Impact of Block Scheduling vs. Open Scheduling on Operating Room Utilization and Patient Wait Times

Summer Internship Report at
Manipal Hospital

By
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Reg. No. PG/24/014

Under The Guidance/Supervision of
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PGDM (Hospital and Health Management)
(2024-2026)



International Institute of Health Management Research, Sector 18A, Dwarka, New Delhi, India

2025

SUMMER INTERNSHIP COMPLETION CERTIFICATE FROM ORGANIZATION

manipalhospitals
LIFE'S ON

30th June 2025

To Whomsoever It May Concern

This is to certify that **Mr. Ankan Kundu** was associated with us as an **Intern** in the department of **Operations**, from **05th May 2025** to **30th June 2025**.

During his tenure with us, we found him to be diligent and hardworking.

We wish all the best to him in future endeavors.

Yours Sincerely,

For Manipal Hospitals Pvt. Ltd.

for

Authorized Signatory

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CERTIFICATE OF APPROVAL FROM INSTITUTE MENTOR

(Completion of Summer Internship from respective organization)

The certificate is awarded to

Name Ankan Kundu

In recognition of having successfully completed his/her Internship in the department of

Title Medical Services

and has successfully completed her Project on

Title of the Project

Date Impact of Block Scheduling Vs. Open Scheduling on Operating Room Utilizations Patients wait times

Organisation Manipal Hospital (Gurugram)

He/She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning

We wish him/her all the best for future endeavors

Organization Supervisor

Head-HR/Department Head

Feeback form (Internship Organization Supervisor)

FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Ankan Kundu

Summer Internship Institution: Manipal Hospital (Gurugram)

Area of Summer Internship: Medical Services

Attendance:

Objectives met:

Deliverables:

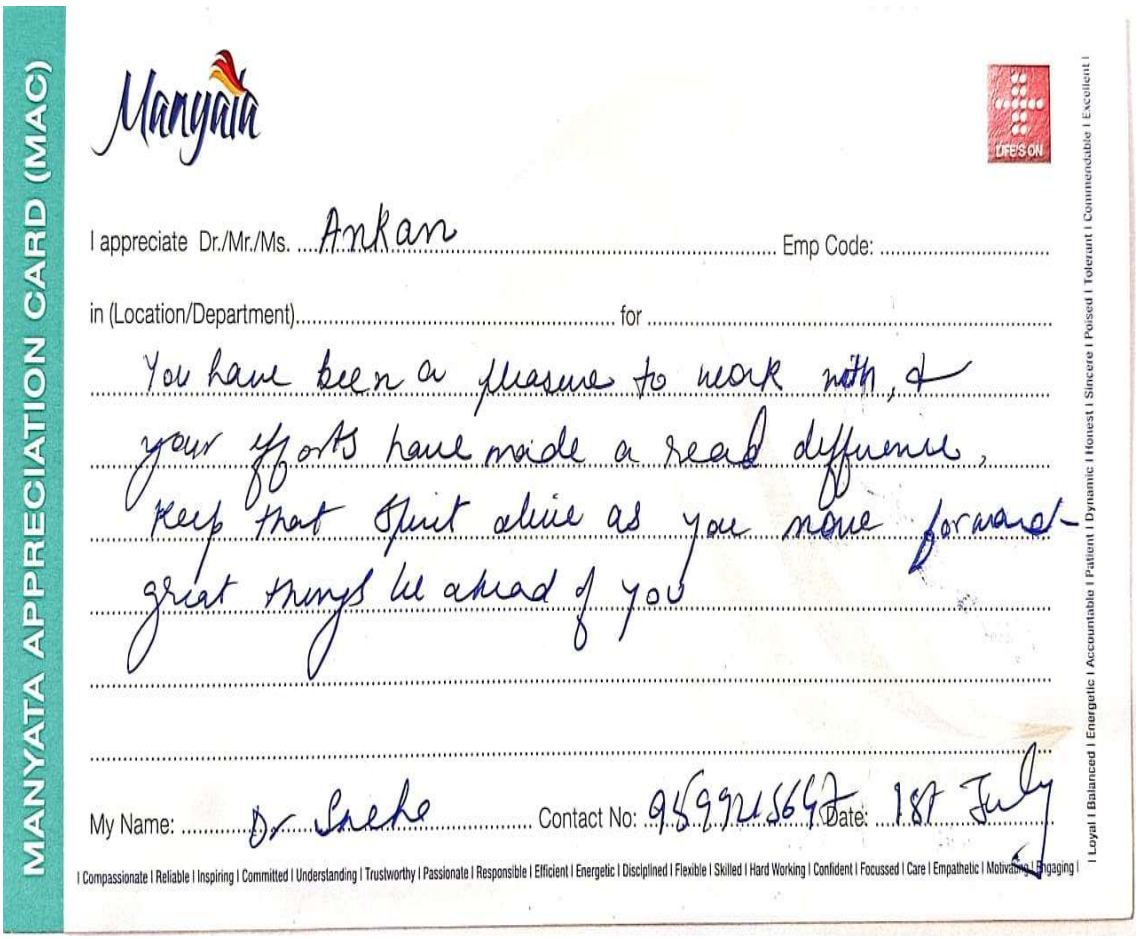
Strengths: Punctuality, Quick learner, Problem Solving

Suggestions for Improvement:

Signature of the Officer-in-Charge (Internship)

Date: 30/08/25
Place: Palam Vihar, Gurugram

Feedback (Appreciation)
(Internship Organization Supervisor)



MANYATA APPRECIATION CARD (MAC)

Manyata

LIFE'S ON

I appreciate Dr./Mr./Ms. Ankan Emp Code: .....

in (Location/Department)..... for .....

You have been a pleasure to work with, & your efforts have made a real difference. Keep that spirit alive as you move forward - great things lie ahead of you

My Name: Dr. Sneha Contact No: 9599215647 Date: 18th July

| Compassionate | Reliable | Inspiring | Committed | Understanding | Trustworthy | Passionate | Responsible | Efficient | Energetic | Disciplined | Flexible | Skilled | Hard Working | Confident | Focussed | Care | Empathetic | Motivating | Engaging |

| Loyal | Balanced | Energetic | Accountable | Patient | Dynamic | Honest | Sincere | Poised | Tolerant | Commendable | Excellent |

Internship Completion Letter
(Internship Organization HR)

To ,

The HR Department
Manipal Hospital
Palam Vihar, Gurugram

Subject: Request for Issuance of Internship Completion Letter

Respected Sir/Madam,

I hope this message finds you well.

I am writing to kindly request a letter of completion for the internship I successfully undertook under the **Medical Service (OT)** of Manipal Hospital, Gurugram, from **5th May to 30th June 2025.**

The internship was an enriching experience that helped me gain valuable insights into hospital marketing operations, and I am sincerely grateful for the opportunity.

I would be highly obliged if you could issue an official letter confirming the successful completion of my internship at your earliest convenience, as I require it for my academic and professional records.

Thank you for your time and consideration.

Warm regards,
Ankan Kundu
IIHMR DELHI
6297371678



FEEBACK FORM
(Institute Mentor)

FEEDBACK FORM

(IIHMR MENTOR)

Name of the Student: Ankan Kundu

Summer Internship Institution: Manipal Hospital, Gurugram

Area of Summer Internship: Medical Services (Operations)

Attendance: 95%

Objective Met: Patient Floe Management, OT Utilization, Interdepartmental coordination.

Deliverables: Assisted in OT utilization analysis, Operational Reporting

Strengths: Good communication skills, Analytical ability, Proactive attitude, Quick learning capability

Suggestions for Improvement: Enhance advanced Excel skill and gain more exposure to hospital financial management.



Signature of the Mentor

Guide / Supervisor

Dr. Mukesh Ravi Raushan

Assistant Professor | IIHMR- Delhi

Date:

Place: New Delhi, India.

