

Study on Turnaround Time of Patients Undergoing MRI Examination

By

Garima Raj

*Dissertation submitted in partial fulfillment of the requirements of the degree
MBA Hospital and Health Management*

Academic year, 2017-2019



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TO WHOMSOEVER MAY CONCERN

This is to certify that Garima Raj, student of MBA Hospital and Health Management from The IIHMR University, Jaipur has undergone internship training at Medica Superspeciality Hospital, Kolkata from 4th February to 3rd May.

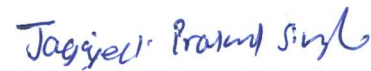
The candidate has successfully carried out the study assigned to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.

A handwritten signature in blue ink, appearing to read 'Ashok'.

Col. (Dr) Ashok Kaushik
Dean, Academics and Student Affairs
The IIHMR University, Jaipur

A handwritten signature in blue ink, appearing to read 'Jagajeet Prasad Singh'.

Dr. Jagajeet Prasad Singh
Associate Professor
The IIHMR University

15 May 2019

MHPL/HR-Communication/2019/05/16016

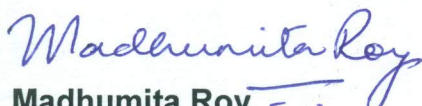
3rd May, 2019

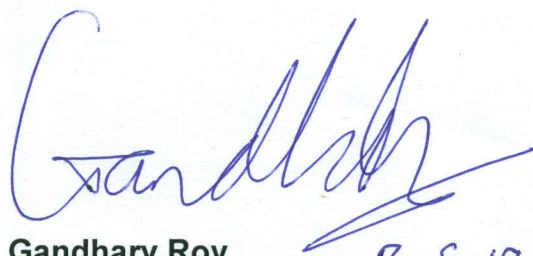
TO WHOM IT MAY CONCERN

This is to certify that **Ms. Garima Raj**, pursuing **MBA in Hospital & Health Management** from **IIHMR University, Jaipur** has successfully completed practical training at **Medica Superspecialty Hospital, Kolkata** in the department of operations, during 4th February 2019 to 3rd May, 2019 as per her academic requirement.

Ms. Raj has prepared a project on “**Turn around time of the patients undergoing MRI examination in Medica Superspecialty Hospital**”. She was found to be an efficient & dedicated student, and her conduct was found to be excellent.

We wish her all the best for her future endeavors.


Madhumita Roy
GM Human Resources


Gandharv Roy
Chief Operating Officer 13.5.19.

THE IIMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify all ethical issues have been considered while collecting data for my dissertation titled A Study on Patients Undergoing MRI Examinations(4th February 2019 – 3rd May 2019).

Garima Raj
Signature of student

Acknowledgement

The success and outcome of this project required a lot of guidance and assistance from many people and I am using this opportunity to express my gratitude to everyone who supported me throughout the course of this project. I am thankful for their aspiring guidance, invaluable constructive, criticism and invaluable advice during the project work. I am sincerely grateful to them for sharing their truthful and illuminating views on number of issues related to the project.

Firstly, I would like to express my gratitude to **Mr Gandharv Roy, Chief Operating Officer**, Medica Super speciality Hospital, Kolkata for his guidance during my dissertation.

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I would like to express gratitude to my Institutional Guide **Dr. Jagajeet Prasad Singh, Associate Professor**, IIHMR University Jaipur for his constant guidance to carry out this dissertation.

Garima Raj
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Table of Contents

Abstract.....	1
Section - 1: Introduction: Rationale, Research question and specific objective/s.....	6-7
Section - 2: Mode of data collection	8
Section - 3: Data compilation, analysis and interpretation.....	9-15
Section - 4: Suggestions and conclusion.....	16
References	17
Annexure	18

Abstract

INTRODUCTION: Turnaround time in MRI is defined as from the time of entry of patient into the department, preparing patients and doing scan up to reporting the finding. The more focus is being given by the hospital healthcare systems in the field of radiology. The radiology department to become more efficient and to reduce more wastage updated to the advanced radiological investigation i.e., MRI scanning.

OBJECTIVE: To estimate the time at each process in MRI Department. To study and assess the elements that determine the Turnaround Time of patients undergoing various MRI procedures.

