# "A Study on the Utilization Rate of Operation Theatre and their Sterilization and Disinfection Processes of KIMS Hospital, Secunderabad"

Dissertation Submitted to

**The IIHMR University, Jaipur**

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

In

Hospital and Health Management

By

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Under the Supervision and Guidance of

Dr Varsha Tanu

(Associate Professor, IIHMR University)

2023

## DECLARATION BY STUDENT

I hereby declare that this dissertation titled **"A Study on the Utilization Rate of Operation Theatre and their Sterilization and Disinfection Procedure of KIMS Hospital, Secunderabad"** is the Bonafede record of my original researchwork. 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 Information derived from the published or unpublished work of others has been duly acknowledged in the text.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

Rohan Parashar

Date-26 May 2023

# CERTIFICATE

This is to certify that **Rohan Parashar** in partial fulfillment of the requirements for the award of the degree of **MBA (Hospital and Health Management)** from the IIHMR University, Jaipur has successfully completed his internship at **KIMS Hospitals , Secunderabad** during February 28- May 27, 2023.

KIMS HOSPITALS™

**Dt: 26-05-2023**

**TO WHOM SO EVER IT MAY CONCERN**

This is to certify that **Mr. Rohan Parashar, ID No: 90402946** has undergone the **Internship** in the department of **Corporate Projects** at **Krishna Institute of Medical Sciences** from **27-02-2023** to **26-05-2023.** During the course of his work, found to be good.

We wish him all the best for his future endeavors.

KIMS is 750 bedded, Multi-Specialty hospital. This is accredited with NABH, NABL & ISO 9001:2015 certified.

**For Krishna Institute of Medical Sciences Ltd.**

KRISHNA INSTITUTE OF MEDICAL SCIENCES LTD. Secunderabad

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# Abstract

## Background

Surgical procedures and disinfection processes were observed for 8 weeks i.e. from 6th March to 29th April 2023, which includes all the surgeries being done in the operation theatre complex 3,4,11,17,18,19,20 of KIMS Hospitals Secunderabad, these OT consist of four specialities which were cardiothoracic , surgical oncology , urology and orthopaedic . Overall utilization rate of each speciality is calculated along the total number of surgeries in each operation theatre and methods of disinfection and sterilization.

## Objectives

- To determine and evaluate the operation theatre utilization rate.
- To identify the process flow to find any bottlenecks in the process.
- To observe the processes of sterilization and disinfection as per the protocol.

## Methods

Descriptive Cross-Sectional Study – To get an overview of how an operation theatre is being utilised descriptive cross-sectional study is done as it helps in collecting data at a single point in time. This type of study attempts to identify the features and patterns of how and operation theatre is used that too without drawing any conclusions about cause and effect or by following any patient over time. It includes monitoring number of operations carried out during study period, identify different kind of processes as per speciality and to calculate utilization rate.

## Result

A total of 487 were performed during the duration of 8 weeks , in orthopaedic department a total of 138 surgeries were performed followed by 133 surgeries in urology department , 124 in surgical oncology and 92 in cardiothoracic department respectively. Data is collected both manually and with the help of OT module application along by the support of the operation theatre staff . Over the duration of 8 weeks an average of 45 hours were taken for orthopaedic surgeries to be performed as compare to average 56 available hours each week . An average of 42 hours per week is the time taken for surgical oncology cases to be performed as compared to 56 hours available per week . 41 hours per week is the average time taken for the completion of cardiothoracic cases and 38 hours per week are utilized by urology cases.

Orthopaedics speciality has a recorded utilization  rate of 78.17%. . After orthopaedics surgical oncology speciality has the second-highest utilisation rate (73.38%). At a rate of 71.7%, the cardiothoracic specialty has had the third-highest usage , with a usage rate of 66.29%, has the lowest utilisation rate among the examined specialties . Time taken for the process of sterilization and disinfection is 15 – 20 minutes average after completion of a surgery and starting of the next surgery.

# Acknowledgement

Words of acknowledgement, however many they might be, are insufficient to expressthe gratitude I feel towards the people who have constantly supported me in successfully completing my dissertation in these unforeseen and unpredictable circumstances.

First and foremost, I would like to sincerely thank Mr. Prabhu Pawar (Business Analyst, Corporate Projects Department), Lucknow, Dr. Ayushi Devi (Business Analyst, Corporate Projects Department) my mentor in KIMS Hospital for their valuable guidance and constant encouragement, which enabled me to complete this project in time. Without their support, the completion of this project was impossible.

I would also like to express my gratitude to my academic guide, Dr. Varsha Tanu (Associate Professor, IIHMR, University), who provided me with all the assistance needed for the completion of my dissertation.

I would also thank the Academic Committee and Placement Cell for their assistance wherever necessary.

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# 1: Introduction

An operation theatre is a crucial area of any hospital or healthcare facility be it a single specialty or multi-specialty, where surgical procedures are being performed. An operation theatre is a cooperative environment where teamwork is required, with medical professionals such as surgeons , nurses , anaesthesiologist and paramedical staff working together to make sure the best possible outcomes for patients is achieved.

These days operation theatres are designed keeping in mind the needs of both the healthcare professionals and patients. The operation theatre must be large enough to have space for all the necessary surgical equipment and for the healthcare professionals working there along with the space for patients needs. The lighting aspect of the operation theatre is also very important the lights should be bright but shadow-free to make the surgical procedures hassle free. Also the temperature and humidity of the operation theatre should be maintained at optimal levels for the safety of patient as well as the surgeons. Role of technology is also very important as advance technology and robotic surgeries reduce the overall time taken for a surgery as well as ensure patient safety.

Another important aspect of operation theatre is maintaining aseptic and sterile environment, as aseptic environment ensures patient safety both the patients and the healthcare professionals present in the operation theatre are protected by aseptic and sterile procedures. The cross-contamination between patient and the healthcare workers must be prevented to maintain aseptic environment. This can be achieved by use of sterile tools and equipment, proper donning and doffing , use of gloves and face mask and following hand hygiene practices.

All these factors are related to the utilization rates of operation theatres and can lead to certain benefits, such as increase in the revenue of the hospital, patient satisfaction, and reduction in waiting times for surgeries. Also good operation theatre utilization rates shows that the surgical equipment are being used efficiently and the staff is also performing effectively thus leading to overall improvement in the utilization rate of the operation theatre.

