

Analyzing the Turnaround Time in the Department of Laboratory Services at a Tertiary Care Hospital, Durgapur

By

Gayatri Ahlawat

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

Academic year, 2017-2019



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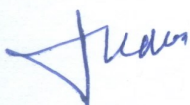
TO WHOM SO EVER IT MAY CONCERN

This is to certify that Dr. Gayatri Ahlawat, student of MBA Hospital and Health Management from The IIHMR University, Jaipur has undergone internship training at The Mission Hospital, Durgapur from 04th Feb 2019 to 30th April 2019.

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

The Internship is in fulfilment of the course requirements.

I wish her all success in all her future endeavors.

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

Dr. Ashok Kaushik

Dean, Academics and Student Affairs

The IIHMR University, Jaipur.

15 May 19

A handwritten signature in black ink, appearing to read 'Sandesh Kumar Sharma'.

Dr. Sandesh Kumar Sharma

Associate Professor

The IIHMR University, Jaipur.



Ref: TMH/HRD/OG/April/19/92

Date: 01/05/19

TO WHOM IT MAY CONCERN

This is to certify that **Dr. Gayatri Ahlawat** has done three months dissertation on **A Study on Redesigning the Department of Laboratory Medicine: Challenges & Opportunities at The Mission Hospital, Durgapur, West Bengal** from 04/02/2019 to 30/04/2019.

During the period of dissertation **Dr. Gayatri Ahlawat** has been found sincere, hard working & having an attitude to learn.

We wish her a successful future and brilliant professional career ahead.

For The Mission Hospital, Durgapur


Ramesh Lall
Sr. General Manager - HR

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled '**Analyzing the Turnaround time in the Department of Laboratory Services at a tertiary care hospital**' in The Mission Hospital, Durgapur submitted by Dr. Gayatri Ahlawat Enrollment No. IIHMR-U/01/2017-19/0566 under the supervision of Dr. Sandesh Kumar Sharma for award of MBA in Hospital and Health Management in Health and Hospitals of the University carried out during the period from 04th Feb 2019 to 30th April 2019 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


Dr. GAYATRI AHLAWAT

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ABBREVIATIONS

TAT- Turnaround Time

NABL- National Accreditation Board for Calibration and Testing Laboratories

IPD- In-patient Departments

OPD- Out-patient Departments

Dept. – Department

LIS- Laboratory Information System

ED- Emergency Department

LOS- Length of Stay

ABSTRACT

Title- Analyzing the turnaround time in the Department of Laboratory Services at a tertiary care hospital, Durgapur

Introduction

Lab investigations are essential in patient management and qualities of the tests reports are emphasized. But there is another aspect of quality which is often overlooked and that is timeliness which is expressed as turnaround time (TAT). But still there is no clear definition of TAT, as to which period should be included in determining TAT for a specific test. For laboratory personnel, it would be from the time of receipt of sample in laboratory till report is generated. However, for a clinician, it would be appropriate from the time of his/her requisition of a test till the report reaches him/her. TAT depends on various factors working within the laboratory as well as outside the laboratory. All three phases which are pre-analytical, analytical and post analytical affect overall TAT of the laboratory.

Objective

The main objective of the study was to analyze the reasons for delayed TAT in the department of laboratory services at a tertiary care hospital and provide further recommendations.

Methodology

An observational cross-sectional study was conducted with an inclusion criteria of reports generated from Biochemistry, Hematology and Microbiology and Serology between 8:00 am to 6:00 pm and the departments of Clinical pathology and Histopathology and Cytopathology were kept in exclusion criteria. A total of 900 sample size was taken, 450 in-patients and 450 out

patients and the study was carried out in five phases each phase having twelve days. The data was collected through a pre designed checklist from LIS.

Results

TAT for OPD was the highest when compared with the IPD and STAT TAT which was around 4:47:23 followed by 4:01:22 and 3:50:32 respectively. It was noticed that highest verification TAT was seen in Biochemistry department for all the cases except for STAT cases. The highest STAT verification TAT was noticed in Serology Department. During the study it was noticed that less sample transportation time was taken for IPD samples to reach the laboratory than the OPD samples.

Conclusion

The study states that there are many outliers which affect the TAT of the laboratory and to reduce the TAT one needs to work on all phases- pre-analytical, analytical and post analytical as these are interrelated and monitoring of these will not help in improving the TAT but will help in ensuring quality control also. It was noticed that main delay in TAT was due to delay in verification of test reports by the laboratory consultants followed by frequent equipment breakdown, manpower shortage and lack of senior management involvement in monitoring and policy making to smoothen the workflow.