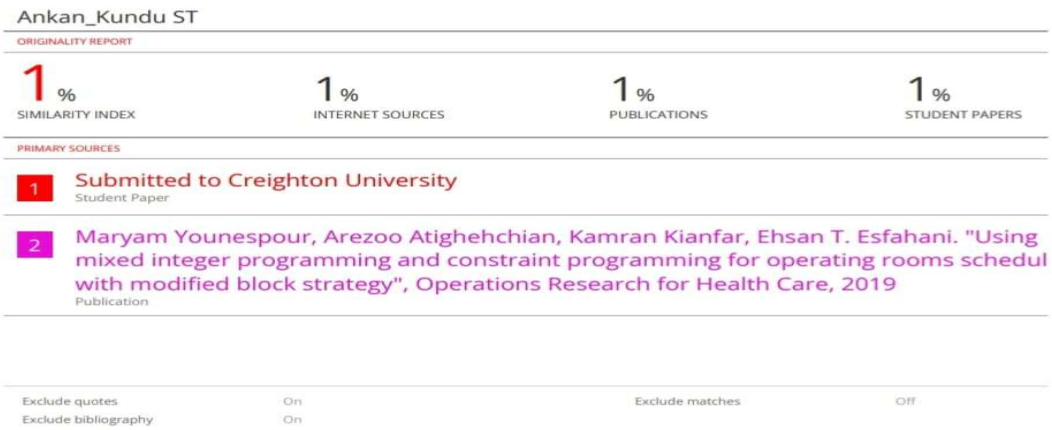
CERTIFICATE OF APPROVAL FROM INSTITUTE MENTOR

Certificate of Approval

The Summer Internship Project of titled **"Impact of Block Scheduling VS Open Scheduling on Operating Room and Patient Wait Time"** at **"Manipal Hospital Gurugram"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.

Mentor / Guide
Dr. Mukesh Ravi Raushan
Assistant Professor
IIHMR - Delhi

Plagiarism Percentage



Ankan_Kundu ST

ORIGINALITY REPORT

1%	1%	1%	1%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Creighton University Student Paper	
2	Maryam Younespour, Arezoo Atighehchian, Kamran Kianfar, Ehsan T. Esfahani. "Using mixed integer programming and constraint programming for operating rooms schedul with modified block strategy", Operations Research for Health Care, 2019 Publication	

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		

ACKNOWLEDGEMENT

I This report is an outstanding prospect to convey my gratefulness to those many people whose timely help and guidance went a long way in finishing this project. I would like to express my sincere thanks to Manipal Hospital Gurugram for giving me an opportunity to explore the practical knowledge practiced by the company. I received a lot of advice and assistance from these folks, whose help was crucial to the project's success. I could not have accomplished anything without this advice and assistance. They assisted me in this undertaking, for which I am grateful. I would like to take this opportunity to thank the Manipal Hospital, Palam Vihar in Gurugram, **Dr. Radhika Khanna (CMS)** for their genuine interest in the project and willingness to share their opinions despite their extremely busy schedules. I consider it a privilege to have worked at the hospital in Palam Vihar, Gurugram - 122017, under their skilled leadership. The entire staff at Manipal Hospital deserves my sincere thanks and obligation for their outstanding support and assistance during the entire Medical Service.

The entire staff at Manipal Hospital deserves my sincere thanks and obligation for their outstanding support and assistance during the entire operation.

And I would also like to thanks to my mentor **Dr. Sunil Singh (Operation Theatre Head**) and Mrs. **Gurdeep Kaur** (OT IN charge) for their guidance and support throughout the whole process of my internship.

My sincere gratitude is extended to my mentor **Dr. Mukesh Ravi Raushan** Professor for the guidance and support necessary to complete the project **on "A Study on Impact of Block Scheduling vs. Open Scheduling on Operating Room Utilization and Patient Wait Times".** Furthermore, I would like to thank **International Institute of Health Management Research** for giving me the opportunity. First and foremost, this big task could not have been completed without my friends and family's everlasting support.

Contents

Unit 1: About the Organization.....1
1.1 Introduction.....1
1.2 Background.....1
1.3 Mission and Vision.....2
1.4 Core Values.....2
1.5 Purpose.....3
1.6 Background.....3
1.7 SCOPE OF SERVICE.....4
Unit 2: Operation Theatre Scheduling.....8
2.1 Introduction.....8
2.3 Basic OT Layout (Flow Diagram).....9
2.4 Roles of OT Team Members (Team Structure Diagram).....12
2.5 Daily OT List Preparation (Sample Format).....12
2.6 OT Documentation.....14
Unit 3 What is this Project About?.....15
3.1: Executive Summary.....15
3.2 Introduction.....15
3.3 Purpose.....16
3.4 Workflow of Operation Theatre:.....17
3.5 Objective.....18
3.6 Methodology.....18
Unit 4 Data Collection Methods:.....20
4.1 Data Collection Process:.....20
4.2 Data Compilation:.....20
Unit 5: Data Analysis.....21
5.1 Patient Distribution.....21
5.2 Data Findings and Interpretation.....21
5.3 Metrics and Calculations.....22
5.4 Personal Development:.....25

Unit 6: Conclusion 26
6.1 Suggestions for improvements 26
6.2 Recommendation: 26

ABBREVIATIONS

S. No	Abbreviation	Full Form
1	IPD	In-Patient Department
2	OPD	Out-Patient Department
3	HIS	Hospital Information System
4	NABH	National Accreditation Board for Hospitals
5	NABH DIGITAL	National Accreditation Board for Hospitals DIGITAL
6	EMR	Electronic medical record
7	ICU	Intensive Care Unit
8	QA	Quality Assurance
9	QCI	Quality council of INDIA

Unit 1: About the Organization

1.1 Introduction

The names "Munn" and "Palla" are combined to form the anglicised name "Manipal." Munn and Palla are the Tulu words for "mud" and "lake," respectively.

Manipal Hospitals is one of India's leading healthcare providers,
known for delivering high-quality, patient-centric medical services. The organization traces its roots back to 1991, when it launched its flagship 650-bed hospital on Old Airport Road in Bengaluru. It is part of the larger Manipal Education and Medical Group (MEMG), which was founded by Dr. T.M.A. Pai and has a longstanding legacy in education and healthcare. Over the years, Manipal Hospitals has grown significantly through both organic expansion and strategic acquisitions, establishing a strong presence across India with more than 30 hospitals in over 15 cities.

1.2 Background

The group is recognized for its commitment to clinical excellence, ethical medical practice, and continuous innovation. It integrates advanced medical technologies, digital health systems, and a team of highly experienced doctors to offer comprehensive healthcare services across a wide range of specialties. Manipal Hospitals has also expanded its reach internationally, with facilities in other countries, and has earned several accreditations and awards for quality care. Through its charitable arm, the Manipal Foundation, the organization also focuses on improving healthcare access for underserved communities. Overall, Manipal Hospitals stands as a symbol of trust, excellence, and innovation in the Indian healthcare landscape.

Manipal Hospitals provide services in gastroenterology, orthopaedics, cardiology, neurology, and a variety of other medical disciplines. The facilities are outfitted with state-of-the-art machinery and cutting-edge medical technology to give patients the finest possible care. Manipal Hospitals' highly qualified and competent medical team, many of whom obtained their training at some of the finest medical schools in the world, is an additional plus.
Manipal Hospitals do more than only provide medical care; they also do research and instruct medical students. The hospital network works with several international organisations and has been involved in a lot of research projects.

In general, Manipal Hospitals is a reputable and well-known healthcare institution in India that provides excellent medical services to individuals from all over the country and abroad.



1.3 Mission and Vision

Mission

The objective of Manipal Hospitals is to offer patient-cantered healthcare services that are high-quality, accessible, and affordable. By utilising the most advanced medical technologies, implementing best practises, and assembling a group of highly skilled and sympathetic healthcare professionals, they provide the greatest results for their patients. Manipal Hospitals also pledges to support medical innovation and research, educate, and develop its staff and medical students, help the underprivileged in the community, and advance environmental sustainability by eco-friendly techniques.

