

A study on Turn-around-Time in Radiology Department at Mission Hospital Durgapur.

Dissertation Submitted to



The IIHMR University, Jaipur

For the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

In Hospital and Health Management by

Mr. Aviral Jha

Under the Supervision & Guidance of Dr. Tripti Bisawa

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DECLARATION

I hereby declare that this dissertation titled Study on Turn-Around-Time in Radiology Department is the bonafide record of my original research work. I declare that this not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.



Name of Student – Aviral Jha

Date – 15th May 2023



Ref: TMH/HRD/Pers.F/May-23/125

Date-31.05.2023

TO WHOM IT MAY CONCERN

This is to certify that **Mr. Aviral Jha** student of **M.B.A in Hospital & Healthcare Management** at **IIHMR University, Jaipur**, has undergone **Dissertation Program** in the department of **Quality Assurance** at **The Mission Hospital, Durgapur** from **01.03.2023** to **31.05.2023**. His topic for Dissertation was **"A Study on Turn Around Time in Radiology Department"**.

During the period of dissertation he has been found sincere.

We wish him all the very best for his future endeavors.

For The Mission Hospital, Durgapur

Ramesh Lall
President- HR & Admin.

Ramesh Lall
President (HR & ADMIN)
The Mission Hospital
Durgapur, West Bengal

Certificate

We certify that this dissertation titled "Study on Turn-Around-Time in Radiology department" is the work undertaken by Mr. Aviral Jha to fulfil the requirement of the MBA degree in Hospital & Health Management from the IIHMR University, Jaipur under my guidance. & Supervision and his approach towards research have been sincere, scientific & analytical

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(IIHMR University, Jaipur)

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(IIHMR University, Jaipur)

Abstract

(A) Background: As it is a universal truth that time is money and at times crucial when it comes to matter of saving life or making it less complicated. In medical sector time is everything when it comes to treatment of patients, As a matter of fact effective TAT(Turn-around-Time) has been proved to make a difference in life and death or further complications.

There is ongoing trend in medical care facilities regarding minimizing TAT in order to provide better and fast health care delivery to patients, not only from optimization of resources and services but also from patient satisfaction.

For efficient care to be provided, medical industries have evolved an optimistic and promising TAT of one hour for radiology Department (from intake of patient to report reading) in order to maximize the pace for treatment of patients, however continues advancement are being studied so as to facilitate the patients.

(B) Objectives - To comprehend the process flow of radiology department and out-patient inflow pattern advised for various diagnostic procedures.

- Perform Analysis for waiting time of patients advised for various radiological diagnoses.
- Analysis of Report generation timing for diagnosed patients.
- To determine whether the Turn-Around-Time has been delayed.
- To Find factors leading to delay in Turn-Around

(C) Methodology - Co-relational Study involving OPD patients' & TAT for Radiological Investigations Advised, having Primary data collected through an observation-based checklist consisting of Patient's billing time and patient in-time for procedure and waiting time elapsed between & also for report generation. While having Secondary data collected through HIS.

Finally, the data gathered was analyzed on MS-Excel for drawing conclusions for further suggestive measures to be adopted for reducing and improving TAT.

Data analyzed involved multiple steps as TAT between patient in-time and billing, between different timings of start of Department and many more.

(D) Conclusion – upon analysis it was found that USG patients must wait for a longer period of time to get their investigation done as compared to CT & MRI patients due to multiple reasons like previous patient before the current patient coming for procedure, patient being absent on his/her turn, patient not prepared, IPD patient came for procedure.

For report generation TAT, the patients of CT & MRI patients have to wait longer as the final report was being available after 24-48 hours as compared to USG where it was being available on the same day.

(E) Key Words - TAT (Turn-Around-Time), Co-relational Study, CT, MRI , USG, Delay, Radiological Investigation.

ACKNOWLEDGEMENTS

First, my Obligations, and Hail to Lord for showering his blessings throughout my journey to complete the project. I would like to express my sincere gratitude and thanks to the Dissertation opportunity I had with Mission Hospital Durgapur. It gave me the much needed exposure for career. It has been a great knowledge acquiring & getting understood to accustom ourselves to real time working scenario. It was an honour to work with such a great team of Mission hospital & make ourselves proud.

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Abbreviation

SL No	Abbreviation	Definition
1	In-Time	Patient called by department for procedure
2	Out-Time	Patient completed the procedure
3	Bill-Time	Time at which patient paid for procedure & received the Bil
4	CT-Scan	Computed Tomography Scan
5	MRI	Magnetic Resonance Imaging
6	USG	Ultra-Sonography Scan
7	HIS	Hospital Information System
8	RIS	Radiology Information System
9	UHID	Unique Health Identification Number
10	OP	Out-Patient i.e., not being admitted
11	IP	In-Patient i.e., admitted in hospital
12	ER	Emergency patients need immediate intervention
13	USG-HC	Ultra-Sonography Scan advised under overall Health Check-up Package

Chapter – 1 Introduction

1.1) Study Purpose – To analyse Turn-Around-Time for OPD patients advised for various radiological investigation starting from billing time of patient at OPD counter till final Report generation

1.2) Research Problem – To find whether or not is there any unnecessary delay in waiting time at radiology OPD.

- Causative factor of delay
- Analysis of TAT of report generation

1.3) Aims & Objectives of Study - To comprehend the process flow of radiology department and out-patient inflow pattern advised for various diagnostic procedures.

- Perform Analysis for waiting time of patients advised for various radiological diagnoses.
- Analysis of Report generation timing for diagnosed patients.
- To determine whether the Turn-Around-Time has been delayed.
- To Find factors leading to delay in Turn-Around

1.4) About the Hospital - The Mission Hospital commenced on 2nd April 2008,

- The Mission Hospital, Durgapur is a pioneer healthcare facility providing tertiary care having 500 beds NABH Accredited.
- The Hospital is also awarded with AHPI Award 2017 for Quality beyond accreditation and in 2018 for being patient friendly Hospital.

1.4.A) Mission, Vision & Values

- Mission -To emerge as a pioneer & Impeccable healthcare institute providing tertiary care to East Indian Citizens.
- Vision -- To bring affordability in availing tertiary healthcare by improvising new techniques & technology.
- Values – Relies on the principle of Patients First.

