Summer Internship Report

at

Max Super Speciality Hospital, Dwarka

(May 01st to June 30th, 2025)

A Report on

Turnaround Time (TAT) Optimization in Radiology and Pharmacy IPD.

By

Dr Priya Singh

Mentor: Dr. Vinay Tripathi

PGDM (Hospital and Health Management)

2024-2026



International Institute of Health Management Research, New Delhi

The certificate is awarded to

Name: Dr Priya Singh

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

Title: Quality Department

and has successfully completed her Project on |

Turnaround Time (TAT) Optimization in Radiology and Pharmacy IPD.

Date: 30th June 2025

Organization: Max Super Specialty Hospital Dwarka

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

We wish her all the best for future endeavors

Organization Supervisor

Head-HR/Department Head

Certificate of Approval

The Summer Internship Project of titled **"Turnaround Time (TAT) Optimization in Radiology and Pharmacy IPD."** at **"Max Super Specialty Hospital Dwarka"** 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.

Dr Vinay Tripathi
Associate Proffesor
IIHMR, Delhi

FEEDBACK FORM

(IIHMR MENTOR)

Name of the Student: Dr Priya Singh.

Summer Internship Institution: Max Super Speciality Hospital. Dwarka

Area of Summer Internship: Quality Department.

Attendance: Full.

Objectives met: Gained practical exposure
Understood the Health Care industry

Deliverables: analyzed the TAT for pharmacy & radiology dept

Strengths: Analytical thinking.
Quick learner.

Suggestions for Improvement: more industry interaction.
Certificate program.

Signature of the Officer-in-Charge (Internship)

Date: 30th June 2025
Place: Dwarka

Priya Singh ST report
ORIGINALITY REPORT

Priya Singh ST report

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Acknowledgement:

I owe my sincere and sincere thanks to the Lord who has blessed the effort put forth in the task on my behalf.

My humble thank and regards go to the almighty God, my guiding light.

At the outset I would sincerely thank my Mentor, Mr Vinay Tripathi, for her invaluable advice and guidance throughout the study the and for her ceaseless help and motivation which has always boosted up my morale.

I am also very thankful to the hospital administration for permitting me to conduct the study, to the staff in I.P.D. Pharmacy and Radiology departments for granting permission to collect the data, without there helps I would not have been able to take this step.

A special thanks to the nursing team, radiology personnel, and pharmacy personnel whose openness and support provided key insights into the operational workflow of the unit.

Contents

Acronyms/ Abbreviations: 9

Observational Learning: 10

Project Report 21

References: ..... **Error! Bookmark not defined.**

Annexure 36

Acronyms/ Abbreviations:

IPD – In Patient Department

OPD – Out Patient Department

RIS – Radiology Information System

CPRS – Computerized Patient Record System

NABH – National Accreditation Board for Hospitals

GDA- General Duty Assistant

HIS- Hospital Information System

RCA- Root Cause Analysis

TAT- Turnaround Time

Observational Learning:

Section -1 -Introduction:

. Max Super Specialty Hospital, Dwarka, which is an extension of the Max Healthcare growth strategy, happens to be one of the most state of art, as also environmentally friendly building in Delhi, and it caters for a wide population of about million residents of Dwarka. The 300 bed hospital has 255 operationalbeds and is spread over G+11 floors, and these floors are planned in such a way that it aids smooth movement for patients as well as co ordination between departments. A vast green campus, measuring 8.62 acres of land in its green field origin with GRIHA 5 Star status. Mrs. Arpita Mukherjee is the Unit Head, Mr. Abhay Soi is theChairman andDirector and medicalsuperintendent, Dr Madhulika Jain, Quality head, Dr MonicaDeo Operationhead Gitesh Mongia is to leadMaxSuper Specialty Hospital, Dwarka and will endeavor to offer unparalleled standards in all medical parameters including safety and patient care in South-West Delhi and adjoining areas .

Key Services Provided

- Cardiac Sciences
- Neurosciences
- Gastroenterology and Hepatology
- Nephrology and Urology
- Oncology (Medical, Surgical & Radiation)
- Orthopedics & Joint Replacement
- Emergency & Critical Care
- Obstetrics, Gynaecology, and IVF
- Pediatrics & Neonatology
- ENT & Cochlear Implant Program
- Robotic Surgery
- Plastic & Reconstructive Surgery
- Radiology & Advanced Diagnostics

Hospital Overview

Parameter	Details
Name	Max Super Speciality Hospital, Dwarka
Location	Plot No. 1, Sector 10, Dwarka, New Delhi – 110075
Inauguration Date	April 2025
Total Beds	300
Emergency Beds	20+
Critical Care Beds	120+
Operation Theatres	10 Modular Ots
OPD Chambers	50+
NABH Accreditation	Yes
GRIHA Sustainability Rating	5-Star
Metro Access	1 km from Dwarka Sector 10 & 11 Metro Stations
Distance from Airport	~15 km (~30 minutes)

