitals. The surgical specialties, especially elective surgeries, bring in much revenue. This helps in covering up the costs from other less profitable departments/ services.

1. Patient Attraction: The latest surgical technologies and renowned surgeons attract patients and raise the reputation of the hospital with an increased patient base.

2. Efficient Utilization: Effective management of OT scheduling to ensure maximum utilization, reducing downtime and enhancing the number of surgeries that can be performed.

Operational Efficiency

1. Scheduling and Turnaround Time: Pro per scheduling ensures less idle time between surgeries, allowing as many operations as possible to be done each day. Quick turnover of OTs between cases reduces the lapse time, thereby increasing productivity.

2. Staffing: Proper, efficient staffing with capable people guarantees that surgeries разм are smoothly conducted and on schedule. Cross-training staff to accomplish a lot of dissimilar tasks may increase flexibility and efficiency.

3. Equipment Management: Maintenance of surgical equipment and time-to-time upgrade ensures no break-downs, and OTs are always available for use; it also ensures that there is no delay in the start of the procedure.

4. Supply Chain Management: The effectual management of the chain of surgical supplies legibly reduces wastage and ensures that the essential items are always available, thus avoiding delays and cancellations of surgeries.

It is most rightly called the heart of the hospitals; the operation theatres play a central role in a healthcare system. And with respect, it's not entirely a metaphor, but it underlines the essentially important functions and the huge impact that OTs have on the general operations and success of any hospital.

The operation theatres are therefore a lifeline to the existence of any hospital since they are linked with both clinical excellence and financial performance.. They are well managed to ensure patient care of the highest quality execution critically for revenue generation and hospital reputation. Hospitals are using ORs to not only improve patient outcomes, but also their own financial performance when targeting these areas of waste through advanced technology, streamlined operations and continuous improvement. Nevertheless, the strategic importance of properly managed OTs cannot be overemphasised and they represent a focal point in contemporary healthcare delivery.

Rationale of study

Optimal use of the facilities directly impacts patient outcomes, hospital revenue, and overall healthcare efficiency. Bokaro General Hospital, a key healthcare provider in the region, has recognized the need to enhance the efficiency of its OT operations.

While on other hand it impact directly to clinical outcomes like,

A.Clinical Outcomes: It is a well know fact that with optimal use of OTs will provide the desirable outcome. Better patient experiences and outcomes are possible when scheduling is more efficient, patients have to wait less time, and fewer appointments get cancelled. A better understanding of the causes for OT inefficiencies can aid in determining strategies to enhance surgical care quality.

B. Economic Impact: OTs are one of the most resource demanding units in a hospital. These require high levels of infrastructure, technology and manpower investments. Poor use of OT time can lead to not utilising resources efficiently and missing chances for revenue stream. Said more simply, if hospitals can optimize OT use they will do a lot better on their financial performance and sustainability.

Operational Efficiency: Streamlined OT management leads to the smooth running of the overall operations in a hospital. Decrease in turnover times, simplification workflows, and better coordination among surgical teams can enhance productivity. This study aims to identify best practices and innovative approaches to improve operational efficiency in OTs.

D. **Patient Satisfaction**: Long waiting times for surgery and frequent cancellations can negatively impact patient satisfaction. Efficient OT utilization can lead to shorter waiting times, timely surgeries, and better postoperative care, thereby improving patient satisfaction and hospital reputation.

AIM

To Investigate the OT Utilization and OT related parameters at Bokaro General Hospital, Bokaro Steel City, Jharkhand.

OBJECTIVE

Calculate and determine the utilization rate of the operating theatre in Bokaro General Hospital.

Understand the most common cause of delay in surgery.

Suggestions for maximizing the use of the Operating Theatre according to the findings.

CHAPTER 2 – LITERATURE REVIEW

OTs are a significant part of any healthcare system and offer the platform where critical surgical activities take place. Their effective utilization is one of the major factors for maintaining quality care, operational efficiency, and hospitals' financial sustainability. From this perspective, this literature review intends to offer existing studies on OT use, identify factors that might have an effect on their efficiency, and examine strategies and good practices in use for OT optimization.

Sr No.	Title	Authors	Methodology	Salient Features
1	Improving Operating Room Efficiency: A Study of Surgical Cancellations in Apollo Hospitals, Chennai	Ramesh, G., & Babu, M. S.	A Prospective Study with Root Cause Analysis was done on surgical cancellations over six months. A Detailed analysis of each cancellation to determine the underlying cause was done. Implementation of interventions based on findings, such as preoperative checklists and enhanced patient communication was done.	Identified patient-related factors and scheduling issues as major causes of surgical cancellations. Implemented preoperative checklists and improved patient communication to reduce cancellations. Reported a significant reduction in surgical cancellations and improved OT utilization rates post-intervention.

2	Utilization of Operation Theatres in a Public Sector Hospital in India: Challenges and Solutions done in KEM HOSPITALS, Mumbai.	Sharma, R., & Gupta, S.	A Cross-Sectional Study with Qualitative Interviews was done. Conducted interviews with surgeons, anaesthesiologists, and nursing staff to identify bottlenecks. Combined quantitative data with qualitative insights to understand the challenges faced in OT utilization. .	Identified key challenges such as equipment shortages, staffing issues, and scheduling inefficiencies. Proposed solutions including better inventory management and regular staff training programs. Observed improvements in OT scheduling and resource allocation following the implementation of recommendations. .

3	Enhancing Operating Room Productivity Christian medical college, Vellore.	Nair, A., & Menon, V.	A Case Study using Lean Management Technique. Application of lean principles such as value stream mapping and continuous improvement processes. Collected baseline data on OT turnover times, case start times, and workflow inefficiencies.	Achieved significant reductions in turnover times and increased the number of surgeries performed. Enhanced overall efficiency and staff satisfaction by eliminating wasteful processes. Demonstrated the applicability of lean management principles in a healthcare setting.
4	Assessing the Impact of Electronic Health Records on Operating Room Efficiency. Gujarat Cancer & Research Institute (GCRI), Ahmedabad.	Patel, M., & Joshi, P.	A Quasi-experimental study with pre- and post-implementation analysis was done.	Evaluated the impact of implementing electronic health records (EHR) on OT efficiency. Compared OT utilization rates and turnover times before and after EHR implementation.

5	Improving Operating Room Utilization Through Process Optimization in a Teaching Hospital, conducted in Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh	Singh, S., & Kaur, H.	A Process optimization study using Six Sigma methodologies was done.	Applied Six Sigma methodologies to identify and reduce variability in OT processes. Focused on key performance indicators such as case start times and turnover times. Implemented process improvements including streamlined workflows and better staff training.
6	Assessing the Impact of Electronic Health Records on Operating Room Efficiency conducted in **Gujarat Cancer & Research Institute (GCRI), Ahmedabad**	Patel, M., & Joshi, P.	A Quasi-Experimental Study with Pre- and Post-Implementation Analysis was done. .	Found that EHR implementation led to improved documentation, reduced scheduling errors, and better communication.

7	Improving Operating Room Efficiency by Applying Bin-Packing and Portfolio Techniques to Surgical Case Scheduling.	Van Houdenhoven , M., Van Oostrum , J. M., Hans, E. W., Wullink, G., & Kazemier, G.	Mathematical modelling and simulation	Applied bin-packing and portfolio techniques to optimize surgical case scheduling. Improved OT utilization rates by more effectively allocating time and resources. Demonstrated the potential of mathematical models to enhance OT scheduling.
8	Communication Failures in the Operating Room: An Observational Classification of Recurrent Types and Effects.	Lingard, L., Espin, S., Whyte, S., Regehr, G., Baker, G. R., Reznick, R., Bohnen, J., Orser, B., Doran, D., & Grober, E.	A Observational study with qualitative analysis was done.	Observed and classified types of communication failures in OTs. Identified recurrent communication issues and their impact on efficiency and safety, recommended targeted interventions to improve communication.

Table 2.1 : Review of Literature

CHAPTER – 3 Methodology

Study Approach

Getting the most out of OT hours was and still is atop concern for the management of the Hospital. It contributes in providing back up time for emergency OT's, infection prevention and processes, and decision making data for facility expansion or downsizing. Bokaro General Hospital is a 650 bedded hospital and it caters to a large patient base in the Industrial township of Bokaro Steel Citty. It has a great inflow of patients from the adjacent towns and cities as well and other panel patients, resulting in an increase of total patient load thereby increasing the total OT procedures, to an average of about 575 cases per month which calls for making the OT utilization time to be more planned and efficient. In order to understand the utilization better an Observational Prospective Study was done from 15th April 2024 – 15th June 2024.

Study Respondents

A Total sample size of 648 cases were taken during this time period, with the help of simple random sampling. All the 6 OT's were observed for the resource time i.e 9am to 3pm on all the workdays (Monday – Saturday) excluding Sundays. The respective entries of the patients was entered in the excel sheet on a daily basis and was then analysed in the form of graphs.

Data Collection and Calculation

All over there were 648 cases which were done during this time period (from April 15th – June 15th) including the Sundays.

OT Utilization = Total time taken for any procedure inside OT ÷ Total resource availability time of OT (6 hrs*60 mins*53 days) *100

Inclusion Criteria – In the sample size for this study only those OT happening on workdays i.e from Monday to Saturday and starting from 9am to 3pm were included. A Random Sampling Method was used for this study and a sample size of 614 out of 648 of total OT's. 14 Days in the month of April, 26 days in the month of May and 13 days in the month of June.

Exclusion Criteria – All the OT's not falling under the above inclusion criteria were excluded i.e 19 OT's done on Sunday and 15 OT's which were not falling under the **resource** utilization Time for OT's i.e (9am-3pm) was excluded. A total of 34 OT was not taken into the sample size.

The OT Timing for scheduled cases was 9 am to 3 pm. (6hrs i.e 360 mins/day) fr all the 6 OT.

Note :- In case of any OT starting between the time period and ending late i.e after 5pm the utilization rate was calculated till 5 pm. In the same way any OT starting before 9 am the utilization rate was calculated from 9 am.

Operational Definition

OT utilization is defined by Donham et al as the quotient of hours of OT time actually used during elective resource hours and the total number of elective resource hours available.