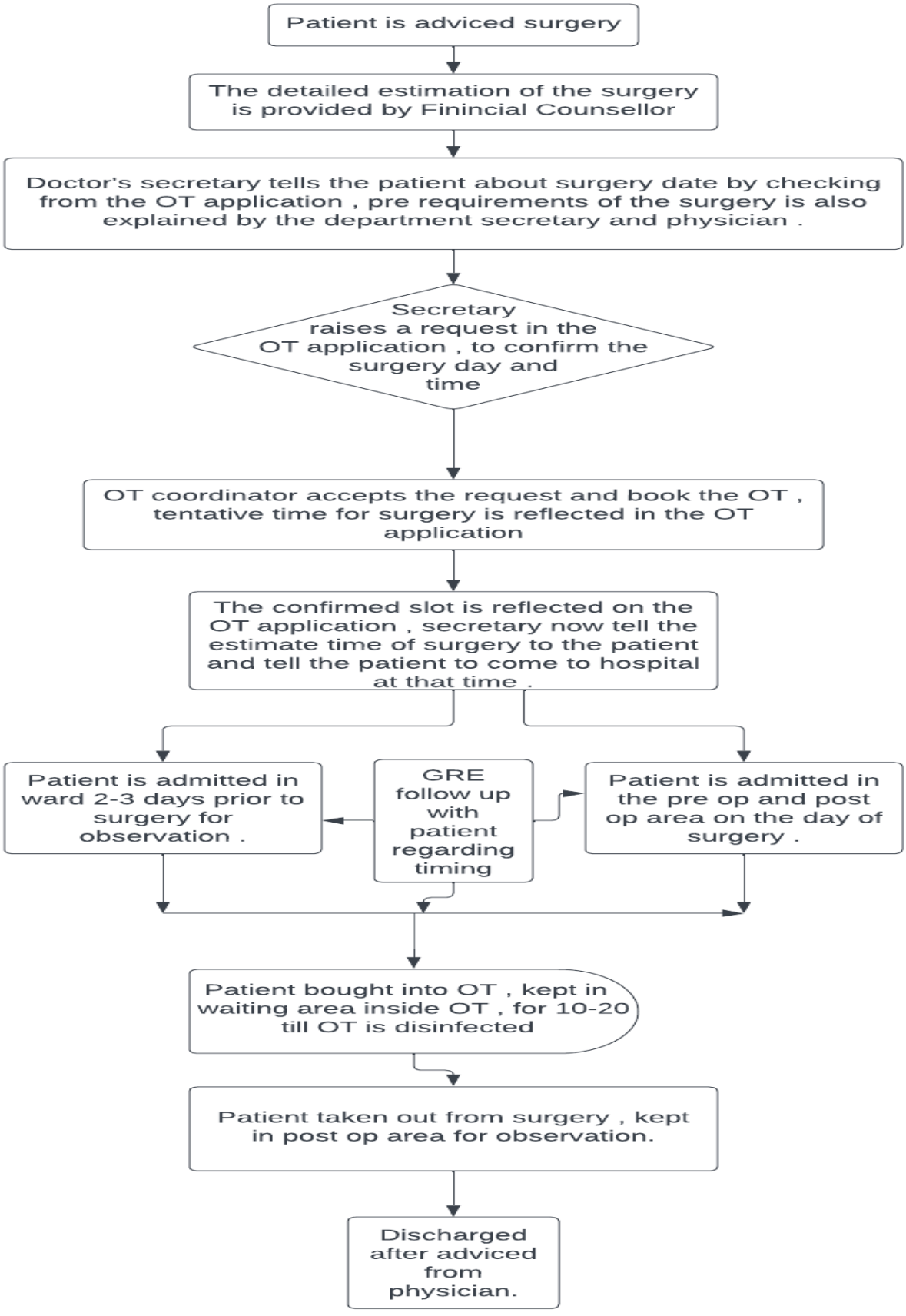
Certain factors can impact the utilization rate of the operation theatre such as total numbers of operation theatres, total available skilled surgeons and staff , how the surgeries are being scheduled. That’s why to increase the operation theatre utilization rate strategies to improve the scheduling of the surgical cases must be developed like KIMS hospital is using a software

known as OT module application to track all the surgical cases , these kind of technological advancements ensure that the operation theatre is being utilized to an optimal level.

KIMS Hospital is a 750 bedded hospital and there are a total of 20 operating rooms, with 10 on each of the sixth and seventh floors. All the operation theatres are equipped with the latest equipment used for various surgical procedures. On December 11th, 2015, KIMS Hospitals was awarded for the first Green OT (Green Operation Theatre) Certification in the state of Telangana & Andhra Pradesh, by Bureau Veritas Certification India Private limited. The Green OT certification project was created by Bureau VERITAS certification company in partnership with Abbott India and multiple healthcare team stakeholders that includes surgeons, clinicians, bio-medical staff, quality assurance department , Green House Gas surveyors, and hospital administrators. This was one of the first certification of its kind in the world and the first "Make in India" certification protocol being developed. Certain aspects like air flow pattern inside operation theatre, type of anesthesia machines being used, types of volatile agents applied, and certain other parameters were covered by the certification procedure. Green operation theatre here represents using cleaner methods and utilizing latest technology and procedures keeping in mind a view towards environment.

In KIMS hospital Cardiothoracic, orthopedics and surgical oncology specialties have two operating rooms each, as opposed to urology, gynecology, and ENT, which each have one. All the 20 operation theatres have well managed preoperative and postoperative areas , with skilled and trained staff , so it is ensured that the operating rooms are used to their full potential.

**Process flow in OT -**



## Methods of sterilization and disinfection –

Operation theatres must be sterilised and disinfected to keep them free of dangerous bacteria. Despite their apparent similarity, the two approaches differ greatly from one anothe.
When something is sterilised, all microbiological life,including bacteria, viruses, fungus, and spores—is eliminated or destroyed.
While disinfection is the process of bringing the quantity of bacteria down to a level deemed safe for human contact

The most common type of sterilisation followed in the operation theatre complexes there was steam sterilisation, which includes exposing the tools to 121°C high-pressure steam for 15 to 20 minutes. In order to kill germs, dry heat sterilisation uses hot air at a temperature of 160–170°C for two to three hours.

Disinfection methods include using chemicals such as chlorine, hydrogen peroxide, and alcohol. Chemical disinfection involves soaking the instruments in a solution of the disinfectant for a specific period, involve exposing the instruments to the respective agents for a specific duration.