Advanced Technology and Equipment

Technology	Description
Da Vinci Surgical Robot	Robotic-assisted minimally invasive surgeries
uMR Omega 3T MRI	Ultra-wide bore high-resolution imaging

Cath Lab – Philips Azurion 5	Advanced cardiac imaging system
Digital Mammography	For early breast cancer detection
Endoscopy Suite	For GI and pulmonology diagnostics
Modular Operation Theatres	Equipped with laminar airflow and HEPA filters

Contact & Patient Services

Service	Details
Website	www.maxhealthcare.in
Phone	+91-11-4965-4965
Emergency	24x7 Ambulance & Emergency Care
Insurance	Cashless Insurance & TPA Services Available
Facilities	Pharmacy, Diagnostics, Cafeteria, Wi-Fi, Waiting Lounges

Sustainability Highlights

- Zero Liquid Discharge (ZLD) System
- EV Charging Infrastructure
- Daylighting Optimization
- Energy Efficient HVAC & Lighting
- Recycled Water for Landscaping

Section -2: Mode of data collection.

Observation check list, CPRS review, RIS review and Hospital Information System (HIS) review

Tools / Instruments employed- TAT tracking templates, Root Cause Analysis

Analysis Plan- Quantitative comparison of ideal TAT and calculated TAT of pharmacy and radiology.

Section -3: Overall findings on learning.

- **IPD PHARMACY**

➢ Standard reference – NABH : Medication of management

➢ Objective

- To ensure the overall process control of the Pharmacy and Store department.
- To receive , inspect, storage, Issue, dispense all the items required in the hospital departments & OPD/IPD customers.

➢ Scope

All Pharmaceutical , Consumable , Non-Medical , Stationary Items used in the hospital.

➢ *Licenses and statutory requirements*

a) *Licences*

- IP PHARMACY
  Drug licence – retail
  Drug licence – wholesale
  Schedule x license – retail
  Schedule x licence – wholesale
  Narcotic licence RMI
  FSSAI licence

- OPD PHARMACY
  Drug licence – retail
  Drug licence – wholesale
  FSSAI licence

b) Registration Certificates

State Pharmacy council Registration certificate.

c) Acts

- Pharmacy Act, 1948
- Food And Drugs Act, 1938
- Drugs and Cosmetics Act, 1940
- Narcotics and Psychotropic Substances Act, 1985
- Drugs and Magic remedies Act ,1954

➢ Procurement Process

Orders are placed based on :

- inventory levels
- consumption pattern
- the lead time in HIS

I. policy for regular items

- PRQ is generated in HIS on the basis of inbuilt ROL in HIS with modifications as per the requirements.
- PO to be raised to vendors by purchase department.
- Receipt of material with duplicate copies of Tax Invoice/Challan from the vendors.
- Supplies verified as per incoming material inspection criteria.

II. policy for new items

- Any new drug introduced shall be indented by the consultant/Clinical Pharmacist vide local purchase request form or Formulary addition deletion form.
- Orders will be placed to selected vendor only after approval.

III. policy for one time purchase/emergency drugs

- Any new drug required for a particular in-patient or drug required in urgency shall be procured and the same is documented in HIS as GRN without PO and billed to the particular patient.
- Emergency or local purchase is made from identified medical store selected on the basis of following guidelines:

i. Shall be located in close proximity of the hospital.

ii. Shall be ready to offer the product at a cost lower than the MRP.

iii. Shall have a good track record in terms of quality of products..

iv. Emergency purchase will be made only when there is an immediate need for a product .

v. In case of non-availability of any lifesaving medicine with local vendors, items are arranged.

- **OPD RADIOLOGY**

  Standard Reference

  - NABH: Quality Management in Radiology

  Objective

  - To ensure the overall quality and safety of radiology services in the OPD.
  - To provide timely and accurate diagnostic imaging services to outpatients.