Ethics

Prior approval for analysis for the data was taken from Hospital Ethics Committee, and patient information was kept confidential during the period of audit.

Implication of this Research

In the context of patient care and outcomes, effective usage of operation theatres (Ots) becomes paramount. The result of the research is also proved that optimized scheduling and resources utilization in OT minimizes wait-time for surgeries which are essentials towards moving to timely actions and quicker recovery. This may tremendously improve the quality of care offered, particularly in a government hospital where there is high patient flow.

For the improvement of operational efficacy, one may increase the usage of OT. Government hospitals can carry out more operations within the same time frame if they identify and remove bottlenecks like long turnover times and scheduling conflicts. This also allows efficient use of patient throughput besides reducing surgical case backlog in health facilities and in turn care is provided promptly to many patients who require it.

For government hospitals, efficient OT management can result in substantial cost savings. Reducing the time that is not used to perform operations and optimizing the allocation of

resources across the departments reduces wastefulness both on medical supplies and staff-hours. As a result, these funds can be channeled to other critical areas such as purchase of advanced medical equipment, improvement of hospital infrastructure or financing more healthcare programs.

The research suggests that effective management of resources is vital in order to optimize OT utilization. Government hospitals often have limited resources such as surgical equipment, pharmaceuticals and qualified personnel like surgical instruments, anesthetics and trained staff. The depletion of resource constraint causes delays and cancellations due to unavailability of materials which can be avoided if the real-time inventory tracking and predictive scheduling are implemented.

Improving the efficiency of operating rooms positively impacts healthcare practitioners' job satisfaction and motivation. Surgeons, anaesthesiologists, nurses, and support staff benefit from having well-organized operation theatres where everything runs smoothly. Job contentment is at its peak when there is minimal pressure and work burden on one coupled with a well-structured working environment. In government hospitals this is particularly important since these hospitals usually have difficulties in keeping skilled personnel.

The policymakers and administrators of hospitals would find the research on occupational therapy utilization insightful. For example, evidence-based findings can be used to make decisions about staffing, allocation of resources and infrastructure development. A case in point is presented by knowledge about the effects associated with advanced scheduling systems or lean management techniques which could therefore lead to investment in OT increasing technologies such as training.

There are several best practices that should be adopted by Government hospitals identified from research studies. These are:

Lean Management Techniques: The use of lean principles to streamline workflows and get rid of wasteful processes.

Real-Time Data Monitoring: Real-time data analytics for monitoring OT activities and making informed decisions.

Multidisciplinary Team Approach: Surgical teams' cooperation should be encouraged so that communication and coordination can improve.

Flexible Scheduling Systems: Dynamic scheduling models that can adjust to fluctuations in surgical needs and availability of staff should be implemented.

Optimizing OT utilization lowers wait times and enhances the surgery experience overall, which increases patient satisfaction. Increasing OT efficiency might boost patient confidence in the public healthcare system at government hospitals, where patients frequently experience lengthy wait times and scarce resources. Better health results result from satisfied patients, who are more likely to follow postoperative care guidelines.

Studies pertaining to the most efficient use of operating rooms offer a thorough comprehension of the obstacles and prospects associated with enhancing operating room productivity in Indian government hospitals. This research has wide-ranging consequences that include better worker satisfaction, financial savings, increased operational efficiency, and improved patient care. Government hospitals can improve surgical services and ultimately contribute to a more dependable and efficient public healthcare system by utilizing these insights.

Chapter – 4 Results and Analysis

All over there were 648 cases which were done during this time period,(i.e from April 15th – June 15th) including the Sundays, size for this study only those OT happening on workdays i.e from Monday to Saturday and starting from 9am to 3pm were included. A Random Sampling Method was used for this study and a sample size of 614 out of 648 of total OT's. 14 Days in the month of April, 26 days in the month of May and 13 days in the month of June. All the OT's not falling under the above inclusion criteria were excluded i.e 19 OT's done on Sunday and 15 OT's which were not falling under the resource utilization Time for OT's i.e (9am-3pm) was excluded. A total of 34 OT was not taken into consideration.

DEPARTMENT	TOTAL OT	PLANNED OT	UNPLANNED OT	EMERGENCY	PLANNED OT %	UNPLANND OT %
ORTHO	80	80	0	0	100	0
GENERAL SURGERY	101	97	4	0	96	4
NEURO	21	21	0	0	100	0
PLASTIC SURGERY	20	20	0	0	100	0
MAXILLO FACIAL	26	22	2	2	84.6	7.6
MINOR SURGERY	155	101	44	10	65	28.3
GYNAE & OB	180	141	22	17	78.3	12.2
ENT	31	25	6	0	80.6	19.3

TOTAL	614	507	78	29	82.5	12.7

Table 4.1 : No. of planned, unplanned and emergency cases, planned and unplanned ot utilization % for different speciality.

The information supplied shows how many operating rooms (Ots) are used by various hospital departments. In addition to the overall number of surgeries, the data also shows the percentage of scheduled and unplanned surgeries as well as a breakdown of planned, unplanned, and emergency Ots. The data has been analyzed and interpreted as follows:

The Orthopedic department had a highly ordered and consistent schedule, with all surgeries scheduled and no unforeseen or emergency procedures.
The general surgery department's high number of scheduled procedures and low percentage of unscheduled procedures show that, while there were some unexpected instances, scheduling was generally effective.
Like the orthopedic department, the neurology department had all of its surgeries scheduled; there were none that were urgent or unscheduled.
There was potential for better scheduling in the Maxillo Facial department, as seen by the high number of scheduled procedures mixed with some emergency and unexpected cases.
Due to the erratic nature of this specialty, the Gynecology & Obstetrics department saw a significant proportion of planned surgeries along with notable unplanned and emergency cases.

Overall, Bokaro General Hospital demonstrates a high percentage of planned surgeries, indicating good scheduling practices. However, the presence of unplanned and emergency surgeries, particularly in departments like Minor Surgery and Gynaecology & Obstetrics, suggests a need for improved predictability and resource allocation to handle unexpected cases more efficiently.

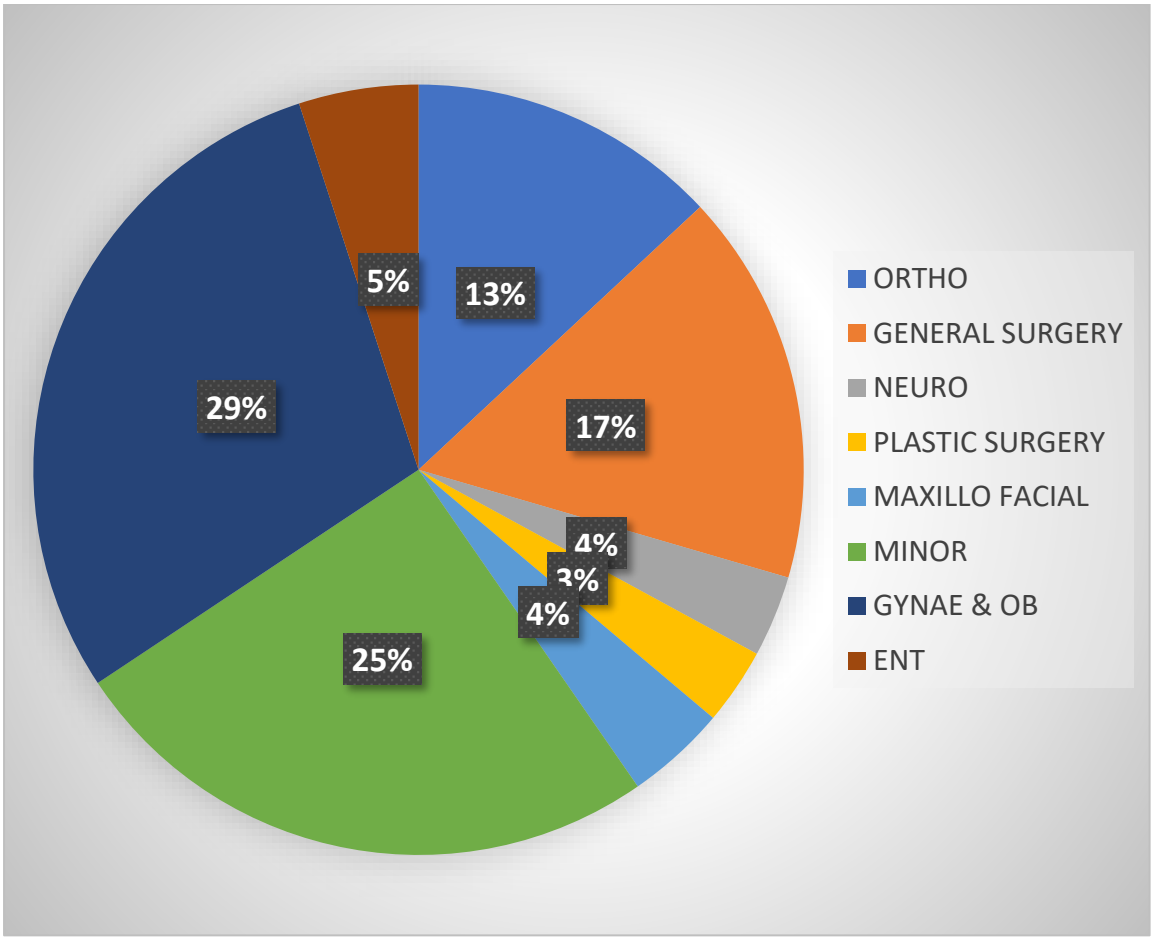

Fig.4.1 : Speciality wise analysis and distribution of total no. of surgery.

The distribution of surgeries among different hospital departments is displayed in the pie chart. It is essential to comprehend the workload and resource distribution in each specialty through the use of this visual representation. This is a detailed examination of the data, highlighting the contribution of each department to the overall number of surgeries and examining the consequences for patient care and hospital administration.

Departmental Breakdown

Minor surgery (29%).

Biggest Contributor: With 29% of all surgeries performed, minor procedures make up the majority of surgeries performed. This high percentage suggests that a substantial portion of the hospital's activities involve minor surgical procedures.

Consequences: Given the high number of minor procedures performed, it is likely that the hospital will need to devote a significant amount of resources to staffing, operating rooms, and post-operative care facilities in order to effectively manage these cases. Process

simplification for minor procedures can enhance overall effectiveness and patient throughput.

