

Study on Turnaround Time of Reports of Radiology
Department at Eternal Heart Care Centre, Jaipur

By

Akriti Mishra

*Dissertation submitted for the partial fulfillment of the
MBA Hospital and Health Management*

Academic year, 2016-2018



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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Akriti Mishra** student of MBA Hospital and Health Management from The IIHMR University, Jaipur has undergone internship training at **EHCC Hospital** from **5th February 2018** to **5th May 2018**.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.


Col (Dr.) Ashok Kaushik


Dean, Academics and Student Affairs

The IIHMR University, Jaipur


Dr. Nutan Prabha Jain
Professor

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TO WHOMSOEVER IT MAY CONCERN

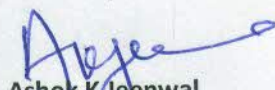
This is to certify that **Dr. Akriti Mishra** student of **The IIHMR University, Jaipur** has completed her internship at **"Eternal Hospital, Jaipur"** from **06th February 2018** to **05th May 2018** for **84 days**.

During this period, she has successfully completed her project in **Department of Quality** on:

1. A study on Turnaround Time of Reports of Radiology Department
2. Assessing the compliance of Pre-Operative Antibiotic Prophylaxis as per CDC and IDSA guidelines in relation to CABG, TKR, TLH and Laparoscopic Cholecystectomy.

We wish her all the best for future endeavours.

For **ETERNAL HEART CARE CENTRE AND RESEARCH INSTITUTE, JAIPUR**


Ashok K Jeenwal
Senior Manager - HR

THE IIHMR UNIVERSITY, JAIPUR**CERTIFICATE BY SCHOLAR**

This is to certify that the dissertation titled **A study on Turnaround time of reports of Radiology Department at Eternal Health Care Centre, Jaipur** and submitted by **Dr. Akriti Mishra** Enrollment No. **IIHMR-U/01/2016-2018/0376** under the supervision of **Dr. Nutan Prabha Jain** for award of MBA in Hospital and Health Management of the University carried out during the period from **5th February to 5th May 2018** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.



Signature

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that all the ethical issues have been considered while collecting data for my dissertation titled, **A Study on Turnaround Time of Reports of Radiology Department at Eternal Heart Care Centre, Jaipur.**

A handwritten signature in blue ink, appearing to read 'Anita Sharma', written in a cursive style.

Signature

ACKNOWLEDGEMENT

The dissertation/internship project, helped in providing me with both, a learning experience as well as a glimpse into the daily managerial level issues of this renowned hospital. I was fortunate enough to interact with the esteemed authorities and staff of the hospital, who have encouraged and guided me with their support and patience.

First of all, I would like to thank **Mr. Subrata Das**, Director HR and training for providing me an opportunity to carry out my internship at **Eternal Heart Care Centre, Jaipur**

I want to express my gratitude and sincere thanks to my mentor **Ms. Kirti Hemkar**, Manager, Quality Department, for her constant support and invaluable time-to-time guidance and kind of help in completion of this project.

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I would also like to thank all those who have directly or indirectly supported me towards the completion of this Internship.

Sincerely,
Dr. Akriti Mishra
MBA-HM (2016-2018)
Roll No –

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
CT	Computed Tomography
EHCC	Eternal Heart Care Centre
GDA	General Duty Assistant
IPD	In- Patient Department
MRI	Magnetic Resonance Imaging
OPD	Out- Patient Department
PACS	Picture Archiving and Communication System
PCS	Patient Care Services
PCPNDT	Pre-Conception and Pre-Natal Diagnostic Techniques
PHC	Private Health Check
TAT	Turnaround time
USG	Ultrasonography

A STUDY ON TURN AROUND TIME OF REPORTS OF RADIOLOGY DEPARTMENT AT ETERNAL HEART CARE CENTRE, JAIPUR

An overview of the radiology department

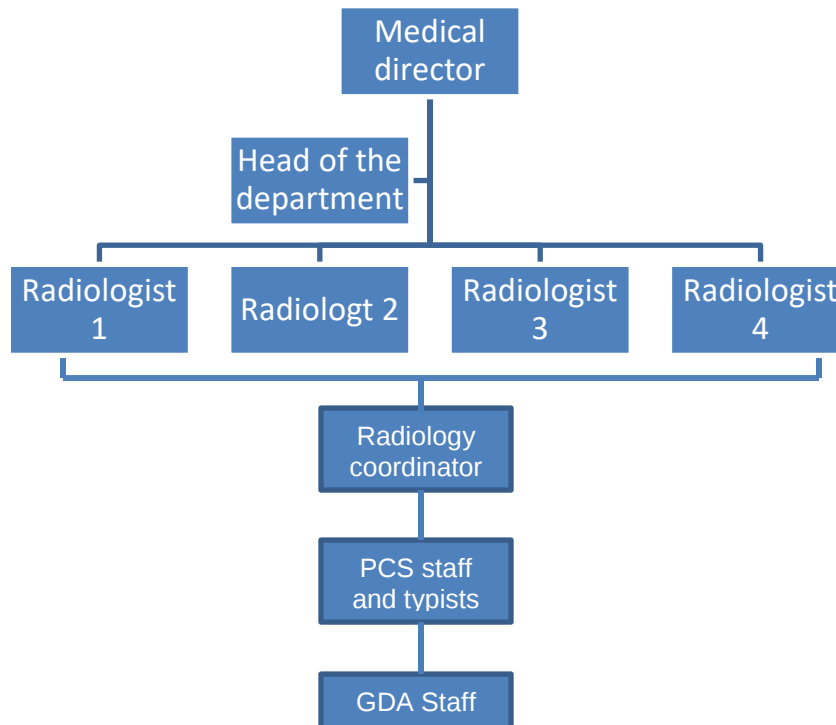
The Department of Radiology at Eternal Hospital provides a full range of radiological services related to MRI, CT, Ultrasound, Fluoroscopy, Mammography, X-Rays and intervention procedures. They have installed technologically advanced, state-of-the-art medical equipment in our endeavor to provide the best diagnostic output with excellent patient comfort. The department is also actively involved in pushing boundaries in the world of radiology and imaging through various research activities.

Location: Ground floor

Equipment: X-Ray (portable as well as Steady), MRI (3.0 T), CT scanner, USG Machine (on floor and steady)

Manpower: 5 Radiologists (For 5 shifts from 8am-8pm)
2 +2+6 Technicians (MRI+CT+X-Ray)
3 Patient Care Services Staff + 1 Radiology coordinator
5 Typists
5 Ground Duty Assistants

Department leadership team:



General observations:

- Responsive and polite staff with the patients and ready to serve the patients.
- Continuous Efforts were made to enhance the process with timely tracking of the reports and maintaining the turnaround time of the patients coming to the departments.
- Mailing the reports to the patients in case when request is being made by the coordinators.
- Trying to maintain the process with as much transparency as possible.
- An estimate of the waiting time was given right on the reception.
- Mainstreaming the gender and maintaining the confidentiality of the patients.
- Only one X-Ray machine for a patient footfall of about 100 patients every day.
- Shortage of waiting area in the department.
- No proper signage and patient information charts.
- Lack of a proper que former.
- No separate change rooms for females and males and for different modalities.
- Communication gaps inter-departmental and intra-departmental.
- Maintenance of form F and PCPNDT register with no chance of errors.
- No proper nursing station in case certain procedure is to be performed.

Introduction to the Project:

- In today's health care environment, radiology is being asked to be the Medical Six Million Dollar Man – the specialty is expected to be better, stronger, and faster than before. And, integral to that achievement is the quickest radiology report turnaround time possible.
- The overall effectiveness of any medical reporting instrument is tied to its ability to serve as a method for communication of data, ideas, and concepts in a clear and unambiguous fashion.
- In addition to these functional requirements, a number of practical and technical requirements should be considered; which involve elements of timeliness, security, confidentiality, accessibility, transmission, and verification.
- Radiology's role is central to disease management (detection, staging and treatment).
- With nearly every hospital patient receiving diagnostic imaging services they play a prominent role in the diagnostic process.
- Providing high quality and effective patient-centered imaging services, it is essential that imaging departments provide the reporting of images in a timely manner.
- Measurement of turnaround time of reports is the most commonly adopted performance metric.
- Rapid turnaround time of reports are important both from a medical and commercial point of view.
- Regardless of how "functionally" accurate and complete the report is, its overall value in positively effecting medical care is limited if the information is not received by its intended recipients in a timely fashion, with a complete and thorough understanding of its contents.