- 1.4.B) Scope of Services–
CLINICAL SERVICES (OPD & IPD) –
 - Anesthesia
 - Cardio Thoracic Surgery
 - Cardiology
 - Dentistry
 - Dermatology
 - Emergency Medicine
 - Endocrinology
 - General Medicine
 - General Surgery
 - Medical Gastroenterology
 - Nephrology
 - Neurology
 - Obstetrics & Gynecology
 - Orthopedic surgery & joint replacement
 - Rhinolaryngology
 - Pediatrics & Neonatology
 - Paediatric cardiology
 - Pediatric Surgery
 - Plastic & Cosmetic surgery
 - Pulmonology & Respiratory Medicine

- Psychiatry
- Urology & Andrology
- Vascular Surgery
- Neurosurgery

Support Services -> Laboratory Services & Transfusion Services

- Blood Bank
- Blood Transfusion Services
- Clinical Biochemistry
- Clinical Microbiology & Serology
- Cytopathology
- Hematology
- Histopathology
- Clinical Pathology

Support Services-> Radiology & Other Diagnostic Services

- X ray
- ECG
- Ultrasound & Color Doppler
- Echocardiography
- CT Scan
- EEG
- NCS

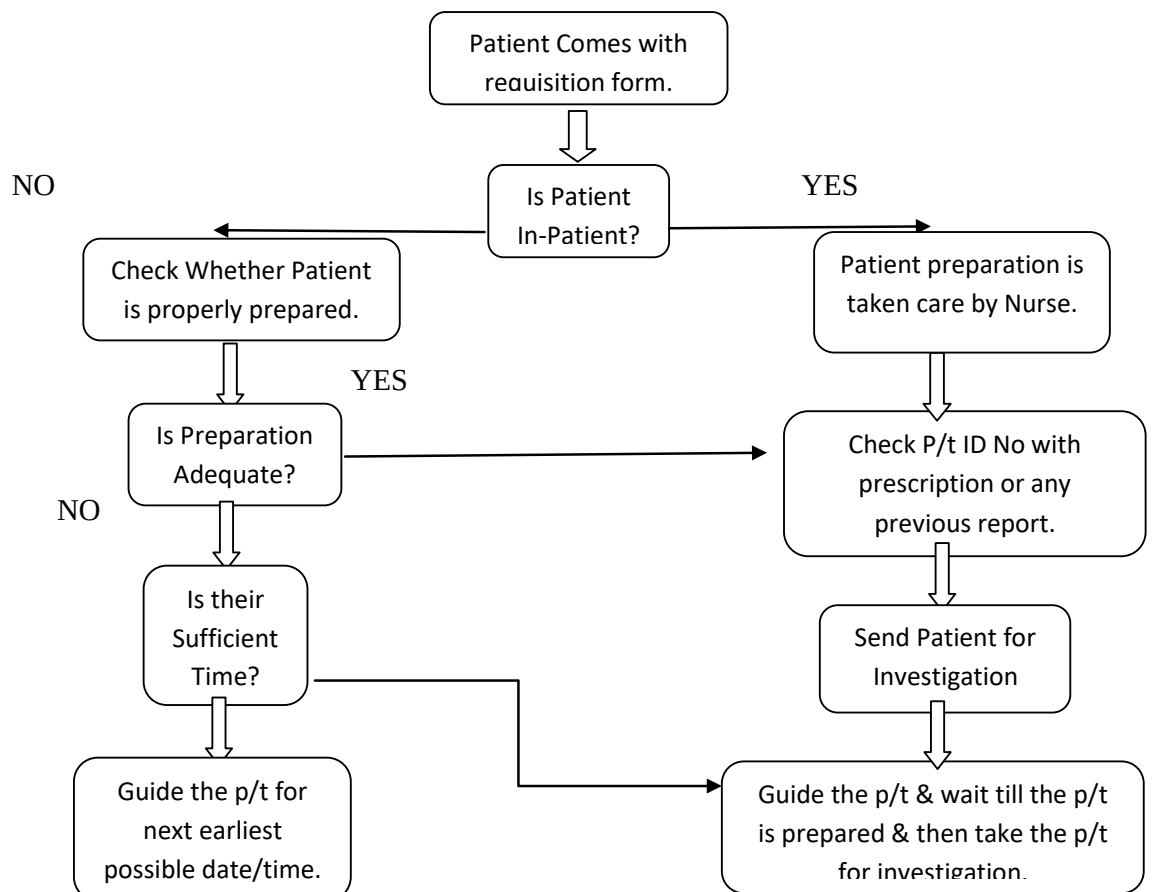
- MRI
- PFT

1.5.) About The Radiology Department –A patient centric facility located at ground floor having state of the art equipments for smooth conduction of various radiological investigations

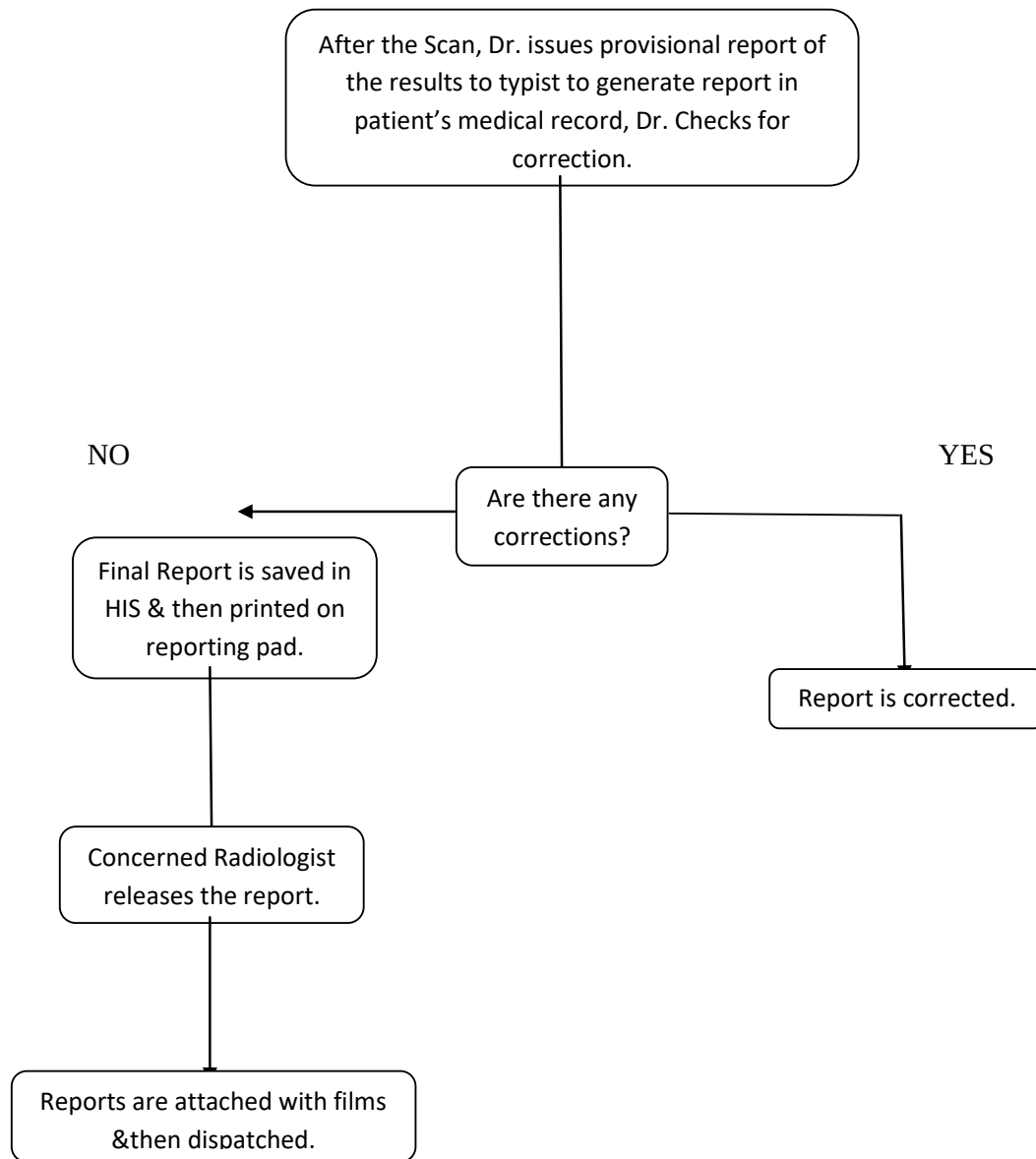
1.5.A) Scope & Services of Radiology Department –