Obstetrics and Gynaecology (Gynae & OB) (25%)
Second-Biggest Contributor: With 25% of all surgeries performed, gynaecological and obstetric procedures account for the second-biggest portion. This ranges from the simplest delivery to the most complex obstetric operations.
Implication: Because of its large proportion, specially trained personnel and obstetric operating rooms are required to handle the special needs of these procedures. Efficient scheduling and resource allocation are critical for both scheduled and emergency obstetric treatments to go well.

This means that general surgery is the third biggest contributor, accounting for 17% of all surgical procedures. This category probably includes many surgeries, both emergency and elective.
Implication: General surgery is varied; therefore, it requires flexible scheduling and resilient surgical teams to accommodate various treatments. It becomes important that an adequate number of operating rooms and post-operative care units are established for general surgery.

These are considered to be the fourth largest contributor, with 13% of surgeries being orthopaedic. This includes arthroscopic surgery, fracture repairs, and joint replacements.
Implication: Most orthopedic operations require an extended working hour and special equipment. In case the orthopedic conditions are dealt with appropriately, waiting times can be reduced as patients' outcome will also be enhanced. The quality and success rate of the operations will be improved once more advanced orthopedic equipment has been procured and working staff trained accordingly.

Surgery related to the ears, nose, and throat (ENT) makes for 5% of all procedures, making it the fifth largest contributor. These treatments might vary from simple tonsillectomies to intricate ear reconstructions.
Implication: Despite the decline in ENT procedures, specialist personnel and allocated resources are still required. Providing operating rooms and ENT patients with specialized post-operative care can enhance patient satisfaction.

In the total surgeries performed under the study period, 84% of the surgeries were performed by the departments Gynae & Ob. ,OT dedicated to minor surgeries,General Surgery & Ortho Department. The OT which is dedicated to perform minor surgeries usually performs surgeries under LA. The cases usually come from surgical OPD during their designated timings. Gynae and Ob. performs the most no. of surgeries with LSCS, followed by TAH and Dilation and curettage.

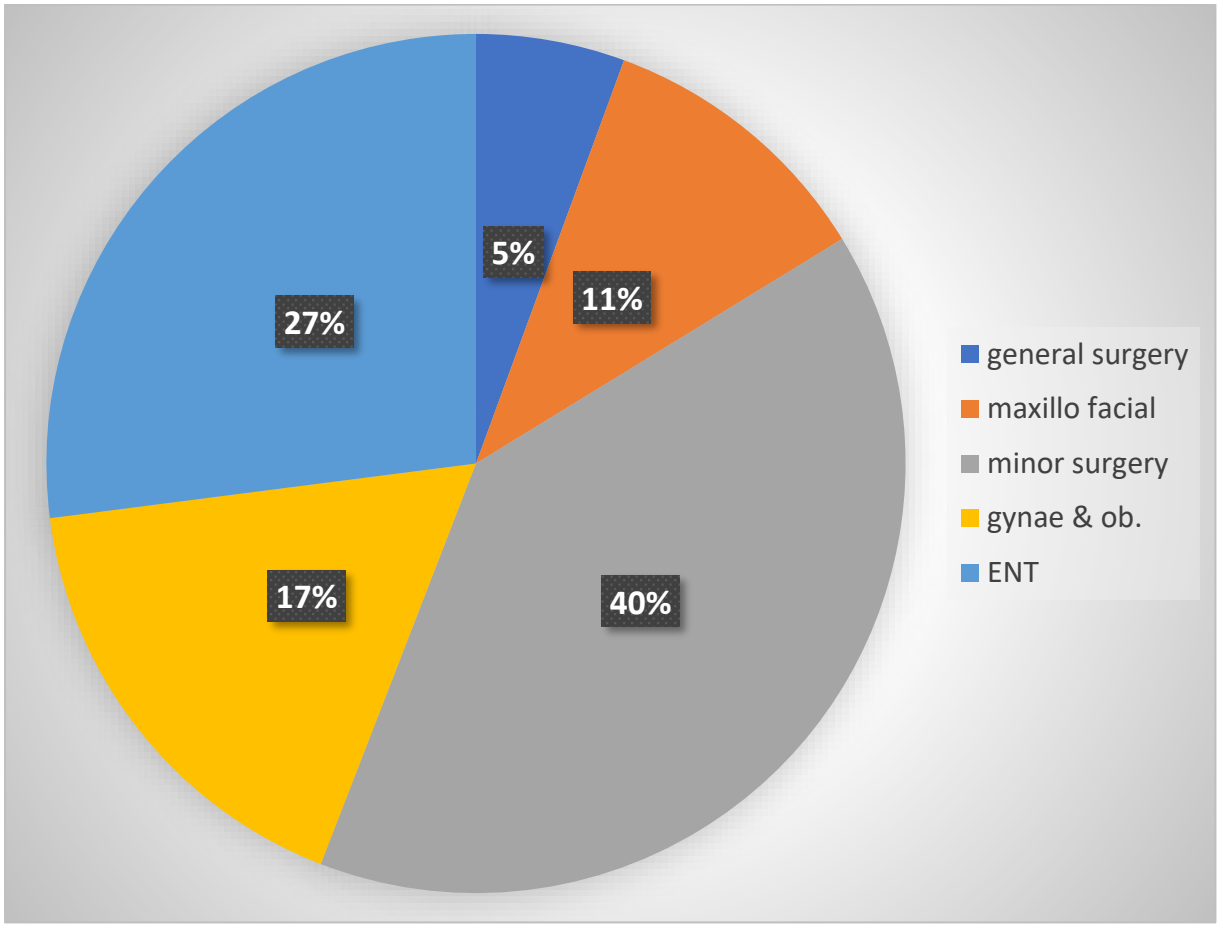

Fig. 4.2 : Unplanned OT %

The percentages of unscheduled operating theatre (OT) utilization across different departments are broken down in depth in the provided pie chart. By definition, unplanned surgeries are those that are not prearranged and usually result from medical emergencies or unanticipated circumstances. Hospital management must comprehend the distribution of unplanned OT consumption since it has a direct bearing on staff preparedness, resource allocation, and overall operational effectiveness.

At 40%, minor surgery department accounts for the majority of unscheduled overtime use.This high rate implies that minor procedures are frequently unanticipated and require flexible and easily accessible OT solutions. Efficient handling of such patients will ensure that the emergency small surgeries are done within the timeframe and not at the cost of elective ones.

Gynaecology and Obstetrics-related procedures account for 27% of unscheduled extra work. The high percentage of unscheduled gynecological and obstetric operations would indicate that emergencies are common, like complications while giving birth. This would require separate emergency OT facilities and staff trained in Obstetric emergency response.

Maxillo facial procedures account for 17% of unscheduled OT visits. The high percentage that this group represents indicates common 33axilla facial diseases or facial damage with emergent situations. In order to be competently managed, the hospital should have experts in surgical teams and equipment always at its disposal.

11% of unscheduled overtime is related to general surgery.
Unplanned general surgeries can result from urgent medical situations that need to be treated right away. To handle these situations without interfering with the main surgical workflow, it is important to guarantee the availability of general surgeons and flexible overtime schedules.

Surgery related to the ears, nose, and throat (ENT) accounts for 5% of unscheduled OT usage. Even though they are less common, unanticipated ENT procedures nevertheless need to be treated right away. These crises can be handled quickly if ENT specialists and the necessary facilities are available.

Minor surgery has the highest percentage of unplanned OT , accounting for 39.6% of the total. The second highest, with 27% of unplanned OT is ENT and the department of gynae and ob. accounts for about 17% of unplanned OT.

This distribution highlights that minor surgery, ENT, Gynae & Ob. Departments experience the most unplanned operations, while the other departments manage to plan all their OT effectively.

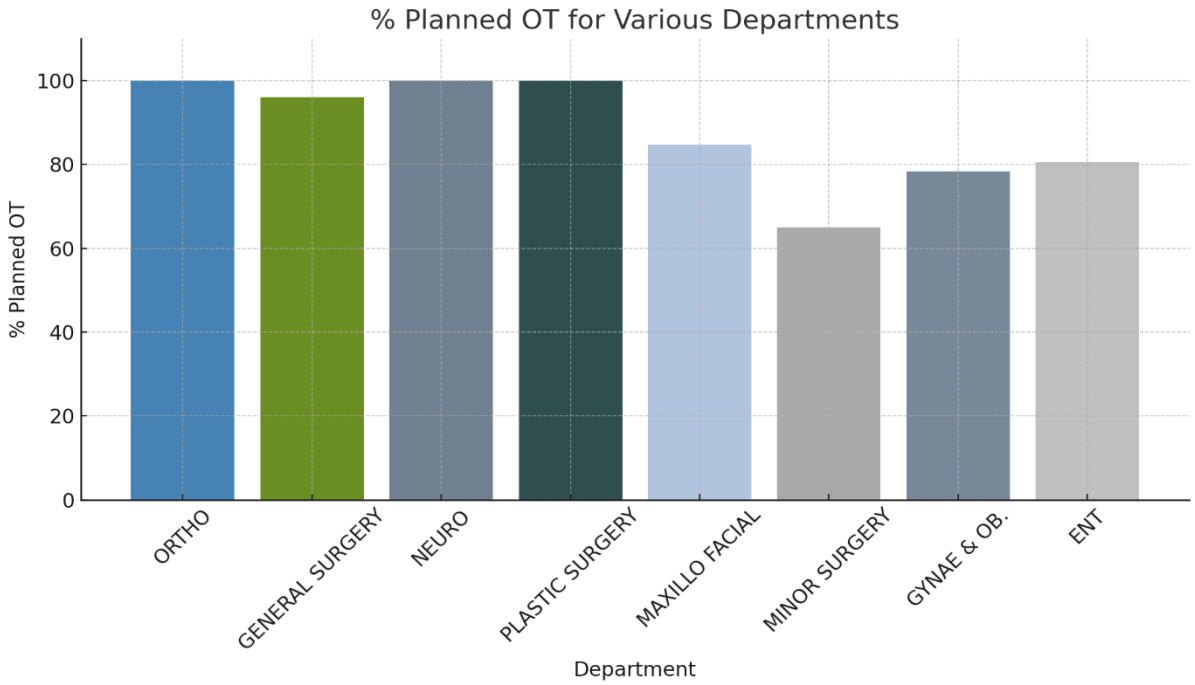

Fig.4.3 : Planned OT in %

The proportion of scheduled operating theatre (OT) utilization for each of the hospital's departments is shown in the bar graph that is supplied. Planned surgeries are ones that are prearranged according to treatment plans and medical assessments. Effective management of scheduled procedures is essential to hospital operations because it affects personnel scheduling, resource allocation, and the general standard of patient care.