METHODOLOGY: The study was conducted at MRI department of MSH, Kolkata. Size – 150 samples selected randomly during the study period. Period of the Study – 1 month. Inclusion criteria – only Out Patients based patients were considered for the study. Exclusion criteria – Inpatients and emergency cases were excluded from the study.

ANALYSIS: MEAN

RESULT: MRCP – 220 min, MRA – 255min, MRV – 229min, Abdomen – 240min, Knee- 259min, Ankle – 262 min and Brain- 198 min.

CONCLUSION: The study is taken to access TAT of MRI in Medica Super specialty Hospital, Kolkata benchmark for MRI is 2hours. In the study, 200 patients were taken among which 118 cases (59%) were with TAT above 2hrs and 82 cases (41%) were within 2hrs. Hence overall average TAT was 2hrs 59 minutes. This shows increased TAT when compared to the hospital benchmark because of various reasons such as claustrophobia, delayed report etc. So, by adopting appropriate suggestions turnaround time can be possibly reduced and utilization of MRI machine can be increased.

Introduction –

Turnaround time in MRI is defined as from the time of entry of patient into the department, preparing patients and doing scan up to reporting the finding.

The more focus is being given by the hospital healthcare systems in the field of radiology. The radiology department to become more efficient and to reduce more wastage updated to the advanced radiological investigation i.e., MRI scanning.

MRI is a non-invasive imaging technology that produces three dimensional detailed anatomical images without the use of damaging radiation. It is often used for disease detection, diagnosis, and treatment monitoring. It is based on sophisticated technology that excites and detects the change in the direction of the rotational axis of protons found in the water that makes up living tissues. MRI employ powerful magnets which produce a strong magnetic field that forces protons in the body to align with that field.

MRI scanners are use to image the bony, non-bony parts or soft tissues of the body. They differ from computed tomography (CT), in that they do not use the damaging ionizing radiation of x-rays.

Types of MRI scan:

1. Brain
2. MR Angiography & Venography (Blood Vessels)
3. Musculoskeletal MRI
4. Body MRI
5. Joint MRI
6. Cardiac MRI

The study was taken to increase the foot fall of patient for MRI scan. To make MRI scan more efficient, one should concentrate on reducing the Turnaround time for radiology report with minimum film wastage and importance should be given to the quality of patient care as well as satisfaction of patients. Thus, the survey data collected manually that allows continuing monitoring of the whole process from the registration of patient for scan till the report distribution to the patients. The data collected and analysed from February 4th, 2019 to May 3rd, 2019.

At the same time observation was done on the reasons for the delay of the scan and study taken aimed at goals to reduce the Turnaround time.

Medica Super speciality Hospital is having 1.5 TESLA PRODIVA MRI SCAN on ground floor.

Human Resource

The MRI department is monitored by well experienced consultants and resident consultants. There are 3 members in the front desk in 3 consecutive shifts, 4 typists and 4 A₂ technicians in 4 shifts, 3 technicians and 2 nursing staffs.

The procedures carrying on are as follows – Abdominal scan, Head scan, Pelvis scan, Contrast scan, Blood vessels scan, knee scan, spine scan and other body part scan.

Aims and Objectives:

Aim –

To study TAT of patients undergoing MRI at Medica Super speciality Hospital, Kolkata and to improve TAT.

Objectives –

- To estimate the time at each process in MRI Department.
- To study and assess the elements that determine the Turnaround Time of patients undergoing various MRI procedures.
- To analyse gaps (for different processes) and provide suggestions for improvement to the department based on the results.