  Acts

  - The Atomic Energy Act, 1962
  - Clinical Establishments Act (CEA), 2010
  - Biomedical Waste Management Rules, 2016
  - The Drugs and Cosmetics Act, 1940
  - The Atomic Energy Act, 1962 & AERB Guidelines
  - The Medical Termination of Pregnancy (MTP) Act, 1971
  - Information Technology Act, 2000

Form Name	Purpose
Requisition Form	Doctor's request for X-ray, CT, MRI, or USG
Patient Consent Form	For procedures like MRI, CT with contrast, biopsy
Pregnancy Declaration Form	For female patients before X-ray, CT,fluoroscopy

Patient feedback form to collect feedback on radiology services

Policies and SOPs

- Patient identification and preparation
- Consent (especially for MRI and contrast procedures)
- Handling of pregnant patients
- Radiation safety and protection

Patient safety and privacy

- Patient informed consent
- Identification protocols
- Use of protective gear
- Pregnancy status inquiry
-

- **Section 4- Conclusive learning**

IPD PHARMACY

It soon became apparent during my last few weeks at the IPD pharmacy how the journey between ordering and a patient being prescribed the medication is not only a case of journey times crossing to the pharmacy counter - lots of little leaps and skips between then count, and don't forget, handoffs! During my placement, some these stood out: A considerable number of hands cross a prescription between orders entering a pharmacy and drugs arriving with the patient's Bedside - even minutes delay through each process: dispatch, collation, restocking and more, accumulates quite quickly on a whole shift The apparent longer time taken over each station by newer members of pharmacy team compared to a trained pharmacist suggests our training/update sessions do have immediate benefit to speed Many of our steps required manual ordering on to HIS, and this accounts a large amount of time logging with

these movements 7.3 Identification of factors leading to TAT prolong in each of hospital set up the RCA were identified, including • shortage of Manpower • Segregation of work were missing • drug availability issue • pharmacy get late order received • Pharmacy dispatch medicine after late, • pharmacy recruitment new team • GDA is getting Late Order atWARD • nurses get delay on Drug administration, • Logistical problem, as not available Lift.

Limitations-

There is limited interoperability among hospital information systems, therefore, information may not be readily available for data and quality indicator monitoring. There is a low competency and training of the pharmacy workforce leading to impact inpatient care and there can be challenges in terms of resistance for implementing the improvementsThere are constraints relating to resources for implementation of improvementsThere can be a lack of flexibility in existing infrastructure to enable flexibility.

Suggestions for improvement-

Develop an streamlined medication dispensing mechanism to bring downTATfor the STATand ROUTINEm medication.

Dedicated team of pharmacists for STATand ROUTINEm medication dispensing process.

Effective inventory management techniques shall be adopted for the availability of medications and to avoid shortages.

ContinuousTraining andDevelopment programs shall be conducted for pharmacy technicians, pharmacists and the NursingStaff.

PerformanceMeasurement metrics have to be developed for monitoringperformance and identify areas of improvement.

Evaluation and introduction of automation on an existing system. The pharmacists should have an effective communication with NursingSTA FF and to clarify

doubts related to the administration. RegularReview ofTAT. Informationfrom feedback are collected and action planned based on patient feedbacks

Radiology department

Observing the radiology department revealed just how much of a barrier to timely reporting can be the ready availability of a radiologist to sign off the exam versus the actual time it takes to complete the scan itself. Some observations from this rotation include: Compliance rates drop after 2 PM which is consistent with informal information gathered; the staff reported that this is largely related to decreased availability of radiologists to sign off on imaging exams after2 PM, rather than an increase in the scanning speed. A lag associated with PACS retrieval was the “dirty secret” reported numerous times to staff and it can not be identified if not by inquiring of the end users.

The new hires and reporting from inexperienced staff members were reported as the highest concerns for adding to the queue.

The 459 cases collected that were also time stamped over the month aided in establishing patterns by specialty and not solely intuition. To identify RCA of longerTAT(e.g.): Manpower shortage, Delayed in complete time, Delayed in approved time, New staff hired in radiology department, Lack of training process, Lack of regular evaluation of staff performance.

Limitation :

Shortages of manpower, time and/or resources (and technology) may limit the progress in improving TAT.

Certain complex imaging studies may require higher expenditure of time and energy in order to report, which could result in longer TAT.

Lack of knowledge and experience may impact on patient care and may result in TAT to suffer. Shortage of time, resources to implement process improvements.

Individual patient’s needs and acuity levels may result in fluctuations in TAT.

Suggestions for improvement:

Standardize reporting templates and format for efficiency ofreportingand uniformity; Develop a smooth process ofimage acquisition for reducingTAT. Of the various radiology departments; Ensure the effectivenessofPACSin image storing and retrievaland imagingreporting; consider introducing digitalradiographyor digital X rays for faster Acquisition & images; Offer training and continuingeducationals programsfor radiologystaff; Define performance appraisal forthe reporting and image acquisition staff and tracktheir performance; Review theTATdata regularly in order to find out the existing bottlenecksand possible areas for betterment;Use thedata analytics forMonitoringkey performance indicators (KPI)like the TAT andIdentifying areas for betterment

Project Report

- **IPD PHARMACY TAT PROJECT**

Rationale:

Pharmacy turn around time (TAT): As one of the very few important operational parameters of the hospital system; this is a vital time to ensure smooth medication dispensing in pharmacy. Unreliable and prolonged pharmacy times impact: workflow in clinical settings: Patient wait times at the pharmacy outlet Increase: Patient safety profile Pharmacy TAT reduction and optimization: This will have a major contribution in new venture of Max Hospital at Dwarka: the tertiary facility. Since patient safety and patient satisfaction are the central tenants of quality improvement as far as quality standards defined by NABH is concerned, this project will contribute to this regard. The present study proposed to bridge the pharmacy related workflow gap to improve TAT for STAT and ROUTINE medicines.