- 1.5 Tesla Creator MRI with state-of-the-art applications
- Advanced Neuro-imaging with multiphasic Liver Study & diffusion MRI
- Non-Contrast whole body Angiography
- Robust musculoskeletal & Spine Imaging
- 128 Slice CT Multi Detector CT with short scan time with low radiation dose & fast post-processing.
- Comprehensive Ultrasound & Doppler imaging with elastography
- Digital radiography with procedures
- Mammography
- Diagnostic & Therapeutic interventions
- X-Ray

1.5.B) Patient Flow process at Radiology Department



1.5.C) Report Generation Process



Chapter – 2 Literature Review

Author & Year	Study location	Sample size	Sampling Technique	Salient features
Nupur verma,Matheus Zanon,Bruno Hochhegger, 2020	Brazil	208516	Stratified	Showcased variation between generalised & specialised reporting,There by reducing reporting TAT
Christoph Stern,Thomas Boehm,Burkhardt Seifert, Nadine Kawel-Boehm ,2018	Switzerland	100	Random	it stated that changing the workflow of radiology department to specific from general can reduce waiting times & increase productivity
Samira Rathnayake ¹ , Felix Nautsch ¹ , Thomas Robin Goodman ¹ ,, 2017	America	7378	Random	Emphasis was given to appoint a resident radiologist in order to reduce overall TAT of reporting
Akintunde o akintomide, ofonime N ukmeh Samuel A efanga 2019	Nigeria	318	Stratified	Stress was laid down to schedule appointments in duraton of half an hour to reduce waiting time in USG
Clinton lam, jared ditkowsky, Michael muradian 2021	USA	11	Stratified	This laid down stress on improving workflow processes & quality indicators in order to reduce overall TAT

Author & Year	Study location	Sample size	Sampling Technique	Salient features
<u>Whitney L Jackson,2015</u>	Ohio	86	Random	Emphasis was laid down to increase radiologists performance by implementing more training to decrease overall TAT and increase efficiency,productivity
<i>Vaibhavi Shah, Yeshwant R Chillakuru,2022,</i>	USA	15117	Stratified	Emphasis was given to implement a digital algorithm model in order predict delay In Tat & to find factors leading to it
Jalal s , ante z,Ouellette h, peters s,munk p,2020	British Columbia	All patients during the study period	Stratified	Emphasis was given to have radiologist appointed on round the clock all week radiologist to decrease TAT
Hitti ea, el-eid,gr tamim h et al,2017	Lebanon	49000	Random	Study emphasised to adopt lean change management measures to improve transportation to reduce overall TAT
Anuradha chndramohan a, viswajit krothapalli a ,ann augustin,2023	India	92	Stratified	Emphasis was given to introduce Teleradiography to improve efficiency to greater extent

Chapter -3 Methodology

3.1) Research Question - To find whether any unnecessary delay in is there waiting time at radiology OPD.

- Causative factor of delay
- Analysis of TAT of report generation

3.2) Research Design – Co-Relational Study Design

3.3) Study Setting – Radiology Department ground floor at Mission Hospital Durgapur (W.B).

3.4) Study Population – 1000 Plus Sample size involving OPD patients advised for radiological investigation under USG, CT-Scan & MRI being studied in duration of 3 Months starting from 1st of March 23 till 31st May 23

- **Inclusion Criteria** – OPD patients advised for radiological investigation under USG, Ct-Scan & MRI.
- **Exclusion Criteria** – IPD & ER patients as for IPD patients timings are after office Hours and ER patients are done on priority basis.
- **Study Tool** – Primary Data collectedby maintaining checklist of patient's billing time, In-time, Out-time for procedure & final Report time while having Secondary data through HIS.
- **Sampling Technique** – Simple random sampling.

3.5) Study Approach –Quantitative Research approach involving analysis of waiting time elapsed between patient's billing time and In-time for procedure & TAT of Report generation. Finally the data gathered will be relying on MS-Excel for analysis and drawing conclusions for further suggestive measures to be adopted for reducing and improving TAT

Data will be analyzed involving multiple steps as TAT between patient in-time and billing, between different timings of start of Department and many more by using excel charts like bar graph, pie chart, calculation based formulae like percentage, average, count

- **Operational Definition –**

- Patient Billing Time – Time at which the patient has paid for procedure through OPD billing and received the bill.
- Patient In-Time – Time at which the patient has received the call for procedure

3.6) Ethical Considerations - Confidentiality has been the highest priority throughout the study duration regarding patient information involving patient UHID & other relevant details.

