

**Study of Turn-Around Time of PET CT scan at House of
Diagnostics (H.O.D), ROHINI,**

Dissertation Submitted to



The IIHMR University, Jaipur, Rajasthan

For the partial fulfillment of the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

By

Ajay Rajput

Under the Supervision and Guidance of

Dr. DayaKrishanMangal

Professor IIHMR University, Jaipur

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TO WHOMSOEVER IT MAY CONCERN

I hereby declare that this dissertation titled “Study of TURN AROUND TIME of PET CT scan at House of Diagnostics (H.O.D), Rohini, Delhi,” is the bonafide record of my original research work. I declare it has 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 Information derived from the published or unpublished work of others has been duly acknowledged in the text.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-Ajay Rajput

Roll No-1057

Date: 18/06/2022

To whom it may concern

This is to certify that **Mr. Ajay Rajput, S/o Late. Man Singh**, a student of MBA (Hospital and Healthcare Management), IIHMR University, Jaipur has successfully completed 3 months (From 22nd March 2022 to 17th June 2022) Internship Program in Quality & operations at **House of Diagnostics Healthcare Pvt Ltd.**

During the period of his Internship Program with us he was found Punctual, Hardworking, and Inquisitive.

We wish him great success.

Best Wishes,

For House of Diagnostics Healthcare Pvt Ltd



CERTIFICATE

This is to certify that Mr. Ajay Rajput was working on the research named “Study of TURN AROUND TIME of PET CT scan at House Of Diagnostics (H.O.D), Rohini, New Delhi,” in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur. He has been under my guidance and supervision, and his approach to the research study has been sincere, scientific, and analytical.

Faculty Guide

IIHMR University, Jaipur

Date:

School Dean

IIHMR University, Jaipur

Date:

Abstract

Introduction- Turnaround time in PET CT is defined as the time of the entry of a patient into the department, preparing patients and doing scan up to reporting the finding.

Objectives-

- To Estimate the time process at each process in PET CT Department. To study and determine the Turnaround Time of a patient undergoing PET CT Scan.
- To find out the possible reasons for the delay and overall increase in TAT in a PET CT department.
- To suggest interventions to fill the gaps and meet the requirements.
-

Methodology- the study is Descriptive Cross-sectional study conducted in House of Diagnostics, Rohini, Delhi, where appointment time, Injection Time, In time, Out Time, and Reporting time were collected in H.O.D without giving prior information to the patient to avoid biasedness. These times are analyzed on an Excel sheet, and graphical representation is done.

Conclusions- based on the result formed by analyzing the excel sheet among 162 patients, TAT for 133 patients is within 6 hours, and TAT for 29 patients is above 6 hours

Keywords- PET CT, Turnaround Time

Acknowledgment

Firstly praises and hearty thanks to the almighty God who has blessed me blessings throughout the dissertation work to complete it on time and successfully.

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I am extremely grateful to my parents for their love, prayers, caring, and sacrifices to educate and prepare me for my future. I am very much thankful to all the participants of the research work who patiently participated and gave their best responses. I am also grateful to all the members who directly or indirectly gave their level best to make this project a huge success.

Sincerely,

Ajay Rajput

Project Co-Ordinator

Table of Contents

Chapter 1.....	10
Introduction / Background.....	10
Types of PET-CT Scan.....	10
Aim.....	11
Objectives.....	11
Chapter 2.....	11
Review of Literature.....	11
Rationale.....	12
Preparation for PET-CT Scan.....	12
Procedure for the PET CT Scan.....	13
Process flow of patients in PET CT department at House of Diagnostics, Delhi.....	13
Chapter 3.....	13
Methodology.....	13
Chapter 4.....	14
DATA COMPILATION, ANALYSIS AND RESULT.....	14
CONCLUSION.....	16
RECOMMENDATIONS.....	15
References.....	15

Abbreviations

<u>Abbreviations</u>	<u>Full forms</u>
HOD	House of Diagnostics
PET	Positron Emission Tomography
CT	Computed Tomography
TAT	Turn Around Time
PSMA	Prostate Specific Membrane Antigen
FDG	Fluorodeoxyglucose

DISSERTATION REPORT

Chapter 1

Introduction / Background

Turnaround time in PET CT in a diagnostic lab is defined and calculated from the time of the entry of a patient into the respective department, preparing patients and doing up the scan to report the findings.