The project endeavours to achieve the same through calculating timings for each operational steps starting from, indent of drug order, to drug order receiving at pharmacy, to order dispatch by pharmacy, to order receiving at wards by GDA and administration by nursing staff and in the process analysing the deviation/gaps with timeline. To draw effective findings and thereby make/propose practical and systemic interventions/solutions. These findings can then guide process improvements leading to

the reduction of overall TAT for STAT and ROUTINE medicines, improved patient care, and enhanced departmental interface in peak hours.

Research Question:

- What is the current average TAT in inpatient pharmacies?

- What are the major causes of pharmacy-related delays?

Objective:

- Primary objective- To evaluate the pharmacy turnaround time (TAT) for inpatient services at Max Hospital, Dwarka.

- Secondary objectives-

  - To identify the specific steps and processes contributing to delays in drug administration to the patient.

  - To identify process inefficiencies and delays in the pharmacy workflow.

Mode of data collection:

Study Design: Time-motion study followed by a quality improvement intervention.

Data Collection Method:

Timestamp data from HIS: A timestamp on HIS record the exact date and time an event occurs. For my study I took Time of Indent (T1) and Time of Administration (T5) from the CPRS.

Pharmacist and Patient Interviews: From the pharmacists I got to know how the medication order is packed, dispensed and dispatched on different floors; patient gave the feedback about if there was any delay in the administration time.

Direct Observation: Noted the T3 and T4 time by taking rounds with the GDA's on floor 6, 7, 8 and 9. There also noted the time of medicines received by the medicine nursing staff.

Sampling:

- Sampling Technique- Random sampling
- Sample Size: 200 each for the Routine and STAT.
- Inclusion Criteria: All the IPD Patients admitted to the IPD wards floor 6, 7, 8 and 9.
- Exclusion Criteria: Emergency and OPD Cases.

Purpose of data collection- The aim of this data collection was to evaluate the actual TAT between time of indent of medicine (T1) and time of administration of medicine (T5) to the patient and compare it against the ideal standard which is 30 minutes for STAT medicines and 2hrs for ROUTINE medicines. This time frame is critical for maintaining operational efficiency, improving patient experience, and ensuring timely administration of medicines to the patient.

Data security and Ethics

- No patient identifiers were recorded
- Observations were non- intrusive
- Observations were done with prior approval from the pharmacy HOD.
- Staffs were informed of the study purpose to ensure transparency.

Tools/Instrument Used:

TAT Tracking Sheet: Checklists as per the NABH Standards.

IP NUMBER	PATIENT CATEGORY	ORDER NUMBER	DRUG	FLOOR	T1	T2	T3	T4	T5	CALCULATED TAT (T5-T1)

Stop watch method:

Also known as Time Study which is used to measure the time it takes to complete a specific task or activity. In my data collection mode I used this to measure T3 and T4 on each floor where the medicines were dispensed by the GDA's.

Results:

1. First whole data gathered then segregated the data floor wise from which the indent was raised for the medicines.

Divide into Routine and STAT medicine.

Order Type	In Compliance	Non-Compliant	Not Found	Total
Routine	76	54	70	200
STAT	50	109	41	200

2. Average of Routine medicines which are not following the Ideal TAT of 2 hours or are non-compliant is 8.28 hours.
3. Average of STAT medicines not following the Ideal TAT of 30 min or are non-compliant is 167.58 min.
4. Calculated TAT= Drug Administration – Time of indent
   Calculated TAT= T5-T1
5. Compliance Rate:

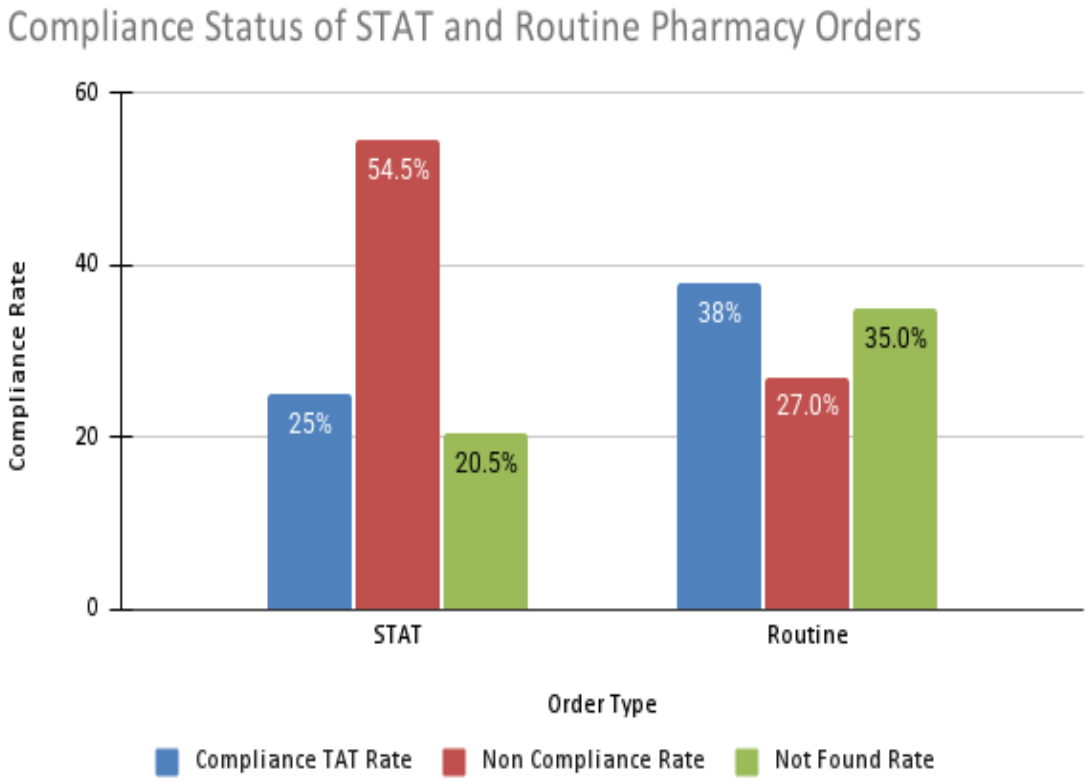
Order Type	In Compliance	Total	Compliance Rate	Non-Compliance Rate	Not Found Rate
Routine	76	200	76/200*100=38%	54/200*100=27%	70/200*100=35%
STAT	50	200	50/200*100=25%	109/200*100=54.5%	41/200*100=20.5%

Interpretation:

This chapter discusses analysis of the data obtained over the one-month period in Max super speciality Hospital Dwarka, regarding the turnaround time (TAT) time from indent of drug(T1) to administration of drug(T5) both STAT and ROUTINE drugs. Objective were: To compare the TAT from our study with optimum TAT of 30 mins for STAT, 2 hours for ROUTINE medicines, detect the points where time delays are incurred and assess the performance.

Order Type	In Compliance	Non-Compliant	Not Found	Total	Compliance Rate	Non-Compliance Rate	Not Found

Routine	76	54	70	200	38%	27%	35%
STAT	50	109	41	200	25%	54.5%	20.5 %



- ROUTINE Medicines: Only 38% of the cases fall under the expected TAT; This calls for a measure of concern and opportunity for improvement in terms of meeting target times. - STAT Medicines: Further lower numbers observed for stat cases of 25% where this falls under unexpected, the hospital's preparedness to attend to critical cases, their immediate interventions to address medical exigencies are impaired. - Data quality issues; There high percentage of missing data (35% for routine and 20.5% for Stat) indicate that there might be problem in the way data is collected, nursing staff not trained on the system (HIS) / down time of the system might lead to lack of proper documenting, thus affecting patient care eventually.

Recommendations

Separate and group your STAT and ROUTINE medication dispensing task forstaff to create better focus, and thus improve efficiency in your workflows; where possible, we will do this by targeting the most significant value of my workflow (especially that T2-to-T3) 1; in practice: Focus on Your STAT Medications; create system/ protocol to identify and manage STAT medications delivery; ensure STATs hit their TAT; Improving Data Quality through your data management systems to collect and manage best possible data to enable accurate data analysis; StaffTraining; providing in-house education for staff to demonstrate to them both the benefit of keeping the TAT and, what happens to those poor, suffering patients when the delivery of medicines isn't performed expeditiously on time (by way of time management, we will most likely spend most our attention to the largest gap of time). Finally: monitor and adjust throughregular monitoringof yourTAT-e.g. You could perform a weekly pull of the T1- T5 gaps, segmented by floor, and this will identify potential slippage far before a resident writes a satisfaction complaint.

- Specific Recommendations for ROUTINE Medicines

1. Analyze Causes of Delays: Conduct a root cause analysis to identify the causes of delays in administering ROUTINE medicines.