The Orthopaedic department has achieved a 100% planned OT utilization. This implies that the orthopedic department schedules all of its surgeries in advance. It suggests a high degree of efficiency and predictability in the scheduling of surgical procedures, which is essential for the best possible utilization of resources and patient care.

The department of general surgery has 97% scheduled overtime utilization.
The high percentage suggests that planning and scheduling procedures are working, as only a small portion of surgery may be unforeseen. This promotes improved resource management and a simpler workflow.

A 100% scheduled overtime utilization is also displayed by the neurosurgery department. Similar to the Orthopaedic department, Neurosurgery follows scheduled surgeries to the

letter. This reduces the chance of last-minute problems and is a sign of strong pre-operative planning.

100% of the scheduled overtime has been utilized by the plastic surgery department.
This demonstrates how the department is able to schedule every surgery in advance and makes sure that there are no last-minute changes or crises that throw off the schedule.
84.6% of Maxillo Facial

Moderate Efficiency: The Maxillo Facial department is expected to use 84.6% of its scheduled overtime. This rate, however still somewhat high, indicates that this department performs some unforeseen surgery. This might be a sign of sporadic emergencies or serious instances that need to be attended to right away.
Small-scale surgery (65%)

Lower Efficiency: The planned overtime utilization for the Minor Surgery department is 65%.
This lower rate suggests that a sizable fraction of the surgeries performed in this field are not scheduled. It implies that either more emergency situations that interfere with scheduled schedules or improved scheduling procedures are required.

The department of obstetrics and gynecology has scheduled a 78.3% utilization of overtime. This suggests that although the majority of surgeries are prearranged, a significant proportion of unscheduled procedures still occur. The erratic nature of labor and its associated problems may be the cause of this.

High Efficiency: The planned overtime usage for the ENT department is 80.6%. Although the majority of surgeries appear to be scheduled based on this high proportion, there is still opportunity to reduce the number of unexpected surgeries.

A high percentage of planned OT across most departments with Ortho, Neuro and Plastic Surgery achieving 100% . Departments like Minor surgery ENT and Gynae & Ob. have a

higher number of unplanned or emergency surgeries , suggesting greater unpredictably in their scheduling.

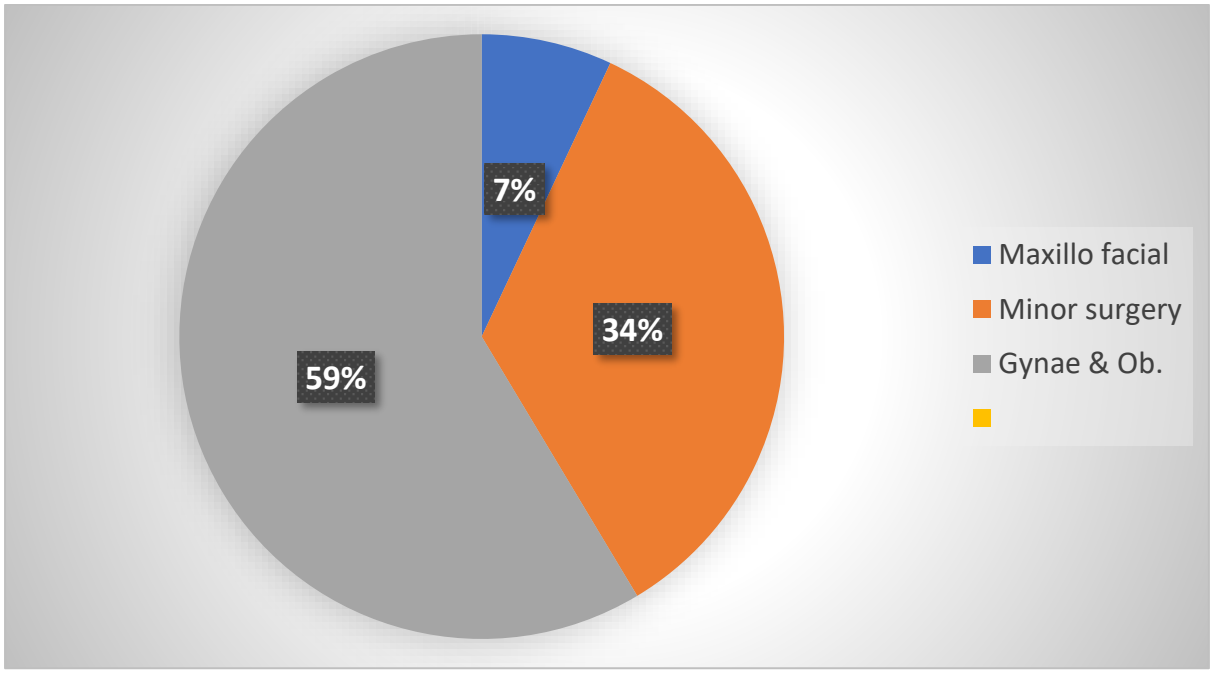

Fig.4.4 : % of emergency cases

The distribution of emergency cases is analyzed to shed light on the working dynamics of different hospital departments. Hospital management may put focused initiatives into place to optimize resource allocation, increase staff training, and raise the standard of patient care by knowing how frequently emergencies occur. The ultimate objective is to guarantee that the hospital can efficiently handle both scheduled and unplanned surgical procedures, therefore enhancing patient outcomes and preserving operational effectiveness.

At 59%, the department of obstetrics and gynecology (Gyn & OB) is responsible for the greatest percentage of emergency patients.
Preeclampsia, labor emergencies, and other obstetric crises, as well as the unpredictability of childbirth are likely to blame for the high percentage of emergencies in this area. To properly handle these instances, strong emergency protocols and adaptable resource allocation are required.

Moderate Emergency Rate: Of all emergency cases, 34% come from the Minor Surgery department.

This department performs a large number of emergency procedures, which highlights the necessity for a surgical team that is responsive and flexible. Managing cases of trauma, acute appendicitis, and other urgent surgical treatments may fall under this category.

At 7%, the Maxillo Facial department has the lowest percentage of emergency cases. Implications: The lower percentage indicates that fewer emergencies, such as facial trauma or dental abscesses, necessitate prompt surgical intervention, and that the majority of procedures performed in this area are scheduled.

Speciality wise OT utilization

Department	Total Cases	Total Time Utilized (in mins)	Total Resource Hrs (in mins)	% OT utilization
ORTHO	80	11465	19080	60
GENERAL SURGERY	101	11560	19080	61
NEURO	21	3065	19080	16
PLASTIC SURGERY	20	3025	19080	15.8
MAXILLO FACIAL	26	3155	19080	16.5
MINOR SURGERY	155	3900	19080	20.4
GYNAE & OB.	180	11750	19080	62
ENT	31	3100	19080	16.2

Table 4.2 : Speciality wise OT Utilization

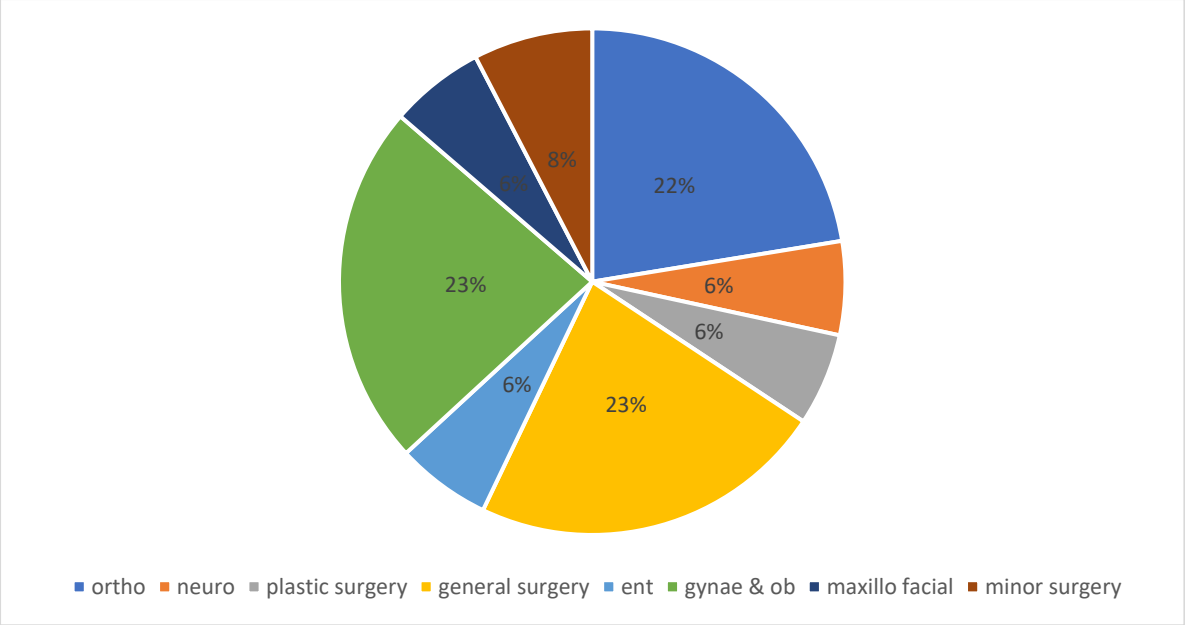

Fig. 4.5 : Speciality wise Utilization of OT in %

The pie chart shows the percentage distribution of Operation Theatre (OT) utilization across various specialties namely Ortho, General Surgery, Neuro, Plastic surgery, ENT, Gynae and Ob., Maxillo Facial and Minor Surgery . This information is crucial for hospital administration to optimize the scheduling and allocation of OT resources.