Literature Review:

The most noteworthy factor hindering proficient turnaround time is poor examination prioritization. Unless a radiologist knows how vital an investigation is or the conditions around a patient's condition or care, he or she can't deliver a report in the most timely manner.(1)

Turnaround time is often considered the most significant measure of a laboratory's service and is used by many clinicians to judge its quality. Along with accuracy and reliability, timely reporting of laboratory test results is now considered an important aspect of the services provided by the clinical laboratory. (2)

A major source of physician — and patient — dissatisfaction is the lack of timely reporting of test results, especially when findings are important for clinical decision-making. In a study conducted, 95% of patients surveyed said they want to receive the results of their radiologic studies “within hours,” suggesting timely reporting is now an important factor in patient satisfaction. (3)

As radiology divisions progress towards computerized data administration, work processes and their supporting informatics foundation are ending up progressively. Advanced dashboards can coordinate separate electronic data frameworks and abridge enter work process measurements continuously to encourage educated basic leadership. A PACS-coordinated computerized dashboard work intended to caution radiologists to their unsigned report line status, combined with a noteworthy connect to the report marking application, can reduce the time required for reporting.(4)

The effects of turnaround time have been studied to a high extent, with correlations being drawn between emergency department treatment and length of stay. As a result; TAT is often considered the most significant measure of a laboratory's service and is used by many clinicians to judge its quality. (5)

A college of American pathologist Q-probes study has reported that preanalytic TAT increases during the day, which however indicates delays in transport and collection stages.(6)

Radiology departments are beginning to embrace new technologies to decrease operating budgets and improve services. One of these technologies is the picture archiving and communication system (PACS). PACS, through immediate availability of images to the radiologist, promises to decrease turnaround times of reports to the clinician. (7)

Current speech recognition software allows exam-specific standard reports to be prepopulated into the dictation field based on the radiology information system procedure code. While it is thought that prepopulating reports can decrease the time required to dictate a study and the overall number of errors in the final report, this hypothesis has not been studied in a clinical setting. (8)

Table: 1 Standard turnaround time for reports as per eternal hospital:

MODALITY	OPD	IPD
X-RAY	45 mins	1 hr.
MRI	2 hrs.	3 hrs.
CT SCAN	2 hrs.	3 hrs.
USG	30 mins	30 mins

Background:

- TAT is often considered the most significant measure of a radiology service and is used by many clinicians to judge its quality.
- Timely reporting of scan results is now considered an important aspect of the services.
- Rapid turnaround time of reports are important both from a medical and commercial point of view.
- Various studies have shown that outcomes in certain situations such as operation theaters and in emergency departments have been affected by timely reporting of radiology investigations

Rationale:

- As a part of the induction programme operations and functioning of certain departments of the hospital was observed based on which a small presentation summarizing the understanding was prepared which gave direction to the study that will be conducted.
- Maintaining the standards and continuous improvement in the quality of the care provided to the patient is what the Eternal Hospital seeks for. In order to maintain the desired standards the hospital has always taken the necessary steps that can further improve the efficiency.
- The suggested study aims to determine the actual turnaround time of the reports and how much it varies if it does from the desired standard reporting time so that steps can be taken to reduce inefficiencies and further enhance the functioning of the department.

Research Questions:

- What is the actual turnaround time of the reports for the scans done in the radiology department at Eternal Heart Care Center Jaipur
- What are the possible reasons for delays, if any

Aim & Objectives:

The study aims at improving quality of imaging services.

The objectives of the study are:

- To understand the reporting process flow of the Radiology department
- To calculate the TAT of reports for OPD & IPD patients after the patient goes for scan in Radiology Department
- To identify the reasons for delay in reporting if any
- To suggest the measures to improve the turnaround time of reporting

Operational definitions:

- **Report:** A clinical and source document that provides interpretation and describes any radiological procedure conducted by a radiologist and signed as well.
- **Time of scan (t1):** Time when the patient enters the room for the scan or investigation.
- **Time of report (t2):** Time when the finalized (signed, corrected, updated on Laboratory Information system) report is generated by the radiologist for the particular patient and investigation.
- **Report turnaround time:** Time taken to generate the final report of the particular patient for the investigation/scan done after the patient goes for scan.

Methodology:

- The study is Cross-sectional and Descriptive in nature
- Radiology department of EHCC was the setting for the study conducted.
- The study was conducted during 8th March – 8th April 2018
- The participants of the study were-
 - ✓ Radiologists
 - ✓ Technicians

- ✓ Patient Care Services / Front Office staff
- ✓ Ground Duty Assistants
- ✓ Typists
- ✓ Patients

Sampling and sample size:

- Purposive Sampling (As per the footfall of the patient at the modality taken up for the study and generation of reports)
- Sample size: 406
- ✓ X-Ray = 175
- ✓ USG = 130
- ✓ CT Scan = 70 , MRI = 31
- ✓ All the five radiologists of the department.
- ✓ Both the technicians (from each shift) for MRI and CT scan and all the six technicians for X-Ray (from each shift).
- ✓ All the five GDAs (from each shift)
- ✓ All the four patient care services staff (from each shift)
- ✓ All the four typists Patients visiting the radiology department for the investigation.

Exclusion and Inclusion Criteria:

- ✓ Only OPD (PHC as well as casual OPD) patients visiting the department for the X-Ray were considered to be the part of the study.
- ✓ However for USG, MRI and CT scan both IPD and OPD patients visiting the department were considered to be the part of the study.
- ✓ Bed-side scans done like in X-Ray and USG was not considered as the part of study.
- ✓ Those patients whose reports were not generated the same day of the scan were not considered to be the part of the study

Process:

- For a day only one modality was taken up for the study.
- Also the fact that reports were not generated for all the OPD patients visiting the departments in case of X-Ray for all the days was considered while calculating the sample size.
- For determining the time of the generation of the reports particularly for X-Ray Laboratory Information System was used.

- Those cases which were not reported at the same day of the scan were not considered to be the part of the study.

Data collection methods:

Primary data:

- ✓ Workflow diagram of the reporting
- ✓ Time study
- ✓ Direct Observation
- ✓ Conversation with the radiology department staff

Secondary data:

- ✓ Laboratory Information System
- ✓ Printed Reports of the Patients
- ✓ Articles and Journals in regard to the study

Data collection tools:

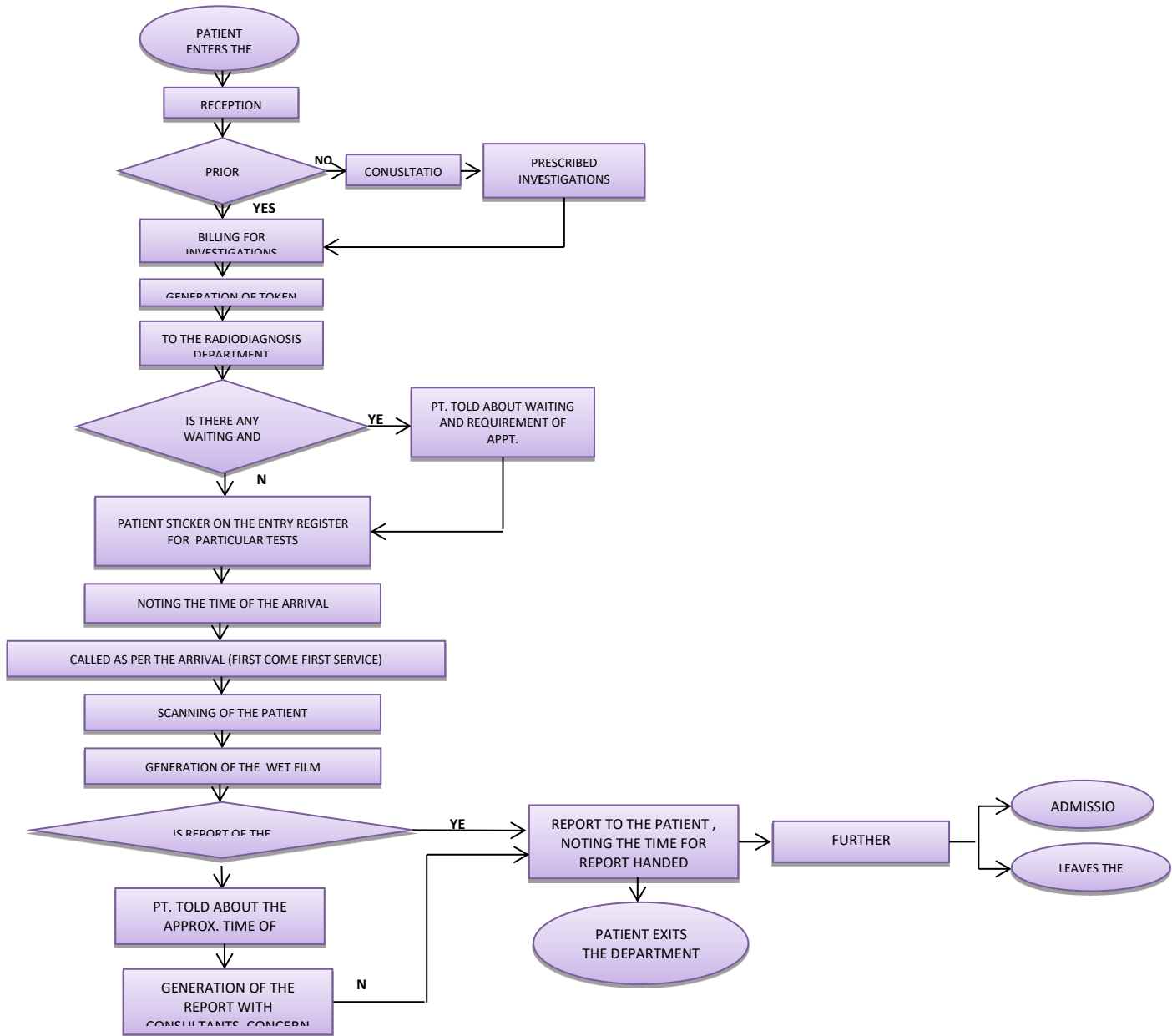
- A workflow diagram with the goal of gaining a clearer understanding of how a process work will be made. The start and the end points of the reporting process and listing of the steps in between will be done which will give a fair idea of all the activities involved.
- Time study will be conducted to calculate the turnaround time of the reports and for determining the exact time of scan and the time of generation of finalized report of the patients.
- Direct observation for understanding the routine activities of the department and flow of the patients and information however no checklist will be prepared for the same and it will be totally a personal observation.