INTRODUCTION

A medical laboratory or clinical laboratory is a laboratory where clinical pathology tests are carried out on clinical specimens to obtain information about the health of a patient to aid in diagnosis, treatment, and prevention of disease.

Lab investigations are essential in patient management and qualities of the tests reports are emphasized. But there is another aspect of quality which is often overlooked and that is timeliness which is expressed as turnaround time (TAT). Mostly the laboratory services are directed at providing a rapid, reliable report at a reasonable cost. However, most laboratories put undue stress on only reliability, whereas the clinician gives more stress on how soon (TAT) a report would be available to them. One of the important reasons for that can be to increase the efficiency of the clinicians by making the decisions regarding the patient treatment during morning rounds only so that for any modification in the treatment the clinician need not to visit the patient again and the other reason could be to reduce the length of hospital stay of the patients, by discharging the patients as early as possible.

But still there is no clear definition of TAT, as to which period should be included in determining TAT for a specific test. For laboratory personnel, it would be from the time of receipt of sample in laboratory till report is generated. However, for a clinician, it would be appropriate from the time of his/her requisition of a test till the report reaches him/her.

The TAT would not be similar for routine tests versus in STAT/urgent tests. Hospital computerization with record of time from test request, sample collection, report generation and receipt of report by clinician would help in generating TAT. Analyzing outliers in TAT in a lab gives insight of causes of delay in TAT and the areas which need improvement.

The study is focused on improving the laboratory workflow by analyzing the process flow of laboratory and TAT.

RESEARCH QUESTIONS

- 1) What could be the reasons for delayed turnaround time in the department of laboratory services at a tertiary care hospital, Durgapur?

OBJECTIVES

- a) To determine the turnaround time of the department of laboratory services
- b) To identify reasons which lead to delayed TAT and give suggestions

REVIEW OF LITERATURE

Hara P. Pati et al in his article “Turnaround Time (TAT): Difference in Concept for Laboratory and Clinician” stated that most laboratories put undue stress on only reliability, whereas the clinician gives more stress on how soon (TAT) a report would be available to them. There is no clear definition of TAT, as to which period should be included in determining TAT for a specific test. For laboratory personnel, it would be from the time of receipt of sample in laboratory till report is generated. However, for a clinician, it would appropriate from the time of his/her requisition of a test till the report reaches him/her. (1)

Joan H. Howanitz et al in his paper “Laboratory Results: Timeliness as a Quality Attribute and Strategy” stated that timeliness in reporting of laboratory results undoubtedly affects clinician and patient satisfaction as well as length of hospital stay.(2)

Xavier Bossuyt et al in his article “Laboratory Medicine: Challenges and Opportunities” stated that current developments may affect the future of laboratory medicine and how to deal with these changes. We argue that to be prepared for the future, clinical laboratories should enhance efficiency and reduce costs by forming alliances and networks;

consolidating, integrating, or outsourcing; and more importantly, create additional value by providing knowledge services related to in vitro diagnostics.(3)

According to an article “Three Strategies for Reducing Lab Turnaround Time” in AACCC (American Association for Clinical Chemistry) stated that automation, electric track vehicle, auto-verification of results have a positive effect on test processing and it reduces the turnaround time (TAT).(4)

Pamela G Manor in an article “Turnaround Times in Laboratory: A review of literature” stated that more than 80% of laboratories receive complaints about test TAT. It was found that delayed TAT not only increases dissatisfaction among patients but also increases the length of stay of patients in the hospitals. (5)

Nitin Kaushik et al in an article “Reduction in Laboratory Turnaround time decreases emergency room length of stay” stated that rapid turnaround of laboratory tests can optimize ED throughput by reducing the length of stay (LOS) and improving patient outcomes. (6)

Robert C Hawkins in an article “Laboratory Turnaround Time” stated that TAT continues to be a cause of customer dissatisfaction with the laboratory service. Laboratory staff can feel frustrated when the effects of improvements in intra-laboratory TAT are diluted by pre-analytical and post-analytical factors seemingly outside their control. It was suggested that all common laboratory tests should ideally be reported as fast as possible by methods yielding high quality results, suggesting 60 minutes or less from sample registration to reporting under optimal conditions. (7)