Literature Review

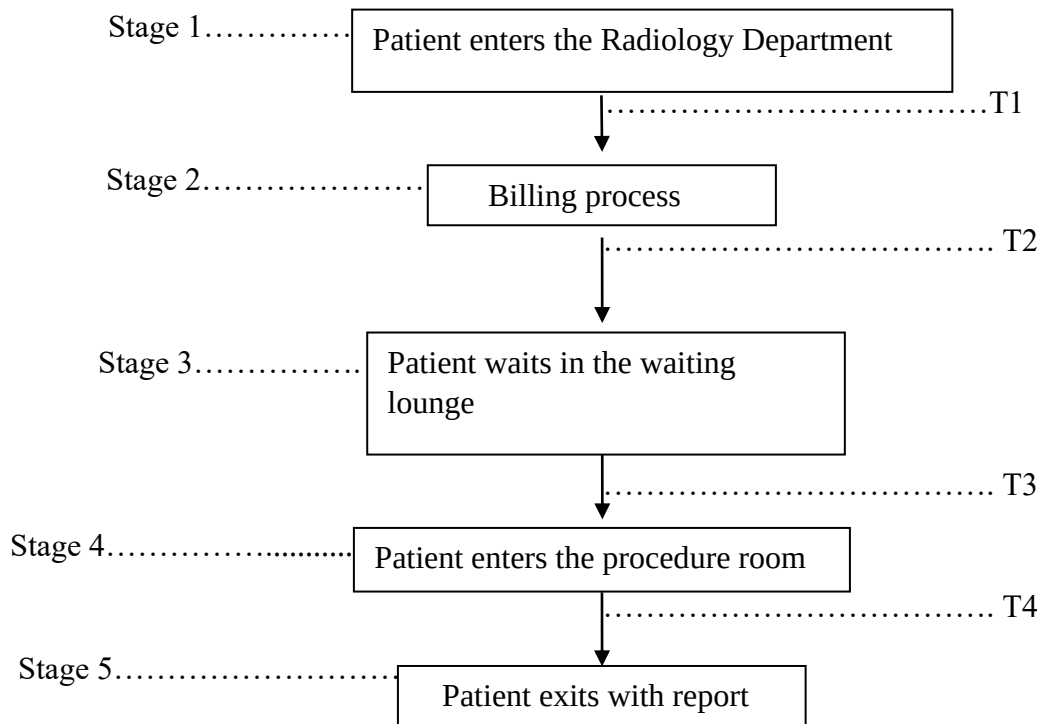
Proper time management is an important problem in many radiology department of hospitals (Random House Kernerman Webster's College Dictionary @2010 K Dictionaries Ltd. Copyright 2005, 1997, 1991 by Random House.Pg 1920-25).¹Study on Time Utilization of Radiology Department (Venus D. Marco, Lisa Smith (2012): The Healing Journey of My Bodacious Ta Ta's: Healed by Grace and on a Budget. Pg 41 author house).²An evaluation of alternative approaches to improve radiology efficiency (Frances T. Fischbach, Marshall Barnett Dunning (2009): A Manual of Radiology and Diagnostic Tests. 8th edit. Printed in china. Pg 16).³A two-step approach for optimizing patient flow in radiology (Randolph H. (2006): Patient Flow: Reducing Delay in Healthcare Delivery. USA, PG).⁴A three-phase approach to improve radiology efficiency in terms of overtime as well as waiting time while improving department OECD (2010): Health Policy Studies Improving Health Sector Efficiency. pg 36.⁵Text book on Healthcare Operations Management authored, Daniel B.McLaughlin and John R.Olsan(third edition).⁶

Rationale –

Turnaround time is one of the major concern of patients in radiology department as imaging is one of the important aspect of diagnosis of diseases.

In Medica Super speciality Hospital, benchmark for TAT is 2 hours, the study was conducted to ensure the benchmark and to increase efficiency of the MRI department.

Chart 1: Process flow of patients in MRI department at Medica Super speciality Hospital



Methodology

Area of study –

The study was conducted at MRI department of MSH, Kolkata.

Problem Statement –

A study to estimate turnaround time – TAT of the patients undergoing MRI examination of MSH.

Design –

Observational Cross-sectional Descriptive Study Design

Sampling Plan –

Method – The data collected was based on convenient sampling. Average flow of patients per day was 15 within working hours of 8 am to 8 pm. 10 patients per day were taken under study.

- Size – 150 samples selected randomly during the study period
- Period of the Study – 1 month
- Inclusion criteria – only Out Patients based patients were considered for the study
- Exclusion criteria – Inpatients and emergency cases were excluded from the study

Sampling Characteristics-

Table 1- shows number of different types of procedures under study

Name of the Scan	Number of cases studied
Abdomen	20
Brain	41
Knee	28
MRA	1
MRV	1
Spine	44
Knee	7
Cardiac	1
MRCP	3
Shoulder	4

Section 2: Mode of Data Collection-

The primary data for the study was collected through observation and shadowing (observing at each step) of MRI patients.