Vision

The goal of Manipal Hospitals is to become a preeminent healthcare organisation recognised for its cutting-edge facilities, patient-cantered approach, clinical excellence, and research and innovation. They want to be known as a trusted partner in their patients' healthcare journeys and to offer them high-quality, inexpensive, and easily accessible healthcare services. Manipal Hospitals is working to accomplish this goal by utilising cutting-edge medical technology, adopting best practises, and assembling a group of compassionate and highly skilled healthcare workers.

1.4 Core Values

Integrity – Upholding honesty, transparency, and ethics in all actions.
Compassion – Treating every individual with empathy, kindness, and respect.
Excellence – Striving for the highest quality in services, performance, and outcomes.
Collaboration – Fostering teamwork and shared responsibility to achieve common goals.
Innovation – Embracing new ideas, technologies, and evidence-based practices.
Accountability – Taking ownership and responsibility for actions and results.

1.5 Purpose

To improve healthcare outcomes and patient experiences by optimizing operating room efficiency through data-driven scheduling strategies, ultimately supporting better resource utilization, reducing wait times, and enhancing the quality-of-care delivery.

1.6 Background

Place of Internship: Manipal Gurgaon, India

Manipal Hospital in Gurgaon (Gurugram) is a premier multi-specialty healthcare facility, part of the renowned Manipal Hospitals network, known for delivering high-quality medical care with a patient-centric approach. Located in Sector 6, near Huda City Centre Metro Station, the hospital is equipped with 150+ beds and state-of-the-art medical technology, including advanced ICUs, modular operation theatres, and 24/7 emergency services.

The hospital offers a wide range of specialties, such as cardiology, neurology, oncology, orthopaedics, gastroenterology, nephrology, and robotic surgery, ensuring comprehensive treatment for complex medical conditions. It is particularly recognized for its comprehensive cancer care, stroke and cardiac emergency protocols, and minimally invasive surgical techniques.

Accredited by NABH and NABL, Manipal Hospital Gurugram adheres to stringent quality and safety standards. With a team of highly experienced doctors and specialists, the hospital provides ethical, affordable, and world-class healthcare services. As part of Manipal Health Enterprises, it upholds a strong reputation for clinical excellence and compassionate care, making it a trusted healthcare destination in the Delhi-NCR region.



Category	Details
Name	Manipal Hospital, Gurugram (formerly Gurgaon)
Location	Sector 6, Palam Vihar, Gurugram (Near Huda City Centre Metro Station)
Parent Network	Manipal Health Enterprises (One of India's largest healthcare chains)
Bed Capacity	150+ beds
Accreditations	NABH (National Accreditation Board for Hospitals & Healthcare Providers), NABL (National Accreditation Board for Testing and Calibration Laboratories)
Specialties	Cardiology, Neurology, Oncology, Orthopaedics, Gastroenterology, Nephrology, Robotic Surgery, Emergency & Critical Care, Maternal & Child Health
Advanced Technology	24/7 Cath Lab, Modular OTs, Advanced ICUs, Robotic Surgery Systems, Cutting-edge Diagnostics
Key Services	- Comprehensive Cancer Care (Medical, Surgical, Radiation Oncology) - Minimally Invasive & Robotic Surgeries - Stroke & Cardiac Emergency Care - Trauma & Critical Care
Notable Features	- Experienced specialists & multidisciplinary teams - Ethical & patient-centric care - Affordable treatment options - International-quality infrastructure
Contact/Website	Official website: www.manipalhospitals.com

1.7 SCOPE OF SERVICE

The hospital offers a wide variety of affordable medical services, as follows:

- Internal medicine
- 24-hour emergency room
- Five operating rooms to dialysis, intensive care, and paediatrics

- **CLINICAL SERVICES**

- Bariatric Surgery
- Cath Lab
- Cochlear Implant Surgery
- Day Care Services
- Dental Sciences
- Dialysis
- Laparoscopic Surgery
- Intensive Care Unit
- Medical & Surgical Gastroenterology
- Neonatal Intensive Care Unit
- Neonatology
- Neurosurgery
- Obstetrics and Gynaecology
- Ophthalmology
- Orthopaedic Surgery including Joint Replacement & Arthroscopic Surgery
- Otorhinolaryngology
- Respiratory Medicine
- Spine Surgery
- Urology
- Vascular Surgery

- **ALLIED MEDICAL SERVICES**

- Ambulance
- Blood Bank
- Dietetics
- Occupational Therapy
- Physiotherapy

- **LABORATORY SURVICES**

- Clinical Biochemistry
- Clinical Microbiology & Serology
- Clinical Pathology
- Haematology

- **DIAGNOSTIC SERVICES**

- Colour Doppler
- CT Scanning
- Mammography
- MRI
- Ultrasound
- X-Ray

- Audiometry
- Interventional Radiology

- **OTHER DIAGNOSTIC SERVICES** ----------

- 2 D Echo
- Audiometry
- EEG
- ECG
- Holter Monitoring
- Spirometry
- Treadmill Testing
- Urodynamic Studies

- **OTHER FACILITIES** ----------

- Ambulance
- Mortuary

- **MADICAL SPECIALTIES** ----------

a. Internal Medicine
b. IVF
c. Critical Care
d. Emergency and Trauma
e. Endocrinology
f. Fatal Medicine Multi Organ Transplantation
g. Plastic & Cosmetic Surgery
h. Rheumatology
i. Paediatrics
j. Cardiology
k. Dermatology
l. Gastroenterology
m. Medical Oncology
n. Nephrology
o. Neurology

- **SURGICAL SPECIALTIES** ----------

a. ENT
b. General Surgery
c. Surgical Oncology
d. Neurosurgery
e. Cardiothoracic Surgery
f. Vascular Surgery

g. Urology Surgery
h. Dental Surgery
i. Paediatric Surgery
j. Ortho Surgery
k. OBG

- **ORTHER SPECIALTIES** ----------

a. Anaesthesiology
b. Psychiatry
c. Microbiology
d. Palliative Medicine

Unit 2: Operation Theatre Scheduling

2.1 Introduction

Operation Theatre (OT) scheduling is the process of organizing and allocating surgical procedures, resources (surgeons, staff, equipment), and operating room time efficiently to maximize utilization, minimize delays, and improve patient care. Effective OT scheduling ensures smooth workflow, reduces costs, and enhances surgical team productivity.

There are two main approaches to OT scheduling:

1. Block Scheduling

In block scheduling, specific time blocks (e.g., half-day or full-day slots) are pre-assigned to surgical departments or individual surgeons. The allocated time is reserved in advance, allowing surgeons to plan their procedures within their designated blocks.

2. Open Scheduling

In open scheduling, OT time is allocated on a first-come, first-served basis. Surgeons or departments book slots as needed, without pre-assigned blocks. This method is more flexible and adaptive to urgent cases.

Advantages:

- Flexibility – Accommodates emergency surgeries and last-minute bookings.
- Fair access – All surgeons have equal opportunity to book time.
- Better for variable demand – Suitable for hospitals with unpredictable surgery volumes.

Disadvantages:

- Potential inefficiency – May lead to overbooking or underutilization.
- Coordination challenges – Requires strong management to avoid conflicts.