2. Implement Process Changes: Implement process changes to reduce delays and improve compliance with TAT.

- Specific Recommendations for STAT Medicines

1. Develop a Priority System: Develop a system to prioritize STAT medicines and ensure that they are administered within the ideal TAT.

2. Improve Communication: Improve communication between healthcare teams to ensure that STAT medicines are administered promptly.

Conclusion:

Looking back at a month’s worth of tracking T1–T5, the most evident conclusion to draw

is the fact that, at the moment, default is the destination, not the detour – just 38% of ROUTINE and 25% of STAT orders were within the ideal parameters. What made me particularly worried, though, is that STAT orders were performing even more poorly than ROUTINE cases, which, definitionally, the ones which might benefit most from the delivery window of time by merely minutes. Let's not lose sight of the fact, though, that about a third of the ROUTINE cases and about one-fifth of STAT cases had not received a time stamp that could be accounted for at the time of the review - and even then, this alone was some indication of how routinely the EMR has been utilized at the point of care.

And frankly, it becomes pretty clear from all of this that nothing else is really going to work here - it is going to have to be a combined approach in regard to staff, processes and documenting behavior; the whole gamut in tandem.

When you only just opened for about 6 months, though, it is a good point to fix this before it becomes the norm.

Key Takeaways

Only 38 percent of ROUTINE orders, and only 25 percent of STAT orders achieved the optimal TAT – ie 'delay is the order of the day' in our existing system. Given that STAT (expedited) orders ought to be highest of priority to process, it's certainly a noteworthy lag in compliance that should be elevated to the Head of Pharmacy directly. Nearly one in three ROUTINE records and one fifth of STAT records had no actual timestamp (usable data) at all, indicating a shortcoming with the HIS logs instead of the care pathway process

-Future Directions

Quality improvement: Worth doing but focus on the exact areas of delay where these data pointed, rather than a broad refresh. Workflow streamlining, especially at the pharmacy to ward handover where most of the time taken for care in these data sat. Data quality improvement, to

embed routine recording at every handover within the HIS, to avoid losing a third of the records from the next audit due to lost time stamps.

References:

1. NABH Accreditation Standards for Hospitals, 6th Edition, 2025.
2. WHO Guidelines on Good Pharmacy Practices, 2011.
3. Institute for Safe Medication Practices (ISMP).
4. Max Healthcare SOPs on Pharmacy Services.
5. Institute of Medicine. Preventing Medication Errors , 2006.

Annexure

Name of the department- In Patient Department Pharmacy

Dates of visit- 6th May to 30th May

Interacted with-

- Pharmacy HOD
- Floor Manager
- Team Leader
- Clinical Pharmacist
- Nursing staff
- GDAs
- Patients

- **RADIOLOGY TAT PROJECT**

  Rationale:

  The importance of Turning Around Time (TAT) in radiology cannot be ignored as a quality indicator since this would ultimately pave for better clinical decision and in the patient outcome. With increasing volume of patients and urgent need for faster scanning the work load in this newly inaugurated institute named Max Hospital, Dwarka, has been challenging the process of optimization for this. TAT may prolong the treatment time for the patient resulting in inconvenience and dissatisfaction.

  Quality improvement would therefore mean an improvement in the overall TAT. The purpose of this study would therefore be to study the current TAT of different scans in radiology, to find out the bottlenecks and bottlenecks responsible for these, and suggest remedial measures for improving their productivity with standards required by NBH to be followed.

By mapping out time it takes for each step of process – from "order complete" through to "result approved by doctors" - and highlighting deviances or gaps between each step, the project aims to find operational deficiencies & offers realistic, system-wide recommendations. Ultimately, output of this process study should enhance XRAY, MRI, CTSCAN & MRI procedures with aim to improve overall TAT & departmental cooperation in peak hours

.

Research Question:

- What is the current average TAT for each imaging modality in the hospital?

- What are the key causes of delay in radiology reporting?

- How can workflow redesign and technology adoption reduce TAT?

Objective:

Primary objective- To evaluate the radiology turnaround time (TAT) at Max Hospital, Dwarka.

Secondary objectives-

-To measure baseline TAT for various imaging modalities (X-ray, CT, MRI, Ultrasound).

- To identify workflow inefficiencies and causes of reporting delays.

Mode of data collection:

Study Design - Descriptive cross-sectional study.
Sample Size & Sampling - All radiology cases (CTSCAN, MRI, USG, XRAY) over 1 month's duration(convenience sampling)
Purpose of Data Collection- The Purpose of Data Collection was to assess the actual TAT time between Order Complete Time and Order Approved Time. Compared and against the TAT ideal of 12hrs time for before 2pm and 22hrs for after 2 pm to ensure better management and to decrease operational workflow.
Duration of the Study- One Month.
Number of samples collected- 459.