- The required data was collected in the pattern as follows

T1 – The Time interval between patient entry in radiology department and billing process

T2 – Waiting Time of Patient outside the Procedure Room

T3 – Time taken to conduct specific scan

T4 – Time taken to generate report

T1	T2	T3	T4
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Time between	Waiting time of	Time taken to
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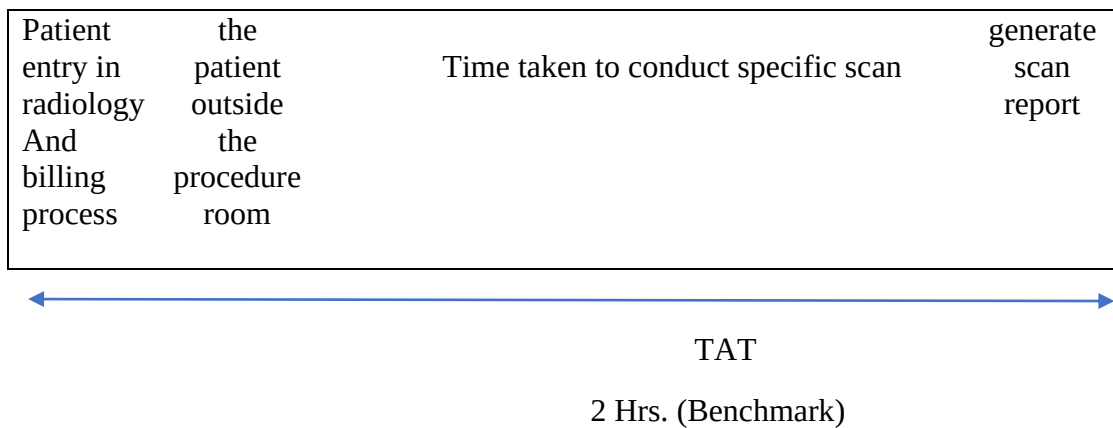
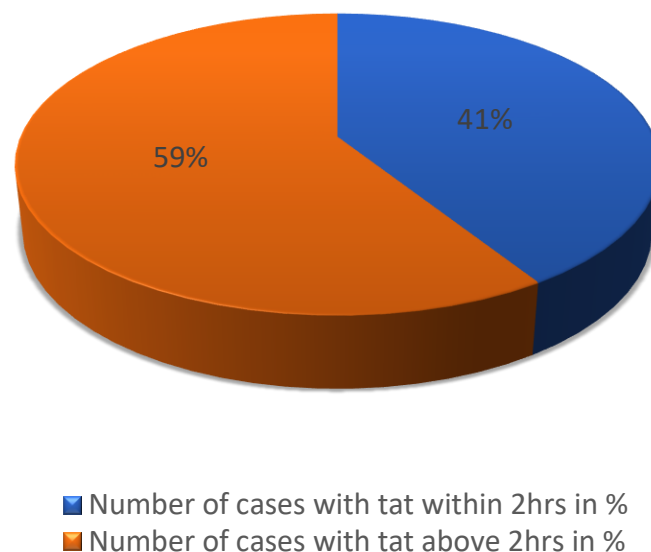


Fig: Detail (time elements) of Turnaround Time (TAT) of MRI patients

Section 3: Data compilation, analysis and result

Data was collected from MRI department of MSH and analysed using MS Excel and presented through table and graphs.