The above chart shows that Gynae & Ob. and General Surgery are using the OT the most which is 62 and 61 percentage respectively. Department of Orthopaedics uses the OT for about 60 percentage, followed by minor surgery which uses for 20.4 percentage and ENT which uses for 16.2 percentage while neuro uses for about 16 percentage.

The examination of overtime consumption across specializations offers insightful information about the operating requirements of various departments. Hospital management can increase staff training, boost overall efficiency, and optimize resource allocation by comprehending these trends. The objective is to guarantee that every department has the tools required to carry out surgeries efficiently, which will enhance patient care and hospital performance.

OT Nos.	Total Procedures	Total Resource Hours	Total Resource Hours (in mins)	Hours utilized (planned +unplanned)	Hours Not utilized	% utilized	% not utilized
New O.T	78	6	19080	11850	7230	62	38
O.T 1	96	6	19080	10120	8960	53	47
O.T 2	135	6	19080	11675	7405	61	39
O.T 3	62	6	19080	8670	10410	45.5	54.5
O.T 4	91	6	19080	11270	7810	59	41
O.T 5	152	6	19080	7120	11960	37.3	62.7

Table 4.3 : % utilization of each OT

1. **O.T Nos.**: Identifies the operating theater.
2. **Total Procedures**: The number of procedures performed in each OT.
3. **Total Resource Hours**: Fixed at 6 hours for each OT.
4. **Total Resource Hours (Mins)**: The total resource hours converted to minutes (6 hours * 60 minutes = 360 minutes; 360 minutes * 53 weeks = 19080 minutes).
5. **Hours Utilized (Planned + Unplanned)**: The number of hours each OT was utilized, including both planned and unplanned usage.
6. **Hours Not Utilized**: The number of hours each OT was not utilized (Total Resource Hours in minutes - Hours Utilized).
7. **% Utilized**: The percentage of total resource hours that were utilized.
8. **% Not Utilized**: The percentage of total resource hours that were not utilized.

Observations:

- **OT 5** has the highest number of procedures (152) but also the lowest utilization percentage (37.3%).
- **NEW OT 1** has a moderate number of procedures (78) with a high utilization percentage (62%).

- **OT 3** has the lowest number of procedures (62) and a relatively low utilization percentage (45.5%).
- **OT 2** has a high number of procedures (135) with a decent utilization percentage (61%).
- **OT 1** and **OT 4** have similar utilization percentages (53% and 59% respectively) with moderate numbers of procedures (96 and 91 respectively).

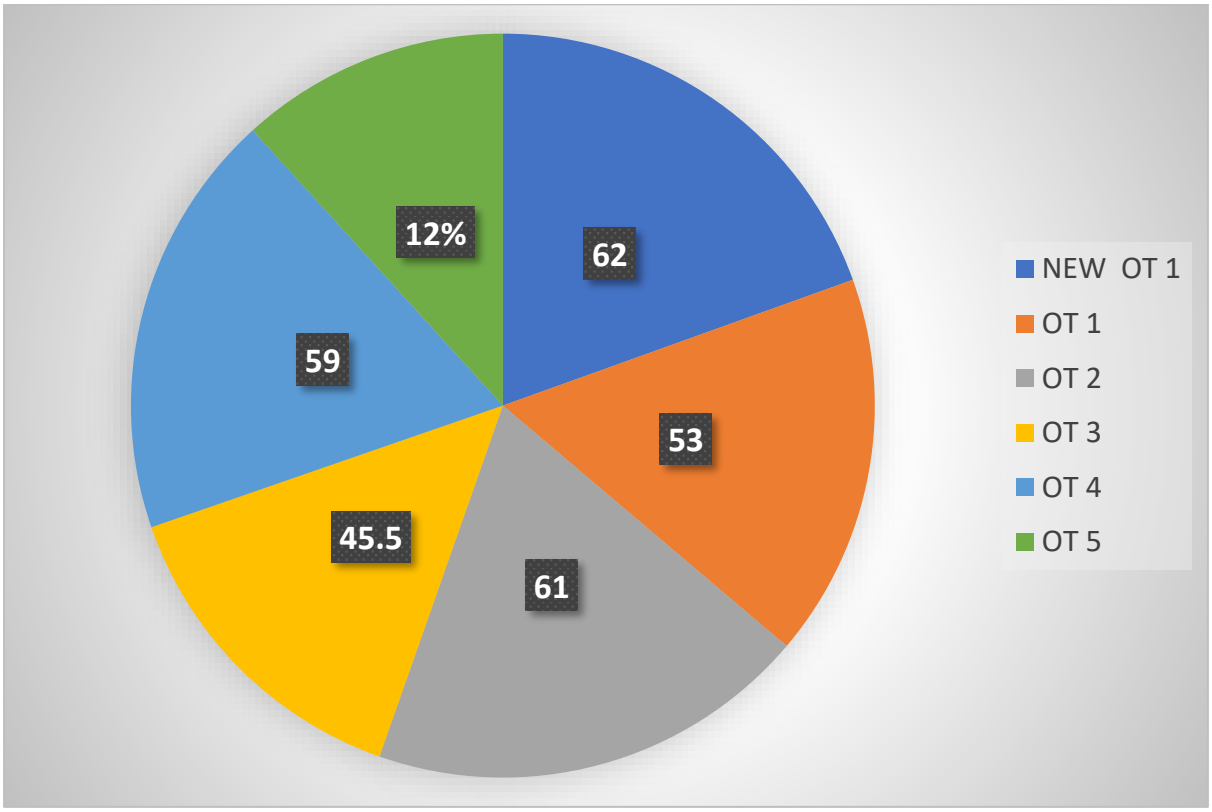

Fig 4.6 : % Utilization of each OT

The usage percentages across several categories are shown visually in the pie chart labeled "% UTILIZED". In the pie chart, each category is represented by a coloured segment, the size of which indicates the category's proportion of consumption.

The distribution of resource use throughout the various categories can be seen by examining the pie chart; certain categories have higher levels of utilization than others. When making decisions about capacity planning, resource allocation, and efficiency enhancements in relation to the categories shown in the chart, this information can be very helpful.

At 62%, the new OT has the greatest utilization rate. It shows that a sizable amount of the capacity or resources allotted to "new OT 1" is being used.
The OT 1 utilization percentage is 53%, which is marginally less than that of "new OT 1." It implies that this category has a moderate level of consumption.
Like "new OT 1," the OT has an 18% utilization rate, which suggests that resources are used to a significant degree in this area.
At 45.5%, OT 3 has the lowest utilization rate. It suggests that, in comparison to the other categories, there is a lower degree of resource usage within this one.

OT 4 utilization percentage, at 59%, is halfway between the higher and lower ranges. Within this category, it indicates a moderate amount of resource use.
Where as OT 5 has an 12 usage percentage, which is similar to "new ot 1" and "ot 2," suggesting that there is considerable resource utilization within this category.

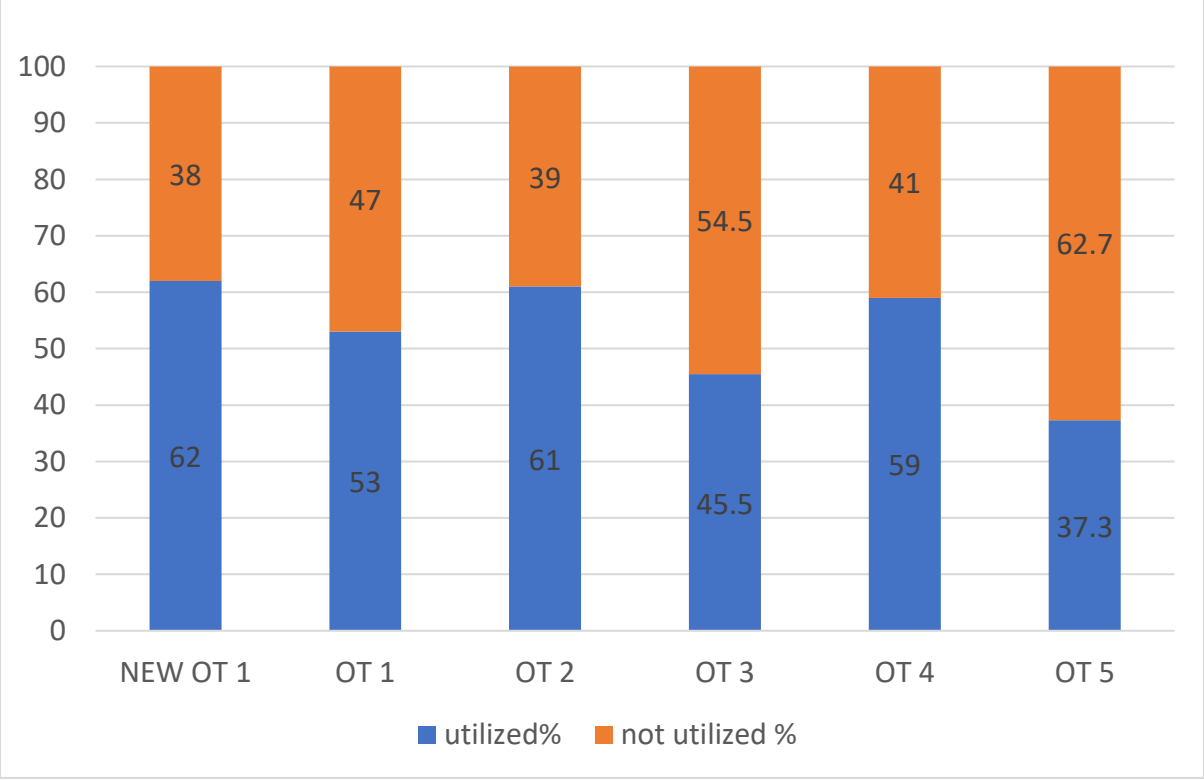

Fig. 4.7 OT Utilization Rate in %

This graph titled "OT UTILIZATION RATE (in %)" analyses and compares the utilization rates across different categories namely "NEW OT 1," "OT 1," "OT 2," "OT 3," "OT 4," and "OT 5." Each bar is divided into two segments: the blue segment represents the utilized percentage, and the red segment represents the not utilized percentage.

New OT 1: Utilized % - 62. Not Utilized% - 38. This OT has a relatively high utilisation rate with 62% of the resources being properly utilized.