Bruce A. Jones et al in an article “Physician satisfaction with clinical laboratory services” stated that most of the physicians show satisfaction about laboratory test results reliability and accuracy whereas the turnaround time is area of dissatisfaction and show an opportunity of improvement. (8)

Paul Valenstein in his article “Laboratory Turnaround Time” stated that the speed with which laboratory results are reported impacts the institution as well as the patient. When results of routine laboratory tests are delayed, physicians show a tendency to reorder the same test which puts an extra cost on the hospital. In the study it was stated that more than four fifths of hospital-based laboratories receive complaints about test turnaround time. Pressure to discharge inpatients as quickly as possible, and intense competition in

the outpatient testing marketplace, are likely to heighten clinicians' demands for more rapid laboratory turnaround time in the future.(9)

Steven J. Steindel et al in his study “Using Outlier Events to Monitor Turnaround Time” mentioned that many laboratories analyzing multiple time intervals helps in locating areas where the delay occur and needs improvement. During the study three phases of laboratory work flow were studied which were pre-analytical, analytical and post analytical and outliers were noticed in all phases which can affect the overall TAT of the laboratory. (10)

METHODOLOGY

The study was carried out in Department of Laboratory of The Mission Hospital, Durgapur.

Research Design: - Cross-sectional Observational Study

Duration of the Study: - The study was conducted for a period of three months (Feb. – April 2019)

Study Population: -

- **Inclusion Criteria-** All the reports generated from Biochemistry, Hematology and Microbiology and Serology from 8:00am to 6:00pm were included.
- **Exclusion Criteria-** All the reports generated from Clinical Pathology and Histopathology and Cytopathology.