Radiology is one of the most focused departments in hospital healthcare system. The primary focus of radiology department is to become more efficient and reduce wastage in accordance with the advanced radiological investigation, i.e., PET CT.

According to WHO survey, cancer has been one of the leading causes of morbidity and mortality in developing countries such as INDIA. Imaging findings, among other factors largely guide complex clinical decisions about treatment of oncologic patients. Most of the radiological procedures map the anatomical and morphological features of tumors with little or no information about their metabolism.

PET CT is a diagnostic imaging test primarily which is widely used to detect cancer and several other ailments. The PET-CT scan is a test which is performed on a special PET-CT Machine, that performs the following two scans together:

- **PET Scan:** PET Scan, the abbreviated form of Positron Emission Tomography component marks and denotes the most actively up-taking cells in the body. Prior to the test, a small dose of radioactive tracer is injected into the patient. The injected radioactive tracer molecule is an isotope which is actively taken up by the most active cancer cells in the body. This uptake of the tracer by the cells is measured by the PET scan component of PET/CT scan to highlight and mark most of the cancers.
- **CT Scan:** Computed Tomography or commonly known as CT scan is used for anatomical localization of the body. A diagnostic quality CT scan is performed along with the PET scan for the anatomical evaluation of the tests. Before the scan, it is mandatory that all patients are given oral contrast (positive/negative) to drink. During the scan, intravenous contrast is injected (unless creatinine is high / history of prior allergy / referring physician's discretion).

Types of PET-CT Scan

A doctor advises the patient regarding the preferred tracer to be used for PET CT scan. The following PET scan tracers and protocols are available and used functionally in HOD:

- **Whole Body PET Scan:** [Whole Body 18F-FDG PET CT Scan](#) (18F-Fluoro Deoxy Glucose). This is the most commonly used scan and it comprises of 90% of all PET Scans.
- **For Prostate:** Ga68 labeled PSMA (Prostate-Specific Membrane Antigen) PSMA PET CT SCAN. PSMA is considered better at localizing Prostate Cancer cases as compared to Whole Body FDG PET Scan.

- **For Abdomen:** Whole Body FDG PET-CT with Triple Phase CT Upper Abdomen is preferred.
- **For Cardiac Viability Assessment:** [Cardiac PET-CT](#) (FDG PET CT Scan + Cardiac Test Component on a Gamma Camera) is most commonly used.

Aim

The aim is to study and analyze Turn Around Time (TAT) of patients undergoing PET CT at House of Diagnostics (H.O.D), ROHINI, Delhi and suggest ways to improve it.

Objectives

- To Estimate and calculate the time process at each process in PET CT Department.
- To study and determine the Turnaround Time of a patient undergoing PET CT Scan.
- To find out the possible reasons for the delay and overall increase in TAT in a PET CT department.
- To suggest interventions to fill the gaps and meet the requirements.

Chapter 2

Review of Literature

Research Name/Authors	Location	Literature Review
A Systematic review of PET and PET/CT in oncology: A way to personalize cancer treatment cost-effectively? By Astrid Langer	Institute of Health Economics and Health Care Management, Munich School of Management, Ludwig, Germany.	The study reviewed that the use of PET/CT is of higher relevance as compared to the PET and also found the cost effectiveness of PET/CT in treating cancer when compared to the PET.
Use a decision analysis model to assess the medico-economic implications of FDG PET imaging in diagnosing a solitary pulmonary nodule. By Catherine Lejeune, Kazem Al Zahouri, Marie-Christine WOronoff-Lemsi, Patrick Arveux, Alain Bernard, Christine Binquet, Francis Guilemin	United States	This study was conducted to assess the use of positron emission tomography (PET) in identifying and diagnosing solitary pulmonary nodules (SPNs). During the study a decision analysis model was constructed, and three prime alternatives were compared: First being wait and watch (WW), secondly PET and anatomical computed tomography (PET), and the third CT plus PET (CT+PET). Transition probabilities were estimated from published data and

