

**Operation Theater Utilization and Most Common
Causes of Delays of Scheduled Surgeries with a
View to Optimize the Utilization.**



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Apollo Health City, Hyderabad

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- 550-bed multi-specialty hospital with over 50 specialties and super-specialties and 12 Centres of Excellence, covers the entire spectrum of health from illness to wellness.



MISSION & VISION

- VISION: Touch a Billion Lives.
 - MISSION: To bring healthcare of International standards within the reach of every individual. We are committed to the achievement and maintenance of excellence in education, research and healthcare for the benefit of humanity.
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AIMS & OBJECTIVES OF THE STUDY:

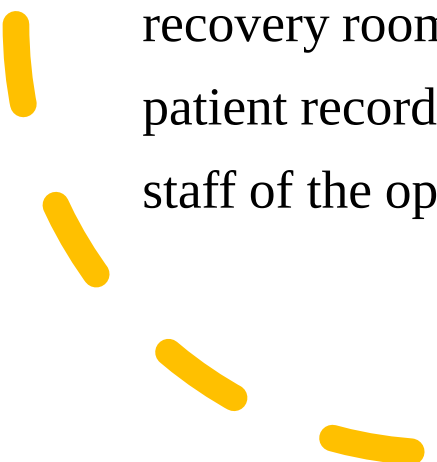
Aim: To identify operation theater utilization and find out the most common causes of delays of scheduled surgeries.

Objective:

- 1) To calculate and determine the utilization rate of operation theatres of Apollo hospitals.
 - 2) To determine the most frequent reasons for surgery delays.
 - 3) Propose suggestions to maximize the use of operation theatres considering the findings.
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MATERIAL AND METHODS-

- **STUDY DESIGN:** The study design used id descriptive Cross-Sectional Study
- **SETTING:** Apollo Hospitals, Hyderabad (550 bedded multi-speciality hospital)
- **DURATION OF STUDY:** 8 weeks (3rd April 2023 to 26th May 2023)
- **STUDY POPULATION-**
 1. **Inclusion criteria:** Included are regularly scheduled cases, which are handled from 8:00 am to 6:00 pm on all business days.
 2. **Exclusion criteria:** Sundays or public holidays and unscheduled or cancelled cases. Emergency cases and cases beyond 6:00 pm are also excluded.

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- **SAMPLE SIZE:** 527 patients, both insurance and cash patients who have undergone surgical procedures at Apollo Hospitals, Hyderabad under 4 OTs of specific departments such as Orthopaedic OT, General Surgery OT, Oncology OT, and Robotic Surgery OT.
 - **SAMPLING TECHNIQUE:** Collection of data is of surgical procedures that happen in 4 OTs of specific departments such as Orthopaedic OT, General Surgery OT, Oncology OT, and Robotic Surgery OT during the period of 8:00 am to 6:00 pm.
 - **DATA COLLECTION PROCEDURE:** By making observations in the operation theatre and recovery room, analysing data using HMIS, collecting data from excel sheet of patient data and patient record registers, discussing with the management staff and other clinical or paramedical staff of the operation theatre.
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DATA ANALYSIS PLAN:

The following parameters were observed for 8 weeks:

Calculation of total number of surgeries in 4 Operation theatres.

Calculation of department wise total number of surgeries of 4 Operation theatres.

Calculate time taken for surgical procedures and time allotted for the procedure.

Calculate overall utilization percentage for departments.

Calculate OT start time, which is the moment the patient is moved inside the OT, and any deviation from that time by more than 10 minutes was noted.

Calculate the period between surgical closure and the patient being moved outside the operating room, with any delay of more than 15 minutes being noted.

Calculate table turnover time, which is the interval between the previous patient wheeled out of the OT and the subsequent patient wheeled in. Any delay of under 15 minutes was recorded.

The following criteria was used to calculate the theatre usage rate:

$$\frac{\text{Total Operation Theatre Hours used}}{\text{Total available Operation Theatre equipped hours}} \times 100$$