Study Tools

The data for the study was collected through

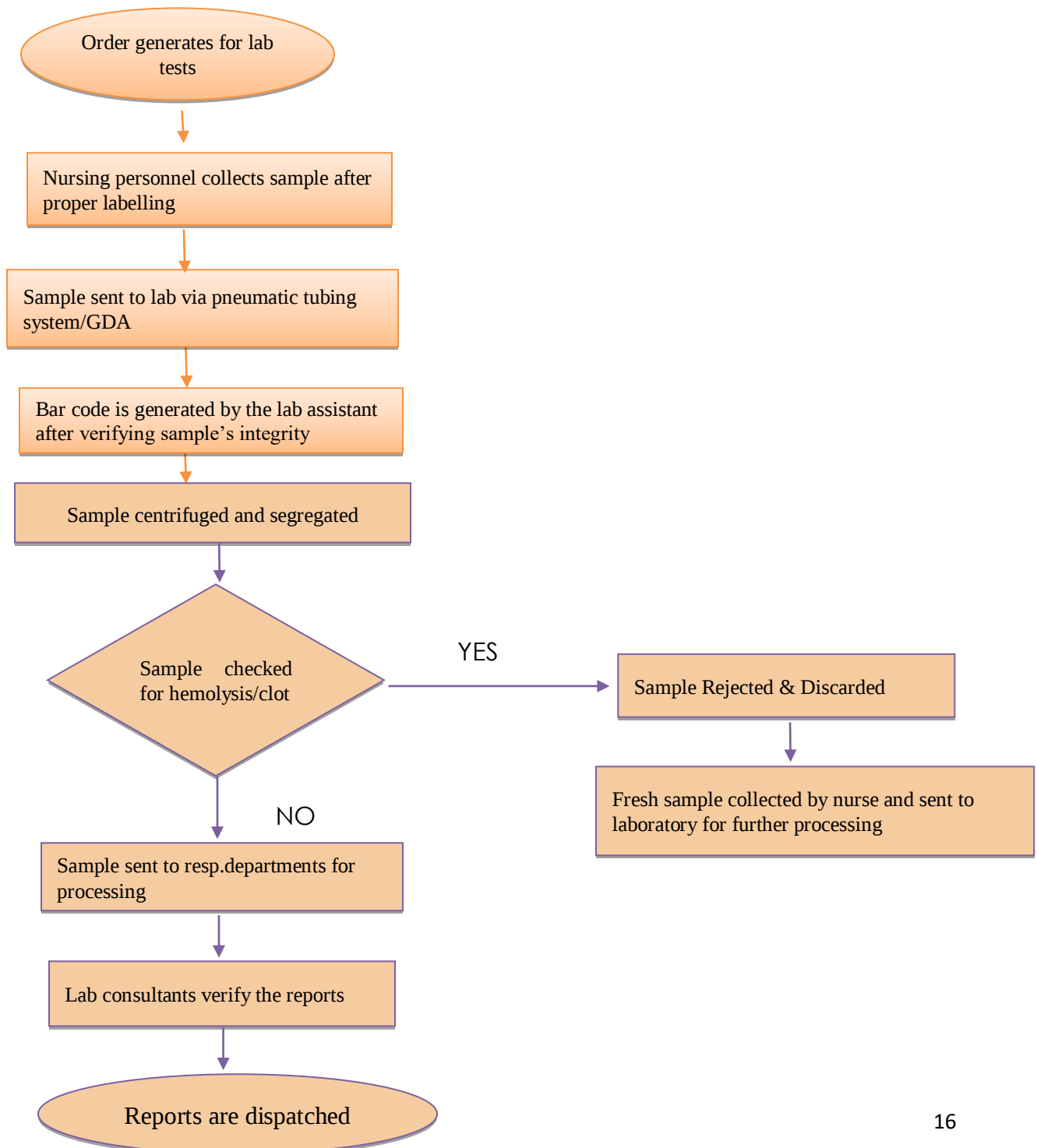
- checklist

Sample Size: - 450 In- patients and 450 Out patients (10% of the total population)

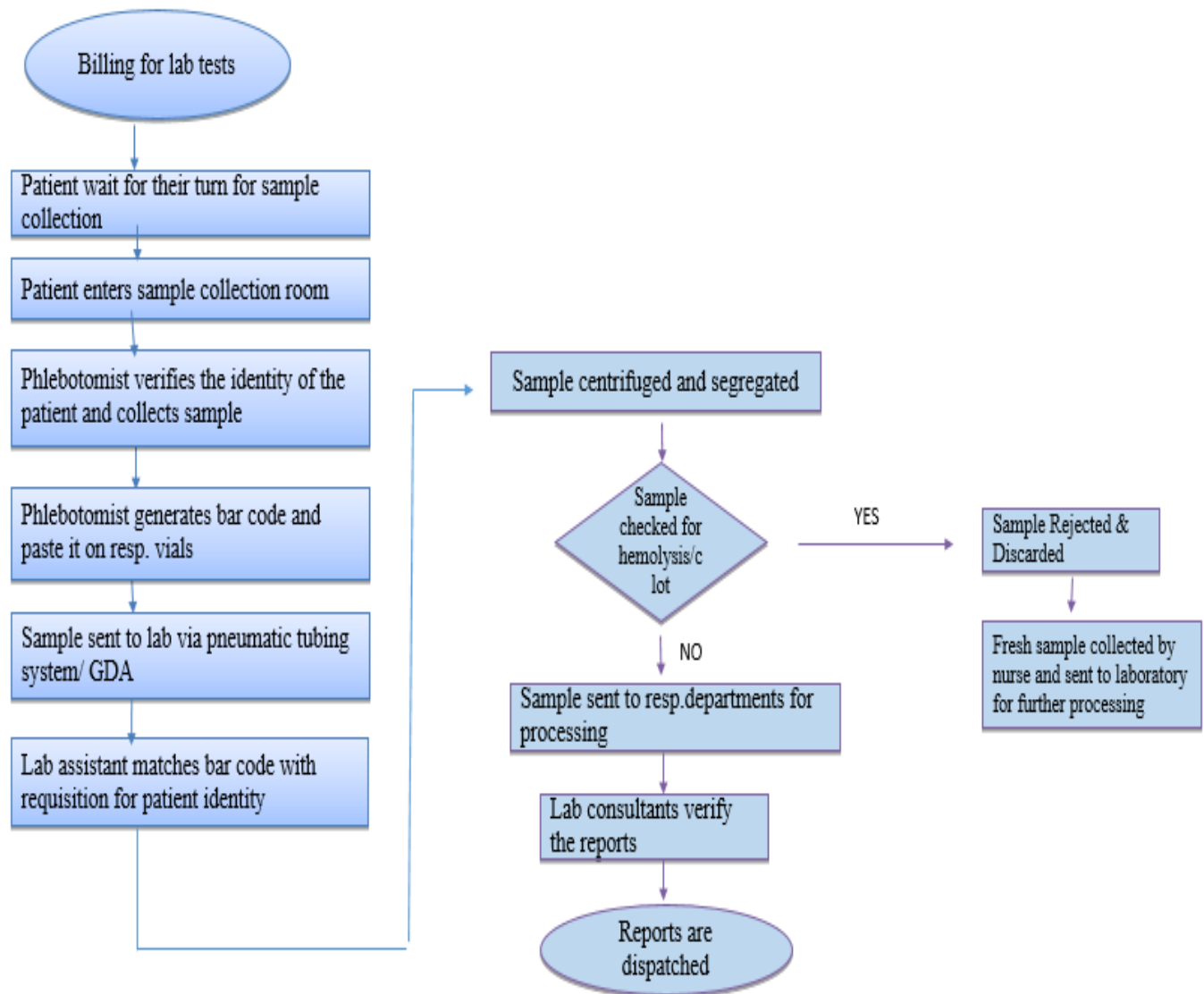
Sampling Technique: - Convenient Sampling Technique