Regular monitoring of sterilization and disinfection processes is done to ensure that the methods are working effectively. Monitoring also helps identify any issues or problems with the equipment or processes and allows for corrective action to be taken before any harm is done to patients or staff.

Regular monitoring and adherence to proper protocols and guidelines are crucial for effective sterilization and disinfection. By following these practices, operation theatres can maintain a safe and hygienic environment for patients and staff. Also as a part of the process and green OT initiative the Bureau Veritas certification company carry out certain audits related to surgical site infection avoidance, anaesthesia monitoring , secure anaesthesia and secure surgical teams and tools, as a framework for measuring the quality,. The procedure is completed with a "Green Score" awarded to the hospital after meeting the necessary quality and safety standards. This score is based on a five-point scale.

**Aim** - To study how surgical facilities are utilised and the process of disinfection of an operation theatre complex.

## Objectives –

- To determine and evaluate the operation theatre utilization rate.
- To identify the process flow to find any bottlenecks in the process.
- To find out whether the processes of sterilization and disinfection are as per the protocol .

## 2: Review of Literature Chapter

Table 1 – Review of Literature

| Name of author | Title of study | Salient features |
|---|---|---|
| Dr. N. Lakshmi Bhaskar Dr. S. Naga Satish Kumar Dr. N. Satyanarayana | The title of this study was Study of Utilization of Operation Theatres in a Tertiary Care Teaching Hospital, Hyderabad , Telangana | In NIMS, 72.51% of the operation theatre complexes were utilized from July 2011 to June 2012, which was the optimal time frame. A total of 18 operation tables equipped to handle all surgical cases coming in the hospital . These theatres are scheduled for six days a week except for public holidays from 9:00A.M. to 4:00. |
| Naik, Shraddha Vidyadhar; Dhulkhed, Vithal Krishna; Shinde, Rewa Hemant | The title study is Prospective Study on Operation Theatre Utilization Time and Most Common Causes of | Study location was Maharashtra type of hospital was tertiary care hospital (teaching) with one thousand beds. The study was conducted from November 1, 2017 to December 31, |

| | | |
|---|---|---|
| | Delays and Cancellations (“Download .nbib”) | 2017. ENT had the longest procedure time followed by orthopedics, and obstetrics had the shortest procedure time. In most cases, delay in starting the surgical procedures were caused by patient transferring postponed from the ward and due to issues related to administration. |
| A P Pandit, Tushar G Dive and Anupam Karmakar | A study of factors affecting utilization of OT | This study was done at D Y Patil Hospital, Navi Mumbai . OT complexes are currently utilized at an average rate of 40.37% and, according to global standards, OT can be utilized to a maximum of 85% to 90%. |
| The authors of the study were Doctor Ritu Chopra, Doctor Monica Goyal, Doctor Shinjini Lahiri, Dr. Varun Gupta, Dr. Vinay Rohilla | Operation theatre utilization: a prospective study | For the period of study, the overall utilization of main OT complex of Jindal Institute of Hospital Sciences was 77.14 %, which is optimal. |
| Mr. S Talati, Mr.AK Gupta,Mr. A Kumar, Mr.SK Malhotra, and Mr.A Jain | The title of this study was analysis of time utilization and cancellations of scheduled cases in the main operation theater complex (“An analysis of time | Of the total resource hours the mean Raw utilization was 81.54% and the Adjusted utilization was 86.09 %. Data was analyzed using the SPSS software version 15 |

| | | |
|---|---|---|
| | utilization and cancellations of scheduled ... ”) | |

## 3. Methodology

**STUDY DESIGN –**

Descriptive Observational study – To get an overview of how an operation theatre is being utilised, a descriptive observational study is used over a period. This is type of study attempts to identify the features and patterns of how and operation theatre is used that too without drawing any conclusions about cause and effect or by following any patient over time. It includes-

- Keeping track of the number of operations carried out during the study period.
- To identify the different kinds of procedures performed in various operation theatres (e.g., orthopaedic, cardiac, urology).
- Monitoring the length of each procedure performed in the operation theatre
- Noting the wheel in (beginning) and wheel out (ending) time of each surgical procedure.
- Find out the causes of any cancellations or delays.

We can learn more about the effectiveness, productivity, and overall utilization of the operation theatre by collecting the data by a descriptive Observational study.

**SETTING –** KIMS Hospital, Secunderabad

**STUDY POPULATION-**

1. **Inclusion criteria**: All the daily cases scheduled from 8:00 am to 6:00 pm during all occupational days. Operation theatre complexes used for the study are 3,4,11,17,18,19 and 20 , of the specialties Orthopaedics , cardiothoracic , surgical oncology and urology .
2. **Exclusion criteria**: Sundays, public holidays, and unscheduled or cancelled cases. Emergency cases and cases beyond 6:00 pm are also excluded.
3. **Study tools**: OT module application , manual data entries in register, MS excel.

**DURATION OF STUDY**: 6th March to 29th April ( 46 Days )

**SAMPLE SIZE**: 487 cases which were cash as well as insurance patients who have undergone surgical procedures at KIMS Hospitals Secunderabad . The samples are taken from 4 different specialities which were cardiothoracic , urology , orthopaedic and surgical oncology.

**SAMPLING TECHNIQUE**:

Collection of data by observation and by OT module application, examination of relevant up-to-date records, and OT staff interview.

**DATA COLLECTION PROCEDURE**: Data is collected by observing the wheel in and wheel out time in the operation theatre which means the time when the patient is taken inside the operation theatre to the time when patient comes out of the operation theatre, also monitoring in the hospital module application and analysing data , collecting data from excel sheet and patient manual record registers, discussing with the operation theatre staff and other clinical or paramedical professionals working in the operation theatre.

**DATA ANALYSIS PLAN**:

The following parameters were observed for 8 weeks:

- Total no. of surgeries in OT 3 & 4 , OT 11 , OT 17 & 18 , OT 19 & 20
- Department wise no. of surgeries i.e. Cardiothoracic , surgical oncology , urology and orthopaedic department respectively.
- Time taken for surgical procedures to be finished and time allotted for the procedure.
- Overall utilization percentage for each departments.
- The time at which operation theatre starts i.e. the time when the patient was shifted inside the operation theatre for surgery. Wheel in time is noted .
- Time of shifting patient outside the OT i.e. the wheel out time was noted .
- Overall operation theatre turnover time is the time when the patient is getting shifted out of the operation theatre and the next patient being wheeled inside the OT.
- If any surgical case gets cancelled or timing is changed, the reason was written down.