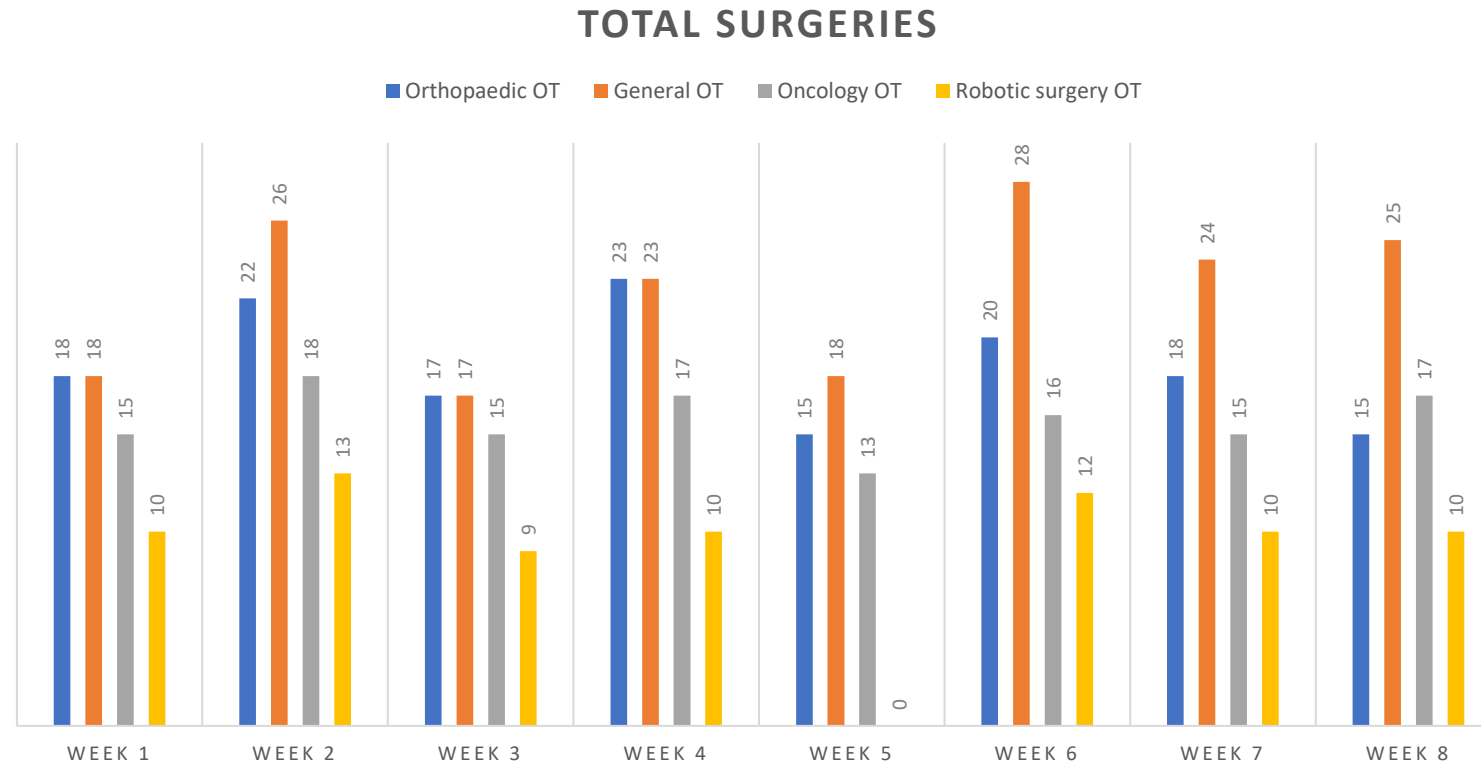


Fig. 1: Figure depicts the comparison of all surgeries of 4 OTs done in the duration of 8 weeks during normal working hours.

Interpretation: Highest number of surgeries were performed in General OT whereas least number of surgeries were performed in Robotic surgery OT.

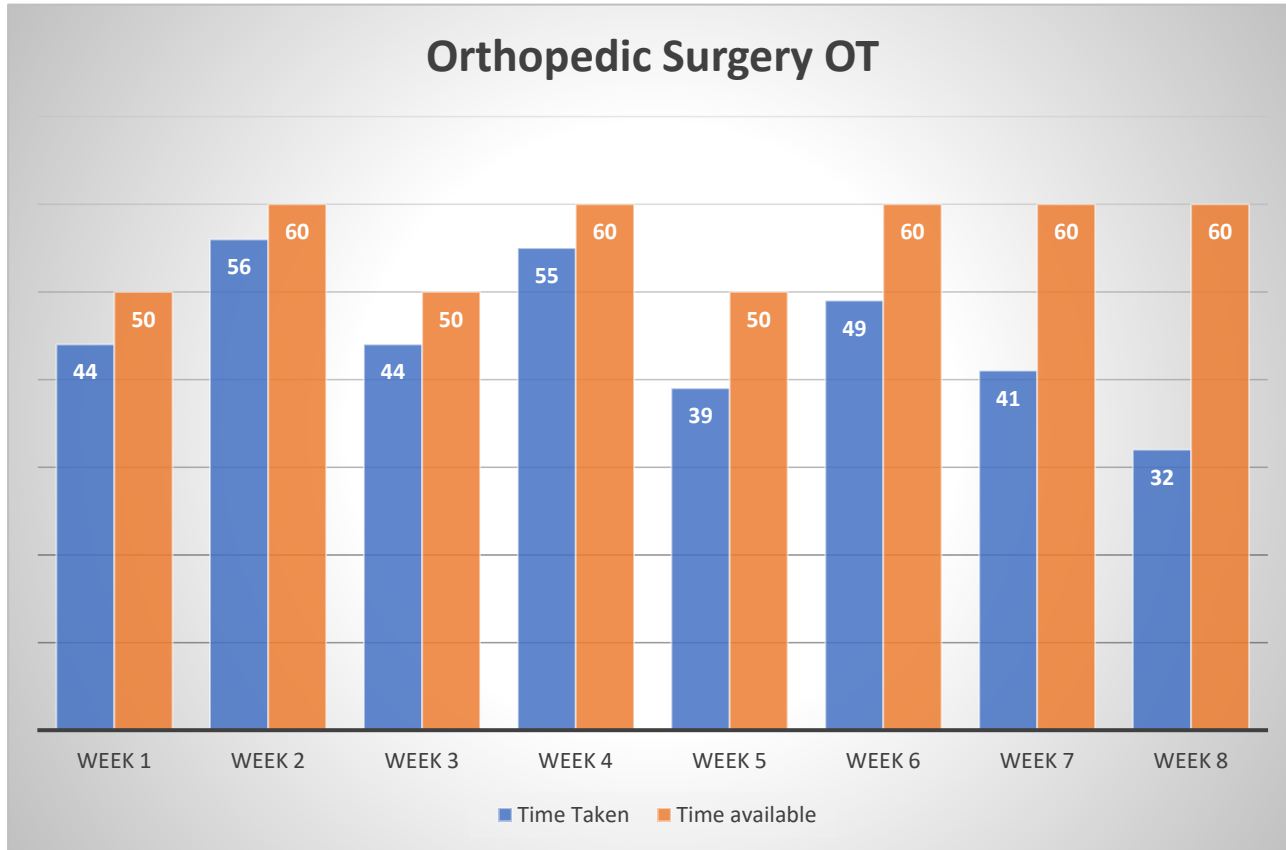


Fig. 2: Figure depicts the comparison of time taken to perform the surgical procedures versus the actual time available in Orthopaedic OT in the duration of 8 weeks during normal working hours.