Laboratory Work Flow Figure 1 Laboratory Work flow

-IPD Work Flow



-OPD Work Flow



Data Analysis

The study included 450 in-patients and 450 out patients.

The study was conducted in five phases which included twelve days in each phase.

The below graph shows the turnaround time of IPD in all phases which was highest during the Phase 3 that was 4 hours 38 minutes and the lowest was seen in Phase 1 which was 3 hours 23 minutes.

When the Average IPD TAT was calculated based on the present data it came to be 4 hours.

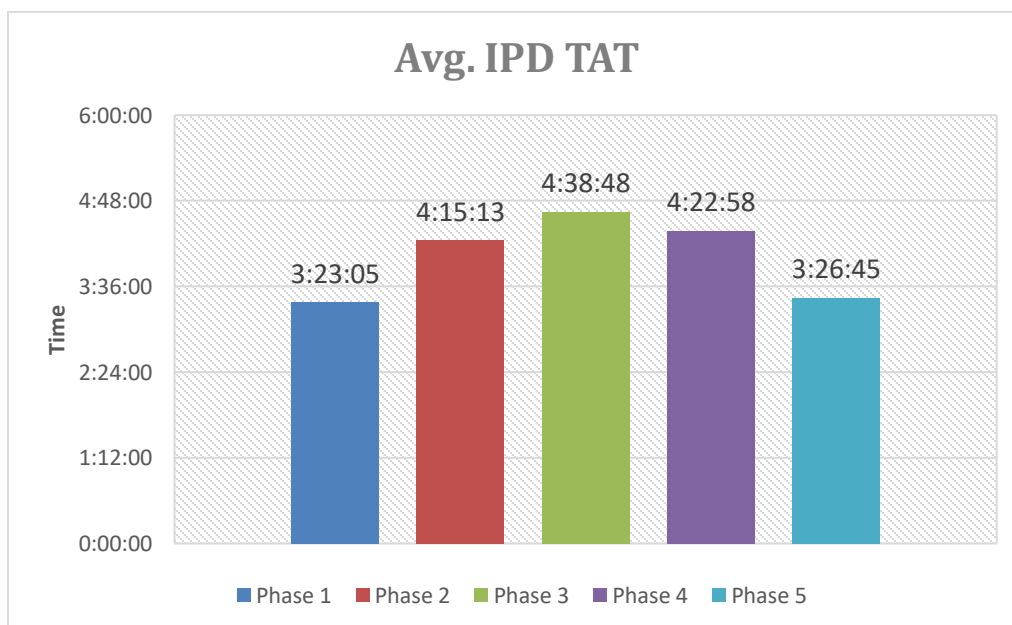


Figure 2 Average IPD TAT

To find out the reasons of increased IPD TAT, various turnaround times were calculated which included-

Sample Acceptance TAT (time difference between sample acceptance and sample collection)

Result Generation TAT (time difference between result generation of tests and the sample acceptance)

Verification TAT (time difference between verification of the test results by the laboratory consultants and the result generation time of the tests)

The following graph shows that the transportation time of samples from various places in hospitals till the laboratory receiving area remained almost same during all the five phase and the highest Sample Acceptance TAT was seen in Phase 3 which was approx. 31 minutes.

Result Generation TAT was seen in Phase 1 which was 2 hours 9 minutes and the least was seen in Phase 5 which was 1 hour 14 minutes.