2.2 Understand OT Structure and Function

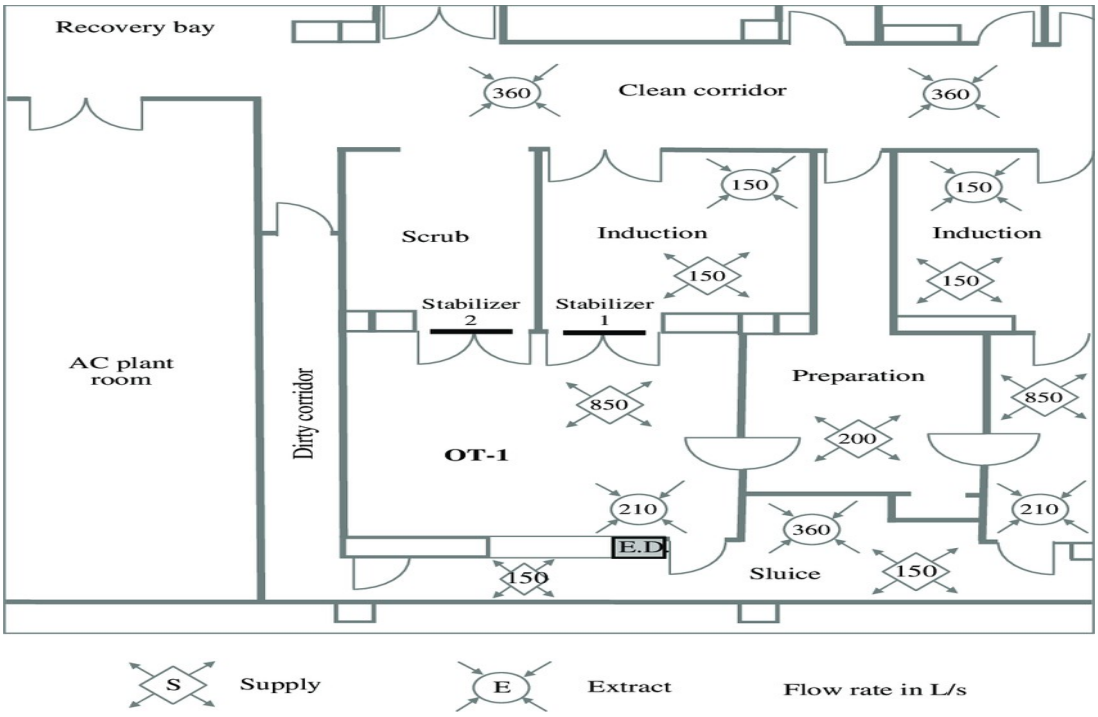


FIG: OT Structure

2.3 Basic OT Layout (Flow Diagram)

Changing Area
↓
Protective Zone
↓
Clean Zone (Pre-op)
↓
Sterile Zone (Operating Room)
↓
Recovery Room / ICU
↓
Disposal Zone

Key Functions:

- Safe surgical procedures
- Infection prevention
- Continuous monitoring
- Emergency readiness

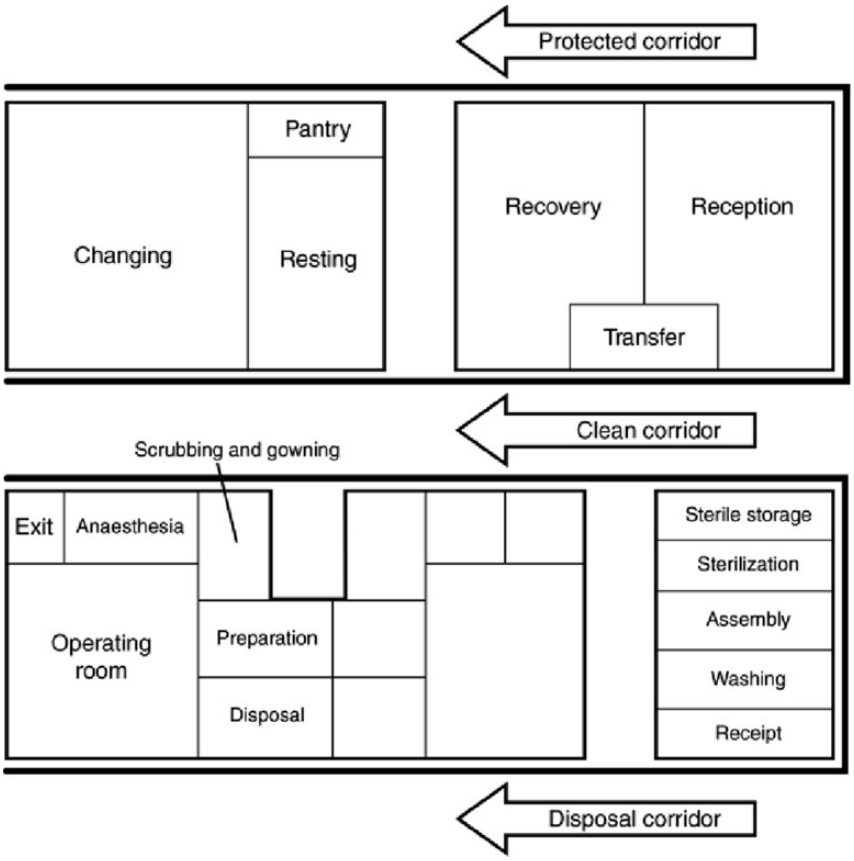
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Surgeries

Elective (Planned)	Emergency (Urgent)	Day-care (Same-day discharge)

- Elective → Planned in advance
- Emergency → Immediate intervention
- Day-care → No overnight stay