Interpretation: Minimum time consumed to perform orthopaedic surgeries in a week is 32 hrs and maximum time consumed is 56 hrs. Total available hrs in the duration of 8 weeks is 450 hrs. Average time consumed in a week during the period of 8 weeks is 45 hrs.

Robotic Surgery OT

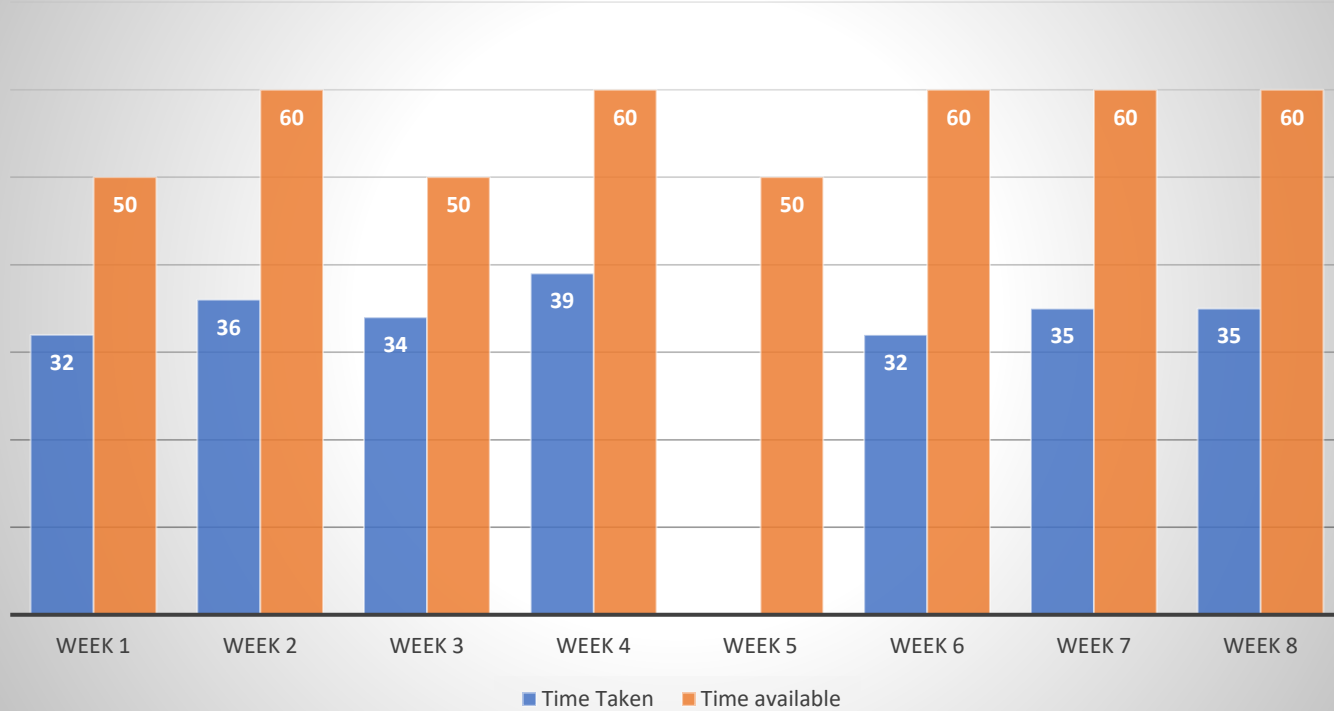