Data analysis:

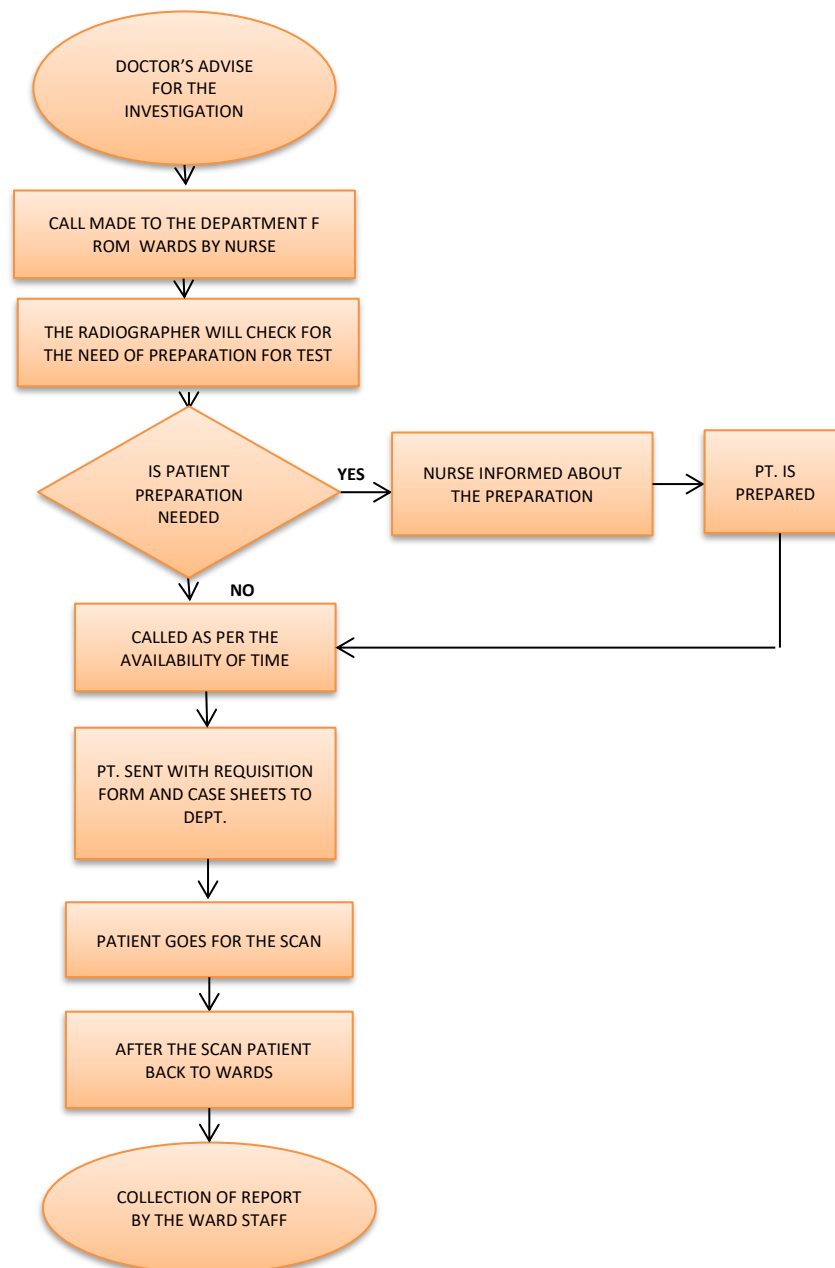
- Data will be collected in an excel sheet and average time taken for generating the reports for the investigations in respect to the particular modality will be calculated and will be compared to the standard reporting time as per the Eternal hospital protocols.
- For documentation and dissemination of the data charts and graphs will be used for the better understanding and clarity.

Results & Process Flow:

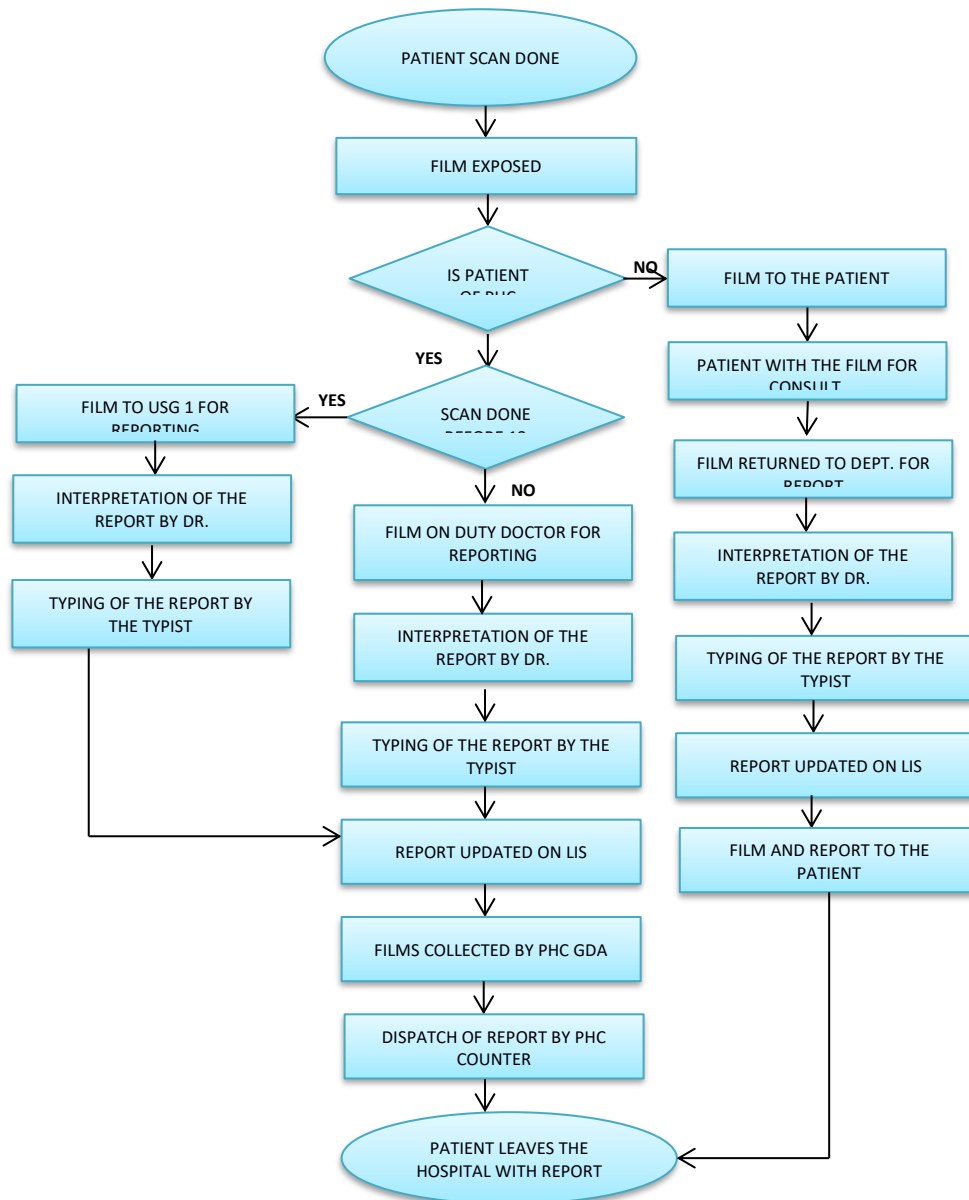
Flow of the OPD patients:



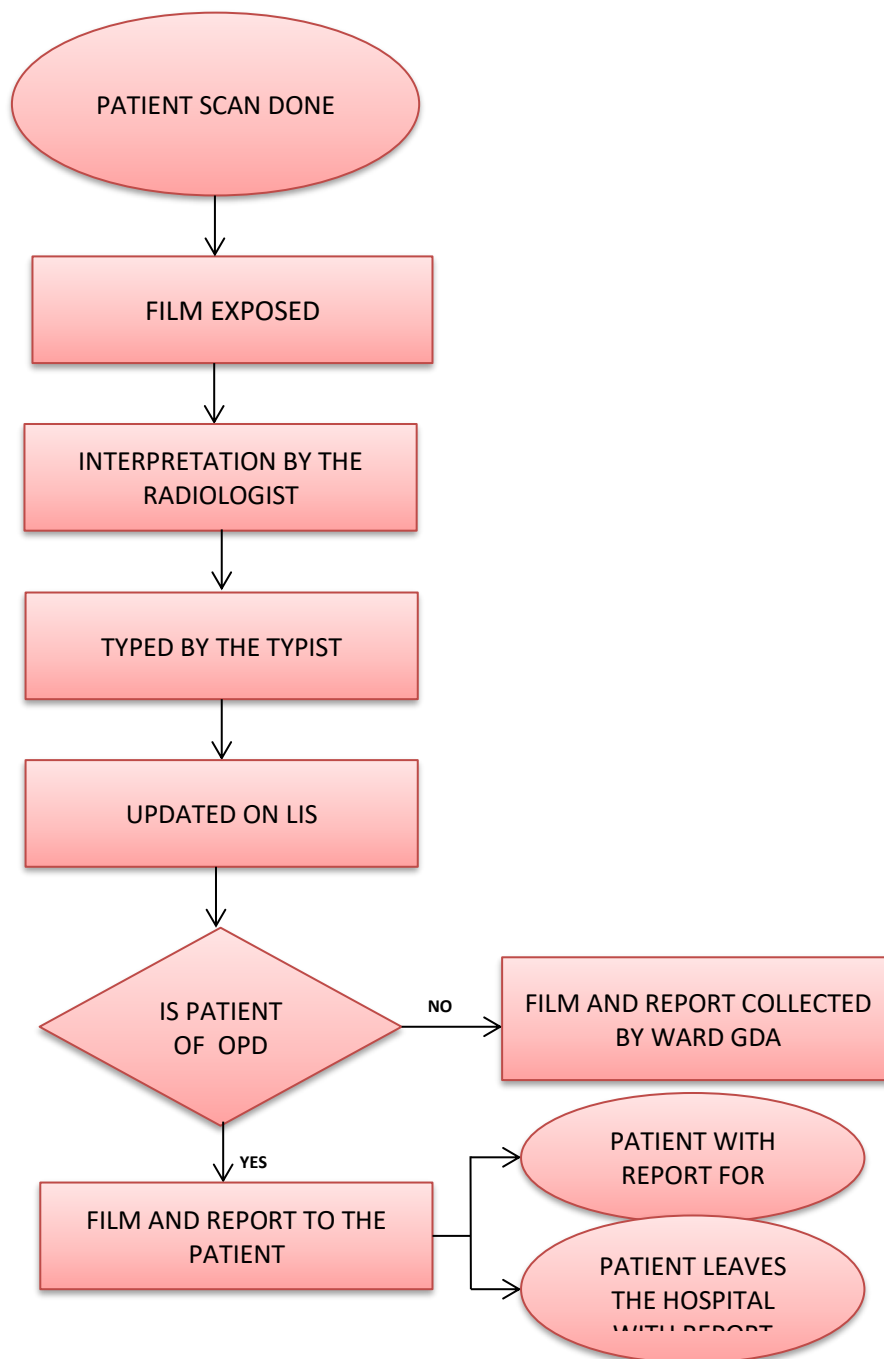
Flow of IPD patients:



X-Ray Reporting:



USG, CT Scan & MRI Reporting:



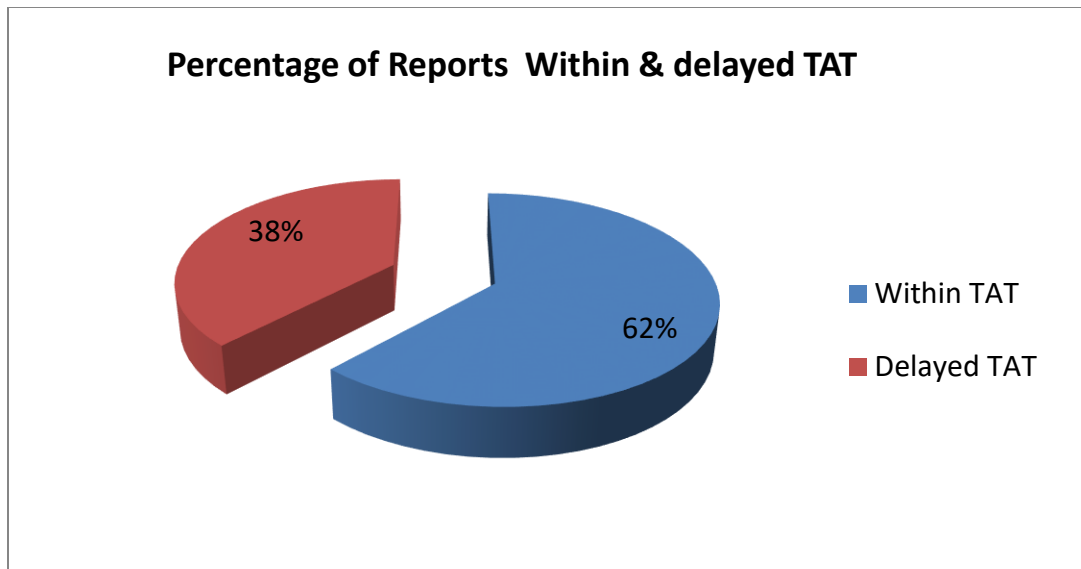


Fig: 1 Overall TAT status of Radiology Department

Interpretation: 4 out of every 10 reports were delayed as can be inferred from the above chart.

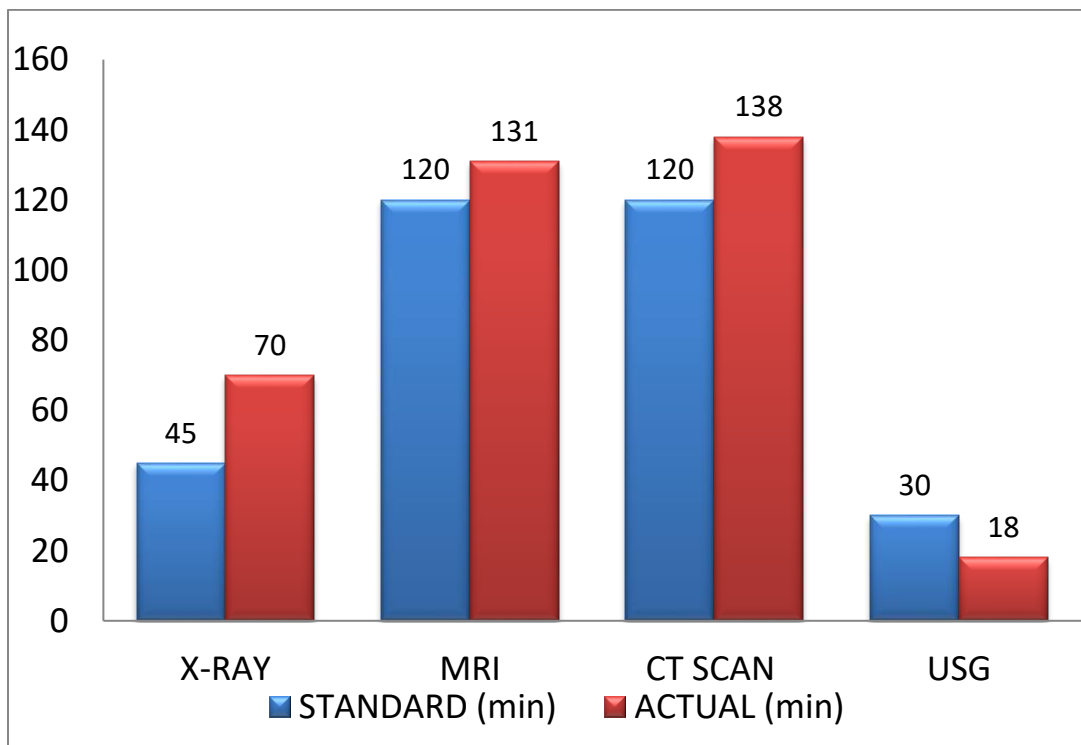


Fig: 2 Standard vs actual reporting time (OPD)

Interpretation: Maximum delay of 25 minutes can be seen in X-Ray followed by CT Scan and the MRI however reports were delivered early in case of USG

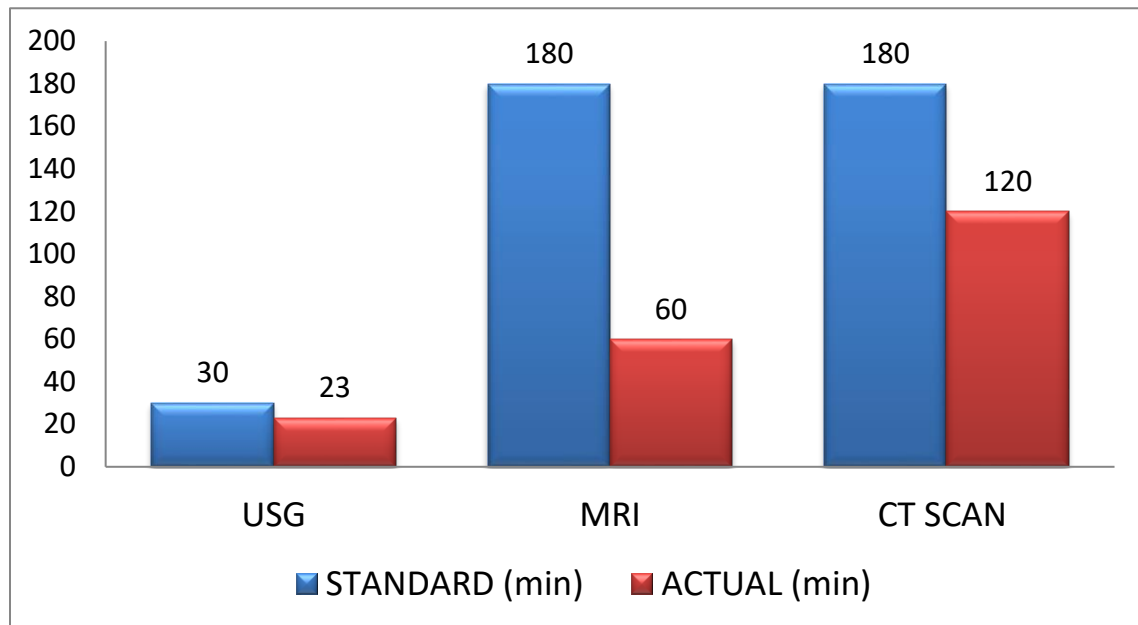


Fig: 3 Standard Vs Actual reporting time (IPD)

Interpretation: In case of IPD the actual reporting TAT was earlier than the standard TAT and hence earliest in the case MRI.