Table – 4.1

Chapter – 4 Results

No of Samples	
Speciality	Number (Percentage)
USG OPD	777(52%)
USG HC	293(20%)
CT	154(10%)
MRI	267(18%)
Total	1491(100%)

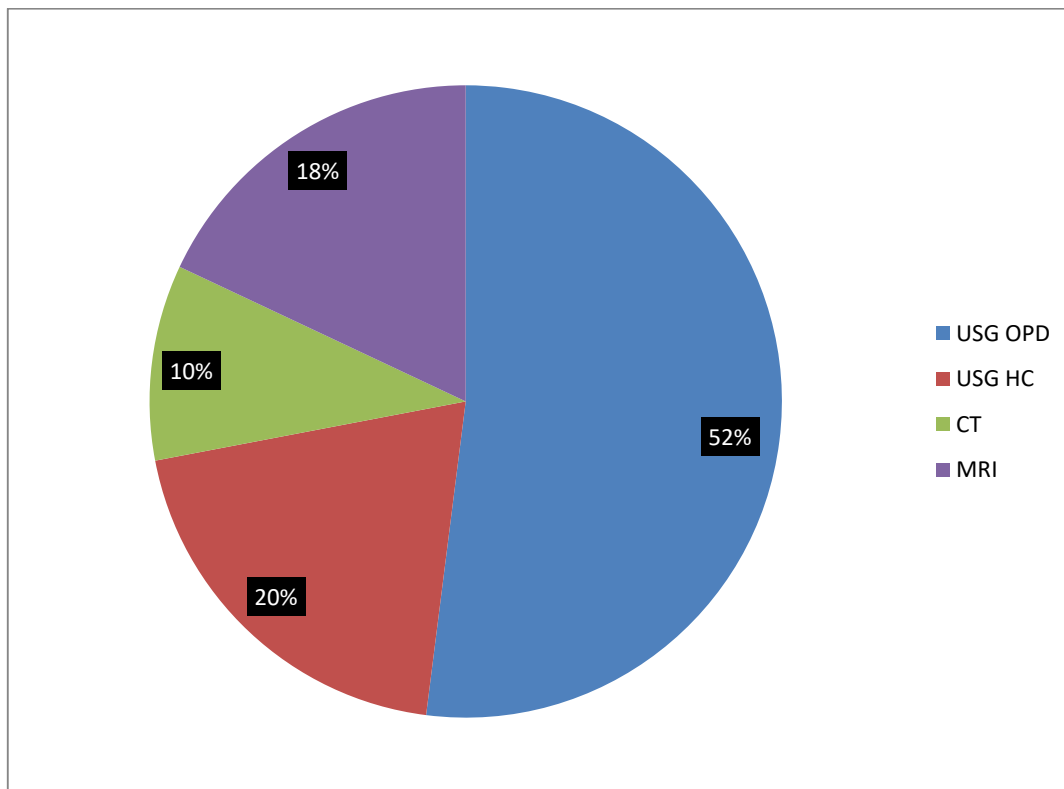


Fig – 4.1

Table – 4.2

waiting time between p/t bill time and p/t in time for procedure	
Speciality name	Avg waiting time (in mins)
USG OPD	180(36%)
USG HC	45(9%)
CT	110(22%)
MRI	170(34%)
Total	505(100%)

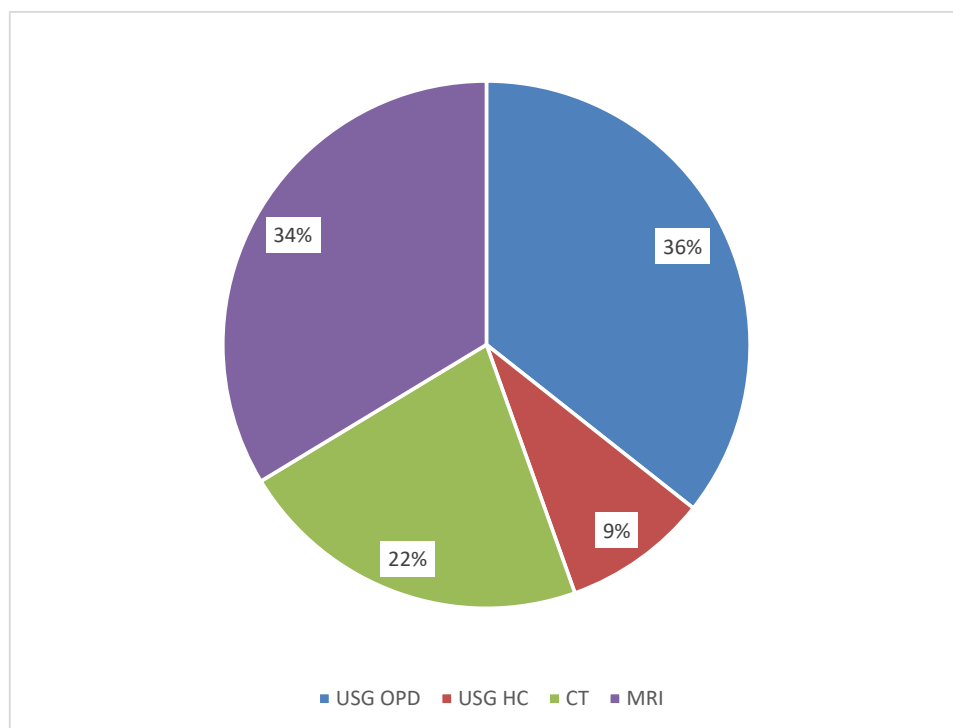


Fig – 4.2

Table – 4.3

Waiting time as per duration						
Speciality name	Less than 1HR	1hr-2hr	2hr-3hr	3 hr-4hr	4hr-5hr	Total
CT	57(37%)	37(24%)	34(22%)	14(9%)	14(9%)	154(100%)