OT 1 has a utilization rate of 53% whereas 47% resources remained unconsumed. OT 2 had a utilisation rate of 61% while 39% of the resources remained underutilised. OT 2 has been mainly dedicated to Gynae and Ob. with Dilation and curettage being the most common procedure with Total intravenous anaesthesia being induced for the same. The major surgeries include TAH (Total Abdominal Hysterectomy) and vaginal hysterectomy and Total pelvic repair.

OT 3 has a utilisation rate of 45.5% where as 54.5%., whereas OT 4 has been dedicated to general surgery with cholecystectomy and Appendectomy being the most performed surgery under the influence of general anaesthesia.

OT 5 has the least utilisation with 37.3%.

Problems faced by the OT's

Staff Shortages:

A severe lack of competent nurses, anaesthesiologists, surgeons, and support personnel.
Due to this lack, the available workforce is overworked, which causes errors and tiredness.
Due of the high patient volume, medical staff frequently works lengthy shifts without getting enough rest, persistent overwork can result in burnout, reduced productivity, and a higher chance of medical mistakes.

The proficiency of the surgical team may be impacted by restricted access to chances for professional growth and continuing medical education.
To maintain high levels of care, regular training in novel surgical methods and equipment use is necessary. Although skilled surgical nurses are frequently in short supply, operating room nurses are crucial to the efficient operation of OTs.
A shortage of nursing workers can put more strain on already-employed nurses, which will impact both their effectiveness and the standard of care provided.Maintaining OT operations

and making sure that **supplies** and equipment are on hand and in working order depend heavily on support personnel, such as technicians and assistants.
Inadequate support personnel might result in inefficiencies, lengthier recovery periods between procedures, and even possible safety risks.

Medical staff burnout, which is characterized by emotional depletion, depersonalization, and a diminished sense of personal success, can be brought on by ongoing stress and heavy workloads.

Healthcare workers who experience burnout may experience worsening mental and physical health, reduced job satisfaction, and increased departure rates.Employees at government hospitals frequently have few opportunities for continued education and career advancement. Medical personnel must get ongoing education in order to stay current on the newest surgical methods, innovations in technology, and recommended procedures.The results of surgical treatments can be impacted by differences in the surgical team's proficiency levels.
To make sure that every team member has the appropriate abilities and expertise, regular training sessions and seminars are required. Inadequate mentorship and supervision can hinder the professional growth of junior medical staff.
Experienced surgeons and anesthesiologists should mentor less experienced colleagues to enhance their skills and confidence.

It is difficult to recruit and maintain talented medical personnel in government hospitals due to lower salaries and less prospects for career progression.
Attraction of talented members will be needed with competitive remuneration packages and crystal-clear career growth tracks. Excessive medical staff turnover rates may result in decreased continuity of patient care and increased costs related to the orientation and training of new staff.
Methods of retaining skilled workers include incentivizing, providing a good work atmosphere, recognizing effort and rewarding accomplishment.
Human resource issues in OTs are taken care of through proper management along with leadership.

In this regard, administrators and medical staff must sit down to identify lapses in staffing, training, and supplies of resources.

Most of the human resource-related issues seen in operation theatres in government hospitals across the country might be quite complex and multi-dimensional. Adequacy of workforce, continuous professional development, training, working conditions, and effective recruitment and retention policies need comprehensive intervention measures to eliminate these problems.

Underutilization of Ot

Due to poor planning in scheduling, some overtime workers sit idle for a long period, which leads to a waste of time and resources.

Underutilization is often caused by administrative delays, lack of proper planning, and non-cooperation. Sometimes the OTs get overly crowded and many surgeries get scheduled at the same time, overburdening the existing resources.

Delays, hasty procedures, and over-crowding can all negatively affect the quality of patient care. Poor scheduling frequently results in either a delay or complete cancellation of surgery at the last minute. This throws a wrench into productivity as well as threatens to compromise the quality of patient care.
Delayed surgeries can exacerbate illnesses. Called-for complications can then follow. Longer convalescence tends to connect itself to such
The patients

Reasonable scheduling demands the ideal balance of coordination between various other departments radiology, pathology, and post-operative care are all directly linked to the surgical schedule.
Preoperative planning and post operative care may get delayed due to lack of coordination among the departments, which negatively affects the smooth running of the entire surgical procedure.
The planned schedule for elective surgery is often disrupted by the need which serves emergent conditions rapidly.

In case there is no emergency plan, then it may result in severe schedule delays and increased stress for medical workers. Protracted and intricate administrative processes may cause ineffectiveness and delays when scheduling surgery.

Scheduling by manual techniques brings about errors, miscommunication, and inefficiency. While this enhances accuracy, synchronisation and updates in real-time, such digital scheduling systems are not being applied as. The data analytics would thus anticipate surgical timelines, patient flow, and resource utilisation to make the task of scheduling more efficient. While technologies for advanced data analytics are available, the absence of these has hindered the hospital's ability to optimize schedules properly
There is no electronic health record at this point.

Poor EHR systems lead to ineffective management of patients' information and even breaks in communication. Effective EHR systems help in maintaining the records of the patients and also in coordinating care; they are helpful in ensuring continuity of care.

Patient information can hardly be tracked and managed effectively on paper-based records. The histories of the patients could be incomplete because paper records are prone to being misplaced, destroyed, or lost..Patient data entry and retrieval by hand is labor-intensive and error-prone.When they might be spending more time with patients, healthcare providers are wasting time on administrative work.

The surgical team may not have easy access to important patient information, like allergies, surgical history, and medical history.
Delayed access to critical information may lead to surgical complications and delays.

This may significantly impact treatment decisions based on incorrect patient information derived through manual record-keeping. An up-to-date record is always essential for the safety of patients and the success of surgical outcomes. The medication error could also be prevented through EHRs, which can generate alerts and reminders for preventing medication errors. Manual records also result in increasing challenges related to meeting regulatory requirements and maintaining accurate documentation.

Delay in surgery

1. Approval Issues
2. Time taken for patient to be shifted from wards to pre-op area.
3. Surgeon busy
4. Unavailability of OT slots.
5. Patient unfit for surgery
6. Surgery Modificatins

Chapter 5 – Discussion

An efficient operation theatre is bound to the overall performance and well-being of a hospital since it improves patient outcomes, efficiency, morale of staff, and resource management. It preserves compliance, safety, and gives operational flexibility. The management and organization are an essential investments that any hospital operation theatre has to make in continuation of the quality surgical care given.

Moreover, a well-organized OT improves the performance and morale of staff by laying down clear roles and responsibilities, reducing stress and fatigue, and providing continuous opportunities for professional development. It maintains better coordination and communication among surgical teams and smooth workflows without hassle or delays. It ensures safer conditions for both patients and staff with effective risk management and adherence to healthcare standards. Moreover, organized OTs also provide operational flee, which advantages their organized approach in terms of patients' comfort and safety, and reduced postoperative infections with proper sterilization and hygiene measures.

A much smaller number of distractions in the operating rooms during procedures can be achieved by keeping all the tools and supplies required for the surgical case in an organized manner.

Due to the fact that equipment won't go missing or fail, surgeons can focus more on the process. In an effective operating theatre, hygiene and sterilization practices minimize postoperative infection risk.
The OT environment is cleaned and sterilized through regular maintenance and cleaning programs. Efficient scheduling and resource management enable timely surgical treatments with better recovery of the patients and shortened waiting time.
In emergency situations, acute illness, surgery needs to be done right away where time delays may prove lethal.
A well-organized OT ensures efficient utilization of staff, materials, and equipment and hence reduces wastage and an organization's operating expenses.
Well-organized inventory will prevent shortage and overstocking of surgical supplies.
Simplified methods along with guidelines shorten time between operations. More surgeries will be done within a single day if time between operations is short.
A shortened OT turnover time enhances the capability of the hospital to accept more patients.
Organized processes and adequate staffing reduce the workload on each member, hence diminishing stress and fatigue.
This reduces stress and thus enhances morale and satisfaction of workers, ultimately improving output.

Effective utilization of resources with reduced wastage brings substantial cost savings to the hospital. Proper inventory management also ensures that funds for equipment maintenance and upgrade are utilized effectively.

Organized OTs ensure better resource allocation, ensuring that emergency conditions get the required time, attention, and aid.
Effective resource management enables hospitals to use funds in the construction of new infrastructure and installation of state-of-the-art technologies. Effective scheduling and resource management reduce the patient waiting time for procedures.
Patient wait time is reduced by effective resource management which reduces tension and anxiety among the patients and minimizes the after-effects of delays.

The blend of patient comfort and attention is maximized within a well-organized outpatient therapy setting, so that every patient is given the best care for their confidence and reassurance during different stages of surgery. Long-term treatment plans for patients

throughout the post-operatively, enhance the entire experience of the patients. Organized occupational therapists maintain high standards of safety and quality by having regulations based on healthcare legislation and standards.
The organized environment facilitates the smooth running of routine audits and inspections. Effective OT management will aid in working out unforeseen circumstances and emergencies.
Well-organized procedures and resource management cost enables scalability, and the hospitals can increase their surgical capacity when needed.
It is, therefore, upon this scalability that the changing healthcare systems and growing patient populations depend.
Well-defined backup plans and procedures ensure proper adjustments to the constantly evolving situation.

OT delay affects the entire system of the hospital. Resource management, staff productivity, care taken by patients, and even the status of the hospital are all affected. More importantly, delays in surgery immediately impact patient outcomes. Longer waits for treatments make the condition of the patient deteriorate, which may later require more complex and dangerous surgery if and when it is finally performed. Delays in such situations can prove to be fatal. Longer hospital stays and lack of visibility into their treatment process increase the discontentment among patients. It affects the goodwill of the hospital and erodes the confidence of the patients in the doctors altogether.

Overtime delays may create huge ripples in the area of personnel. The makeup time lost due to surgery cancellations would be tremendously stressful and tiring for surgeons, anesthesiologists, nurses, and other support staff. This will lead to medical staff turnover rates, fatigue, and a drop in job satisfaction. This may also include overtime work by staff for longer periods to clear the backlog of surgeries, which again exacerbates fatigue and reduces overall productivity. Ultimately, this can create an uncongenial work environment whereby it becomes very difficult for the hospital to retain competent staff and thus maintain satisfactory standards of care.