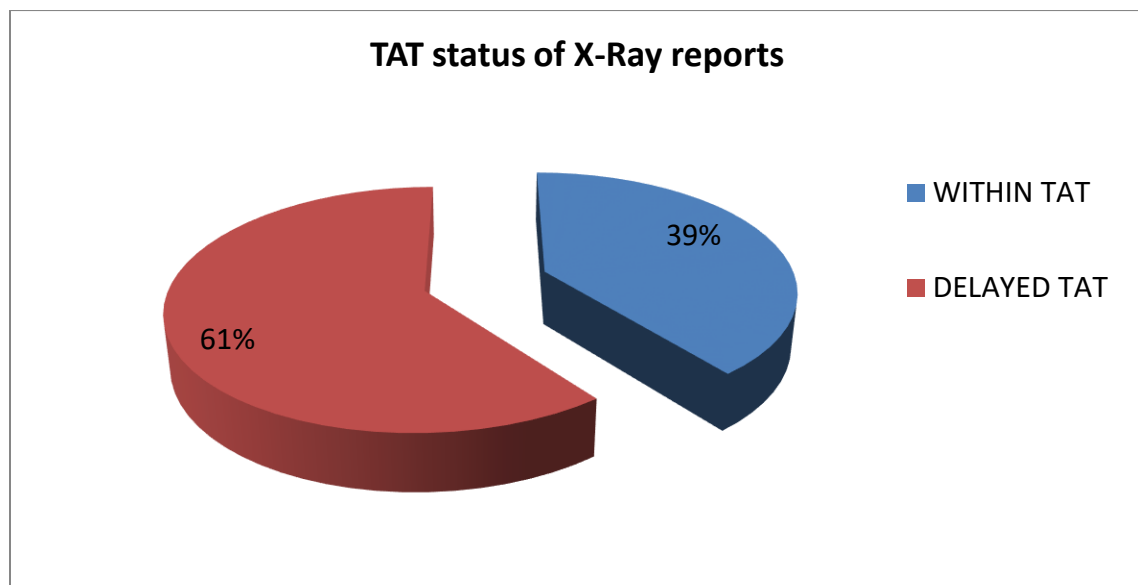


Fig: 4 TAT statuses of X-Ray Reports

Interpretation: Approx. 6 out of 10 reports were in the delayed TAT in case of X-Ray and only 39% of the total reports of X-Ray were within the TAT.

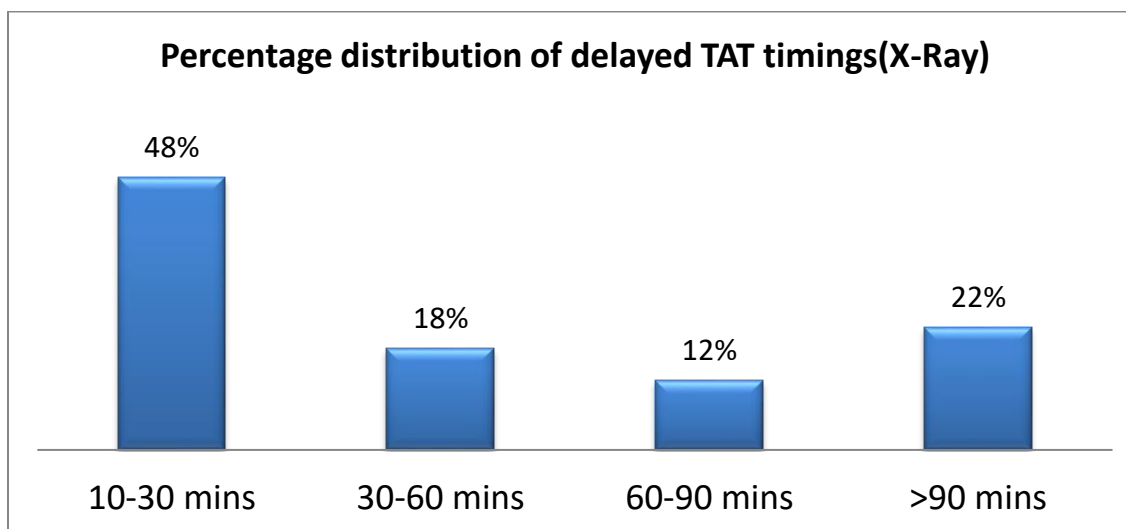


Fig: 5 Percentage distributions of delayed TAT timings

Interpretation: Majority of reports were delayed by 10-30 mins followed by delay of more than 90 minutes in the 22% of the total delayed reports for X-Ray.

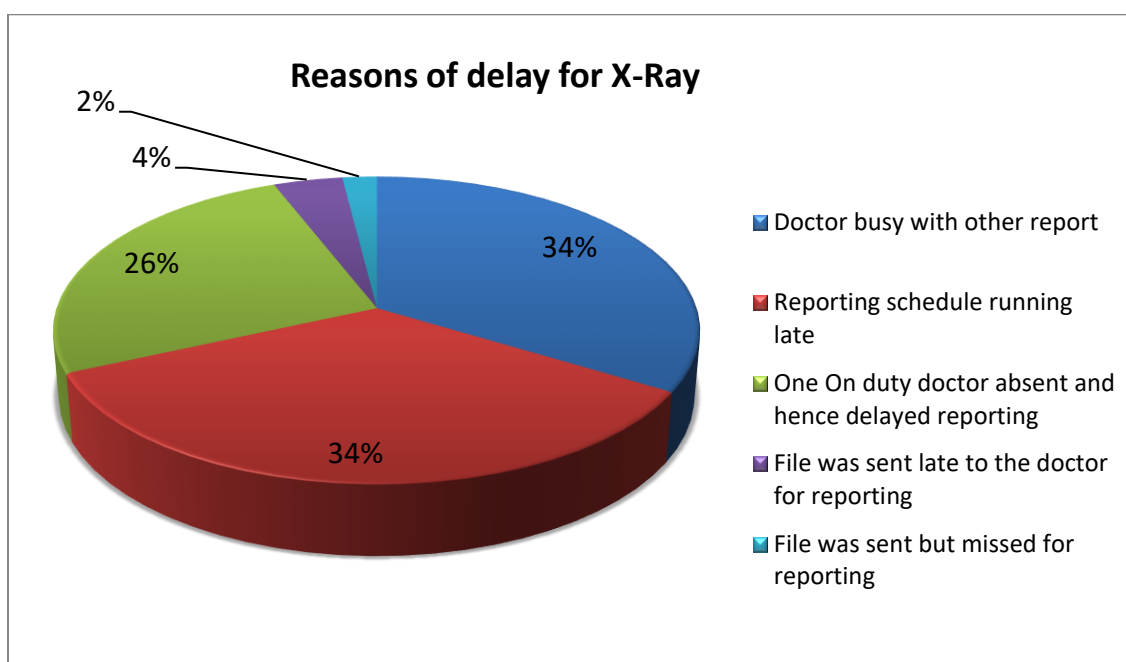


Fig: 6 Identified reasons of delay in case of X-Ray

Interpretation: In most of the cases the reporting was delayed either due to doctor being busy reporting the reports of other modalities or due to the schedule reporting time running late and other reasons of the delay can be inferred from the above chart.

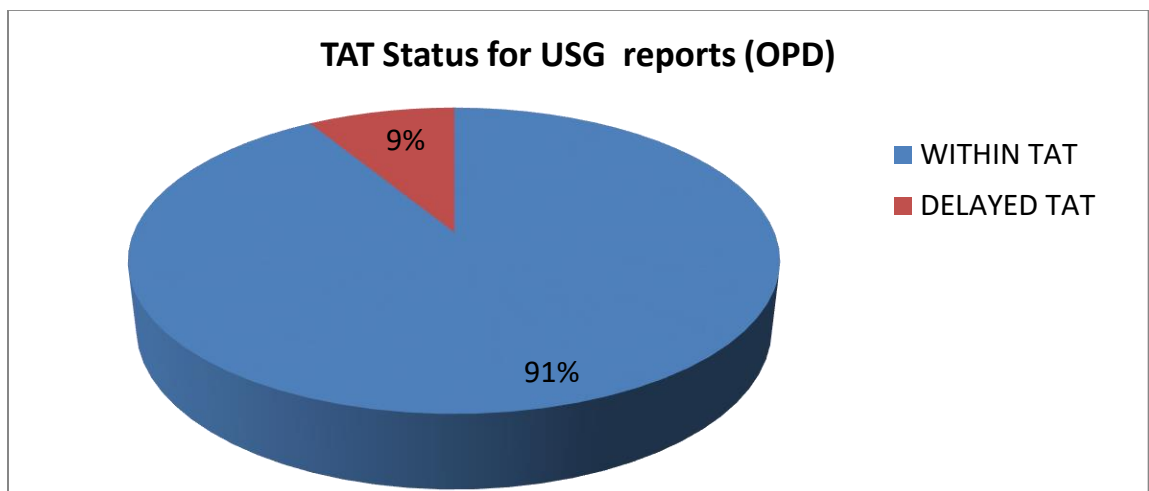


Fig: 7 TAT status of USG (OPD)

Interpretation: 91% of the total OPD reports of the USG were within the TAT leaving remaining in the delayed TAT.