Chart 2- showing the number of patients with TAT within 2 hours and patients with TAT above 2 hours among 102 patients

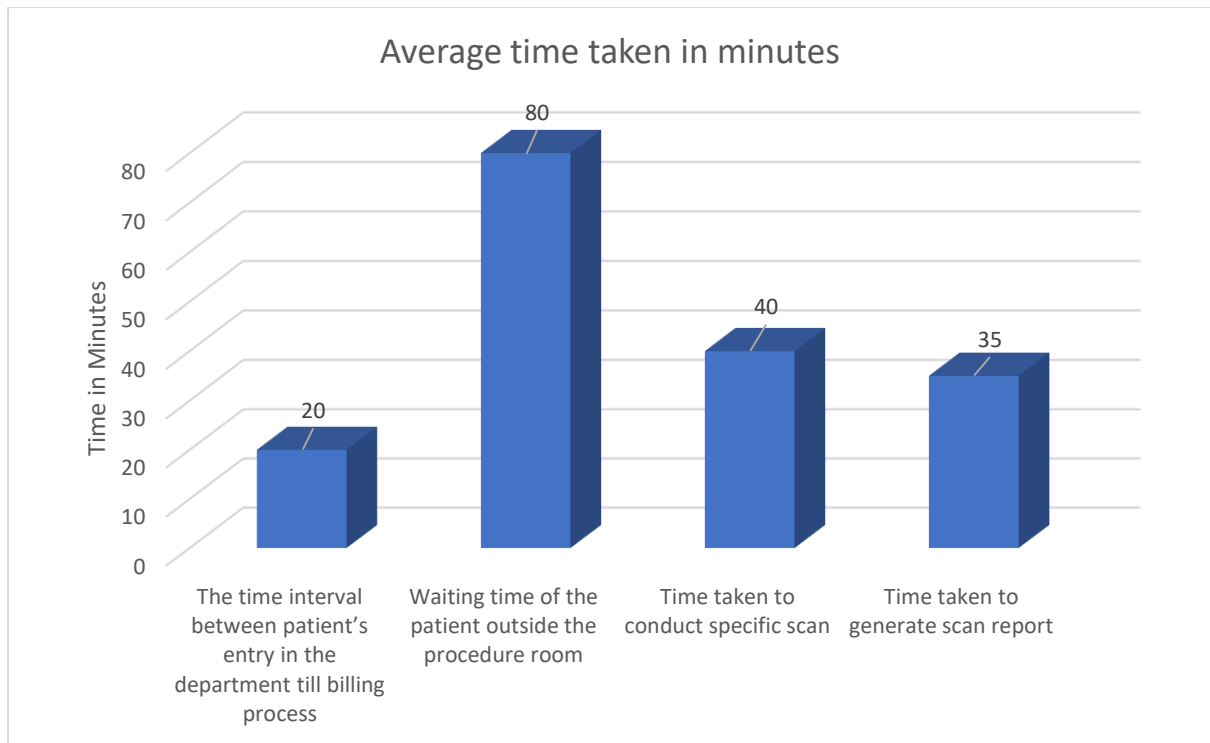


The above chart showing the distribution of patients with TAT. The total number of patients included in the study were 150 outpatients. The hospital benchmark for TAT of MRI is 2hours. Among 150 patients, TAT for 82 patients is within 2 hours with 41% and TAT for 118 patients is above 2 hours with 59%. The average TAT of 150 patients is 2hours 57 minutes and median time is 3hours 90 minutes.

Table 2-The following table shows the Average Turnaround time for MRI.

Steps	From-To	Average time taken in minutes
T1	The time interval between patient's entry in the department till billing process	20
T2	Waiting time of the patient outside the procedure room	80
T3	Time taken to conduct specific scan	40
T4	Time taken to generate scan report	35

As mentioned above the time interval from patient's entry to the department to billing process is 20 minutes (T1). Then waiting time of the patient outside the procedure room is 80 (T2). Later time taken to conduct specific scan is 40 minutes (T3). Lastly time taken to generate scan report is 35 minutes (T4). Thus, the average Turnaround time for MRI is 2 hours 55 minutes.

