

**“OPTIMIZING WAITING TIME AND OPERATIONAL
EFFICIENCY IN RADIOLOGY DEPARTMENT: A CASE
STUDY OF MANIPAL HOSPITAL, VARTHUR ROAD,
BENGALURU”**



Dissertation Submitted By:
Dr. Monika Sharma
(IIHMR University Jaipur)

Guide: -
Dr. Mahender Kumar
(IIHMR University Jaipur)

Introduction

In the realm of healthcare, radiology departments play an important role in diagnosing and managing various medical conditions. Efficient operation within these departments is extremely crucial to ensure timely patient care, reduce waiting times, and improve overall hospital performance. Radiology departments, often characterized by high patient volumes and complex workflows, face significant challenges in maintaining operational efficiency while delivering high-quality care.

Manipal Hospital Varthur Road (formerly Columbia Asia Hospital) in Whitefield, Bangalore, is a leading multispecialty hospital renowned for its international standard services and compassionate care. Established in 2016, the hospital aims to provide comprehensive patient care across various specialties. It is recognized for medical excellence and offers a wide range of services including Cardiology, Neurology, Orthopedics, Cancer Care, and more. With 150 beds, NABH Accredited, the hospital features specialized departments equipped to handle complex medical cases and emergencies. The hospital prides itself on its team of skilled doctors, nurses, and paramedical staff dedicated to delivering high-quality care with empathy and commitment.

Vision

- Be the destination of Choice to the communities we serve
- Be the most preferred and respected health care organization in every location that we operate

Mission

To Enhance “GRWOTH, DIFFERENTATION & POPL” & To serve our patient with smile

Growth

To augment patient Volume in existing and New location through current and new Engines of growth

Differentiation

By innovation in delivering clinical excellence and enhancing

People

Constantly endeavor to uphold and improve the organization values

Core values

- Clinical excellence, Patient Centricity, Ethical Practices

Our Motto

“Life’s On”

Objective of Study

The primary objective of this dissertation is to explore and implement strategies to optimize waiting times and improve operational efficiency in the radiology department of Manipal Hospital, Varthur Road, Bengaluru. This study aims to:

1. Identify the key factors resulting to longer waiting time
2. Identify the key factors leading to operational inefficiencies as well we non-conversions
3. Analyze the current process flow and resource allocation within different segments of the radiology department
4. Develop and implement actionable proposals to streamline processes and reduce waiting times
5. Develop and implement actionable proposals to improve operational efficiencies and increase conversions
6. Evaluate the impact on patient satisfactions, department efficiency and conversions as concerned within the radiology department

Literature Review

SN	Literature	Authors and Year	Study Location	Sample Size	Sampling Technique
1	Effect of radiology study flow on report turnaround time	Rathnayake, Samira Nautsch, Felix Goodman, Thomas Robin Forman, Howard P, Gunabhushanam, Gowthaman (2017)	Department of Radiology and Biomedical Imaging, Yale University School of Medicine	7378	Convenient Sampling

Salient Feature: Investigated the effect of radiology study flow on report turnaround time. Found that streamlined workflows significantly reduce TAT. The purpose of this study was to assess the importance of relative value unit (RVU) flow and other factors in report turnaround time (TAT) in emergency radiologic operations.¹

SN	Literature	Authors and Year	Study Location	Sample Size	Sampling Technique
2	Mapping TAT to a generic timeline: A systematic review of TAT definitions	Breil, Bernhard Fritz, Fleur Thiemann, Volker Dugas, Martin (2011)	Institute of Medical Informatics, University of Münster, Münster, Germany	1000	Convenient Sampling

Salient Feature: Assessing turnaround times can help to analyse workflows in hospital information systems. This paper presents a systematic review of literature concerning different turnaround time definitions

SN	Literature	Authors and Year	Study Location	Sample Size	Sampling Technique
3	Radiologist report turn-around time: Impact of pay-for-performance measures	Boland, Giles WL Halpern, Elkan F, Gazelle, G. Scott (2010)	Department of Radiology, Massachusetts General Hospital and Harvard Medical School	100000	Convenient Sampling

Salient Feature: Expedited finalized radiologist report turnaround times (RTAT) are considered an important quality care metric in medicine. This study was performed to evaluate the impact of a radiologist pay-for-performance (PFP) program on reducing RTAT

1 Key Research Questions

1. What is the average TAT in the radiology department across different departments?
2. What are the factors that result in longer TAT?
3. How do waiting time impact patient satisfaction and clinical outcomes in radiology department?
4. What strategies can be implemented to optimize operational efficiency and reduce waiting time?
5. What are the factors that lead to non-conversions of patients post consultation?
6. What strategies can be implemented to optimize operational efficiency and improve patient conversion?