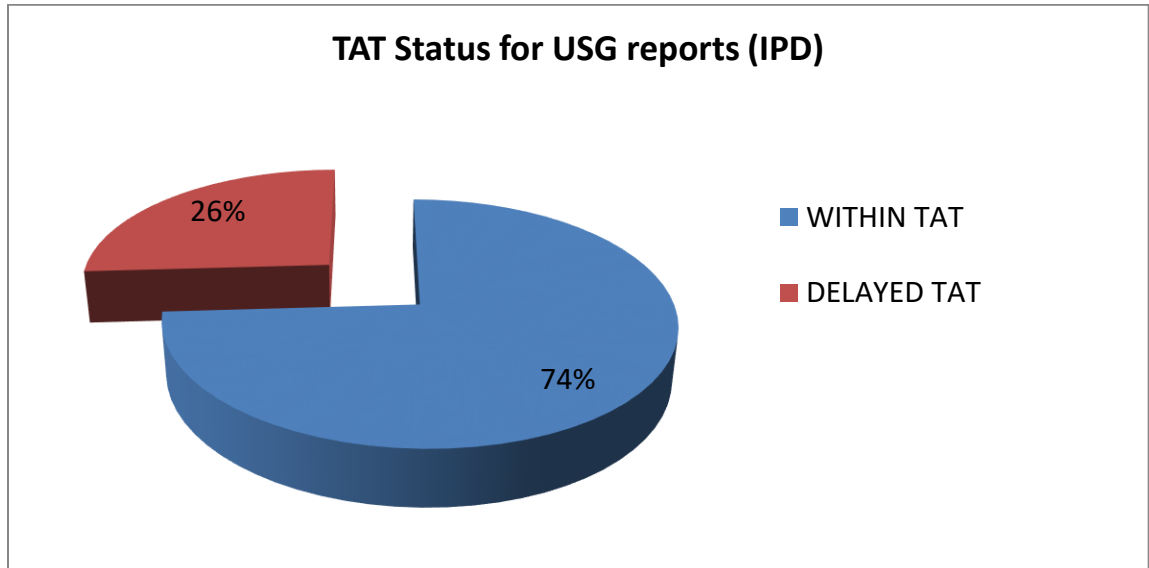


Fig: 8 TAT status of USG (IPD)

Interpretation: 74% of total IPD reports of the USG were within the desired TAT timing leaving remaining to the delayed TAT time slot.

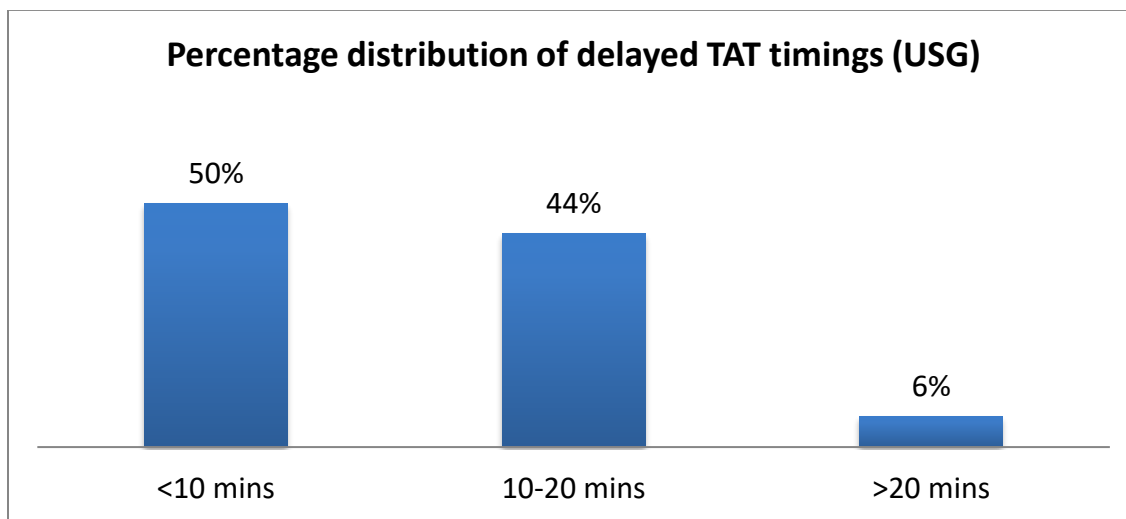


Fig: 9 Percentage distributions of delayed TAT timings.

Interpretation: 50% of the total delayed reports were delayed by less than 10 minutes and 44% were delayed by 10-20 minutes and the remaining 6% were delayed by more than 20 minutes.

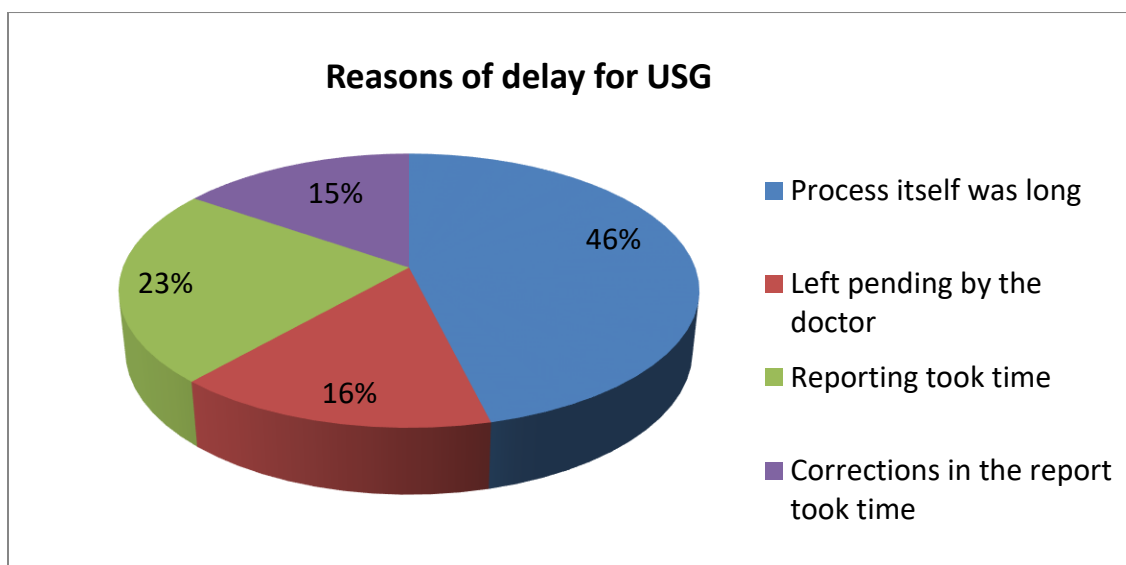


Fig: 10 Identified Reasons of delay for USG reporting

Interpretation: Major reason of the delay for reporting in USG was process itself being too long like in Pre and post cases followed by more time taken in generation of report by the radiologist

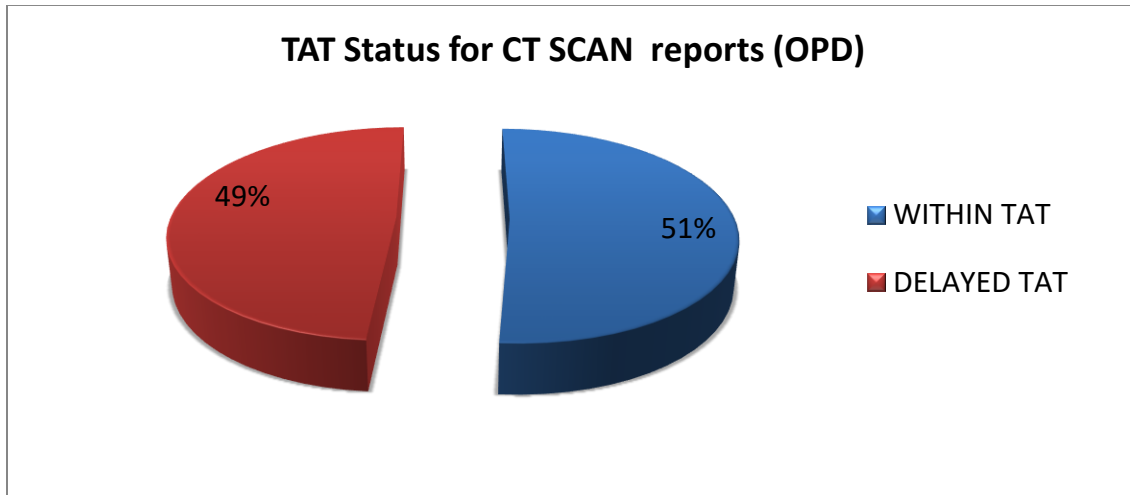


Fig: 11 TAT status of CT Scan (OPD)

Interpretation: Almost half of the reports generated were delayed in case of CT Scan for all the OPD patients going for CT scan.