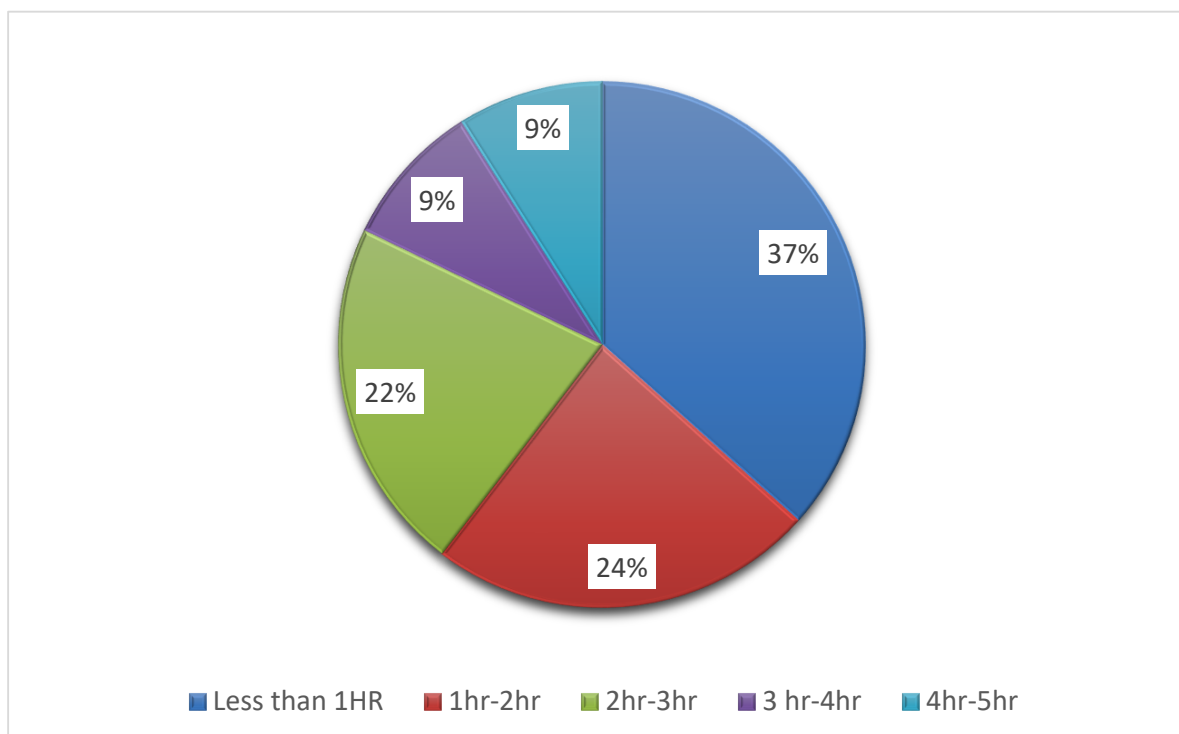


Fig – 4.3

Table – 4.4

Waiting time as per duration						
Speciality name	Less than 1HR	1hr-2hr	2hr-3hr	3 hr-4hr	4hr-5hr	Total
MRI	80(30%)	107(40%)	24(9%)	32(12%)	24(9%)	267(100%)

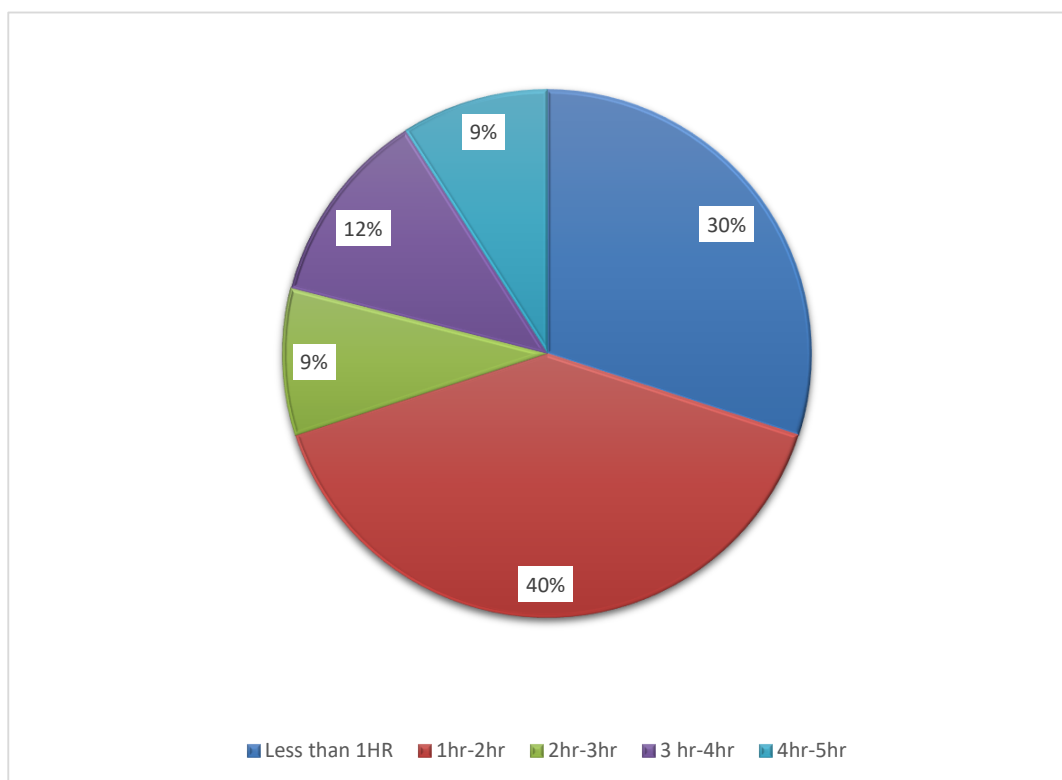


Fig – 4.4

Table – 4.5

TAT of p/t in-time for procedure and billing time (USG OPD)						
Bill time	Less than 1HR	1hr-2hr	2hr-3hr	3 hr-4hr	4hr-5hr	Total
Before 10 Am	94(22%)	205(48%)	81(19%)	-	47(11%)	427(100%)
After 10 Am	95(27%)	81(23%)	112(32%)	32(9%)	32(9%)	350(100%)

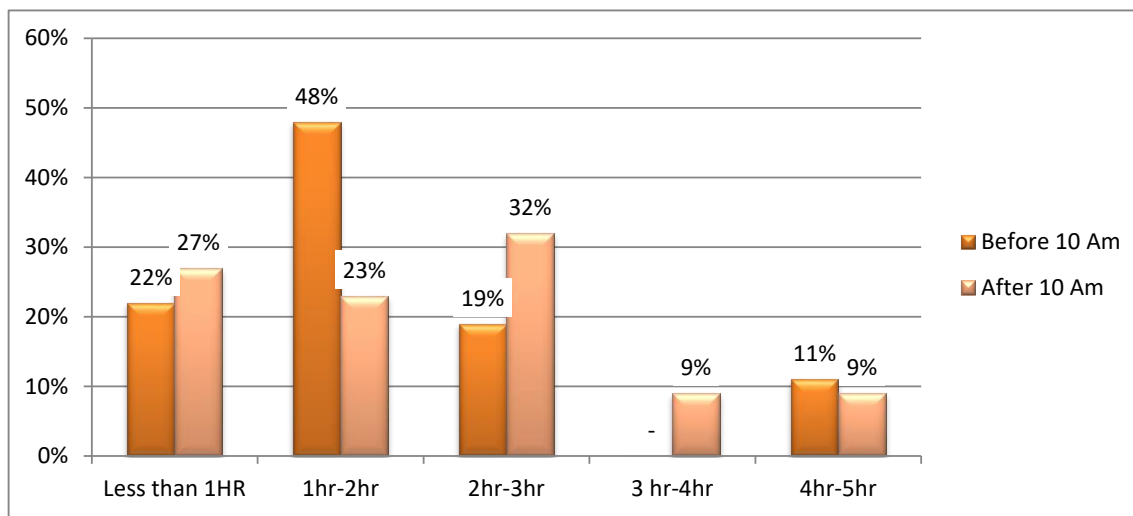


Fig – 4.5

Table – 4.6

TAT of p/t in-time for procedure and billing time (USG HC)				
Bill time	Less than 1HR	1hr-2hr	2hr-3hr	Total
Before 10 Am	27(13%)	170(83%)	8(4%)	205(100%)
After 10 Am	9(10%)	72(82%)	7(8%)	88(100%)