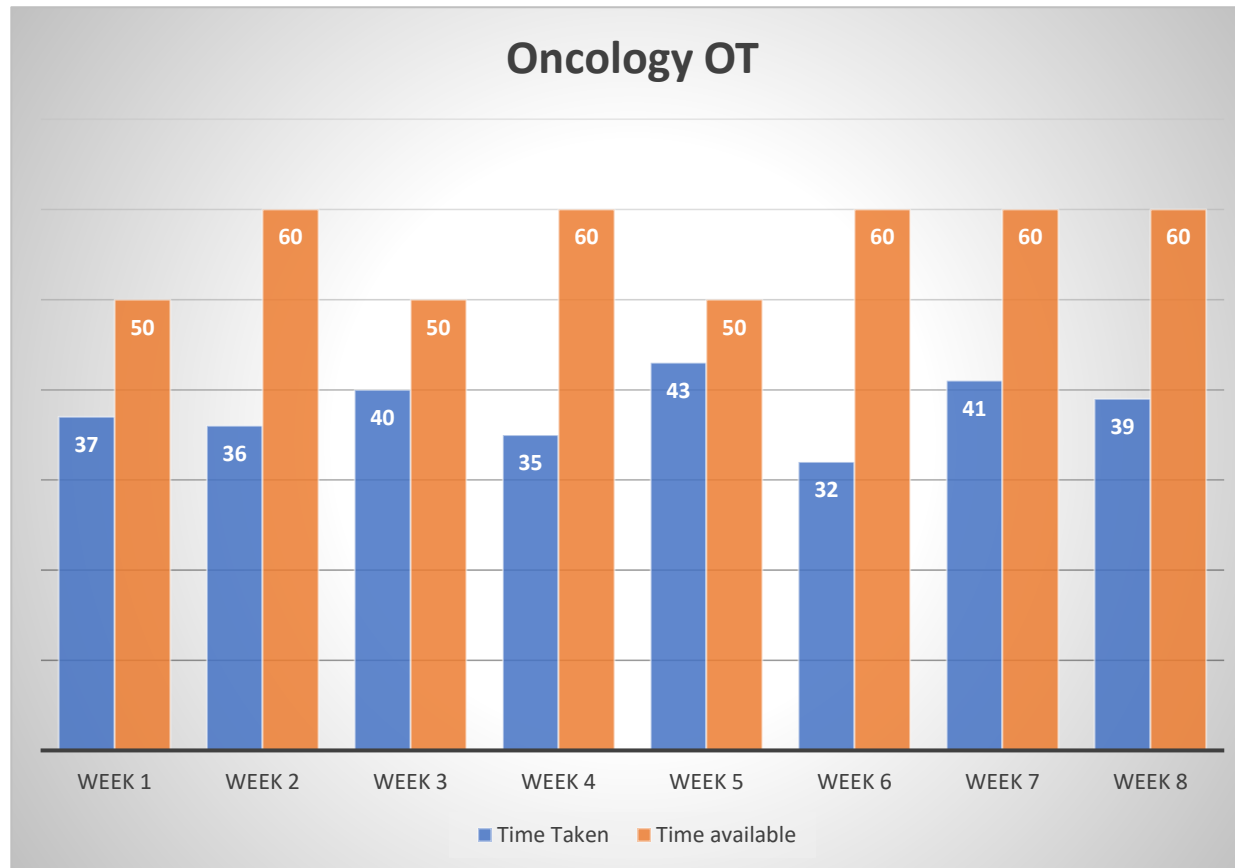
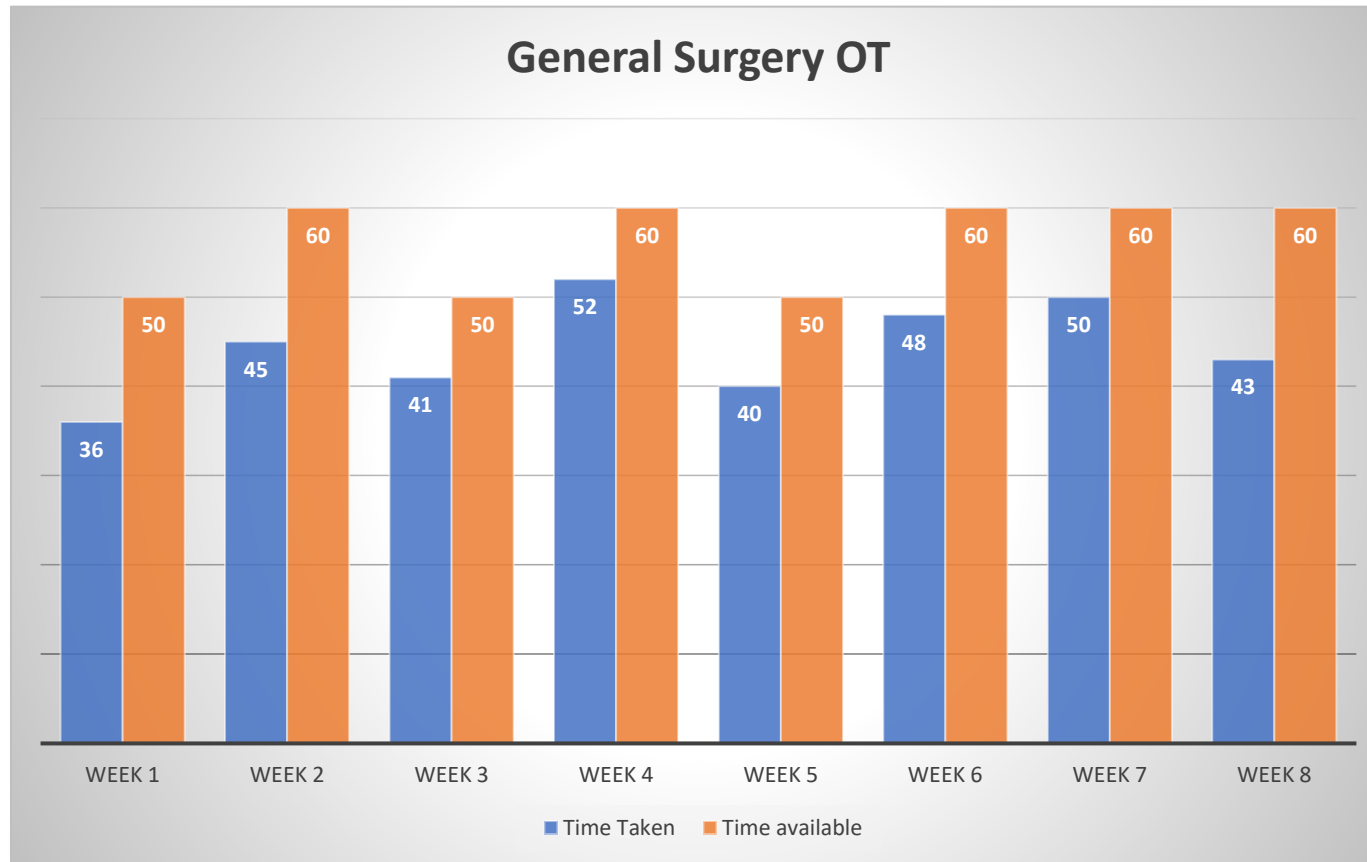


Fig. 3: Figure depicts the comparison of time taken to perform the surgical procedures versus the actual time available in Robotic Surgery OT in the duration of 8 weeks during normal working hours.