		consultations with experts. Costs of diagnosis were derived from the renowned French reimbursement scale and the treatment costs were from the national hospital database of diagnosis-related groups.
Use a decision analysis model to assess the cost-effectiveness of 18F-FDG PET in managing metachronous liver metastases of colorectal cancer. By Catherine Lejeune, Kazem Al Zahouri, Marie-Christine WOronoff-Lemsi, Patrick Arveux, Alain Bernard, Christine Binquet, Francis Guilemin	France	The study concluded that PET for diagnosis and staging does not additionally generate survival effectiveness as compared to CT alone. However, the cost savings associated with its use and the improvement of therapeutic management, therefore, justified its generalization in clinical practice.

Rationale

The Turnaround time is one of the major concerns of patients in Radiology Department as imaging is one of the most important aspects of diagnosing a disease.

In House Of Diagnostics, a benchmark for TAT for PET CT is calculated to be within 6 hours starting from the patient's entry into the department; the study is conducted to ensure the benchmark is achieved and increase the efficiency of PET CT department.

Preparation for PET-CT Scan

- **Fasting:** 4-6 hours of compulsory fasting is required. Overnight fasting is preferable. During the period of fasting, only plain water is allowed and recommended.
- **Ongoing Medication:** Patients should inform prior about any ongoing medications that may require special precautions or preparation for their examination.
- **Advice for Diabetics for [Whole-Body PET CT Scan](#):** Diabetic patients are advised to have a light breakfast at 6:00 am on the day of the test, and must follow the advised prescription. It is important that the patient does not to miss the diabetic medications on the morning of the test. The patient should inform the concerned lab person about their diabetic prescription for them to plan the needful for the test.
- **Creatinine And Urea Tests:** It is mandatory to have blood test levels for Serum [Creatinine](#) and [Urea](#) checked prior to the examination.
- **Clinical Records:** While coming for PET scan patients must make sure to carry all their relevant medical records for reference (Doctor's prescription, previous CT/MRI films along with reports, treatment summary, discharge papers, surgery details, biopsy/post surgery histopathology reports etc.). Submission of such clinical records helps the doctor to work up and identify patient case-specific diagnostic detailing.

- **Old Records:** If a previous PET scan has been performed, the patient should not forget to bring a DICOM version in a CD and reports. Without CD of the previous PET scans, comparison for measuring improvement or deterioration of cancer will be difficult.

Procedure for the PET CT Scan

- **Verification of Documents:** According to the allocated time of appointment and location, the reception staff verifies the relevant documents are complete. They ensure that patients carry hospital records, previous scan reports, and images to enable the best-case detailing of themselves. If they are not done in the past few days, the mandatory [Creatinine](#) and [Urea](#) Blood tests are conducted for the test.
- **Checking Vitals:** After obtaining the [Creatinine](#) and [Urea](#), eGFR has to be calculated. The technical team then checks the patient's vitals, rules out the common symptoms such as a fever, and conducts a Blood Glucose Test on the spot for FDG PET Scan cases to ensure Patient's viability for the scan.
- **Administration of the Tracer:** After checking the vitals, PET tracers will be administered and will be given oral contrast to ingest orally and wait till the medicine gets absorbed in the patient's body.
- **PET CT Scan Conducted:** Patient is advised to lay down in the machine for a few minutes and follow the Nuclear Physicist's instructions for the PET CT scan to be conducted.
- **IV Contrast and PET CECT Scan:** Unless contrast is contra-indicated or creatinine is observed to be high, IV Contrast is then injected via a Pressure Injector for CT Contrast. After Contrast is Injected, the PET-CT scan with contrast is conducted.
- **Wait for Films and a CD:** In most cases, films and CD are made available within a couple of hours of the scan.
- **Wait for Reports:** Since PET-CT Scan is considered to be a detailed investigation, team of doctors review and report the study within 24 working hours. A patient receives a SMS notification regarding their report as soon as the information is generated.