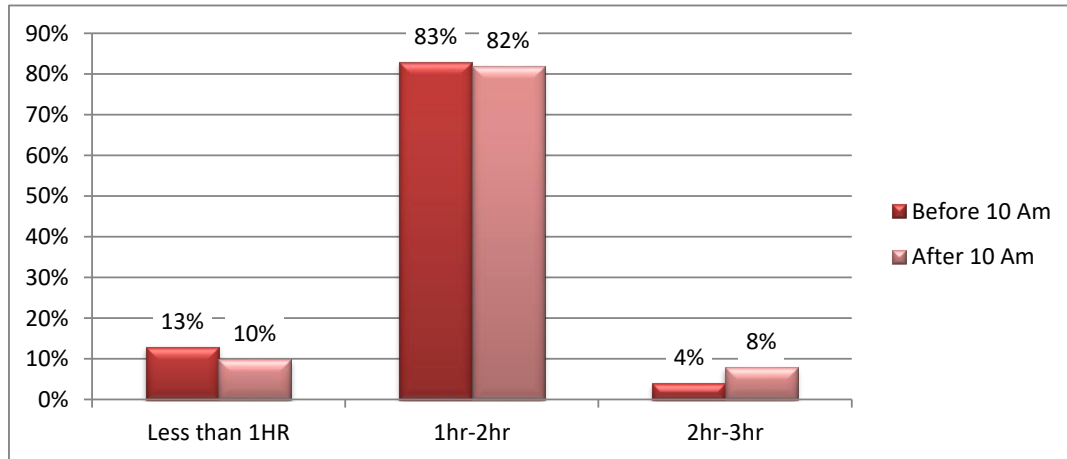


Fig – 4.6

Table – 4.7

reasons of Increased waiting time In USG OPD	
Reason	percentage
previous p/t	60%
p/t absent at time of turn	8%
Ipdt p/t comes	12%
p/t not prepared	10%
Overlapping p/t	10%

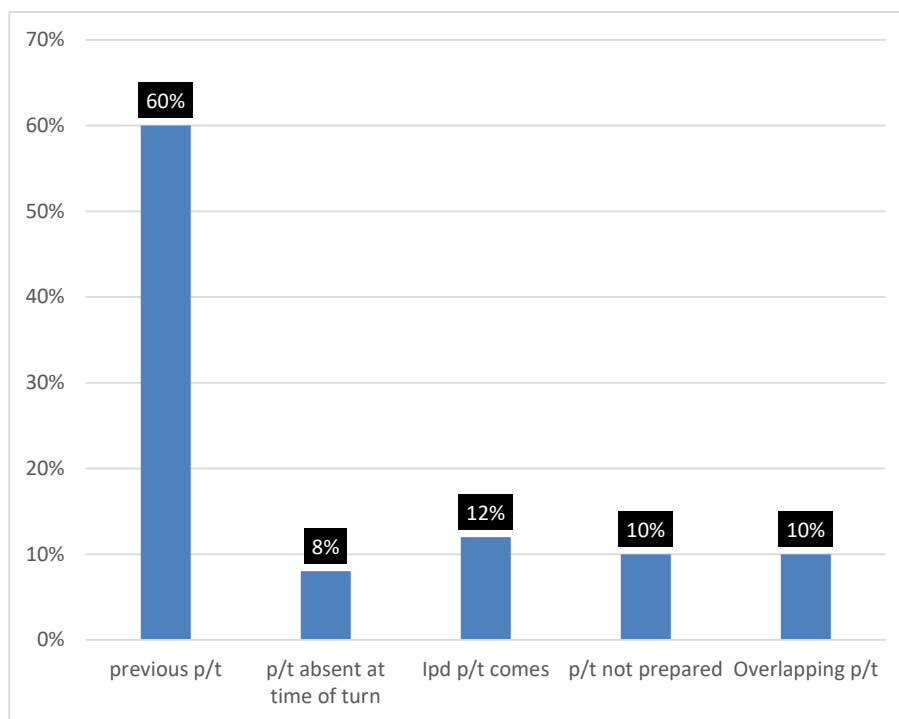


Fig – 4.7

Reporting TAT

Table – 4.8

Speciality name	Less than 30 Mins	30mins-1HR	1hr-2hr	2hr-3hr	3 hr-4hr	4hr-5hr	Total
USG OPD	210(27%)	124(16%)	272(35%)	62(8%)	78(10%)	31(4%)	777(100%)

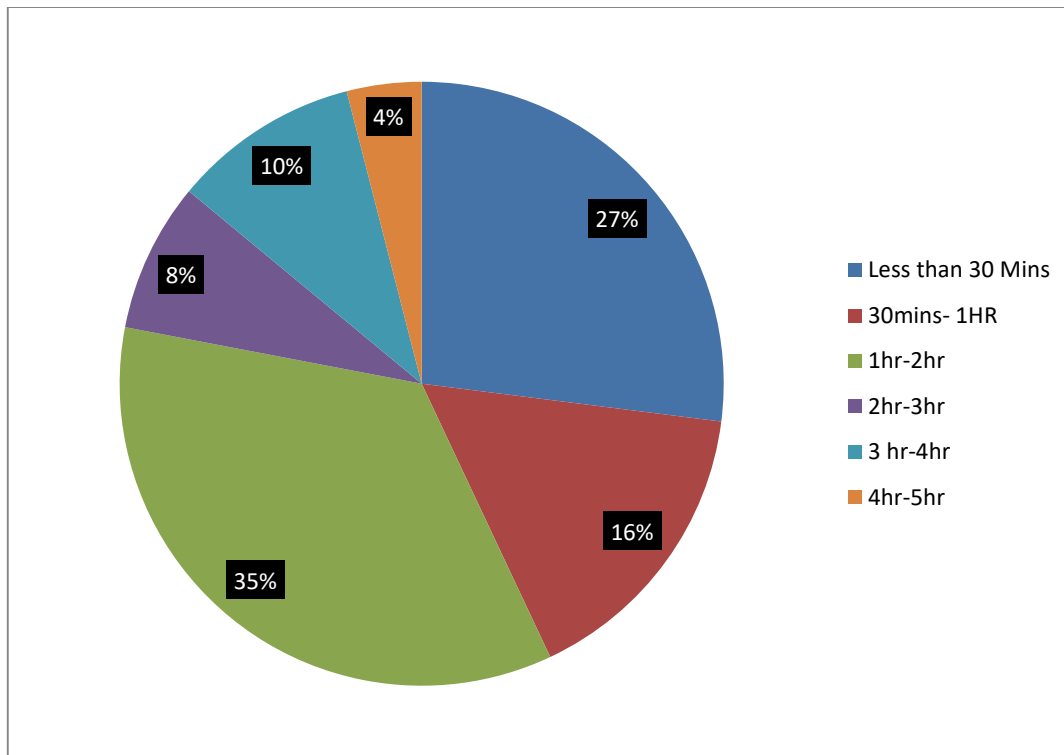


Fig – 4.8

Table – 4.9

Speciality name	Less than 30 Mins	30mins- 1HR	1hr-2hr	Total
USG HC	152(52%)	70(24%)	70(24%)	292(100%)