Method of Data Collection

HIS – Records Real time information about process start,end times and duration
PACS time stamps- to track process step progression
Interviews - To assess the process of radiology procedure in the department to obtain insight into procedures of PRE- REQUISITE forms i.e. Of the form used prior to procedure,How doimeter is crucial in measuring radiations for dose calculation and accuracy in both patient and personnel.
Sampling TECHNIQUE- RANDOM SAMPLING.

SAMPLE SIZE- 459 PATIENTS FOR OVER A PERIOD OF ONE MONTH.

INCLUSION- all O.P.D patients

EXCLUSION- ALL E.M.E.R.G.E.N.C.Y cases and I.P.D patients

Data security and Ethics -

All patient identifiable information was not recorded
Observations done were non- intrusive.
Prior written approval from the H.O.D. Of radiology was obtained prior to commencing data collection.
Personnel were briefed about the data collections process.

Tools/Instrument used:

- The checklist made is under the format of NABH

Patient ID	Department	Test Name	Order completion date/time	Approved date/time	Calculated TAT(Approved date/time- Order date/time)	Ideal TAT

- Root Cause Analysis:

Category	Root cause	Observation	Recommendations
Manpower	Limited Radiologists, Delay in report verification.	Delay during weekends, reports pending due to approval backlog.	Hire radiologists on shifts or use tele-radiology, Enable auto-escalation or digital sign off system.
Machine	Machines downtime, RIS/PACS lag	Maintenance logs show frequent breakdowns, delay in image retrieval.	Schedule maintenance, optimize software infrastructure.
Methods	Delay in patient transfer, manual reporting	Ward-radiology communication	SOPs for porter scheduling ,

		gaps, report tying takes time.	introduce voice dictation.

Results:

- OPD data collected for the month of Mau, 2025. Total of 459 samples collected across, X-RAY, MRI, CT SCAN and USG.
- Segregation of sample based on compliance and non-compliance.
- Compliance means those who are falling under the category of ideal TAT i.e., 12 hours if the procedure is done before 2 PM and 22 hours if the procedure is done after 2 PM.
- Non-Compliance means those are not following the Ideal TAT.

Modality	Compliance	Non Compliance	Ideal TAT(in hours)
MRI	57	4	12
MRI	56	5	22
CT SCAN	48	5	12
CT SCAN	25	17	22
X RAY	52	7	12
X RAY	49	12	22
USG	57	4	12
USG	48	13	22

- Calculated TAT= Approved time – Calculated time
- Finding the Compliance Rate:

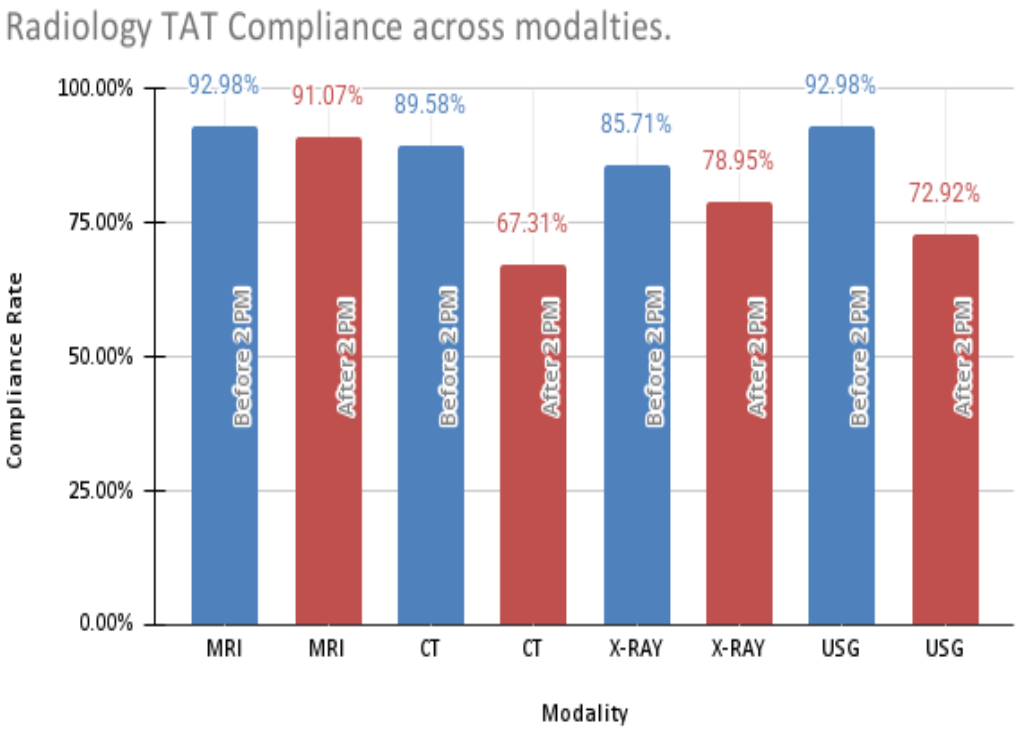
Modality	Time	Total	Delayed	Compliance Rate
MRI	Before 2 PM	57	4	57-4/57*100=92.8%
MRI	After 2 PM	56	5	56-5/56*100=91.07%
CT SCAN	Before 2 PM	48	5	48-5/48*100=89.58%