Research Design

This study will employ a mixed-methods research design, combining qualitative and quantitative approaches to gather comprehensive insights into the factors affecting waiting times and operational efficiency in radiology departments. All the data was collected from the observations of sample of over 500 patients and registered hospital data through the internal MIS system(TRACK CARE). The sample comprises patients across various department of radiology, age, gender, occupation and complexities.

3.3 Study Setting

The study will be conducted at Manipal Hospital, Varthur Road, Bengaluru, focusing on its radiology department. This setting was chosen due to its reputation and diverse patient population, providing a robust environment for studying waiting times and operational processes.

Study Population

The sample size has over 517 patients across different gender, age, medical complexities etc who were either advised for a scan at radiology department or have already scanned. These patients may or may not be the resident of the city.

Research Procedure

The research procedure employed are:

1. **Qualitative phase:** Through observations as well as through conducting interviews and focus groups with key stakeholders (patients, radiologists, administrative staff) to understand their perspectives on waiting times, operational challenges, and potential solutions.
2. **Quantitative phase:** Analyze operational data from hospital records, including waiting times, patient throughput, and resource utilization along with recording own data of waiting time and conversions.

3.6 Operational Definitions

1. **Waiting Time:** The duration from the patient's appointment time to start of their radiology procedure
2. **Conversion:** Percentage of patients who availed radiology service at the hospital out of the total patients who were advised

3.7 Inclusion Criteria

1. Patients across all age groups
2. Patients who availed the services of X-Ray, USG, CT and MRI
3. Staff: Radiologists, technicians, and administrative personnel directly involved in radiology service delivery.

Exclusion Criteria

1. Patients who refused to be a part of the study
2. Staff: Not directly related to the radiology department

Ethical Consideration

1. **Informed Consent:** Participants were fully informed about the study's purpose, procedures, and potential risks.
2. **Confidentiality:** Data collected are anonymized to protect participant confidentiality. Only aggregated data will be reported to ensure anonymity.

Results and Findings

The results will cover 4 parts:

1. Time Motion Study – X-Ray Analysis
2. Billing TAT Analysis
3. CT and MRI Non-Conversion Analysis
4. X-Ray Non-Conversion Analysis
- 5. Time Motion Study – X-Ray Analysis**

This study examines the time taken for the technician to do the X-Ray of the patient and time taken to get the film out.

Duration: April'24 and May'24

Total Patients studied: 134

Data	Time Taken X-Ray	Time Taken Film Out
Max Time Gap	18 mins	139 minutes
Min Time Gap	2 mins	2 mins
Avg Time Gap	6 mins	11 mins
Median Time Gap	5 mins	6 mins

1. Billing TAT Analysis

This study examines billing time taken at the registration desk of the radiology department.

Duration: May’24

Total Patients studied: 181

Data	TAT
Max Time	46 mins
Min Time	1 min
Avg Time	7 mins
Median Time	6 kins

Waiting time less than 5 mins: 88 out of 181 patients

Waiting time 5-10 mins: 48 out of 181 patients

Waiting time 10-20 mins: 43 out of 181 patients

Waiting time more than 20 mins: 2 out of 181 patients

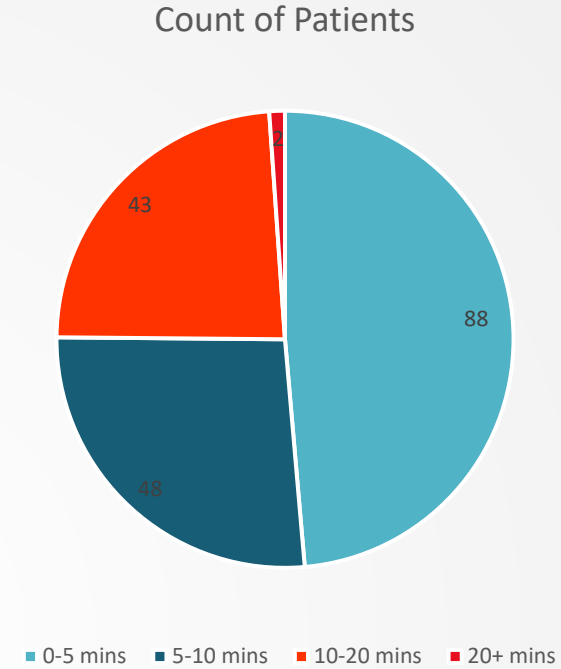


Figure 2: Pie chart for Billing TAT Analysis

2. CT and MRI Non-Conversion

This study examines the conversion % of patients who have been advised undergo CT or MRI at the hospital.