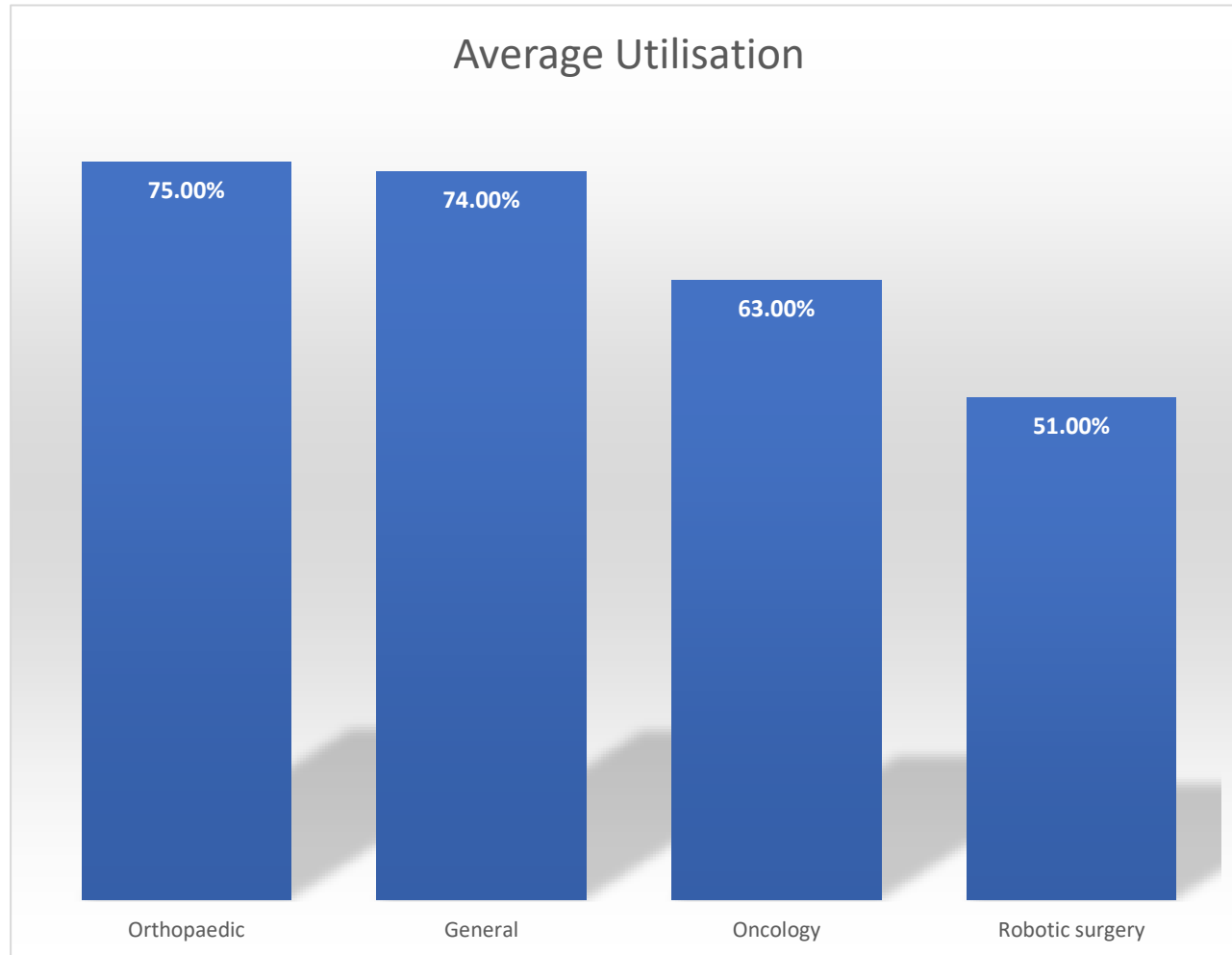
Interpretation: Minimum time consumed to perform robotic surgeries in a week is 32hrs and maximum time consumed is 39 hrs. Total available hrs in the duration of 8 weeks is 450 hrs. Average time consumed in a week during the period of 8 weeks is 30 hrs.



- **Fig. 4:** Figure depicts the comparison of time taken to perform the surgical procedures versus the actual time available in Oncology Surgery OT in the duration of 8 weeks during normal working hours.
- **Interpretation:** Minimum time consumed to perform robotic surgeries in a week is 32hrs and maximum time consumed is 43 hrs. Total available hrs in the duration of 8 weeks is 450 hrs. Average time consumed in a week during the period of 8 weeks is 38 hrs.

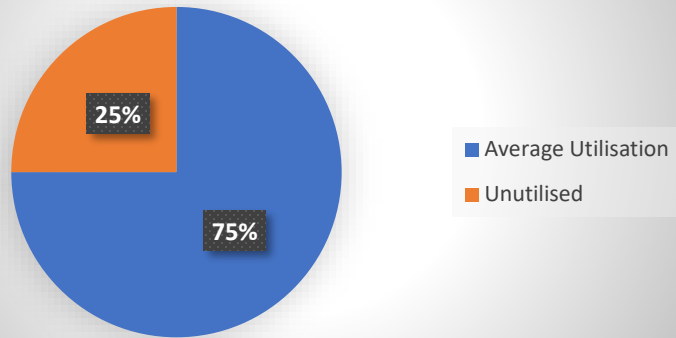


- **Fig. 5:** Figure depicts the comparison of time taken to perform the surgical procedures versus the actual time available in General Surgery OT in the duration of 8 weeks during normal working hours.
- **Interpretation:** Minimum time consumed to perform robotic surgeries in a week is 36 hrs and maximum time consumed is 42 hrs. Total available hrs in the duration of 8 weeks is 450 hrs. Average time consumed in a week during the period of 8 weeks is 44 hrs.