Figure : Operation Theatre Zoning System



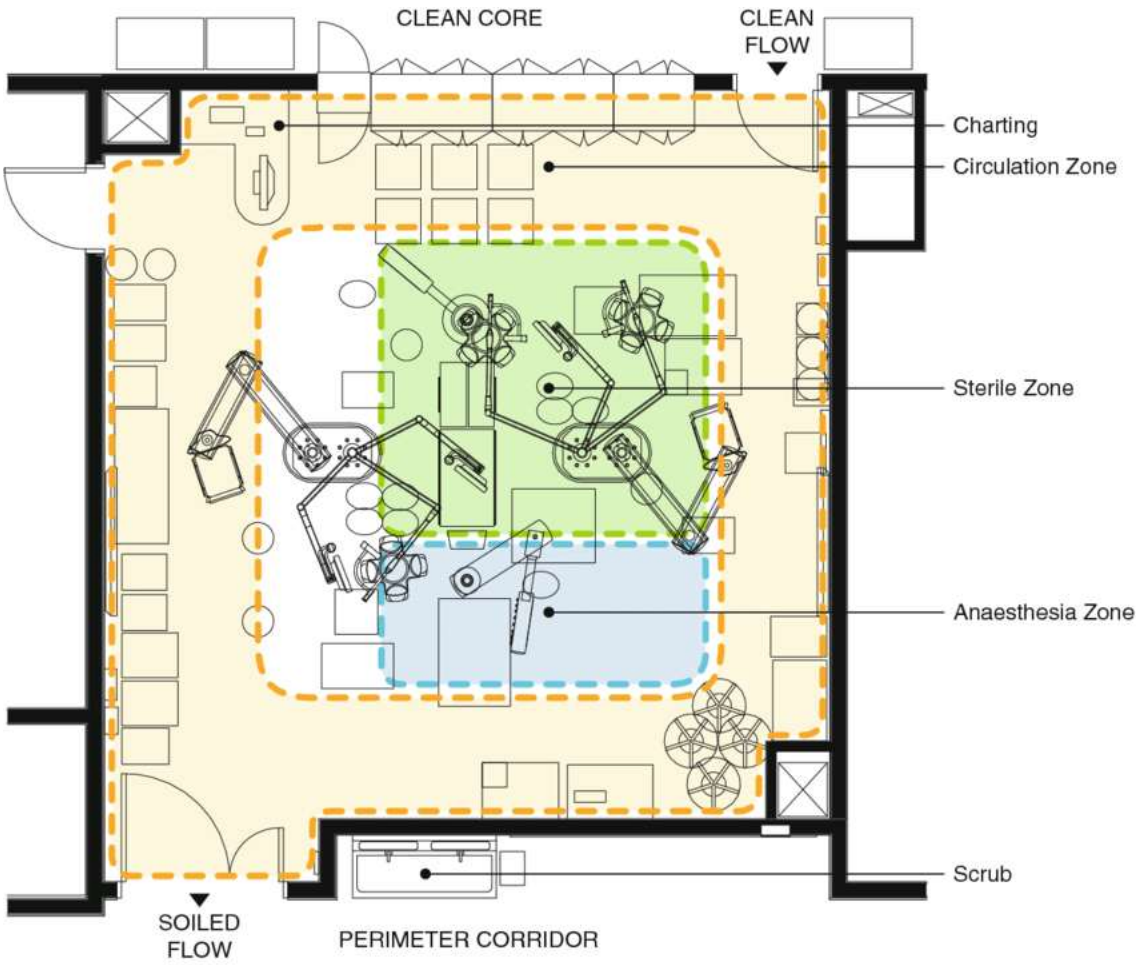


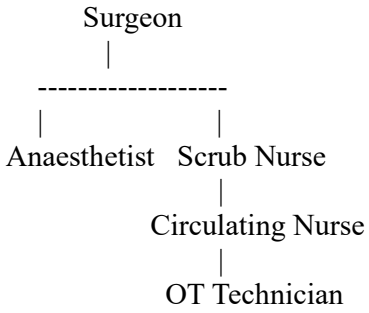
FIG: OT ZONE MAPPING

Zoning Diagram

[Protective Zone]
↓
[Clean Zone]
↓
[Sterile Zone]
↓
[Disposal Zone]

- Ensures infection control
- Maintains sterile environment
- Controls movement of staff & materials

2.4 Roles of OT Team Members (Team Structure Diagram)



- Surgeon → Performs surgery
- Anaesthetist → Manages anaesthesia
- Nurses → Assist & maintain sterility
- Technician → Equipment readiness

OT Scheduling Methods

Block Scheduling

Monday:
8–11 AM → Surgeon A
11–2 PM → Surgeon B
2–5 PM → Surgeon C

Open Scheduling

Slot available → Assigned to next confirmed case

- Improves OT utilization
- Reduces idle time

2.5 Daily OT List Preparation (Sample Format)

Time	Patient	Surgery	Surgeon	OT No.
9 AM	Mr. X	Lap Chole	Dr. A	OT-1
11 AM	Mrs. Y	Hernia	Dr. B	OT-2

Updated daily based on emergencies.

Pre-operative Protocol (Checklist Flow)

Patient ID Check
↓
Consent Verified
↓
Fasting Confirmed
↓
Allergy Checked
↓
Surgical Site Marked
↓
WHO Checklist Completed

Patient Handling & Positioning

Common Positions:

- Supine
- Prone
- Lithotomy
- Lateral

Prevent nerve injury
Maintain circulation & breathing

Post-operative Care Coordination

Surgery Completed
↓
Shift to Recovery
↓
Monitor Vitals
↓
Transfer to Ward / ICU
↓
Inform Family

2.6 OT Documentation

- Operative Notes
- Anaesthesia Record
- Implant Details
- OT Register Entry
- Billing Codes

Ensures legal safety & NABH compliance.

Communication & Coordination Flow

OT ↔ ICU
OT ↔ Wards
OT ↔ CSSD
OT ↔ Blood Bank
OT ↔ Biomedical Dept.

Smooth coordination prevents delays.

Use of Digital Tools

HIS System
↓
OT Scheduling Software
↓
Digital Patient Records
↓
Inventory Tracking

Improves efficiency and reduces manual errors.

Unit 3: Impact of Block Scheduling vs. Open Scheduling on Operating Room Utilization and Patient Wait Times

3.1: Executive Summary

This report provides an in-depth examination of two fundamental operating room (OR) scheduling methodologies - block scheduling and open scheduling - and their impacts on hospital operations, patient care, and financial performance. Through comparative analysis of real-world data, workflow diagrams, and case studies, we evaluate how these systems affect:

OR Utilization Rates: Measures how efficiently operating rooms are used during available hours.
Patient Wait Times: Indicates the average duration patients wait before surgery or treatment.
Staff Productivity: Assesses the efficiency and output of surgical and support staff.

Our findings reveal that while block scheduling maximizes OR efficiency, open scheduling improves patient access. We propose a hybrid model that combines the strengths of both approaches while mitigating their weaknesses, along with implementation strategies supported by digital tools and process optimization.

3.2 Introduction

Efficient operating room (OR) scheduling is vital for optimizing hospital resources, reducing patient wait times, and enhancing surgical care outcomes. Two commonly employed scheduling strategies are block scheduling and open scheduling. Block scheduling allocates fixed time slots to specific surgeons or departments, providing predictability and continuity of care. In contrast, open scheduling allows flexible allocation based on case demand, offering adaptability but potentially resulting in inefficiencies.

This study examines the comparative impact of these two scheduling methods on operating room utilization and patient wait times. While block scheduling may enhance OR efficiency and reduce cancellations through planned allocation, it can also lead to underutilization if slots go unused. Open scheduling, on the other hand, may improve access but increase variability and delays. By analysing real-world data, this research aims to determine which scheduling approach better balances resource optimization and patient-centred outcomes in a hospital setting.

(Vladu A, Ghita TC, Daina LG, Tri DP, Daina MD. Enhancing Operating Room Efficiency: The Impact of Computational Algorithms on Surgical Scheduling and Team Dynamics. Healthcare (Basel). 2024 Sep 24;12(19):1906. Doi: 10.3390/healthcare12191906. PMID: 39408086; PMCID: PMC11476208.)

Key Scheduling Approaches:

Block Scheduling

- Fixed time blocks allocated to surgeons/specialties (typically 4-8 hours)
- Advantages: Predictable workflow, better surgeon satisfaction

Challenges: Underutilization when blocks go unfilled

Open Scheduling

- First-come, first-served model
- Advantages: Flexible for urgent cases

Challenges: Unpredictable workflow, OR idle time

Hybrid Models

- Combination of reserved blocks + open pools
- Utilization Rate: Target 75-85% (Actual OR time/Scheduled time)
- Turnover Time: Benchmark <20 minutes between cases
- On-Time Starts: Top hospitals achieve >65%

This analysis evaluates Manipal Hospital's June 2025 OR data to identify optimization opportunities in these key areas.

3.3 Purpose

1. **Evaluate Efficiency**
   - Compare the performance of **block scheduling** (fixed time slots) vs. **open scheduling** (first-come, first-served) in terms of:
   - **OR Utilization** (% of scheduled time used productively)
   - **Patient Wait Times** (delays between scheduled and actual procedure starts)
   - **Turnover Time** (gap between consecutive surgeries)
2. **Identify Improvement Opportunities**
   - Pinpoint bottlenecks causing delays (e.g., prolonged turnovers, unpredictable case durations).
   - Assess compliance with protocols (e.g., antibiotic administration, surgical checklists).
3. **Optimize Resource Allocation**
   - Balance surgeon block time with urgent/emergency case demands.
   - Reduce OR idle time and after-hours overtime costs.
4. **Enhance Patient & Staff Experience**
   - Minimize delays to improve patient satisfaction.
   - Streamline workflows to reduce staff burnout.
5. **Provide Data-Driven Recommendations**
   - Propose a **hybrid scheduling model** combining the strengths of block and open scheduling.
   - Suggest **digital tools** (e.g., AI for case duration prediction) and **process improvements** (e.g., parallel turnovers).
6. **Quantify Financial Impact**

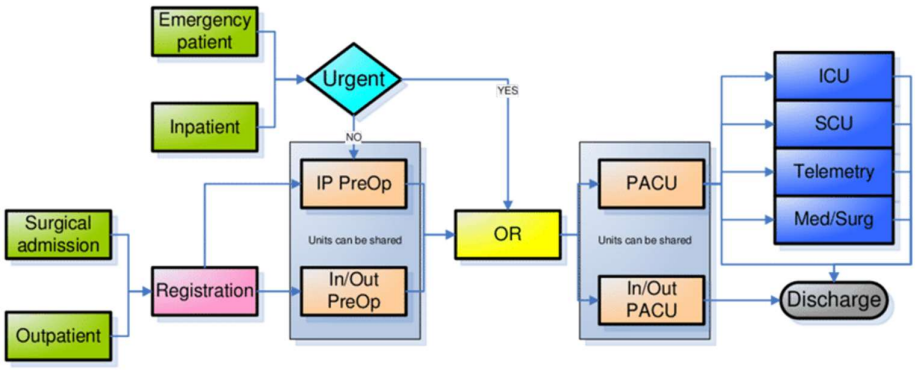
- Estimate cost savings from improved OR utilization and reduced overtime.