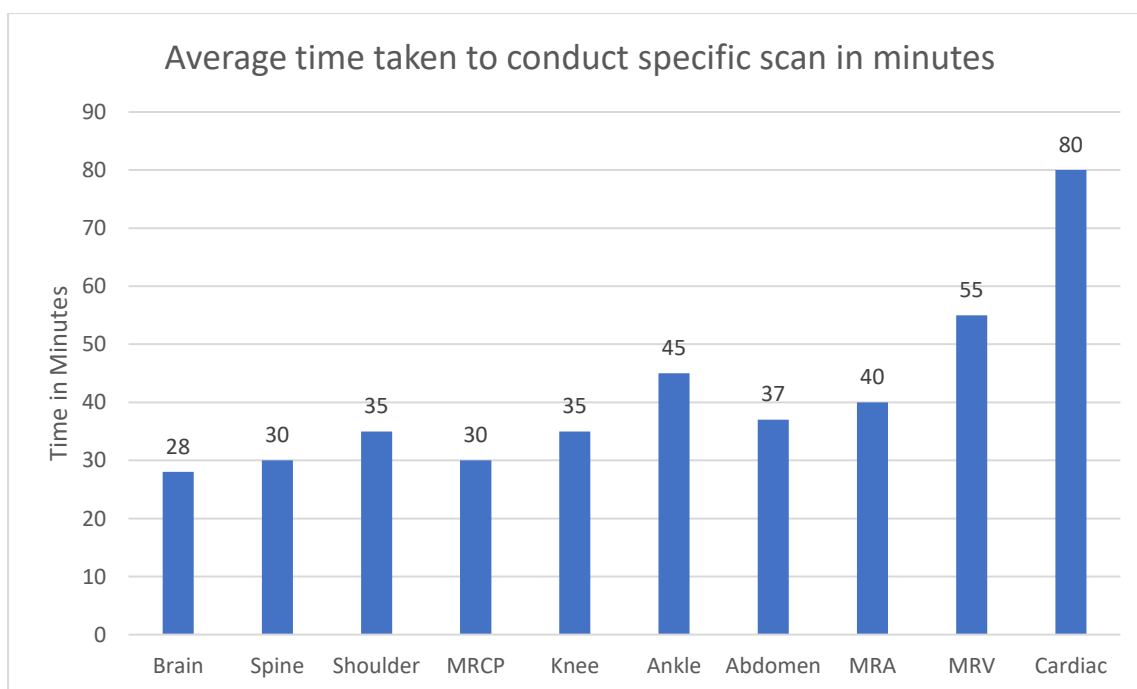


The graph shows that the average time interval between patients' entry in the department till billing process is 20 minutes. The average waiting time of the patient outside the procedure is 80 minutes. And the average time to conduct specific scan is 40 minutes. Lastly the average time to generate report is 35 minutes. Overall average time of TAT for MRI is 2 hours55minutes.

Table 3-The following table shows the Average time taken to conduct specific scan.