The most frequent reasons for delay in surgeries in all the operation theatres were studied and analysed. A comparative analysis was done on the OT utilization by OT being utilised vs

actual OT functioning hours was which were from 8 am to 6 pm was done. The operation theatre utilization rate is calculated as follows:

$$\frac{\text{Total theatre hours used}}{\text{Total available theatre hours}} \times 100$$

15 to 20 minutes is the average time taken for cleaning and disinfection of the operation theatre complex.

Use of Microsoft excel for the analysis and interpretation of the data collected, Graphical representation of the data and data visualization techniques such as histograms , pie charts etc can be used to visually explore the relationships and identify patterns in the data.

## Limitations

This study does have some limitations. First, information was gathered and examined during a brief period (two months), also potential reason for cancellation could not be assessed.

## ETHICAL CONSIDERATIONS

Data security, privacy and confidentiality of all the cases was maintained all the time for collection, capturing and analysis of the information, patient name, mobile number and other identifiers were not compromised .

## Implications of the research

The implications of this research could be significant for the KIMS hospital administration, surgeons, nursing and paramedical staff and also the patients. By identifying the most frequent reasons for delay of scheduled surgeries, the management team can take steps to address these issues , thus leading to more efficient use of the operation theatre complex and better patient outcomes. This study can also help in identifying certain areas where technology and other interventions can be implemented to optimize operation theatre utilization rate. Also the effective sterilization and disinfection methods are studied to ensure aseptic environment of the operation theatre complex .

## Results:

Section 1 of results shows the comparison of surgeries performed in the month of March and April (2023), 8 week comparison is shown among four specialities i.e. urology, cardiothoracic , surgical oncology and orthopaedic respectively .

Section 2 of results depicts hours operation theatre complex of four specialities being functional versus actual functioning hours.

Section 3 of results shows the average utilization rate of the operation theatre complex of four specialities being undertaken for the study.

Section 4 of results shows the adherence to the disinfection and sterilization policies.

## Section 1

Comparison of surgeries performed in the month of March and April 2023 –

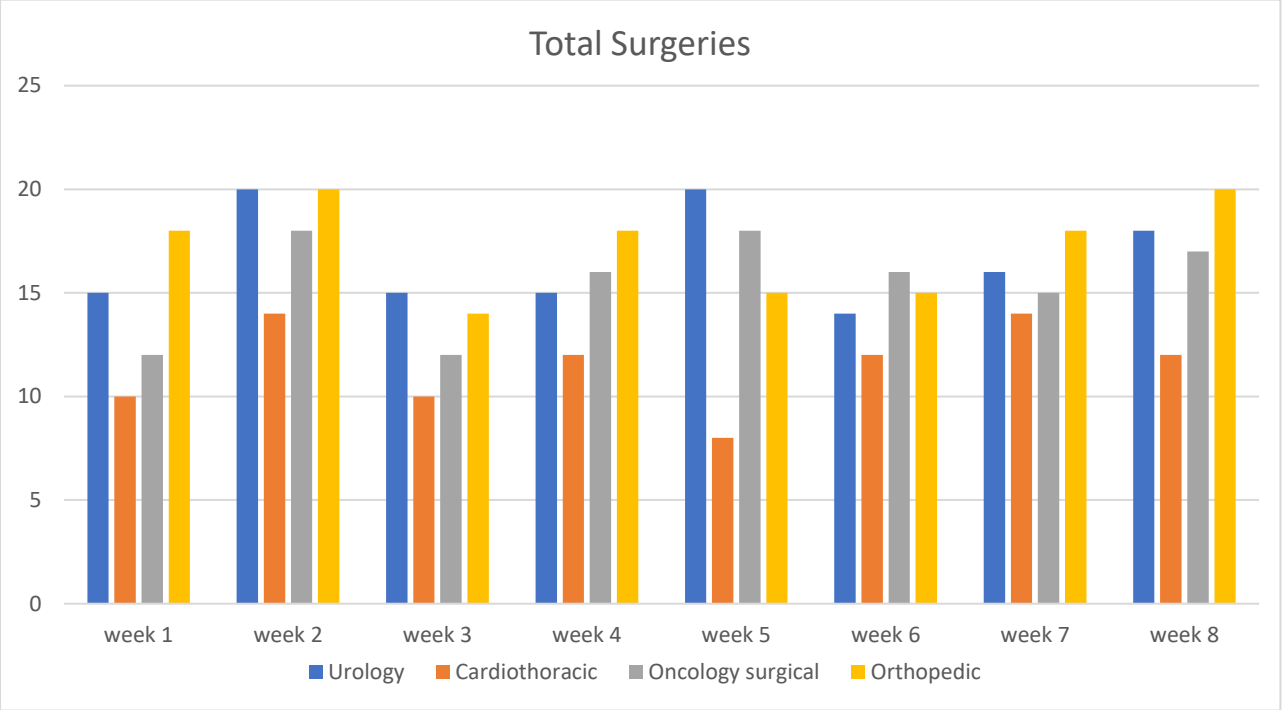



Fig.1 – Comparison of total surgeries

Interpretation - A total of 487 were performed during the duration of 8 weeks , in orthopaedic department a total of 138 surgeries were performed followed by 133 surgeries in urology department , 124 in surgical oncology and 92 in cardiothoracic department respectively . Major surgical case load were among these four specialities . Operation theatre complex 3,4 , 11, 17,18,19 and 20 . These operation theatre complex were located on the $6^{th}$ and $7^{th}$ floor. OT module application is used for monitoring the wheel in and wheel out time in the operation theatre complexes located on the $7^{th}$ floor . Total ten operation theatres are there on $7^{th}$ floor , similarly 10 operation theatres are on $6^{th}$ floor but no OT module application is used on $6^{th}$ floor for monitoring wheel in and wheel out time instead it is monitored manually and maintained in a register and in excel sheets which are updated daily . So data is collected both manually and with the help of OT module application along by the support of the operation theatre staff .

## Section 2

Hour's operation theatre complex of four specialities being functional versus actual functioning hours.