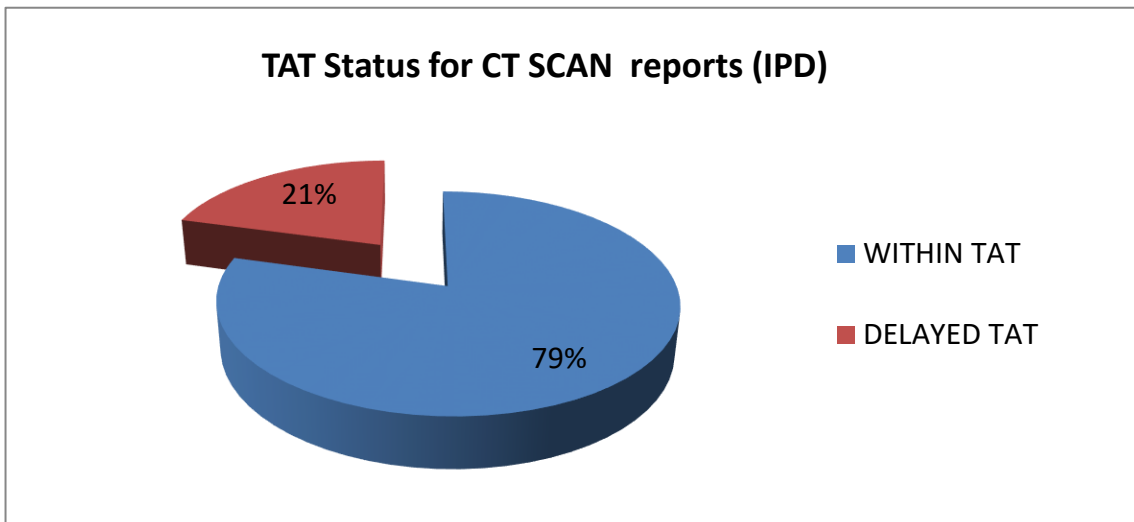


Fig: 12 TAT status of CT Scan (IPD)

Interpretation: 79% of the total IPD repots generated were within the TAT leaving the remaining in the delayed TAT timings.

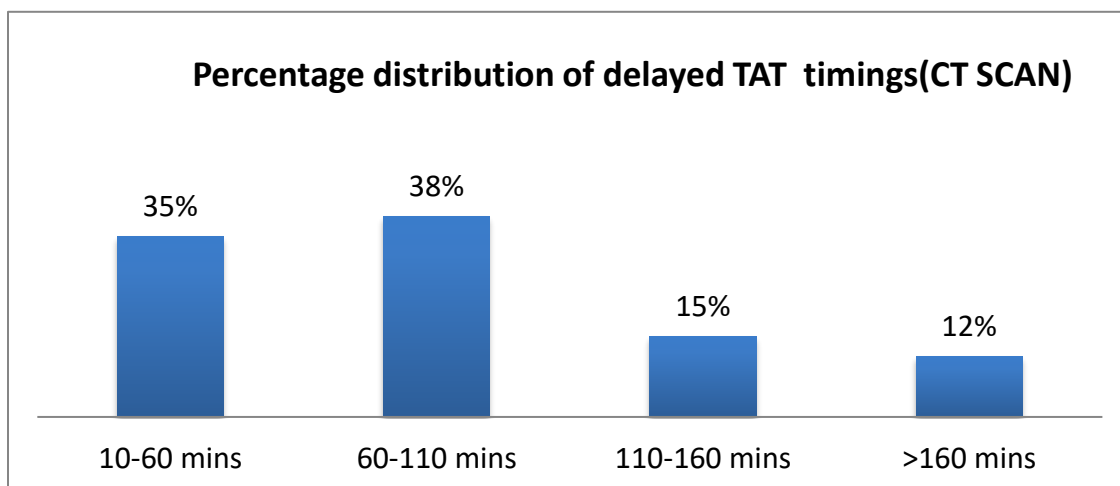


Fig: 13 Percentage distributions of delayed TAT timings.

Interpretation: 35% of the total delayed reports were delayed by 10-60 minutes and 38% were delayed by 60-110 minutes and the remaining 15% and 12% were delayed by 110-160 and >160 minutes respectively.

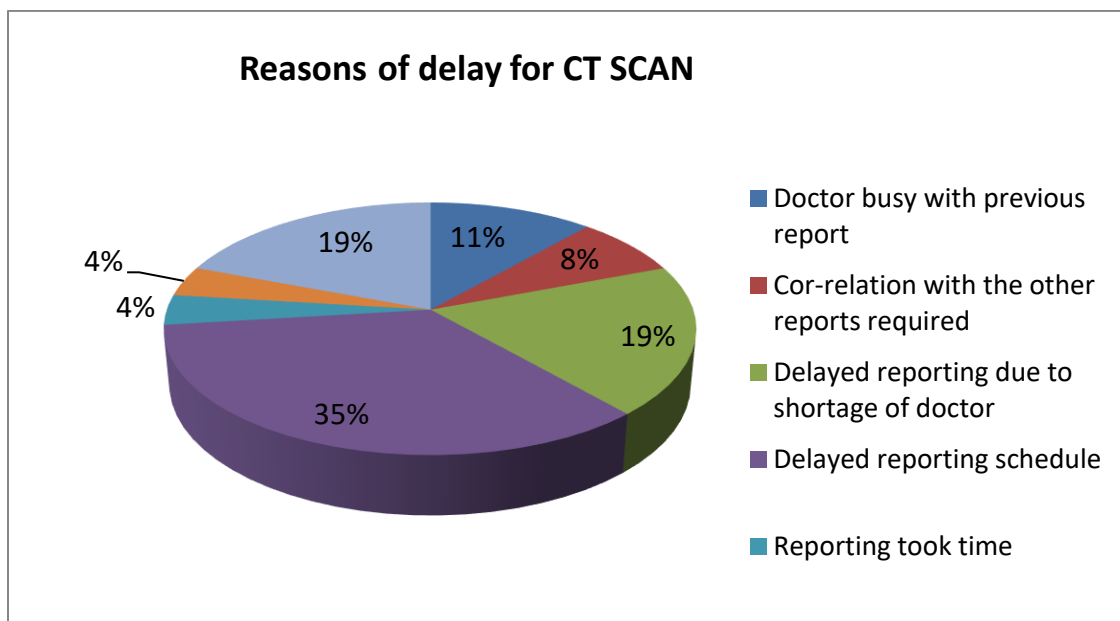


Fig: 14 Identified reasons of delay in case of CT scan

Interpretation: In most of the cases the reporting was delayed due to doctor being busy reporting the previous report followed by co-relation required with other reports further reasons of the delay can be inferred from the above chart.

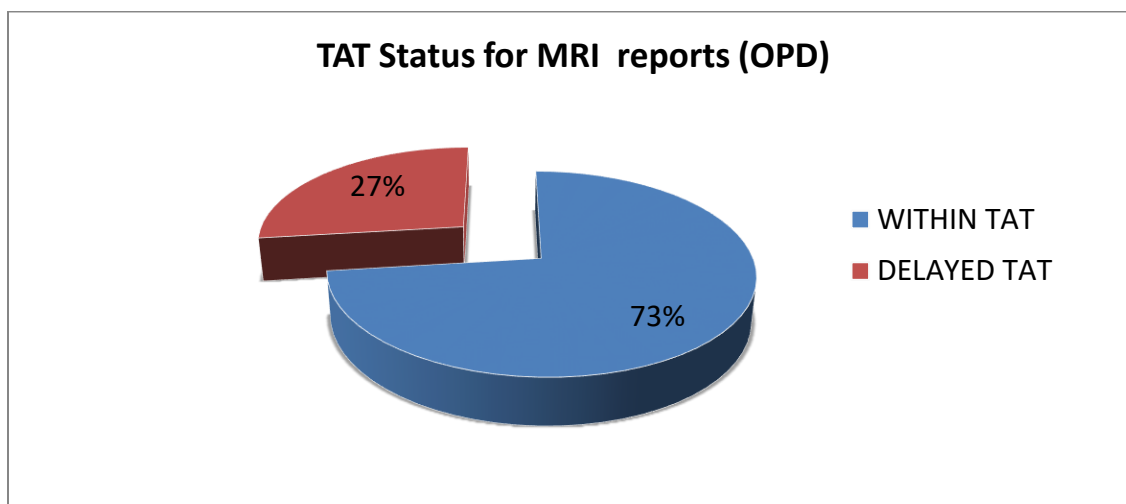


Fig:15 TAT status of MRI (IPD)

Interpretation: 73% of the total OPD repots generated were within the TAT leaving the remaining in the delayed TAT timings.