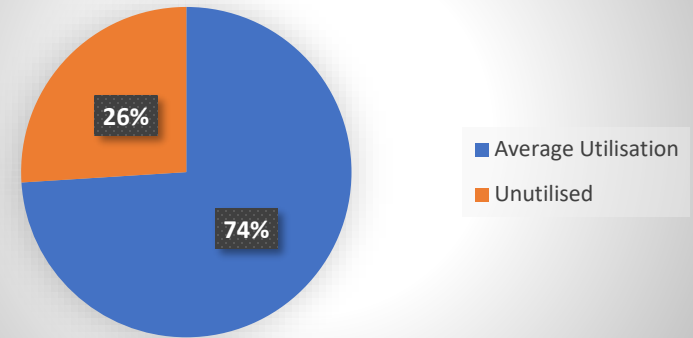


- **Fig. 6:** Figure depicts the average utilisation rate of all the surgical procedures performed in 4 OTs in the duration of 8 weeks during normal working hours.
- **Interpretation:** Minimum utilisation is observed in robotic surgery OT and maximum utilisation is observed in orthopaedic OT.

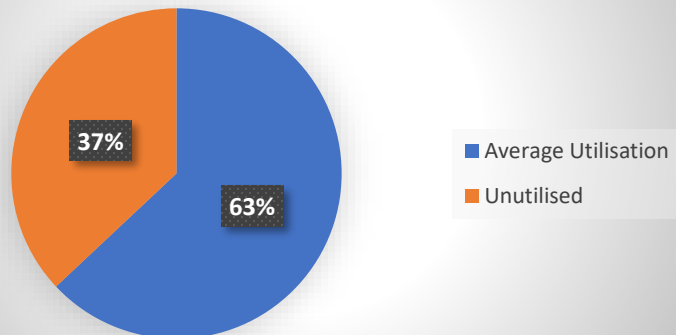
Orthopaedic OT



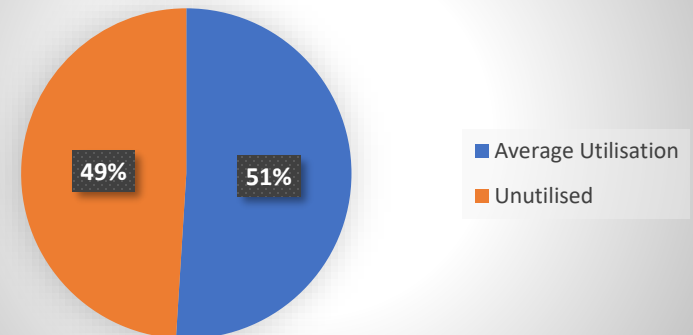
General Surgery OT

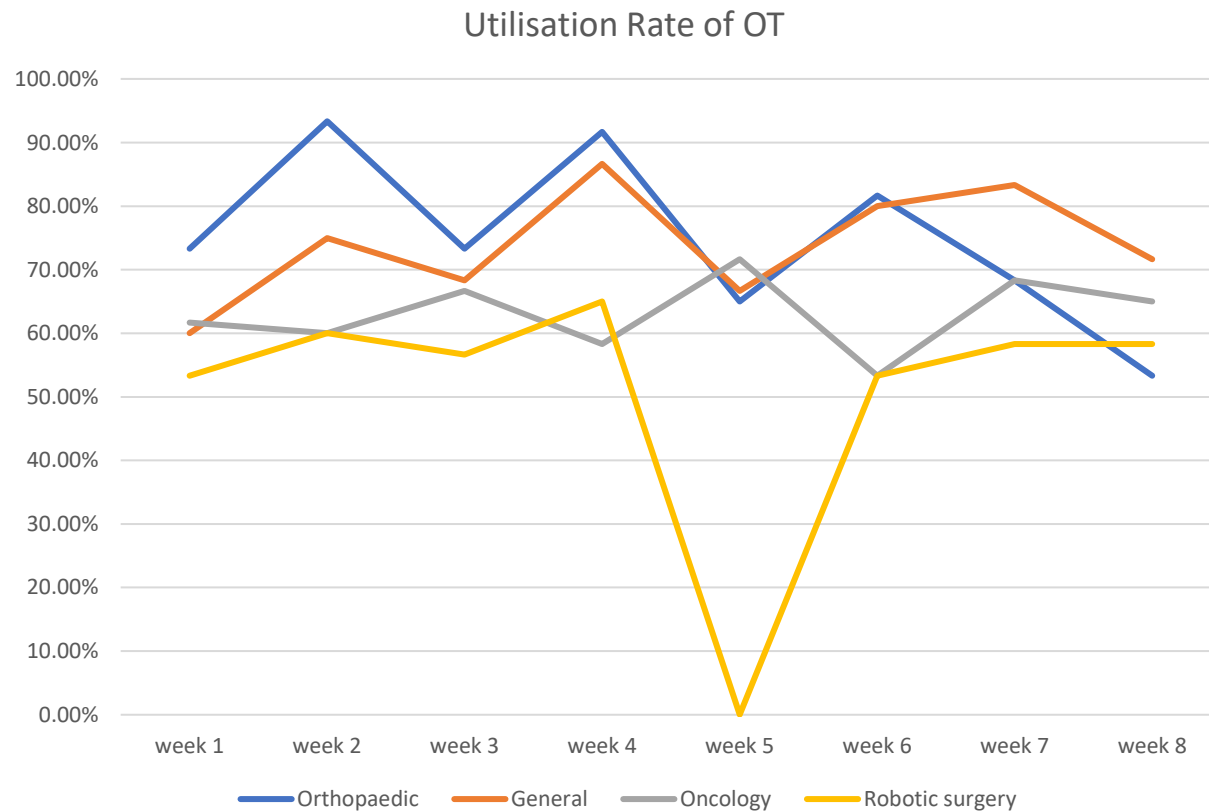


Oncology OT



Robotic surgery OT

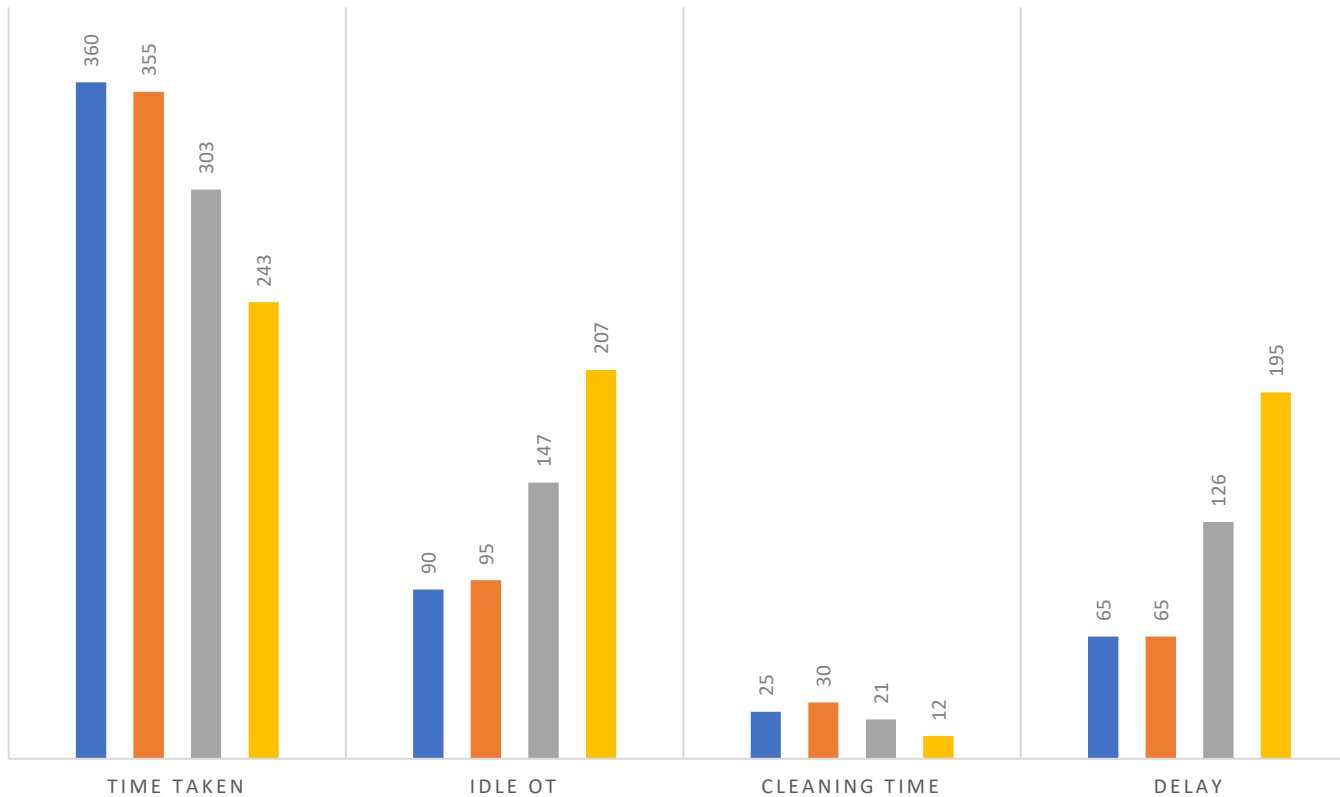




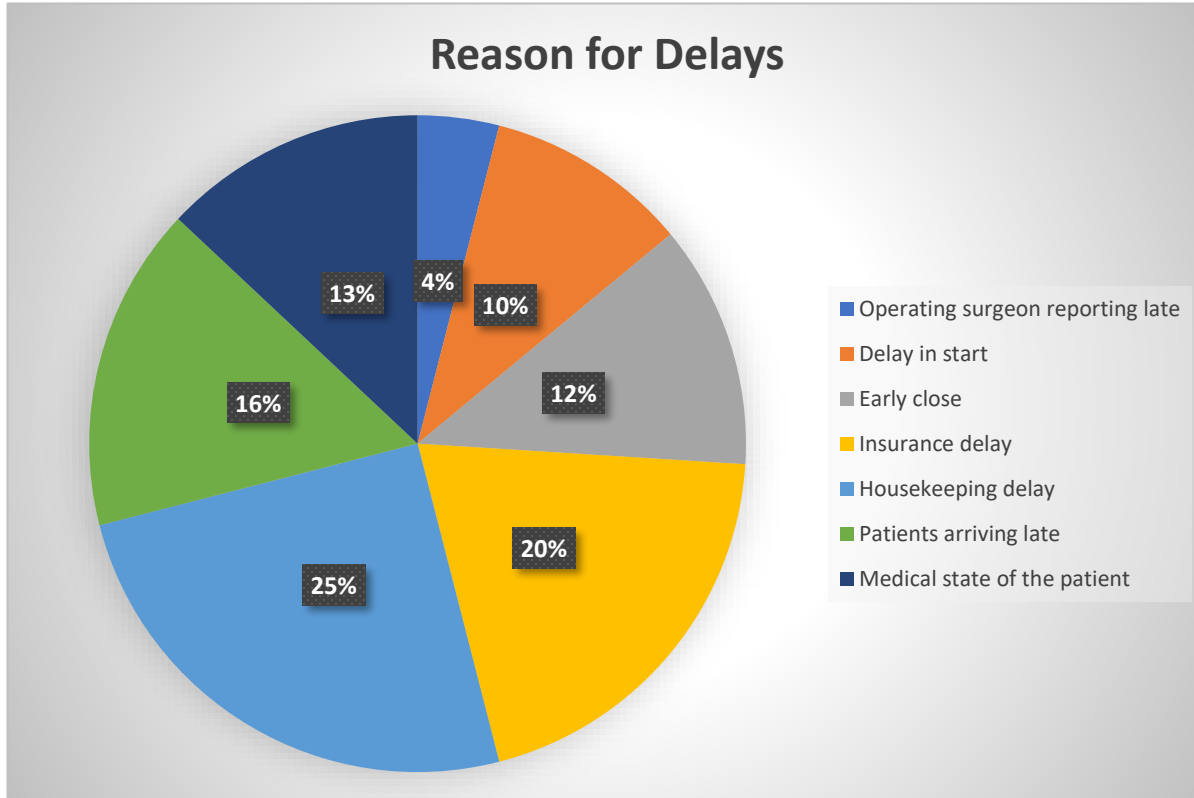
- **Fig. 11:** Figure depicts the average weekly utilisation rate of all surgeries in the duration of 8 weeks during normal working hours in 4 OTs.
- **Interpretation:** It is observed that utilisation rate of robotic surgery OT dropped in 5th week and gradually increased in 6th week. Oncology surgery OT utilisation rate increased in 5th and 7th week while decreased in 4th week. Utilisation rate of orthopaedic surgery OT increased many times in 2nd, 4th and 6th week while decreased in 5th week. General surgery OT was used optimal in 4th week and least utilised in 5th week.

OT TIME UTILISATION IN HRS

■ Orthopaedic ■ General ■ Oncology ■ Robotic surgery



- **Fig. 12:** Figure depicts the weekly time utilisation of all surgeries in the duration of 8 weeks during normal working hours in 4 operation theatres.