CT SCAN	After 2 PM	52	17	52-17/52*100=67.31%
X RAY	Before 2 PM	49	7	49-7/49*100=85.71%
X RAY	After 2 PM	57	12	57-12/57*100=78.95%
USG	Before 2 PM	57	4	57-4/57*100=92.98%
USG	After 2 PM	48	13	48-13/48*100=72.92%

Interpretation:

The analysis report for the data collected for a month in max super speciality Hospital Dwarka on turnaround time (TAT) order complete time of procedure to the order approved time for procedure (XRAY, USG, MRI, CTSCAN). The analysis includes the calculation of TAT Compliance Rate for different modalities by calculating compare Calculated TAT with the ideal TAT, identify any delay in workflow process and calculate workflow efficiency.

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X RAY	After 2 PM	57	12	78.95%
USG	Before 2 PM	57	4	92.98%
USG	After 2 PM	48	13	72.92%



MRI. Although its process has been tiresome, its compliance before 2 PM (92.8%) and after 2 PM (91.07%) was not really compromised showing efficient workflow.

CT SCAN had a sharp decline after 2PM (67.31%) compared to before 2 PM (89.58 %) indicating limitation of staff or resources.

X-RAY shows decrease in compliance after 2PM (78.95 %) but not of the same magnitude as CT scan.

USG shows high compliance of 92.98 % after 2 PM but after 2PM the compliance dropped significantly at 72.92% showing a potential inefficient operating time frame.

All and all, before 2PM has a higher compliance rate.

Recommendations

Workflow Review - 1 A comprehensive review of radiology workflow to determine the causes of the delays and areas for improvement -- focusing specifically on the after-2-pm CT and USG queue since this is where the data show the drop happens. Staff TrainingEducate staff on the importance of meeting TAT and how delays affect quality of

care. Technology UpgradeUpgrade of systems and technology to facilitate efficiency of workflow and decrease delays.

Monitoring and FeedbackRegularly monitor and assessTATs and provides updates to staff on performance.

Root Cause Analysis Conduct a thorough root cause analysis of non-compliance in order to determine how the underlying reasons for delays. Modality - Specific Recommendations - 1 1. X- Ray -review and evaluate X- Ray workflow for possible ways to enhance to reduce delays. 2. MRI -investigate the causes of non-compliance in MRI and what would improve Tatar.

3. USG - review and evaluate USG workflow for possible ways to enhance to reduce delays.

4.CT Scan - investigate the causes of non-compliance in CT Scan and what would improve Tatar.

Conclusion:

I completed this project to measure the Turn Around Time (TAT) from order complete time to report approval time in the radiology department at Max Super Speciality Hospital, Dwarka. The TAT should be 12 hours for an order placed before 2 PM and 22 hours for an order placed after 2 PM. Quick turning around and approval of procedures is an essential element in the radiology department because it is important for patient safety, reduction of medication errors in treatment, and optimization of the workflow of the department.

86.7% of the 459 cases I followed during the month were within the TAT, which is a good baseline to begin with since this is a new department. The 14.59%, however, is not distributed equally. The only exceptions were CT and USG cases put in after 2 PM, which indicates a gap in staffing or sign-off only during that window, not necessarily an issue department-wide.

Important findings

- 86.7% of the 459 cases examined meet the TAT, which is a good starting point considering it is a new department-only a few months old.
- The remaining 14.59% of the cases are predominantly CT and USG ordered after 2 PM, so the focus should be to improve TAT in that window of time and not across the entire hospital.
- A gap in staffing or sign-off during the afternoon shift likely affects the TAT more than a general departmental overhaul.

Future tasks

- Ongoing monitoring of TAT to observe trends and improvement opportunities.
- Continuous monitoring and improvement of radiology procedures to enhance patient care and satisfaction.

References:

1. NABH Accreditation Standards for Hospitals, 6th Edition, Jan 2025.

2. Khorasani R, et al. Optimizing Radiology Workflow: A Review of Best Practices. Radiology Management, 2021.

3. Max Healthcare Internal SOPs on Diagnostic Imaging.

Annexure

Name of the department- Radiology department

Dates of visit- 2nd June to 30th June

Interacted with-

- Radiology HOD
- Consultant
- Technician
- GDA's
- Patients