Process flow of patients in PET CT department at House of Diagnostics, Delhi

Chapter 3

Methodology

Study Design: Qualitative and Observational Study.

Study Area: The study was conducted at the House of Diagnostics, Rohini, Delhi

Study Population: The population of the study will include the patients visiting the centre for PET CT.

Study period: The duration of the study will be three months, starting from the month of March to June.

Sampling Plan:

Method-The data was collected based on convenient sampling. The average flow of patients per day was calculated to be around 12 within working hours from 7 am to 9 pm. An average of five patients per day were taken under study.

- A sample size of 162 patients was selected randomly during the study period.
- Time duration of Study- 1 month.

Mode of data collection:

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

The required data was Collected in a pattern as follows:

- T1- Is the time is taken by the department from the arrival of the patient at appointed time and injecting the patient with medicine.
- T2- Is the waiting time of patient outside the procedure room after injection of the medication.
- T3- Is the considered time taken to conduct the specific scan.
- T4- Is the total time taken to generate the report.



Chapter 4

DATA COMPILATION, ANALYSIS, AND RESULT

The data collected from PET CT department of House of Diagnostics, was analyzed using MS Excel, and visually represented through tables and graphs.

Chart.

The above chart represents the distribution of patients with TAT. A total no. of 162 patients were included in the study. According to HOD benchmark for TAT of PET CT is within 6 hours. Among 162 patients, TAT for 133 patients was seen to be within 6 hours, and TAT for 29 patients was observed to be above 6 hours as compared to benchmark timings.

The Average Tat of 162 patients is calculated to 5 hr and 53 mins.

Table- The following table shows the Average Turnaround time For PET CT

Steps	From-To	The average time taken in Minutes
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CONCLUSION

After analyzing the data, we can conclude that the total tat of PET CT is overall perfect for any organization, which is 82.09% of the cases fall under the benchmark of HOD. The HOD benchmark for TAT of PET CT is within 6 hours. Amongst 162 patients observed, TAT of 133 patients lies within the range of 6 hours, and TAT of 29 patients is observed to lie above the benchmark of 6 hours. **The Average Tat of 162 patients is calculated to five hrs. and 53 mins.**

RECOMMENDATIONS

- Reminder messages or calls should be done a day prior to the test to the patient who has booked the appointment of PET CT to come at an appointed time.
- Effective communication can be obtained and cultivated by organizing knowledge enhancement training for registration of staff regarding various protocols of PET CT department.
- Patient should be strictly guided about the medication and fasting rule to avoid delay in tests by this carelessness of patient.
- Vital parameters like Creatinine, Urea, and GFR level must be checked a day before the test by the patient to reduce the time to wait for report on the same day of the test.
- In the Appointment system, we can made several changes, by appointing the patient at a gap of several minutes so that the gap between injection time and In Time time can of the patient can be reduced which will improve the overall TAT.

References

Taylor & Francis. 2022. *What Is the TAT? A Review of Ten Years of Research*. [online] Available at: <<https://www.tandfonline.com/doi/abs/10.1080/00223891.1990.9674114>> [Accessed 1 July 2022].

Hawkins, R., 2022. *Laboratory Turnaround Time*. [online] PubMed Central (PMC). Available at: <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2282400/>> [Accessed 1 July 2022].

Wankar, A., 2022. *Study of determination of laboratory turnaround time in tertiary care hospital in India*. [online] Msjonline.org. Available at: <<https://www.msjonline.org/index.php/ijrms/article/view/2430>> [Accessed 1 July 2022].

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Internet, journals and e-journals.