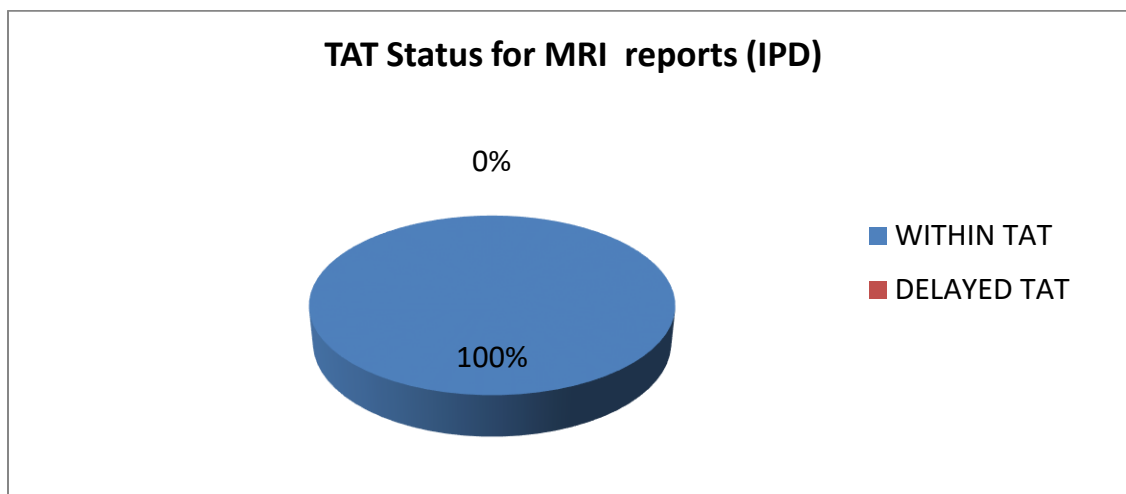


Fig: 16 TAT status of CT Scan (IPD)

Interpretation: All the IPD reports were generated within the standard timing of the report.

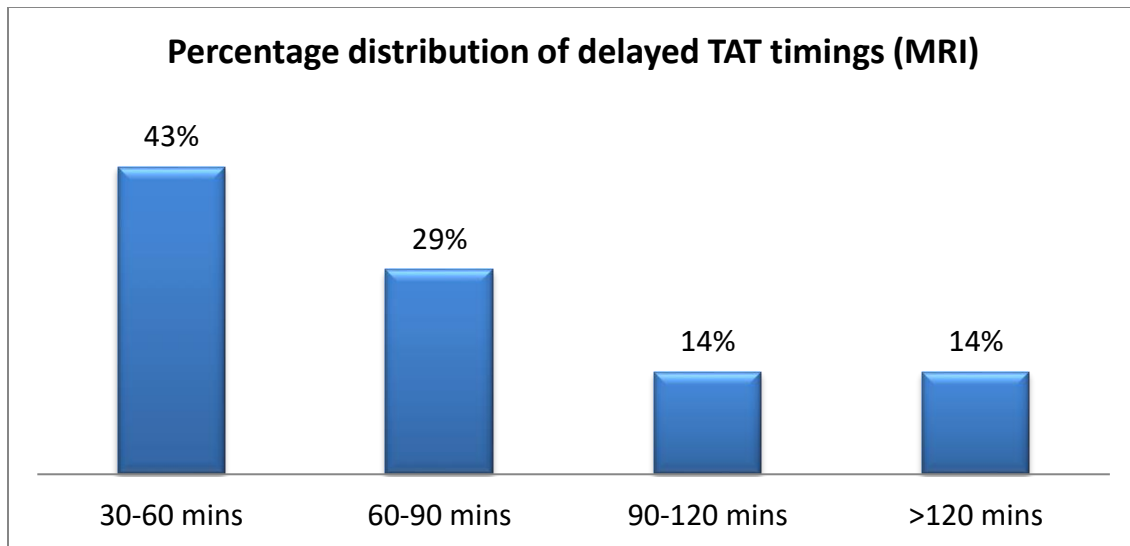


Fig: 17 Percentage distributions of delayed TAT timings.

Interpretation: 43% of the total delayed reports were delayed by 30-60 minutes and 29% were delayed by 60-90 minutes 14% were delayed by 90-120 minutes and the remaining 14% by more than 120 minutes.

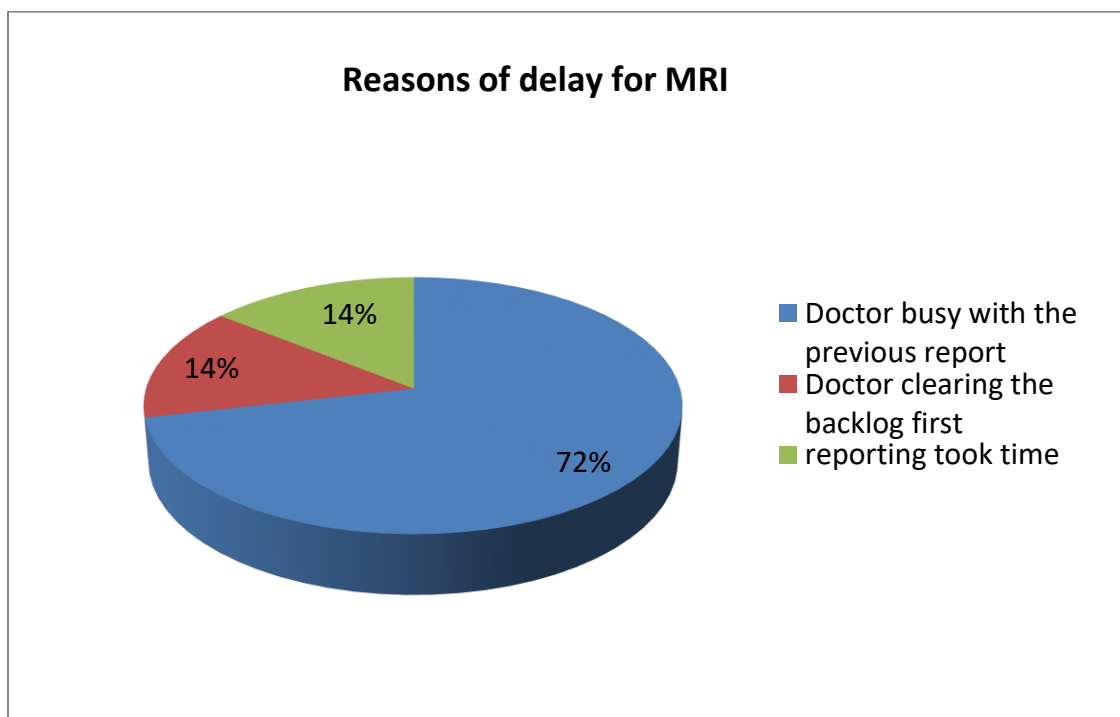


Fig: 18 Identified reasons of delay in case of MRI

Interpretation: In most of the cases the reporting was delayed due to doctor being busy reporting the previous report followed by doctor clearing the backlog of the reports, further reasons of the delay can be inferred from the above chart.

Discussion:

- Of total 406 reports 62% were within the TAT and reporting for the remaining 38% was delayed.
- The actual time of reporting for X-ray (OPD) was found to be 1hr 10 mins, for CT SCAN (OPD) 2 hrs.18 mins (IPD) 2 hrs. , for MRI (OPD) 2 hrs. 11 mins (IPD) 1hr and for USG (OPD) 18 mins (IPD) 23 min.
- More delays in X-ray and CT Scan Unit because of the duty doctor being busy with other report or with the previous report.
- With the reference of the available literature this can be attributed to the lack of prioritization while reporting.
- Other reason for delay were:
 - ✓ process being too long
 - ✓ reporting took time
 - ✓ clearing the backlog
 - ✓ delayed reporting schedule
 - ✓ shortage of doctor
 - ✓ file sent late for reporting
 - ✓ Reporting being missed.
- The standards given for the reporting however varied from patient to patient and radiologist to radiologist.
- Another interesting finding from the study was IPD reporting time was below the standard timings and hence suggests that the OPD reporting needs more
- Lack of availability of all the radiologists during the peak hours due to different shift timings.
- Complicated X-Ray reporting, lack of interdepartmental communication, improper time management within the staff were other observations
- Reasons of delay varied with modality with most common being doctor handling two modalities at the same time and thus getting busy with report formulation of the other

Conclusion:

- Although delay was majorly seen in relation to X-Ray and CT scan reporting however TAT of reporting for other modalities seemed to be in control.
- Further interventions and changes can enhance the process and can bring down the reporting time.
- This will at the end can improve the overall experience of the patients visiting the department and will smoothen the functioning as well

Suggestions:

- Changes in the shift of the doctors. (analyzing the patient footfall from 7pm – 8 pm)
- TAT alerts when reports are nearing their deadline so that they can be re-assigned as needed.
- Regular audits at least once a month for unreported imaging investigation.
- Report to be completed at the same day of the scan.
- IPD patients should be given specific time slots so as to avoid delay for reporting of OPD patients.
- Monthly and quarterly reports for systems to gauge the overall performance of their radiology and identify areas that need improvement.
- Voice recognition and digital transcription software can be used for the speedy reporting process.

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Annexure

S.No.	Date	Modality	Pt. Name	Time of scan (T ₁)	Time of Report (T ₂)	TAT (T ₁ -T ₂)	Remarks