- **Interpretation:** It is observed that Robotic Surgery operation theatre has maximum idle time followed by Oncology operation theatre, followed by General Surgery operation theatre and least in Orthopaedic operation theatre. This shows that delay is caused maximum in Robotic Surgery operation theatre, and this can be because a smaller number of cases are performed in this operation theatre. Delay is also caused in Oncology operation theatre and reason behind this can be because of delay in shifting the patient to operation theatre from wards or delay in start of surgery. Minimum delay is observed in General and Orthopaedic operation theatre and reason behind this can be delay in insurance clearance or delay in start of surgery.



- **Fig. 13:** Figure depicts reasons for delay in the surgical intervention performed in the duration of 8 weeks during normal working hours in 4 operation theatres.
- **Interpretation:** It is observed that maximum delays are due to housekeeping staff for shifting the patient late inside the operation theatre, followed by insurance delay, patient arriving late for the surgery, medical state of the patient, early close and delay in start of surgery. Minimum delay is due to surgeon reporting late.

Recommendations:

Here are few recommendations which can help to increase utilisation of Operation Theatres:

- Accurate estimates of case duration can prevent delay of subsequent surgery.
- In the preoperative area, visual dashboards can provide real-time patient tracking and status updates.
- Separate operation theatre should be dedicated to only emergency cases so that scheduled surgeries won't be delayed because of it.
- Preoperative workups, such as consultations and investigations can be included into electronic check lists so that tasks that must be finished prior to admission on the day of surgery can be tracked for completion. This can minimise the possibility of the surgery day cancellations and even patient can search for unfinished preops.
- Time management trainings for the operation theatre staff and doctors may help to achieve a mindset shift to emphasise the value of operation theatre utilisation.
- Training and management of housekeeping staff is necessary for avoiding the delay in shifting the patient to operation theatre.



CONCLUSION:



Operation theatre is one of a hospital's most costly divisions. Because operating time costs money, efficiency in the operating room should be promoted. It is imperative to make a concerted effort to cut down on unnecessary theatre breaks. It is doable to reach utilisation rates of between 70% and 80%, which may adapt to changes in demand brought on by challenges encountered during procedures.



From April 2023 to May 2023, an overall utilisation rate of 4 operation theatres of 75%, 74%, 63%, and 51% for orthopaedic, general, oncology, and robotic surgery, respectively. It may be concluded that, except for the Robotic Surgery OT, OT utilisation in Apollo Hospitals is good and can be increased to reach up to optimal level with proper efforts.



The largest downtime is observed in operating rooms for robotic surgery, followed by those for oncology surgery, general surgery, and orthopaedic surgery. This shows that delays for robotic surgery occur most frequently in the operating room.



Overall, the patient's late relocation into the operating room is blamed for the most delays, followed by insurance delays and patient arriving late for the surgery.