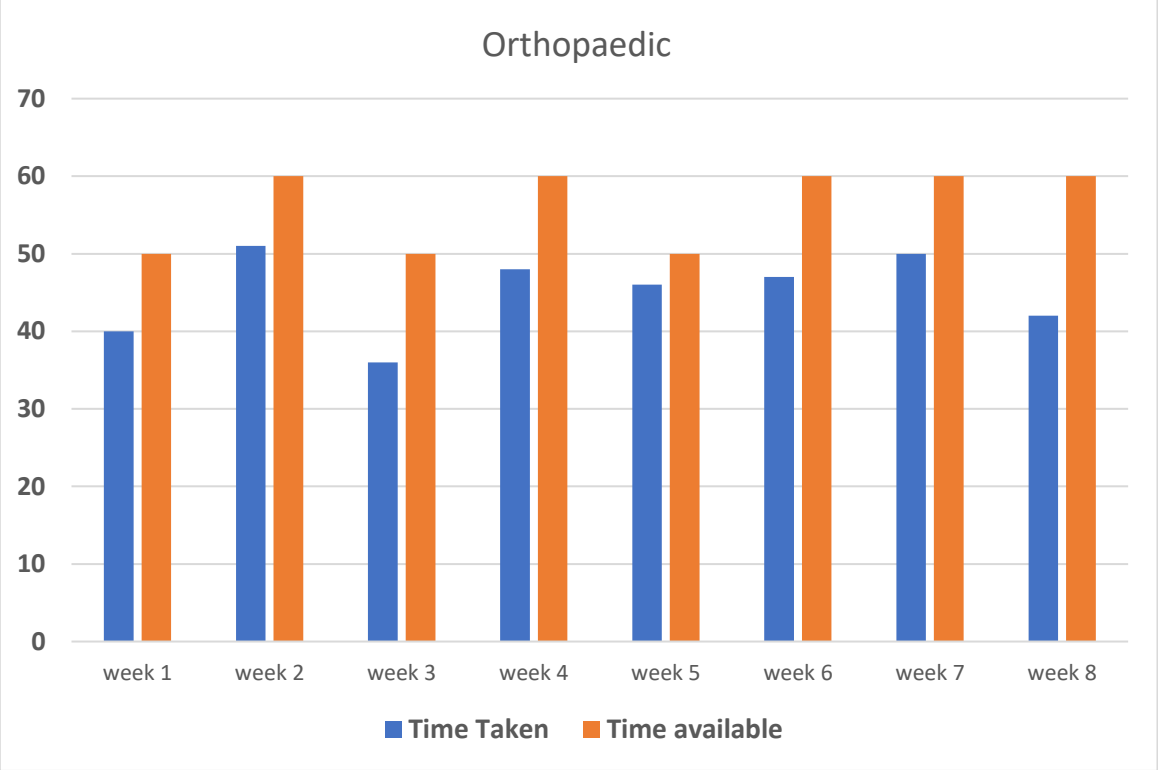



Figure 2 – Time taken in hours for total orthopaedic surgeries.

Interpretation - Over the duration of 8 weeks an average of 45 hours were taken for orthopaedic surgeries to be performed as compare to average 56 available hours each week . Procedures like total knee replacement (TKR) , ORIF(Open reduction and internal fixation) of the Distal Radius Fracture took around 2 – 3 hours , while some procedures like bilateral core decompression took up to 4 hours . All of the orthopaedic cases were performed in OT complexes 3 and 4 . Data is taken manually and is interpreted by the help of Microsoft excel. The use of OT module application was not there in the operation theatres of $6^{th}$ floor that's why data is recorded manually . Orthopaedic cases were highest among the 4 specialities being undertaken and the average is also highest as compare to the other specialities.