The table shows the data of calling / follow ups done by the hospital staff to the patients who have been advised to take CT or MRI scan. The observation shows that only 65% patients are being contacted leaving a huge scope for a non-conversion.

Total Patients Observed: 57

Row Labels	Count of Patients
Calling/Follow up not done	20
Calling/Follow up Done	37
Total	57

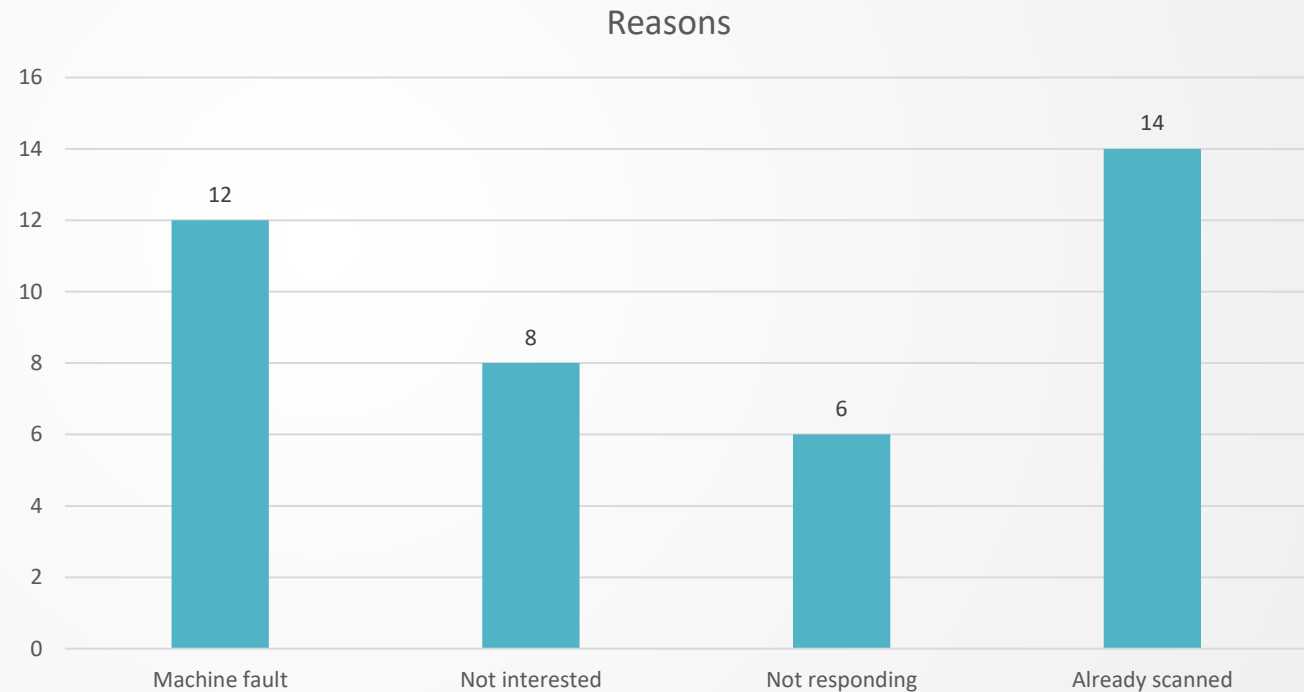
Following are the responses on calling:

Row Labels	Count of Patients
Scan Done	6
Scan not applicable for now	8
Patient not interested	8
Scan could not be done – machine issue	12
Patient not responding	6
Patient took appointment post calling	3
Patient scanned from outside	14
Total	57

The data reflects are potential non-conversion risk of at-least 40 patients out of 57.

Major reasons for potential non-conversions are:

- 12 patients could not scan due to machine fault
- 8 patients seemed not interested
- 6 patients were not responding
- 14 patients already scanned from outside



Bar chart for potential non-conversion reasons for CT/MRI

3. X-Ray Non-conversion Analysis

This study examines the conversion % of patients who have been advised take the X-Ray scan.