Another critical area where delays in OT impact is that of resource management. Inefficient use of the hospital operating rooms can lead to huge financial losses since they are very expensive spaces. This may mean costly surgical facilities and equipment working under

worktables, hence money down the drain. Conversely, delayed surgeries that are to be fitted in could mean misused resources, raising the cost of upkeep or maintenance and hastening the wear and tear of equipment. Moreover, surgical supply chains are turning more complex and inefficient, making them highly tied to shortages or overstocking, either of which will stress the finances of a firm.

Hence, OT delays can impact a hospital's functioning as a whole. Most scheduled surgeries have to integrate with other services such as radiology, pathology, or post-operative care units. Bottlenecks in these areas may occur due to delays and result in a knock-on effect of inefficiency throughout the hospital. This can result in ineffective use of beds in hospitals, and prolongation of waiting time for diagnostic examinations and post-operative care, which places an additional burden on other services of the hospital and crowding. Ultimately, this may end up affecting the operational efficiency and thereby financial solidity of the hospital due to such systemic inefficiencies, which would mean compromising on the excellence of services provided to all patients and not just to those who are awaiting surgery..

Surgery delays may be further prolonged by approval issues because gathering the required approvals sometimes requires extensive and lengthy administrative processes. Some of these processes include consent forms, procurement of regulatory approvals, and insurance verification. Poor performance in these processes can lead to significant surgically related delays since surgery is not possible without paperwork. This can be minimized by hospitals through the adoption of computerized systems of approval, ensuring all required documents are ready well in advance, and improving the speed of administrative procedures. Clear procedures and some training for employees about how to deal with approvals would help to reduce bureaucratic hindrances.

Another very critical reason for the delays is the transportation time from the wards to the pre-op room. It may be due to poor staffing, communication problems, or some problem in logistics. Inadequate patient transport will definitely throw a wrench into the surgical schedule, thus delaying later surgeries with a ripple effect. In general hospitals, this may be reduced through effective patient transport strategies: specialized transport teams or unambiguous communication guidelines may help. Real-time patient movement tracking and coordination technology can also be used to ensure that transfers are very prompt and the wait times remain as short as possible.

This could mean delayed OT timelines due to overburdened case loads or administrative responsibilities among surgeons. In such a case, patients will have to wait for a longer period for surgeries conducted by overbooked surgeons. More effective scheduling systems balance the work burden among surgeons and ensure ample time for each surgery procedure, which hospitals may follow to address the situation. Surgery can start on time by easing the workload of overburdened surgeons through the appointment of more surgeons or employing part-time specialists during busy periods.

The surgery get delayed due to non-availability of OT slots; the common reason is overbooking, and emergency cases get priority. This can result in frequent postponement or rescheduling of elective surgery. This can be minimized by hospitals by incorporating advanced scheduling software that dynamically changes the schedule based on real-time data. A buffer gap between procedures and special time slots for urgent surgeries may help accommodate unforeseen delays without hampering the rest of the plan. Increasing the hours of operation for OTs during peak times, or increasing the number of OTs available, can accommodate more surgeries.

Late alterations to surgical plans may vastly delay surgery, for example, by changing the process or realizing additional equipment is needed. In most cases, late changes result from poor preparation earlier on or unexpected findings that may arise during the procedure. This can be minimized by hospitals through improved communication between surgical teams and better preoperative planning. This can be ensured by taking time for proper preoperative meetings to discuss the plan of care and any alternate plans. An understanding support staff who responds to requested needs in a timely manner and well-stocked OTs on equipment that is frequently needed can also help manage unexpected changes effectively.

Recommendations and suggestions for optimum utilization of OT's

Grouping of OT's

This grouping of OTs can significantly improve their optimization through resource allocation, procedure simplification, and coordination of the surgical team. The grouping of OTs based on various standards prescribed, such as surgical specializations, types of operations, or urgency of cases, can lead to better and more improved utilization of facilities effectively and efficiently.

Accurate allocation of resources can be achieved if OTs are grouped by surgical specialties like Orthopedics, Cardiology, Neuro Surgery. Each group can be provided with the exact tools, supplies, and equipment necessary for the surgeries that come under its specialty category. This can ensure all the required resources are available at one's fingertips and significantly reduces the preparation time necessary to get the OT ready for different procedures. This way, as each OT group can have an individual schedule ensuring that it is kept maximum busy and has minimum idle time between operations, specialist groups can expedite the process of scheduling surgeries.

This can be better put into orientation by grouping OTs according to the kinds of procedures or urgency of the case. For instance, when there is a dedicated group only for emergency surgeries, an OT will always be available during urgent situations, thereby minimizing delays of scheduled elective surgeries. In the light of this, elective operations have easier transitions and are easier to plan when they are scheduled concurrently. It also promotes better communication and collaboration between individuals working in the same group and thus attains more effective workflows with less waiting time.

OT grouping increases scalability and flexibility, making it easier for hospitals to adjust to changes in surgical demand. Without affecting the OT system as a whole, more workers and resources can be assigned to high-demand groups during peak hours. On the other hand, resources can be reallocated to other hospital departments or used for training and maintenance when there is less demand. The entire effectiveness and efficiency of the hospital's surgical services are eventually improved by this flexibility, which guarantees that OTs are used effectively and can react quickly to changing needs.

In my view, Ortho should have a completely dedicated OT because this department performs a good number of surgeries usually it shares it’s OT with Neuro department. OT 5 which

usually performs Minor surgeries which can be very well shifted to minor surgery department near the Surgery OPD. This can allow to accommodate the long list of cases which are waiting for their turns respectively. Sometimes OT 5 performs cases such as abcess drainage or wound cleaning or even laryngoscopy for which we do not necessarily need a specially dedicate OT as such.

Pre – release OT schedule

By enabling better planning, lowering uncertainty, and enhancing cooperation among all parties engaged in the surgical procedure, pre-releasing the operation theatre (OT) schedule can greatly improve its optimization. By taking a proactive stance, OT resources are used as efficiently as possible, which ensures smooth surgical procedures and better patient results.

Well ahead of time, the OT schedule was made available so that surgical teams—physicians, anesthesiologists, nurses, and support personnel—can plan and get ready for procedures way in advance. With the knowledge of the timetable well in advance, the teams can make sure that all necessary supplies and tools being used are well sterilized. Such planning diminishes the last-minute scrambling as well as reduces the possibility of delays caused by broken or missing equipment. It also provides better coordination with other departments, like pathology and radiology, so that pre-operative diagnoses and evaluations are completed in time.

Early OT scheduling thus increases integration and communication among the various surgical process departments and individuals. This is efficient person and resource allocation since it will ensure that the right people are present in any given procedure at any given time that they may be needed. The risk of miscommunication, or rather, the errors resulting from miscommunication, can be reduced if the timetable is clearly communicated to all concerned parties—including the surgical team itself, transport services who are supposed to bring the patient to the theater, and other post-operative units involved in the administration of after-care. This teamwork ensures that work runs more smoothly and turn-around time between two surgeries might be minimized by making sure that shifting of patients to the OT is on time, starting procedures on time, and that any possible complications will be taken care of beforehand.

The OT schedule, if issued well in advance, can help to provide better utilization of surgical facilities and the skills of doctors to the hospital. Proactive scheduling gives early alert or warning for possible bottlenecks and allows their correction before it causes delays. Besides, with such scheduling, it is possible to schedule surgeries in a way so that optimum overtime usage could be achieved. This could include grouping similar treatments that require less setup time, or booking longer, more complicated surgeries when resources are available. It also allows putting in buffer periods for emergencies or unexpected delays to keep the overall timetable on pace. Much preparation and the foresight embedded in the content do yield better performances of the surgical services of the hospital, and patient throughput.

Pre – op and post – op being on the same floor as the OT

Keeping pre-operative and post-operative departments on the same floor as the operation theatre can help optimize surgical operations. Proximity facilitates easy transitions and coordination, which eventually improves patient care and enhances operational effectiveness.

This therefore considerably reduces the time and effort required in transferring patients from the pre-op to post-op facilities when these sections are sited on the same floor as the OTs. The proximity therefore shortens the wait time for surgery and sending the patient into a post-operative recovery phase. Faster turnaround allows OTs to adhere more closely to their schedules, reducing turnaround time between cases and increasing the potential number of procedures that can be performed in a certain period. This benefit enhances the entire surgical workflow in addition to optimizing OT resource utilization..

More effective coordination of the surgical team, nursing staff, and support staff can be done if pre- and post-operative areas are on the same floor as the occupational therapists. These major areas are proximal to one another, thus allowing easier and faster coordination and communication and providing faster responses to whatever issues might arise. For example, it enables staff to quickly respond if a patient either needs additional preoperative preparation or has complications after surgery, instead of making patients travel between the floors. Patient flow has also turned out to be more streamlined and predictable, which makes surgeries on time possible by effective surgical schedules.

Pre-op, OT, and post-op facilities are much more proximate, minimizing the amount of stress and discomfort taken in with many transfers and improving the experience of the patient overall. This helps the patients reap benefits from a less-stressful and more-organized encounter, with less waiting throughout their treatment process. More importantly, same-floor care minimizes the potential risk of fallacies or other problems happening during the course of transferring the patient to different places, such as falls or dislodging of IV lines, hence providing better care under conditions of safety. The enhanced results of patient happiness and safety increase patient care and confidence in the healthcare system.

In conclusion, locating pre- and post-operative spaces on the same level as the operating room reduces transfer times, improves medical team coordination, and improves patient experience and safety. Together, these elements support the theater's optimal operation, which results in more effective and efficient surgical care.

A better start time for the first case will help optimize the surgical schedule for the entire day in an operating theater. An on-time start for the first surgery sort of sets a tone of how the rest of the day should be; this can be achieved by careful preparation, smooth workflow, and good communication.