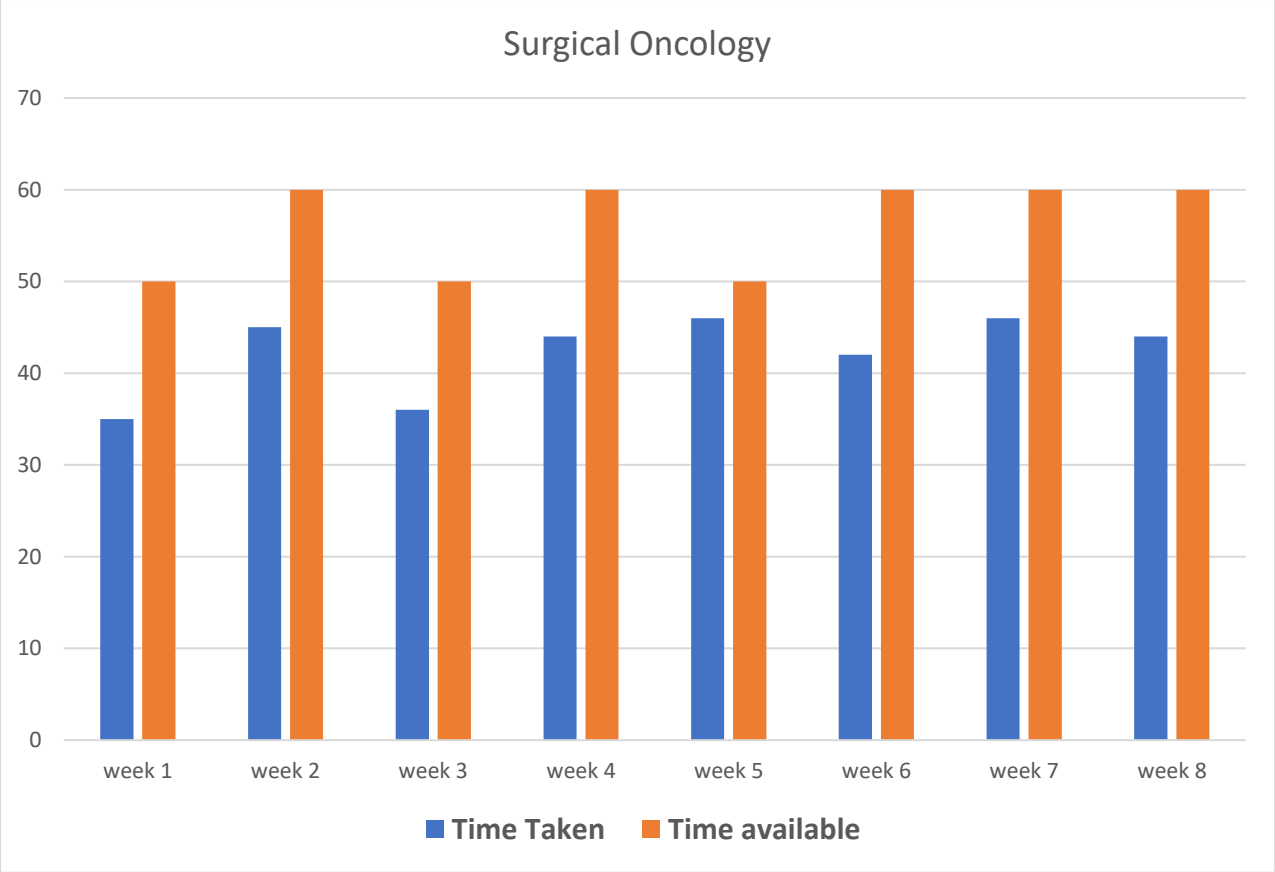



Figure 3 –Time taken in hours for total surgical oncology cases

Interpretation – An average of 42 hours per week is the time taken for surgical oncology cases to be performed as compared to 56 hours available per week . Surgical procedures like ileostomy closure , total thyroidectomy, took around 4 to 5 hours while certain other procedures like myomectomy , laparotomy , radical nephrectomy , lap tubectomy , lymph node biopsy took around 2-3 hours . All the surgical oncology procedures were performed in operation theatre complexes 19 and 20 located on 7$^{th}$ floor. The use of OT module application makes the process of data collection and interpretation easy and further evaluation can also be done easily by the help of this application. The overall utilization rate can vary based on various factors such as the nature and complexity of surgical oncology cases like thyroidectomy, available resources in the OT complex, schedule of surgeries, and other considerations.

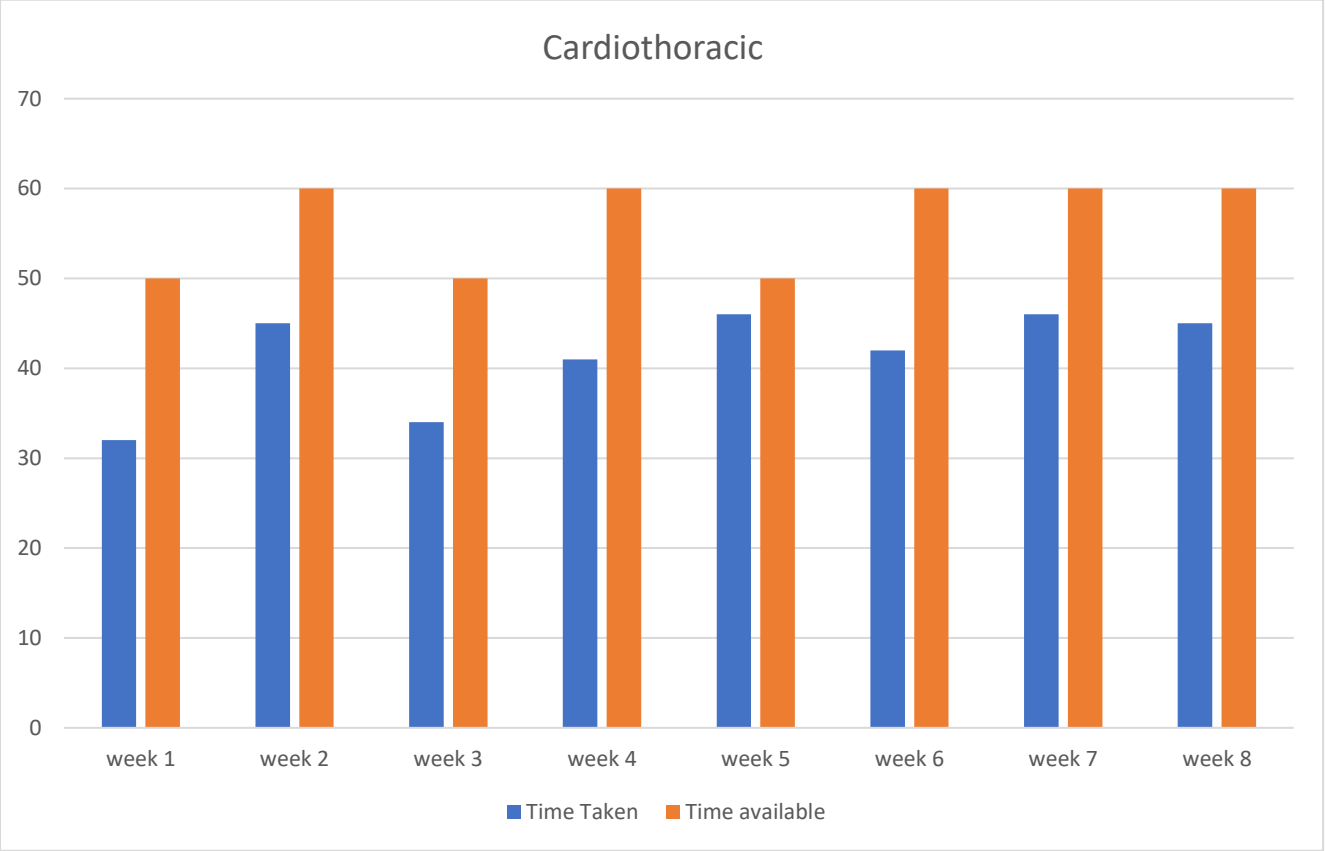



Figure 4 – Time taken in hours for total cardiothoracic surgeries

Interpretation – As seen in the above data 41 hours per week is the average time taken for the completion of cardiothoracic cases .

Procedures like Coronary artery bypass graft (CABG) , orchidectomy took around 3 to 4 hours for completion , while certain procedures like aortic valve replacement , mitral valve replacement took around 2 hours for completion .