Ultimate Goal

To enable **evidence-based decisions** that maximize OR efficiency, patient access, and hospital revenue while maintaining high-quality care.

3.4 Workflow of Operation Theatre:

Figure: Workflow of operation theatre with respect to OT Zoning



OT scheduling is the systematic planning of surgeries, staff, equipment, and operating room time to ensure efficiency, minimize delays, and optimize resource use. Proper scheduling improves patient flow, reduces costs, and enhances surgical team productivity.

Two Main OT Scheduling Methods
1. Block Scheduling
Definition: Fixed time blocks (e.g., 4-hour or full-day slots) are reserved for specific surgeons or departments.

How it works:

Hospitals assign blocks weeks/months in advance.

Surgeons plan their cases within their allotted time.

Unused time may be released for others if not utilized.

Advantages:
- Structured & predictable – Surgeons know their OT slots in advance.
- Higher OT utilization – Reduces idle time when blocks are fully used.
- Better resource planning – Staff and equipment can be pre-arranged.

Disadvantages:
- Rigid system – Difficult to accommodate emergencies or delays.
- Wastage of time – If a surgeon cancels or underutilizes their block.

Best for: Hospitals with mostly elective (planned) surgeries.

2. Open Scheduling

Definition: OT time is booked on a first-come, first-served basis without fixed assignments.

How it works:

Surgeons request slots based on availability.

Priority may be given to urgent/emergency cases.

More dynamic but requires strong coordination.

Advantages:

- Flexible – Easier to fit in emergency surgeries.
- Fair access – No fixed blocks, so all surgeons can book time.
- Adaptable – Works well for unpredictable surgery volumes.

Disadvantages:

- Can cause conflicts – High demand may lead to overbooking.
- Less efficient – Without strict planning, OT time may be underused.

Best for: Hospitals with many emergency cases or variable surgery demands.

Which Method is Better?

Factor	**Block Scheduling**	**Open Scheduling**
Predictability	High (fixed slots)	Low (flexible)
Emergency Cases	Hard to accommodate	Easier to fit in
Efficiency	High if fully used	Can be inefficient
Fairness	Favors block holders	More equal access

Hybrid Approach? Some hospitals combine both:
- Core blocks for elective surgeries.
- Open slots for emergencies or last-minute bookings.

Key Goal of OT Scheduling:

- Minimize idle time.
- Reduce patient waiting periods.
- Maximize surgeon and staff productivity.
- Ensure smooth workflow with minimal disruptions.

3.5 Objective

- To investigate the effective time utilization of operation theatre by categories of disease in Manipal Hospital, Gurgaon
- To study the factors affecting non-utilization of Operation theatre in Manipal Hospital, Gurgaon

3.6 Methodology

The method mainly used to complete this project on Impact of Block Scheduling vs. Open Scheduling on Operating Room Utilization and Patient Wait Times study is the primary data / information of Manipal Hospital - Palam Vihar, Gurugram which I have collected myself

during my 2 months internship there. I have collected and observed the entire process of Operation Theatre for precise concepts and accurate statistical data.

In the project report, I also included references to the data and flow from earlier months to gather further details. Examining every aspect of the circumstance and doing a situational analysis are the goals. The technique involves the general research plan, the sampling process, the fieldwork that was conducted, and lastly the analysis process. Observation has been used to gather the primary data. Referred for secondary data are TAT data from the previous month.

Study Design:

Type: Comparative Cross sectional study
comparing two different scheduling method and data is collected at a specific time of time

Study Sample:

All surgical cases of Month of the May and June 2025 recorded during the internship period (no sampling bias).
Cross-referenced with past data to identify trends.
The study sample consists of All surgical cases recorded during the internship period (no sampling bias) and cross-referenced with past data to identify trends at Manipal Hospital during the internship period. Both primary and secondary data sources were used to ensure a comprehensive analysis.

Sample Size:

The total sample size of All surgical cases, whose data were gathered over two months, from May 1, 2025, to June 30, 2025.

Sample Selection:

The sampling method employed was stratified random sampling, ensuring a balanced representation of surgeries conducted under both Block Scheduling and Open Scheduling models. The data was collected retrospectively from hospital records over a defined period. Surgical cases were grouped based on the type of scheduling system used and then randomly selected from each group to avoid selection bias. This approach ensured that cases from different departments, time slots, and levels of complexity were proportionally represented in the study, thereby enhancing the validity and comparability of results across the two scheduling models.
The study compares two scheduling types (Block vs. Open) and to ensure both groups are adequately represented, then stratified random sampling is most appropriate.

Primary:

1. Operating Room (OR) Logs:
   - Actual surgery starts and end times
   - Number of surgeries performed under block vs. open scheduling
   - Duration of each surgery

2. Patient Records (from OT scheduling database):
   - Patient wait times (arrival to surgery start)
   - Rescheduling or cancellation records

Secondary:

1. Hospital Management Information System (HMIS) reports
2. Previous year's OT utilization reports
3. Standard operating procedures (SOPs) for scheduling
4. Published research articles or government reports on OR scheduling
5. Benchmark data from NABH

4.1 Data Collection Process:

Documentation Review:

- Reviewed hospital records, including previous months data, to identify trends and deviations.
- Data was collected retrospectively from hospital records including OT schedule logs, rescheduling sheets, monthly summary reports, and patient wait time trackers.

4.2 Data Compilation:

Relevant columns such as Surgery Type, Scheduled Time, Actual Time, Delay Reason, and Patient Arrival Time were selected. Data was standardized and categorized into Block and Open scheduling to ensure accurate comparisons.

The following metrics were calculated:

- OR Utilization (%): (Actual OT time used / Total Available OT Time) × 100

- Average Patient Wait Time: Actual Start Time – Scheduled Time

- Rescheduling Rate: (No. of Rescheduled Surgeries / Total Scheduled Surgeries) × 100

5.1 Patient Distribution

Total Surgeries: 484

Block Scheduling: 246 patients

Open Scheduling: 238 patients

Total Available Time for surgery in a day = 8 hrs.

Total available time in two months = 8hrs. × 60days = 480hrs

Average OT Actual time = 6. 5hrs. × 60days = 390hrs

Block scheduling total time 230 hrs.

Open Scheduling total time 160 hrs.

Overall utilization = 81.25%

5.2 Data Findings and Interpretation

Metric	Block Scheduling	Open Scheduling
Avg. OR Utilization	47%	33.33%
Avg. Patient Wait Time	120 mins	90 mins
Rescheduling Rate	12%	18%

Block Scheduling led to higher OR utilization due to structured allocation, but also increased patient wait time due to cascading delays. Open Scheduling offered flexibility, reducing patient wait time, though often at the cost of lower utilization and higher rescheduling.