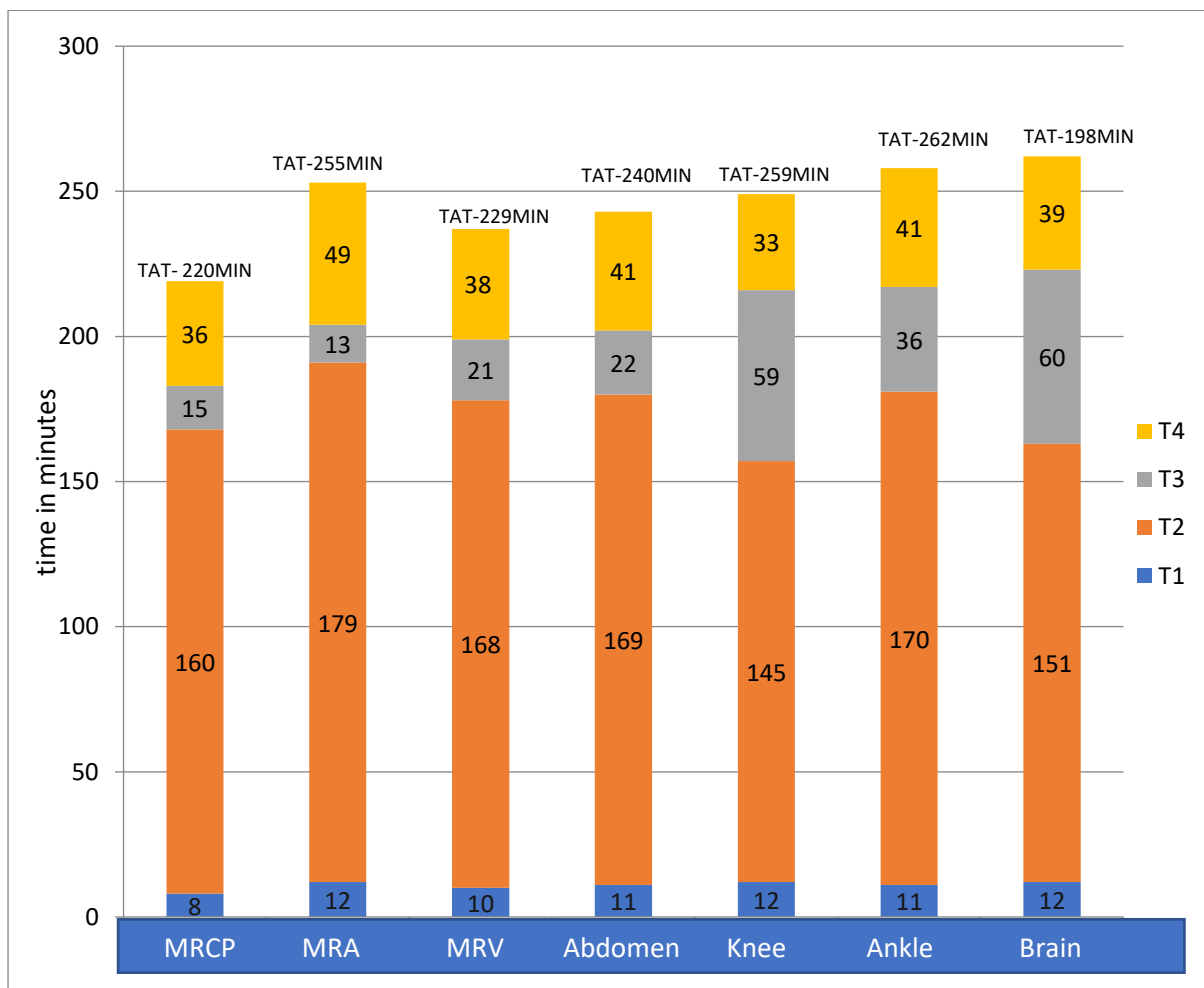
Name of Scan	Average time taken to conduct specific scan in minutes
Brain	28
Spine	30
Shoulder	35
MRCP	30
Knee	35
Ankle	45
Abdomen	37
MRA	40
MRV	55
Cardiac	80

Graph 2 – shows the Average time taken to conduct specific scan



The above table and graph show the Average time taken to conduct specific scan such as for Brain is 28 minutes, Spine is 30 minutes, Shoulder is 35 minutes, MRCP is 30 minutes Knee is 35 minutes, Ankle is 45 minutes, Abdomen is 37 minutes, MRA is 40 minutes and MRV is 55 minutes.

Graph 3- shows the average T1, T2, T3, T4 and total TAT of various procedures under study



CAUSES

Fish- bone analysis –

Fish-bone analysis is the basic tool which shows cause of specific event.

The defect is shown as fish's head that is increased turnaround time and causes are extended to left as fish –bones. Each potential cause is traced back to find the root cause using 6 why technique which includes methods, man, environment, measurement, machine and material.