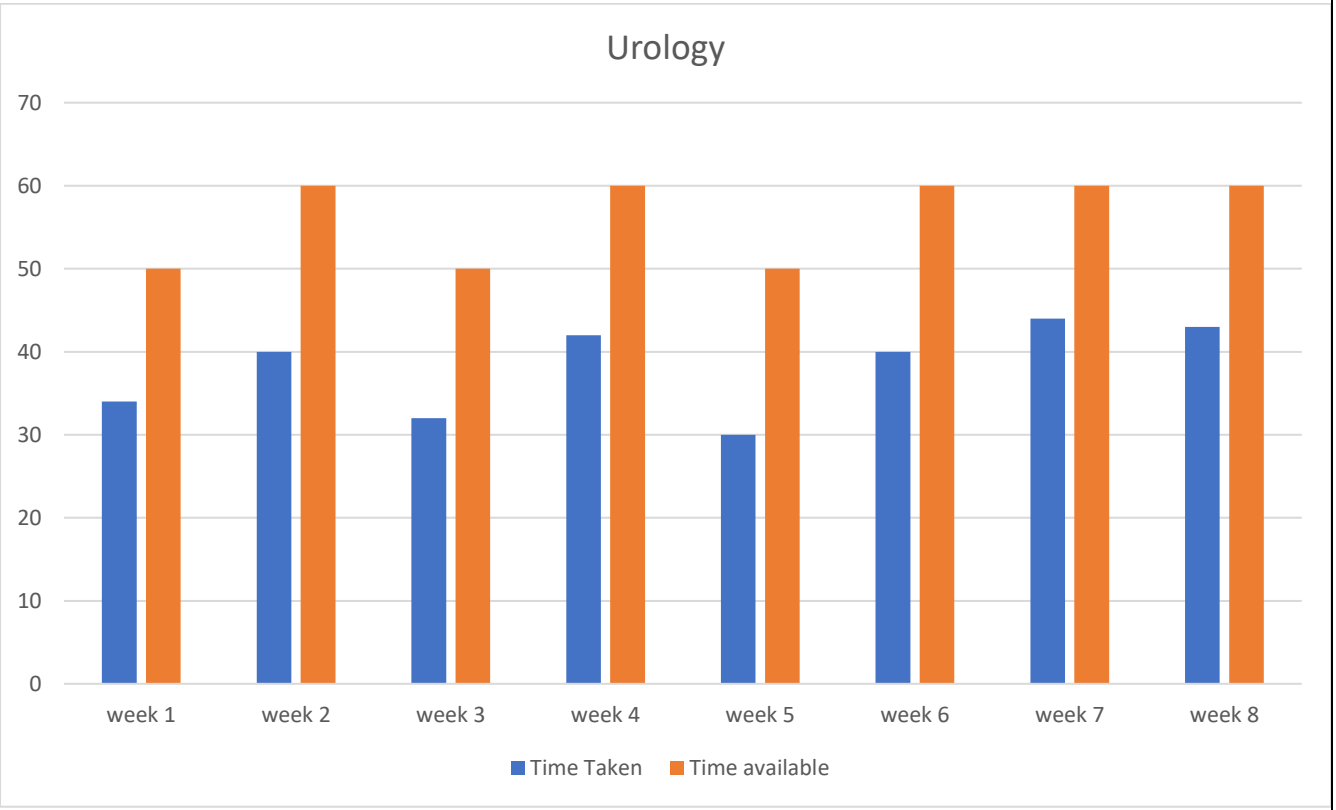



Figure 5 – Total surgical hours for urology department

Interpretation – As per the above data it is seen that 38 hours per week are utilized by urology cases . Certain surgical interventions like kidney transplantation took around 4 hours for completion while procedures like ureteroscopy and laser stone fragmentation took around 2 to 3 hours for completion .

## Section 3

Average utilization rate of the operation theatre complex of four specialities being undertaken for the study .

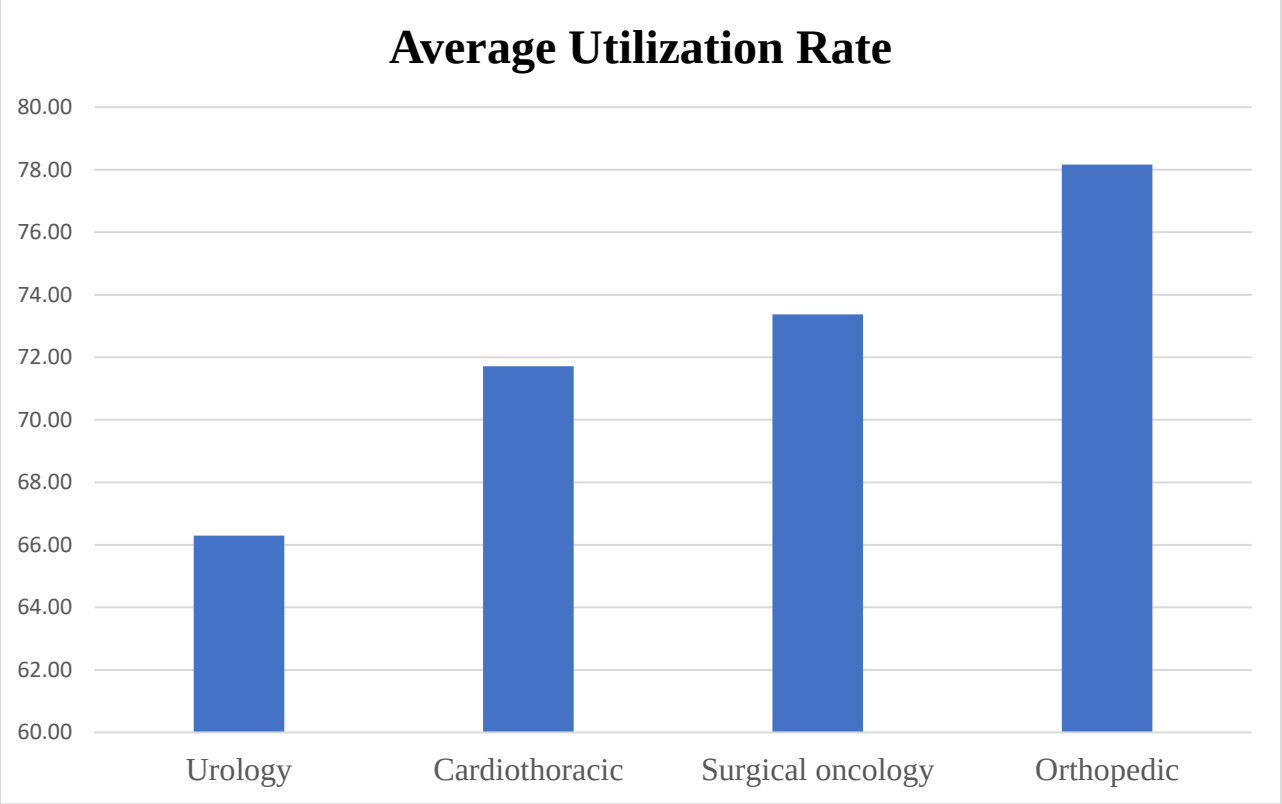



Figure 6 – Average utilization rate

Interpretation – Orthopaedics speciality has a recorded utilization rate of 78.17%. This means that during the study period, the orthopaedic speciality operation theatre was used for surgical procedures about 78.17% of the time. After orthopaedics surgical oncology speciality has the second-highest utilisation rate (73.38%). This means that during the study period, interventions occurred in the surgical oncology operation theatre were 73.38% of the time. At a rate of 71.7%, the cardiothoracic specialty has had the third-highest usage. This represent that 71.7% of the time, the cardiothoracic operation theatre is used for surgical procedures. The urology speciality, with a usage rate of 66.29%, has the lowest utilisation rate among the examined specialties. This suggests that during the study period, procedures performed in the urology operation theatre were approximately 66.29% of the time.