The graph shows that it took the lab consultants approx. 2 hours and 38 minutes to verify the test reports in Phase 4 which was highest among all the Phases and the least time was taken during Phase 1 which was approx. 52 minutes

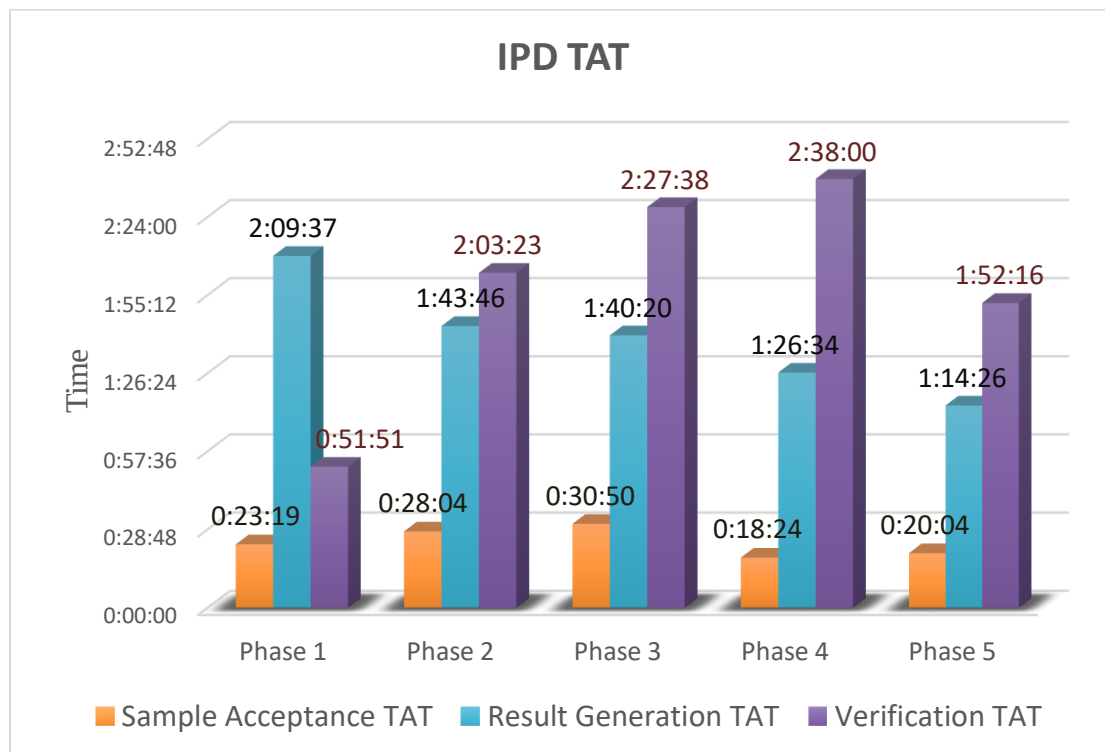


Figure 2.1 Average IPD TAT

The below graph shows that when the department wise Average TAT was calculated for the departments of Biochemistry, Hematology and Serology, the highest turnaround time was noticed in Biochemistry Department which was followed by Hematology and Serology.