Total Patients observed: 52

Row Labels	Count of Patients
X-Ray done at the hospital	14
X-Ray not done at the hospital	38
Total	52

This study reveals that:

- Follow up calling for X-Ray patients is not a norm/practice
- Generally, 73% patients do not take X-Ray at the hospital

CT and MRI Non-Conversion Analysis (DOXPER)

A. Summary – Overall Data:

- Total patient record observed and analysed – 57
- Total Calling Done – 37/57
- Patients eligible for immediate scan – 40/57
- Cases already do – 6/40
- 3 patients took appointment post calling

B. Non Conversion major reasons (from eligible patients):

- 35% (20/57) patients were not contacted pro-actively
- 40/57 patients were eligible for immediate scan
- 35% (14/40) patients scanned from outside
- 30% (12/40) patients were not converted due to faulty machine
- 35% (14/40) patients were either not interested or were not responding to call

C. Opportunity lost due to non conversion:

- Total opportunity lost can be guesstimate to around Rs. 3L for 2 days
- Potential lost would be around Rs. 1.5L per day from CT/MRI

CT and MRI Non-Conversion Analysis

Row Labels	Count of MH-ID	Sum of Avg Cost	Calling %
Calling not Done	20	150000	35%
Calling Done	37	277500	65%
Grand Total	57	427500	100%

Row Labels	Count of MH-ID	Sum of Avg Cost	%Cases
Done	6	45000	11%
Scan Not Applicable for now	8	60000	14%
Non conversion due to machine fault	12	90000	21%
Patient not interested	8	60000	14%
Patient not responding to calls	6	45000	11%
Patient took appointment post calling	3	22500	5%
Scanned from outside	14	105000	25%
Grand Total	57	427500	100%

Row Labels	Count of MH-ID	Sum of Avg Cost	% Cases
Non conversion due to machine fault	12	90000	30%
Patient not interested	8	60000	20%
Patient not responding to calls	6	45000	15%
Scanned from outside	14	105000	35%
Grand Total	40	300000	100%

A. Solution for Incomplete dispatching and reporting Error

- Step 1: Billing is completed.
- Step 2: Sticker is printed.
- Step 3: The sticker is affixed to the X-ray envelope.
- Step 4: All envelopes with stickers are placed inside the console room.
- Step 5: Printed films are inserted into the corresponding folders.
- Step 6: Envelopes containing films are retrieved at the dispatching desk.
- Step 7: Films are dispatched to patients.

B. Solution for late dispatching

- A Desktop inside the new x-ray room will help in reducing the dispatching time
- Technicians can do the editing and scanning simultaneously.
- The above mention process if done inside the x-ray room by a designated person.
- On x-ray table patients identity must be confirmed before performing the scans.

A. Major Reasons

- Single counter for following:
 - Billing
 - Health Check-up
 - Enquires
 - Appointment-CT & MRI

B. Solutions:

- Middle Counter can be used for following:
 - Enquires
 - Health Check-up
 - Appointments



Recommendation /Suggestions

To address these findings comprehensively, the radiology department should consider the following recommendations:

1. **Enhance Equipment Maintenance:** Implement regular maintenance schedules to minimize downtime.
2. **Optimize Staffing Levels:** Ensure adequate staffing to manage patient volumes effectively.
3. **Upgrade Technological Infrastructure:** Invest in robust IT systems to streamline operations and reduce technical disruptions.
4. **Improve Training Programs:** Provide ongoing training to staff to enhance technical skills and patient interaction.
5. **Enhance Patient Communication:** Implement proactive communication strategies to reduce non-conversion rates and improve service uptake. (GUEST and HEART)
6. To Reduce the billing time at radiology a new billing Desk is being Suggested.

1. **Process Improvement** new process for dispatching is being introduced by me –Where the dispatching is being assigned to a specific staff.
2. **Replacement of manual Entry** manual way of writing the name on report envelop is replaced by digital one.
3. **Recommended Digital Token system** in Radiology Department to reduce the Queue.
4. **A designated counter for Enquiry** and appoint in Radiology Department for Walk in Patients which reduces the billing TAT and over all waiting time.
5. **The role plays are conducted** for all the PCCs and Ground Staff to improve the patient experience.

By implementing these recommendations, Manipal Hospital can enhance operational efficiency, improve patient satisfaction, and optimize revenue generation in its radiology department.

To Improve the Communication

Follow the MWOL: Manipal Way of Life:

G.U.E.S.T.

1. Greet
2. Understand
3. Engage/Empathise
4. Solve
5. Thank

All PCCs and Other staff to follow the GUEST SOP and ensure optimum first experience

In case of issues like unavoidable extreme delay which is beyond our control leading to long

waiting for patients: **H.E.A.R.T.**

1. Hear
2. Empathise
3. Apologize
4. Respond
5. Thank

Never leave them unattended

By implementing these recommendations, Manipal Hospital can enhance operational efficiency, improve patient satisfaction, and optimize revenue generation in its radiology department.

Thank You