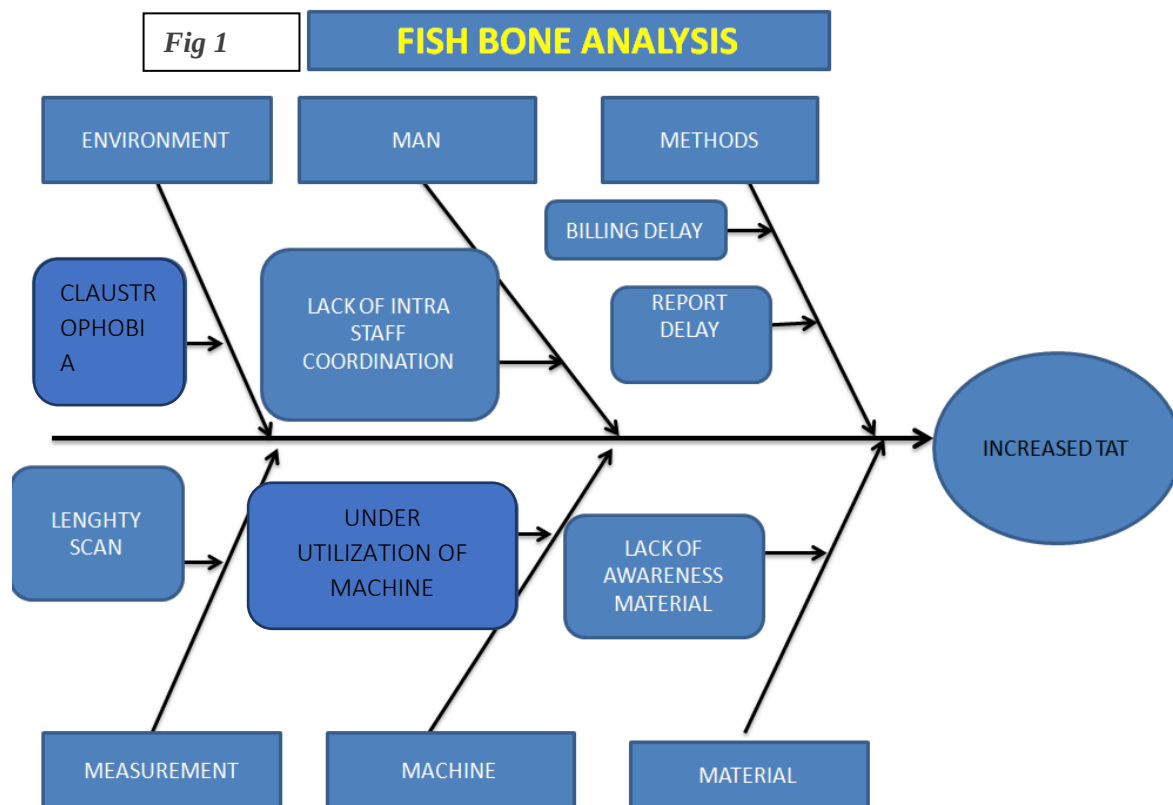


Fig 2- showing the reasons for increased TAT

RESULT: MRCP – 220 min, MRA – 255min, MRV – 229min, Abdomen – 240min, Knee- 259min, Ankle – 262 min and Brain- 198 min.

Section -4: Suggestions and conclusion

Suggestion:

1. Patient may inform one day prior for the test on phone.
2. Effective communication can be obtained by organizing knowledge enhancement training to registration staff regarding various protocols of MRI procedures.

Conclusion:

The study is taken to access TAT of MRI in Medica Super specialty Hospital, Kolkata benchmark for MRI is 2hours. In the study 200 patients were taken among which 118 cases (59%) were with TAT above 2hrs and 82 cases (41%) were within 2hrs. Hence overall average TAT was 2hrs 59 minutes. This shows increased TAT when compared to the hospital benchmark because of various reasons such as claustrophobia, delayed report etc. So, by adopting appropriate suggestions turnaround time can be possibly reduced and utilization of MRI machine can be increased.

References

1. Random House Kernerman Webster's College Dictionary @2010 K Dictionaries Ltd. Copyright 2005, 1997, 1991 by Random House.Pg 1920-25.
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7. Handbook of Healthcare Operations Management Methods and Applications by Brian T. Denton
8. Introduction to Healthcare Quality Management by Patrice Spath(third edition)

Annexure

Table 1: shows the various services providing in MSH

Chart 1: shows process flow of patients in ultrasound department at MSH

Table 2-shows number of different types of procedures under study

Figure.1: Details (time elements) of Turnaround Time (TAT) of USG patients

Chart 2- shows the number of patients with TAT within 2hours and patients with TAT above 2 hours among 150 patients

Table 3- shows the Average Turnaround time for MRI

Graph 1- shows the Average Turnaround time for MRI

Table 4- shows average time taken to conduct Specific scan

Graph 2 – shows the Average time taken to conduct specific scan

Graph 3- shows the average T1, T2, T3, T4 and total TAT of various procedures under study

Table 5- showing the reasons for increased TAT

Data collection format-

1. Date of collection
2. Medical record number
3. MRI Procedures
4. Elements of TAT (T1, T2, T3 and T4)