NO. Of Reports
 Biochemistry= 212
 Hematology=93
 Serology= 21

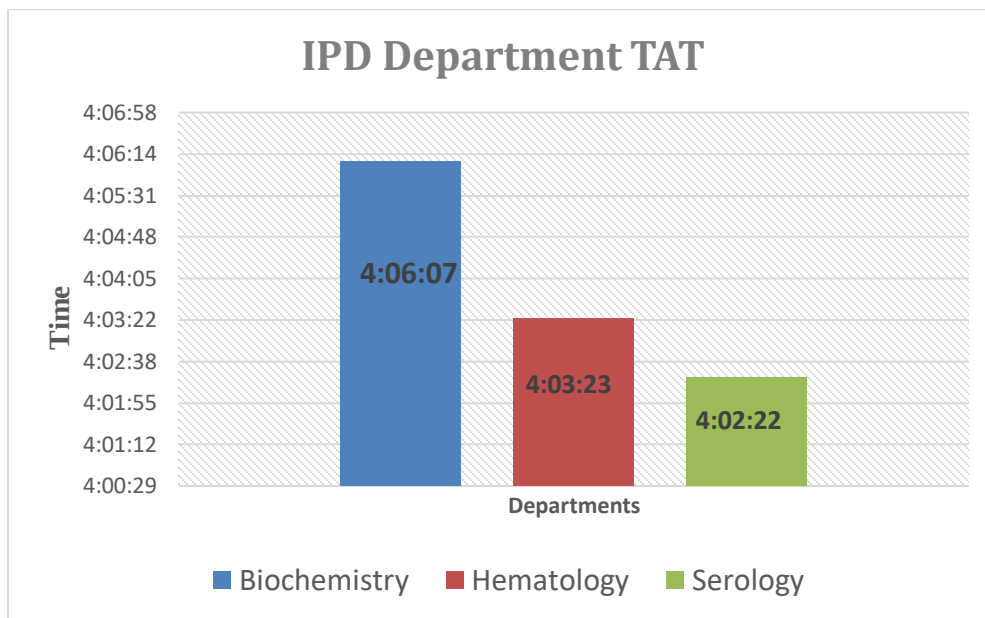


Figure 3 Average IPD Department wise TAT

The graph below shows the verification turnaround time of various departments, the highest time taken by the lab consultants to verify the test reports was by the Biochemistry Department which was 2 hours 6 minutes, although the verification time for other departments was also 2 hours.

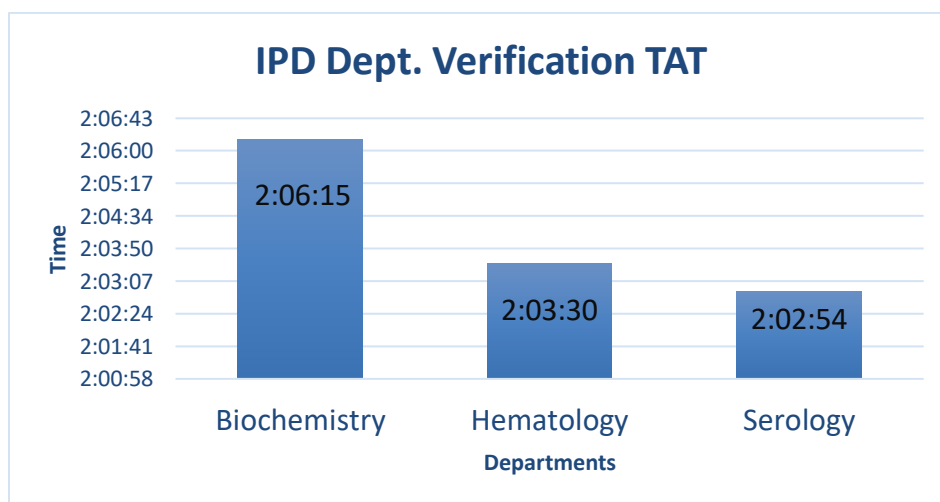


Figure 4 Department wise Verification TAT

The graph below shows the Average Turnaround time of OPD in different phases of the study. The highest Average OPD TAT was seen in Phase 5 which was 5 hours and the least was noticed in Phase 1 which was 4 hours 36 minutes.