Many strategies may be utilized by hospitals toward better start times for the initial cases. Most importantly, all the preoperative activities, such as patient assessment, laboratory work, and imaging, should be completed well in advance. Pre-admission clinics might help in this matter, wherein days before the procedure, planned assessments are done earlier. This can be minimized a lot by designating a dedicated first-case start team that would involve anesthetic, surgical, and nursing personnel especially assigned to make sure everything is ready. This team will come early to set up the OT, ready all supplies and equipment, and guarantee that the patient is ready to receive anesthesia. Finally, clear communication procedures should be established to ensure all members of the team are aware of their duties and deadlines, and any potential issues are addressed immediately

When the first case starts on time, it impacts the rest of the day's schedule and increases the amount of work that can be completed. The first surgery going well minimizes the cascading effect of delays for other procedures later in the day. By adhering to the timetable, all the

overtime is used to its best advantage, allowing more surgeries to be fitted within the time available. It also makes sure that idle time of the surgical team and the support staff is at a minimum. Reduced wait time and smooth functioning of operations also means that patients are happier when procedures start on time.

When the first case starts on time, hospitals are better placed in managing resources like staff, equipment, and availability of OTs. Effective management of the resources reduces operating expenses and raises the capacity of the hospital to take more patients or deal with emergencies. It's also not always that the surgical team is catching up due to early delays, and prompt starts can improve the morale and productivity of the team. From the point of view of the patient, earlier procedures will mean less period of fasting, reduced anxiety, and easier procedure overall. Therefore, getting the first case on time can be considered the most important step towards planning an overtime shift that will provide efficient and quality care to patients, optimize resources, and result in increased operational efficiency.

Live OT Tracking

Live operation theatre tracking can be much useful in optimizing OTs by providing real-time visibility into surgical operations, enhancing their coordination and communication, and providing data-driven decision-making. In an integrated manner, live tracking systems use the latest technologies such as RFID tags, Internet of Things devices, and specialized software to allow real-time monitoring and management of surgical process status and progress.

Live OT tracking systems enable real-time information regarding each surgery, starting from the patient's arrival in the hospital until preoperative preparation, commencement, and end of the procedure, and postoperative care. This type of visibility can be very useful to the surgical teams and the hospital management in keeping track of each surgery, spotting delays or bottlenecks, and taking remedial action on time. This will help them reduce idle time and maximize the usage of OT by making sure that the next surgeries start on time with a clear view of the OT schedule and the status of ongoing procedures. Better management workflow enables them to efficiently manage personnel and resources and assures that overtime is effectively used throughout the day.

Real-time OT tracking improves coordination and communication among the surgical team, anesthesiologists, nurses, and support staff. This helps ensure real-time information to all concerned persons about changes in the schedule of surgeries and their current status. It therefore ascertains that adequate personnel and equipment would be available at the right time, reducing errors and miscommunication. For instance, the system can alert the next team involved in a case to the fact that a surgery will run longer than expected to make sure there is less idle time in between. By live tracking, effective coordination can be achieved in order to reduce waiting times, create smooth transitions, and ensure an efficient and well-organized overtime environment.

Live OT tracking systems gather important information about the start and end times, length of procedures, delays, and causes of delays related to surgical operations. Hospitals can find trends, inefficiencies, and areas for development by analyzing this data. Data-driven insights can help guide decisions about better resource allocation, preoperative and postoperative process improvement, and scheduling practices optimization.

Chapter – 6 Conclusion

From the above study it can be concluded that out of 614 surgeries performed during the study period that happened within the resource hours of OT i.e (9am – 3pm) 82.5% were planned surgeries, while 12.7% were unplanned ,

New OT 1 and OT 2 were the most utilized OT’s in the resource hours i.e about 62 and 61 was utilized respectively. OT 4 was utilized for 59% followed by OT 1 which was used for 53%. OT 5 had the least utilization percentage with about 37.3%.

It clearly shows that the scheduling of the OT needs improvement. Operation theatre scheduling is important for better patient care outcomes, ensuring full utilization of available resources, smoothening hospital operations, and enhancing operational efficiency. Proper OT

scheduling will fully mobilize and monitor the surgical activities to optimize the availability of OTs, reduce the waiting periods, and put the surgery on the fast track.

First, they can reduce delays and ensure that patients get surgical care in time by ensuring a proper scheduling plan for surgeries, taking into consideration the complexity and urgency. This provides assurance that OT slots will be allotted in relation to priorities assigned to the procedures, such as emergency, urgent, and elective cases. Although elective procedures could be scheduled on the availability and readiness of patients, emergency surgeries could be given urgent precedence to have important patients get timely interventions. The careful organization in taking turns and timing of surgeries also enables smart scheduling to be a great help in letting hospitals optimize OT usage throughout the day. It maximizes the number of surgeries conducted every day, minimizes idle time between procedures, and optimally exploits these rather expensive OT resources in terms of personnel and specialist equipment.

The second dimension of OT scheduling allows for the planning of all the various teams that take part in surgical care: surgeons, anesthesiologists, nurses, and ancillary staff. With well-defined and organized schedules, healthcare professionals are better placed to ensure that every surgical procedure is adequately catered to with surgical instruments, anesthetic supplies, image-guiding tools, and other equipment, sanitized and ready to be used.

The most common causes for delay in surgeries were :

1. Approval Issues
2. Time taken for patient to be shifted from wards to pre-op area.
3. Surgeon busy
4. Unavailability of OT slots.
5. Patient unfit for surgery
6. Surgery Modificatins

Surgery delays are attributed to approval issues, which create administrative hurdles that should be cleared before the start of any procedure. These include problems in securing insurance approvals, followed by medical clearances, regulatory clearances, and even patient consent papers. Each step of the approval process takes coordination between the patients,

health professionals, administrative staff, and insurance companies, which can cause delay and inefficiency. An example of how surgery scheduling may be delayed is when paperwork is incomplete or wrong and takes some more time to update. Additionally, differences in the different healthcare systems' and legal jurisdictions' approval procedures may create more complexity and prolongation of the permission-seeking process, impacting surgical scheduling and consequently the care delivered to patients.

The following are some of the strategies that hospitals can use in reducing the approval-related delays,

First, with the use of electronic health records and digital consent forms, the process of documentation will be easy and, as such, the risk of errors reduced, enabling faster approvals. Standardizing approval workflows and protocols across departments creates consistency and efficiency. More specifically, training of the staff on the necessity of accurate and timely documentation could be emphasized and training provided on effective methods for gleaning approval. This many times allows for streamlining Approvals times based on close collaboration with insurance providers and regulatory bodies to clearly set up communication channels and expedited review pathways. Ultimately, increasing transparency and airing views of stakeholders, together with the harnessing of technology in automating and streamlining approval processes, will form one of the key mechanisms to reduce delays relative to problems with approvals while scheduling surgical procedures.

The surgery can be delayed by the time consumed in transporting patients from wards to the pre-operative (pre-op) area, and hence hospital patient care and operational efficiency get affected. Different issues can cause delays in patient transfers, such as insufficient personnel to transport patients on time, logistical problems during the transferring process between different hospital departments, or even poor communication among the team. These delays can play havoc with the surgical schedule, causing patients to wait longer and perhaps even delaying more surgeries.

The hospital can adopt various measures to tide over such situations and minimize the delays in patient transfers. First and foremost, logistics for the transportation of patients from the wards to the pre-op area should be improved by designating certain transport teams or persons to do this job, including details like stretchers and wheelchairs that should be made available to the transport teams so that transfers from the pre-op area to the wards go much

more smoothly. Setting up clear protocols and communication routes between the pre-op area, transport teams, and nursing staff may also be helpful in smoothing out the process and avoiding any miscommunication or delays.

Improving OT Efficiency

Giving a Timely reminder to the surgeons about the surgeries

Early intimation of planned surgeries to the surgeons will significantly improve OT efficiency since this would ensure tray readiness, avoid the chance of delay, and maximize resource utilization. Reminders that persuade surgeons to prioritize overtime commitments are very useful because surgeons often bear many responsibilities. These reminders thus help a surgeon prepare for surgery by going through patient charts, discussing surgical plans with anesthetic teams, and ensuring that all necessary equipment is available in the operating theatre. This not only helps avoid unwanted delays, therefore assuring that procedures start on time, but this lead-up inflates patient satisfaction and benefits OTs by optimizing resources. Reminders help surgical teams in communicating and setting themselves up as all individuals involved will know what role and responsibility they have during the performance, which always sets them ready for these. Concurrent or successive surgeries happen frequently in busy hospital settings, and this type of communication enables workflow management to be effective**.**

Grouping of OT's

The OTs could also be segregated based on procedure type or specialty to use them efficiently, manage workflow, and also allocate resources optimally. This way, with segregation by characteristics such as urgency levels, as classified by emergency or elective type, or surgical specialties like orthopedics or neurosurgery, hospitals would be able to cater much better to the needs of each group and speed up their processes. In its plan, overtime is used whenever there is a likelihood of reducing idle time, which is achieved by the setting up of staff and equipment to certain treatments in order to reduce set-up times between surgeries. In addition, grouping eases coordination between surgical teams or other supporting personnel. Standardization of procedures and workflows ensures good communication and

rapid completion of all preparatory work in each group. For instance, at specialized OTs, any urgent surgeries could be prioritized to ensure prompt access and short wait times. Grouping of OTs helps improve the surgical environment by smoothing operations and making best use of available resources to result in better patient care and satisfaction.

Live OT tracking software

Live OT tracking software enhances the efficiency of operation theatres. This is done by giving real-time OT visibility into surgical procedures for more coordination and communication among teams, while also supporting data-driven decision-making. Real-time tracking of the progress/status of surgeries is possible with the latest technologies such as RFID tags and Internet of Things devices.

In the operation, location and status visibility of surgical tools, personnel, and patients are noted. In a visibility setup such as this, OT managers can track excess utilization against overtime and recognize bottlenecks to optimize available resources. It provides real-time reports regarding surgical progress to surgeons and support staff, who can adjust schedules immediately and prepare for other procedures.

References

"Operating Room Leadership and Management" by Alan D. Kaye, Charles J. Fox III, and Richard D. Urman.

"Practical Operating Theatre Management" by Jaideep J. Pandit

Optimization and planning of operating theatre activities: an original definition of pathways and process modelling Simone Barbagallo, Luca Corradi, Jean de Ville de Goyet, Marina Iannucci, Ivan Porro, Nicola Rosso, Elena Tanfani & Angela Testi

Measuring and reporting theatre utilization and efficiency Mathew Muir, Amanda Baric, Shekhar Kumta, David Watters, Russell Hodgson.