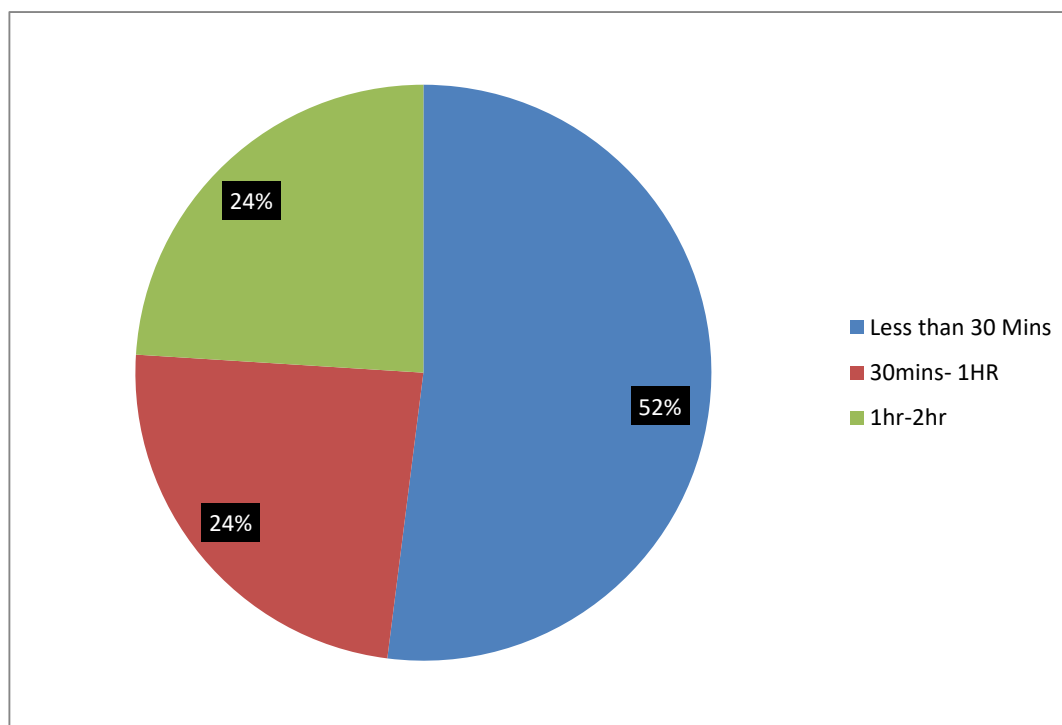


Fig – 4.9

Table – 5.0

Speciality Name	on same day	after 1 day	after 2 days	Total
CT	42(27%)	74(48%)	39(25%)	155(100%)

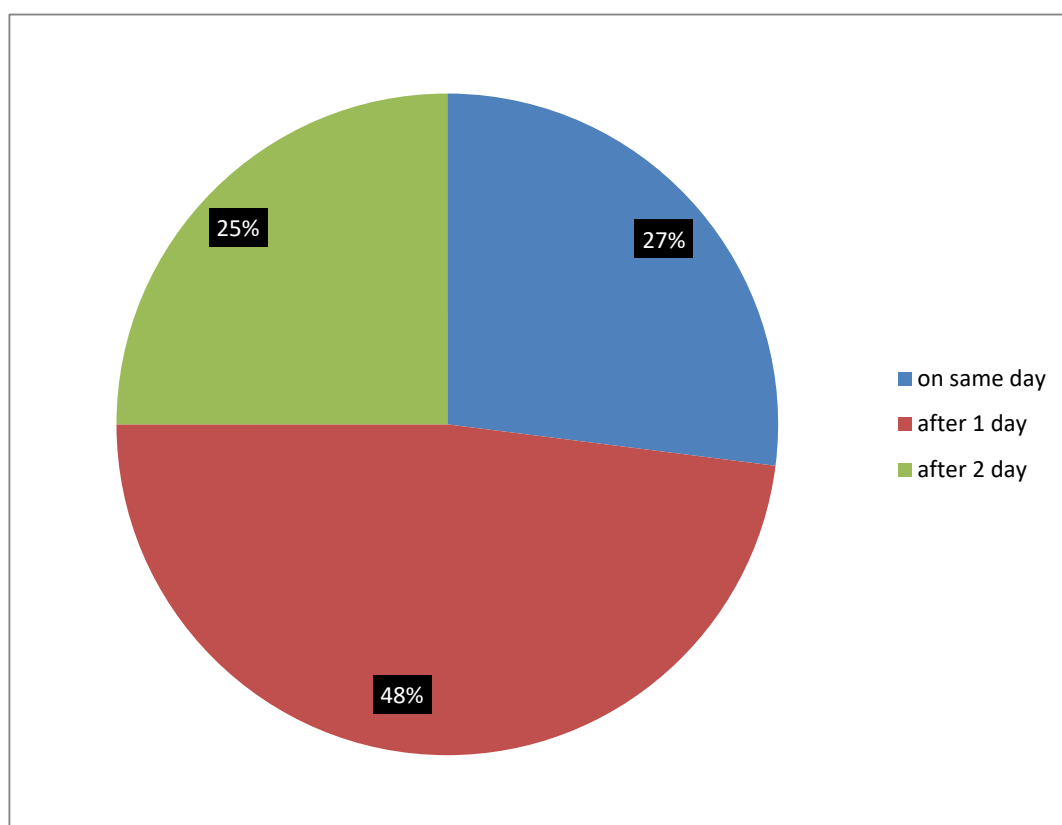


Fig – 5.0

Table – 5.1

Speciality Name	on same day	after 1 day	after 2 day	Total
MRI	53(20%)	168(63%)	45(17%)	267(100%)