5.3 Metrics and Calculations

Metric	Block Scheduling	Open Scheduling	Calculation
Avg. OR Utilization	47%	33.33%	Given as direct % values
Avg. Patient Wait Time	120 mins	90 mins	Block: 246×120 = 29520 mins Open: 238×90 = 21420 mins
Rescheduling Rate	12%	18%	Block: 29 of 246 = 12% Open: 42 of 238 = 18%

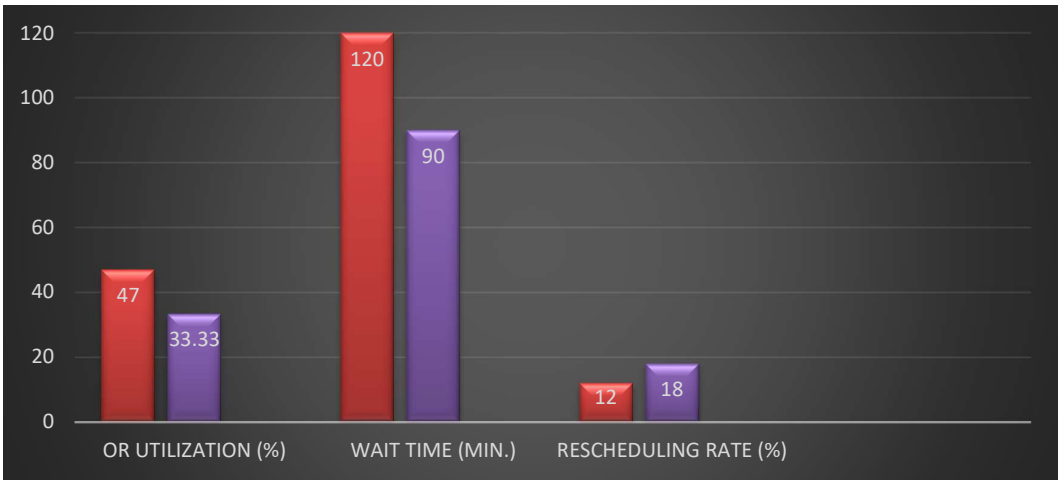


FIG: OR UTILIZATION (%), PATIENT WAIT TIME AND OR RESCHEDULING RATE (%)

Category	Surgeries	Percentage (%)
Ortho	108	32%
General	91	27%
Urology	49	15%
Plastic	31	9%
Others	58	17%
All Cases	484	100%

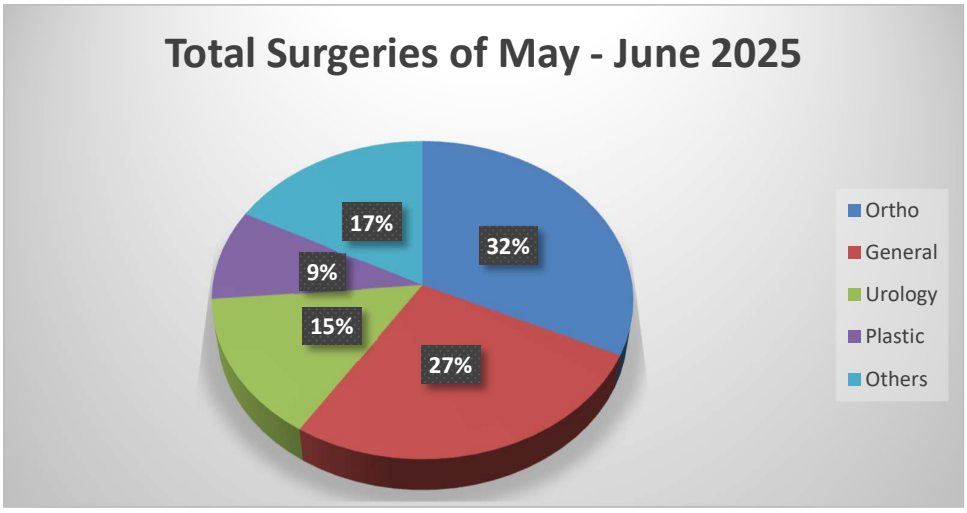


FIG: DEPARTMENT WISE TOTAL SURGERIES

Department	SCHEDULED TIME	ACTUAL TIME
ENT SURGERY	40:00:00	39:40:00
GENERA SURGERY	74:00:00	72:00:00
GYNAE SURGERY	120:00:00	117:22:00
NEURO SURGERY	24:00:00	22:30
ONCO SURGERY	20:00	18:50
ORTHO SURGERY	150:00:00	144:40:00
PEDIATRICS SURGERY	40:00:00	40:00:00
PLASTIC SURGERY	34:00:00	33:00:00
SPINE SURGERY	40:00:00	39:30:00
UROLOGY SURGERY	36:00:00	52:50:00
VASCULAR SURGERY	10:00	08:30

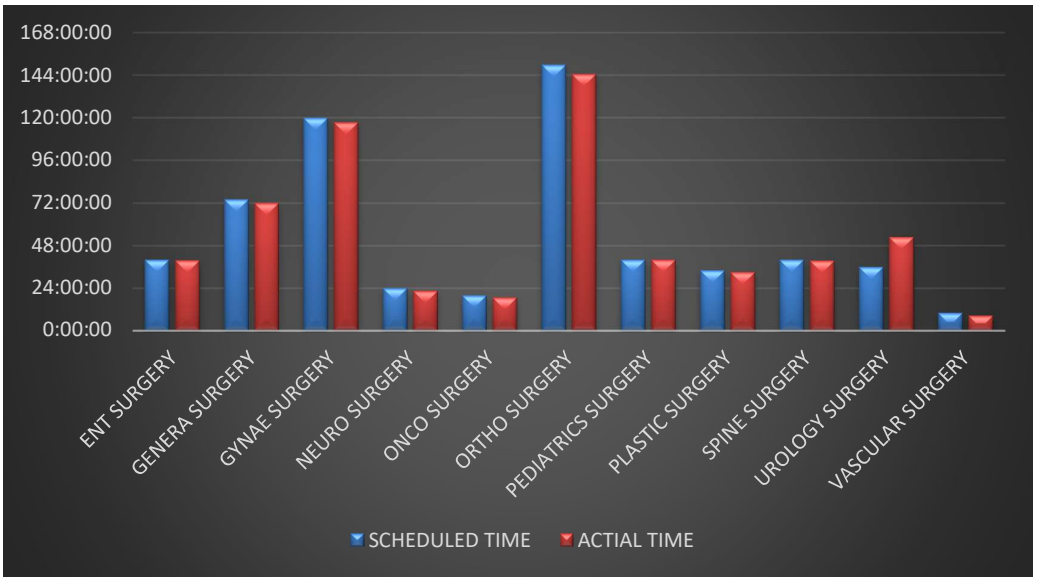


FIG: COMPARISON OF SCHEDULE TIME AND ACTUAL TIME OF SURGERIES (DEPT. WISE)