These utilisation rates show the effectiveness and productivity of each operation theatre within the various specialties. According to the graph, orthopaedic speciality has the largest demand for surgical procedures followed by surgical oncology, cardiothoracic, and urology.

## 4. Discussions / Conclusion

• The no. of surgeries performed in the month of March 2023 is 239 as compared to

248 surgeries performed in the month of April 2023.

• Number of surgeries performed have slightly increased in the month of April. In both the

months maximum surgeries are being conducted in OT 3 and 4 which is of orthopaedic specialty

• As compared to the month of march, no. of cardiothoracic surgeries have slightly reduced. In March no. of cardiothoracic surgeries performed were 46 whereas in the month of April surgical cases were 44.

• Total available hours from 6$^{th}$ March to 29$^{th}$ April 2023 for all the OTs was 460 hours out of

which 305 hours were used by operation theatre 11 of urology speciality which was the lowest followed by 331 hours of operation theatre 17 and 18 cardiothoracic speciality , 338 hours by operation theatre 19 and 29 of surgical oncology speciality and 360 hours by operation theatre 3 and 4 of orthopaedic speciality which was highest hours being utilized.

• Overall utilization percent in all the four specialities was 66.2% urology , 71.7% cardiothoracic , 73.3% surgical oncology and 78.1% of orthopaedic respectively.

• To calculate the OT utilization rate following formula is used:

Total hours Operation Theatre Hours used / Total available Operation Theatre hours*100.

# 5: Recommendations

KIMS Hospital Secunderabad already has a good operation theatre utilization rate as we can see after determining the utilization rates of four specialities which were urology , cardiothoracic , surgical oncology and orthopaedics , the utilization rate of urology speciality was less around 66% as compare to the utilization rates of other specialities as they were more than 70% with 78% highest of the orthopaedic speciality, so keeping that in mind several recommendations can be considered to further optimize the operation theatre complexes and improve their efficiency.

- Standardize scheduling of all the surgeries: To reduce any waiting time in between procedures, make sure that the scheduling process is effective, well-coordinated by all the staff members. Consider using operation theatre module more efficiently and remove any bug occurring in the application so that it can aid in maximising the order of surgical interventions being performed while taking into account factors like type of procedure , length of procedure, any special requirement by patient and availability of equipment used.
- By increasing the effectiveness of pre-operative procedures such as pre anaesthetic check up , part preparation that includes preparing the patient for surgery , certain documentation and health check up if done effectively can also reduce certain delays and surgeries could start on time .
- Also by improving teamwork and communication among the members of healthcare team such as effective communication between surgical teams, anaesthesiologists, nurses, and paramedical staff and ensuring regular team meetings the issues related to delay in surgeries could be discussed among all the members and those issues will not be repeated next time during any surgery.
- By adopting standardised protocols and checklists in operation theatre effective workflow could be ensured as checklists are essential for all the surgical procedures so standard protocols must be adopted as this will increase safety during any surgical procedure and also reduce unnecessary delays .
- The use of resources and equipment used for surgical procedures could be maximized by regularly reviewing and evaluating the use equipment used for surgical interventions . Some appropriate actions can also be taken to optimise the use of any

resources that are being used inefficiently or used less. Cost-effective purchase of certain equipment could also be a solution .

- Continuous training and development program for staff members which include nurses , anaesthesiologists , surgeons and paramedical staff could improve their work efficiency, improve their professional growth and they can work more effectively as a team.
- By analysing certain performance metrics and key performance indicators which are related to operation theatre complexes such as time operation theatre complex being used , turn around time for surgeries , cancellation rates of surgeries , waiting time of patient in pre operative area etc. helps to improve the utilization rate further and also we can monitor results by following such key performance indicators.
- By examining the patient flow from admission in the hospital to discharge we can identify certain areas which can be improved . Any bottlenecks in the process of registration , examinations in the pre operative area , and post operative area should be identified and effective solution should be provided . This will also improve the overall operation theatre utilization rate.
- If routine maintenance and downtime preparations are there it will ensure that the operation theatre complex is free of any disruptions and regular maintenance of equipment used for surgical procedures, ensure that the operation theatre can be used optimally.
- Hospital must take certain initiatives for ongoing quality improvement such as taking feedback from employees as well as from patients as this will help in maintaining good bonds and establishing a healthy culture in the hospital.

# REFERENCES


1. Lakshmi Bhaskar N, Satish Kumar SN. A study of utilization of operation theatres in a tertiary care teaching hospital, Hyderabad. *Indian J Appl Res.* 2015;5:427–9.
2. Vinukondaiah K, Ananthakrishnan N, Ravishankar M. Audit of operation theatre utilization in general surgery. *Natl Med J India.* 2000;13:118–21.
3. Kumar R, Sarma R. Operation room utilization at AIIMS, a prospective study. *J Acad Hosp Adm.* 2003;15:1–6.
4. Talati S, Gupta AK, Kumar A, Malhotra SK, Jain A. An analysis of time utilization and cancellations of scheduled cases in the main operation theater complex of a tertiary care teaching institute of North India. *J Postgrad Med.* 2015;61:3–8. [PMC free article] [PubMed] [Google Scholar]
5. Kumar R, Sarma RK. Operation room utilization at AIIMS, a prospective study. *J Acad Hosp Adm.* 2003;15:1–6. [Google Scholar]
6. Shah J, Ansari A, Bhattacharyya J. Cancellation of urologyoperations. *Clin Gov J.* 2006;11:128–33. [Google Scholar]
7. Kumar R, Sarma R. Operation room utilization at AIIMS, a prospective study. *J Acad Hosp Adm.* 2003;15:1–6. [Google Scholar]