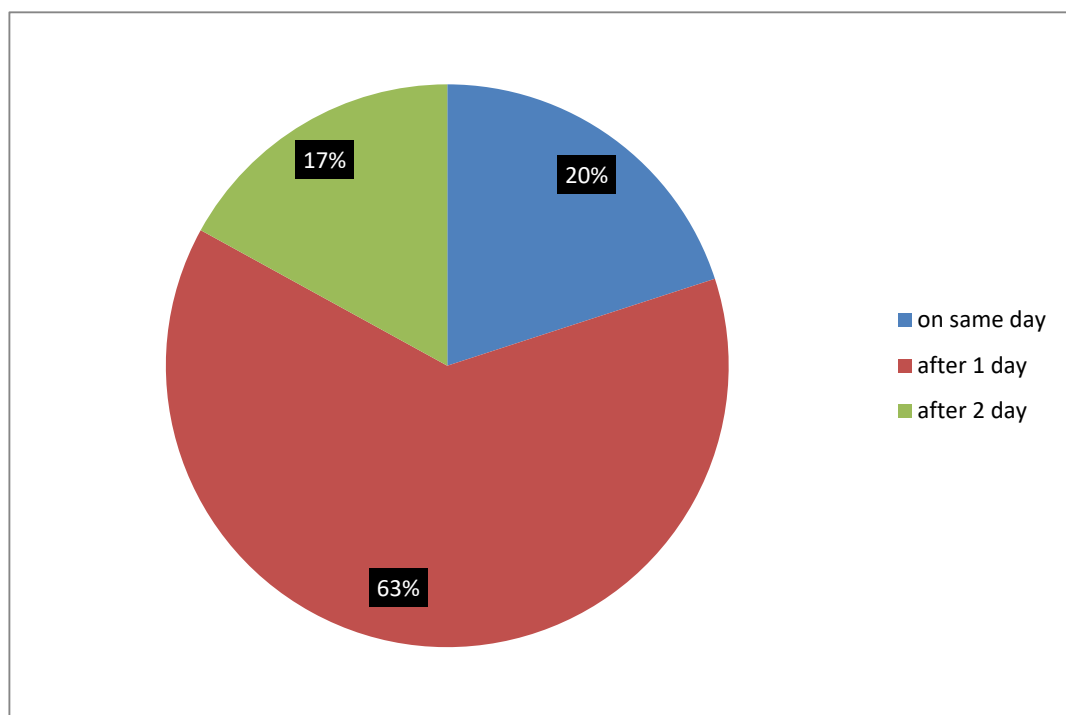


Fig – 5.1

Chapter – 5 Discussion

- Primary Aim was to analyse patient TAT in radiology department
- As observed, there is great extent of waiting time in USG dept, Although the staff is fully efficient & dedicated, However the delay is observed from patient's side
- Major reason of delay is due to increase load of previous patients ie patients who got delayed due to previous patients before them
- Now if we look a little bit more precisely that why the load of previous patients increases,
- Reasons include patient absent at time of their turn
- Ie due to crowding of patients came for MRI, CT & USG in same area while not having enough seating space makes patients uncomfortable and they tend to move away from radiology department
- Now at this point if there turns come up then they will be absent which lead to delay in their investigation & other patients
- Another reason which is prevalent is overlapping patient
- This reason is mostly evident in case of patients advised for health check-up as both patient of OPD & Health check-up tends to create problem as both of their requisition came at same time
- Patient not prepared is another reason due to which delay occurs
- Despite being told to have proper urine pressure by staff, reasonable no of patients have improper urine pressure that makes them ineligible for test
- Now these reasons lead to disruption of the order made by the staff for patient intake, which makes difficult for the staff to tell patients that how much time it would take
- Now waiting time has it's prevalence in CT & MRI department also
- But there staff is able to tell patients that how much time it would take time as patients are already told about their probable time of intake

- The only reason for waiting time in CT & MRI is time taken by procedures or previous patients in line
- As contrast procedures are also performed in CT-Scan, this takes around 20-30 mins each patient
- So, if 3-4 contrast procedures are lined up, that would lead to normal delay of 1-2 Hour
- Same as in MRI, where normal investigation takes around 30-40 mins(Without Contrast)
- And if contrast is advised, then it could take around 1 hour to complete
- So, if 3-4 MRIs are scheduled before a patient, that could easily lead to normal delay of 1.5 to 2 or 2.5 hours.
- Now if reporting TAT is considered then, it can be observed that despite having increased waiting time in USG department, Final reports are being available on same day
- Where as majority of CT & MRI reports are being available after 24-48 hours of investigation being done
- Reason is that, overlapping of investigations ie CT & MRI departments are being run round the clock and there is load of night investigations to be done
- Now the load of night investigations creates a backlog in delivery of reports as CT & MRI are complex investigations and it takes time to prepare final conclusion of report & moreover if correction is advised then delay is escalated further
- So, Normally it takes 24-48 hour to deliver final report
- Other reasons of delay in final reporting are system buffer ie system gets hanged, not frequently but sometimes like twice or thrice in a day which leads to additional delay of roughly around 10 mins.

Chapter – 6 Conclusions

- Finally by concluding, It can be fairly said that USG Patients have to experience max waiting time
- Reasons pertaining to delay are arising in USG OPD patients only
- Major reason pertaining to delay is previous patients that were scheduled before current patients
- As evident, waiting time can be observed in CT & MRI
- But waiting time is only because of time taking procedure, no reason as for delay
- As far as reporting is concerned, USG patients receive reports on same day
- Whereas CT & MRI patients receive reports after a day or two
- Max patients in CT & MRI receive reports after a day only where as some complex reports take 2 days to be received.
- Recommendations (for Waiting Time)
- As observed, there is great extent of waiting time in USG dept, Although the staff is fully efficient & dedicated, However the delay is observed from patient's side
- Recommendation would be to stick a poster outside USG dept in regional & national language regarding all aspects of p/t preparation for USG tests, because it has been observed that p/t enquires about how much water he has to intake for test,
- Not only will it reduce the workload of staff to tell almost every p/t that how much water he has to intake, but also it will make easier for staff to take p/t for test easily and without delay.
- Next recommendation would be to start billing of USG at 10 Am rather than before that, as it has been observed that p/t have to wait for USG to start at 10 Am, However there billing has been done prior to that.
- This will reduce the pressure of managing the delays as waiting time would be reduced for p/t waiting to start USG
- Moreover it is suggested to do the billing of only 5 p/t at a time and for duration of 10-15 min later after first billing slot. This will reduce the problem of p/t absenteeism at time of their turn and also it will give chance to intake IPD p/t without delaying the OPD p/t as the next billing slot would be 10-15 min later.
- These measures, if implemented, can reduce the delay caused by the previous p/t problem

- Recommendations (Reporting TAT)
- Although there is no major reason has been observed for which reporting has been delayed, but few measures can be taken to further reduce the reporting TAT
- System Buffer – It has been observed that the system in which report is being prepared, sometimes doesn't perform at par due to which there is additional delay of avg 10 mins,
- However its occurrence is not there in every report generation process but it can be fairly said that around 15% report generation process do experience this problem
- Recommendation would be necessary upgrades regarding software & hardware as per requirement.
- Correction in report – There is sometimes correction is advised at time of report generation, Although this also doesn't have prevalence in every report generation process but it can be fairly said that around 5% report generation experiences this reason.
- Recommendation would be to focus more on training regarding reducing chances of correction
- However there is one reason due to which specifically reporting TAT of MRI & CT is affected, that is that CT & MRI are functional & catering patients round the clock
- This increases the TAT of final reporting as the load of result analysis is extended
- Recommendation would be to allocate staff specific for result analysis of Night.

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