FIG: Staff Meeting

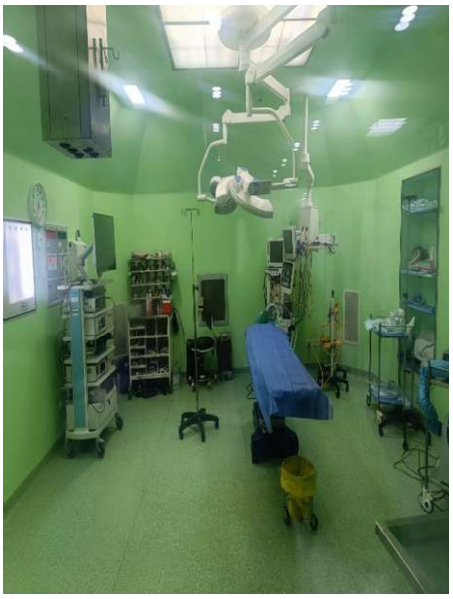
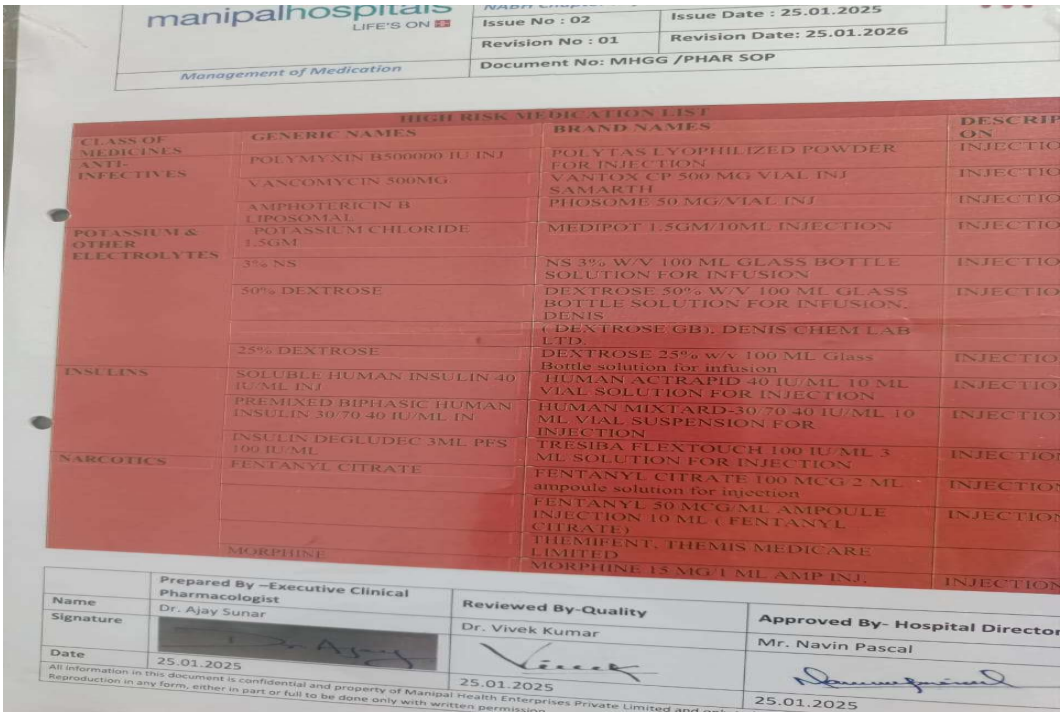


FIG: Operation Theatre



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Issue No : 02	Issue Date : 25.01.2025
Revision No : 01	Revision Date: 25.01.2026
Management of Medication	Document No: MHGG /PHAR SOP

HIGH RISK MEDICATION LIST

CLASS OF MEDICINES	GENERIC NAMES	BRAND NAMES	DESCRIPTION
ANTI-INFECTIVES	POLYMYXIN B500000 IU INJ	POLYTAS LYOPHILIZED POWDER FOR INJECTION	INJECTIO
	VANCOMYCIN 500MG	VANTOX CP 500 MG VIAL INJ SAMARTH	INJECTIO
	AMPHOTERICIN B LIPOSOMAL	PHOSOME 50 MG/VIAL INJ	INJECTIO
POTASSIUM & OTHER ELECTROLYTES	POTASSIUM CHLORIDE 1.5GM.	MEDIPOT 1.5GM/10ML INJECTION	INJECTIO
	3% NS	NS 3% W/V 100 ML GLASS BOTTLE SOLUTION FOR INFUSION	INJECTIO
	50% DEXTROSE	DEXTROSE 50% W/V 100 ML GLASS BOTTLE SOLUTION FOR INFUSION. DENIS	INJECTIO
		(DEXTROSE GB). DENIS CHEM LAB LTD.	
	25% DEXTROSE	DEXTROSE 25% w/v 100 ML Glass Bottle solution for infusion	INJECTIO
INSULINS	SOLUBLE HUMAN INSULIN 40 IU/ML INJ	HUMAN ACTRAPID 40 IU/ML 10 ML VIAL SOLUTION FOR INJECTION	INJECTIO
	PREMIXED BIPHASIC HUMAN INSULIN 30/70 40 IU/ML IN	HUMAN MIXTARD-30/70 40 IU/ML 10 ML VIAL SUSPENSION FOR INJECTION	INJECTIO
	INSULIN DEGLUDEC 3ML PFS 100 IU/ML	TRESIBA FLEXTOUCH 100 IU/ML 3 ML SOLUTION FOR INJECTION	INJECTIO
NARCOTICS	FENTANYL CITRATE	FENTANYL CITRATE 100 MCG 2 ML ampoule solution for injection	INJECTIO
		FENTANYL 50 MCG/ML AMPOULE INJECTION 10 ML (FENTANYL CITRATE)	INJECTIO
	MORPHINE	THEMIPENT, THEMIS MEDICARE LIMITED MORPHINE 15 MG/1 ML AMP INJ.	INJECTIO

	Prepared By –Executive Clinical Pharmacologist	Reviewed By-Quality	Approved By- Hospital Director
Name	Dr. Ajay Sunar	Dr. Vivek Kumar	Mr. Navin Pascal
Signature			
Date	25.01.2025	25.01.2025	25.01.2025

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FIG: High Risk Medication List

5.4 Personal Development:

1.Discipline and Time Management

Working in an OT requires you to be highly punctual, organized, and time-bound. Every minute matters during surgical procedures, and delays can affect patient outcomes.

2. Effective Communication Skills

You interact daily with a wide range of professionals—surgeons, anaesthetists, nurses, technicians, and even patients' families.

3. Teamwork and Coordination

The OT runs on teamwork. No single person can ensure a successful surgery alone.

Become more collaborative, cooperative, and skilled in multi-disciplinary coordination.

Unit 6: Conclusion

This project explored the critical aspects of Operation Theatre (OT) scheduling, focusing on block scheduling and open scheduling methods, their advantages, disadvantages, and suitability for different healthcare settings.

- Block Scheduling improves efficiency and predictability for elective surgeries but may lead to underutilization if not managed properly.

- Open Scheduling offers flexibility for emergency cases but can result in conflicts and inefficiencies without strict coordination.

- A hybrid model (combining both methods) may be the optimal solution for hospitals balancing elective and emergency surgeries.

6.1 Suggestions for improvements

Conduct daily briefings and debriefings with the OT team before and after surgeries.
Train Staff in Communication and Teamwork
Shift to electronic records and voice-assisted data entry to reduce paperwork.
Take feedback from OT staff, surgeons, and patients regularly.
Assign a trained OT coordinator to manage scheduling, logistics, and communication across departments.

6.2 Recommendation:

Based on the findings from literature review, data analysis, and observed trends, the following recommendations are proposed for improving Operating Room (OR) scheduling efficiency and reducing patient wait times:

1. Adopt a Hybrid Scheduling Model
Combine the strengths of both block and open scheduling.
Allocate fixed block times to high-volume, high-efficiency surgeons while keeping a portion of the schedule open for emergencies, urgent cases, or last-minute bookings.

2. Regular Monitoring of Block Utilization
Track block utilization metrics monthly.
Reassign or redistribute underutilized blocks to specialties or surgeons with higher demand.
Implement automatic release policies for unused block times (e.g., release 72 hours before the surgery date).

3. Use Data-Driven Scheduling Tools
Employ predictive analytics and scheduling software to match surgical demand with OR capacity.
Forecast case duration more accurately based on historical data to reduce turnover delays.

4. Improve Communication and Coordination
Ensure effective communication among surgical teams, anaesthetists, and OR staff to reduce delays.

Introduce daily huddles and pre-operative briefings to align schedules and reduce last-minute cancellations.

5. Implement Wait Time Tracking and Reporting
Track patient waits times from scheduling to surgery.
Identify bottlenecks and develop action plans to address prolonged waits in specific departments or for certain procedures.

6. Schedule Buffer Times Strategically
Introduce short buffer intervals between surgeries to accommodate unexpected overruns and prevent cascading delays.
Schedule complex or longer cases earlier in the day to minimize overtimes.

7. Conduct Periodic Scheduling Audits
Review scheduling patterns, cancellation rates, and utilization reports regularly.
Use findings to continuously refine and improve scheduling policies.

Limitations of study

- **Limited Availability of OT Time**

Number of OTs is usually limited compared to the volume of surgeries.
Leads to long waiting times and scheduling conflicts.

- **Communication gap delays procedures or compromise safety**

Need clear and timely communication between the surgical team, anaesthetists, nurses, and support staff is critical.

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