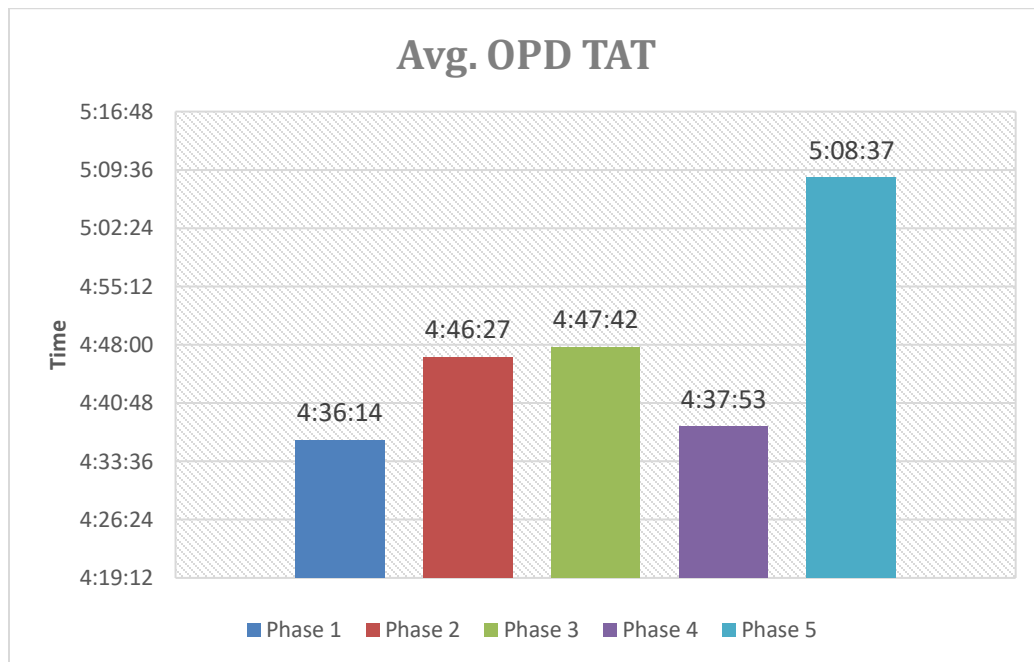


Figure 5 Average OPD TAT

The graph below shows the OPD turnaround times at different steps. The highest verification time was noticed in Phase 5 which was 2 hours 56 minutes and the least time taken for verification of test reports was seen in Phase 3 which was 2 hours 19 minutes.

It was found out that the Sample Acceptance TAT and the Result Generation TAT was almost same for all the phases.

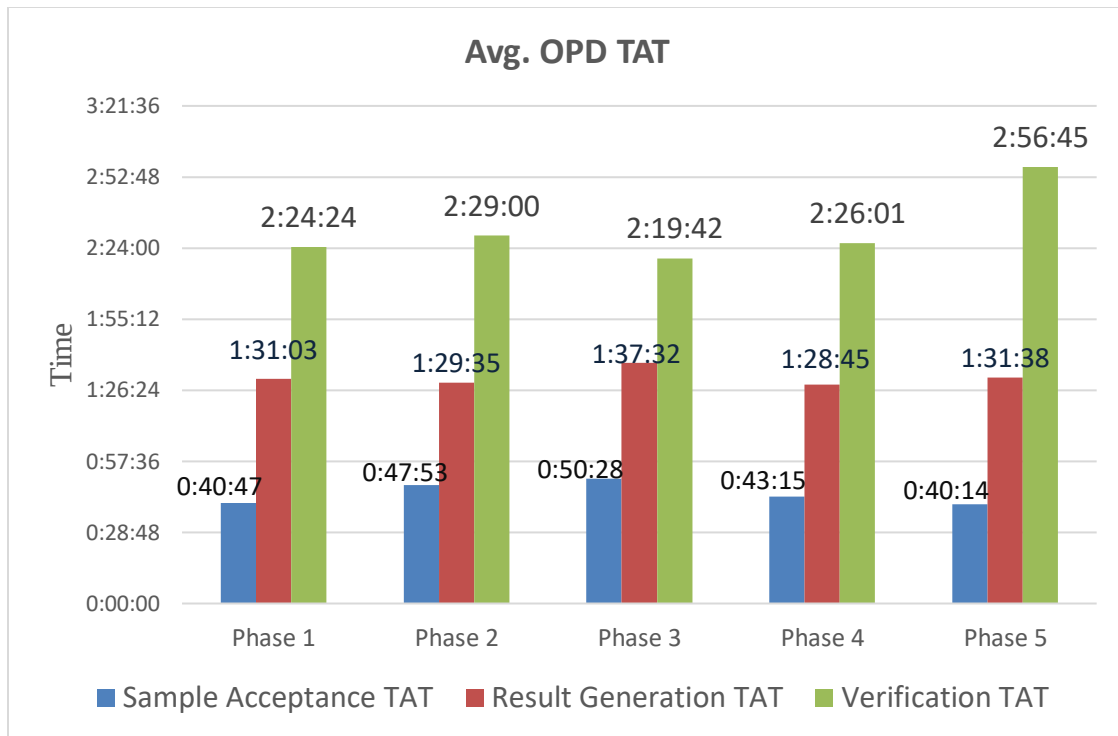


Figure 5.1 Average OPD TAT

The graph below shows the Department wise OPD TAT of Biochemistry, Hematology and Serology. The highest turnaround time was noticed in Biochemistry Department which was 4 hours 47 minutes. The TAT of Hematology and Serology was almost same that was approx. 4 hours 40 minutes.

NO. Of Reports
 Biochemistry= 219
 Hematology=176
 Serology= 61

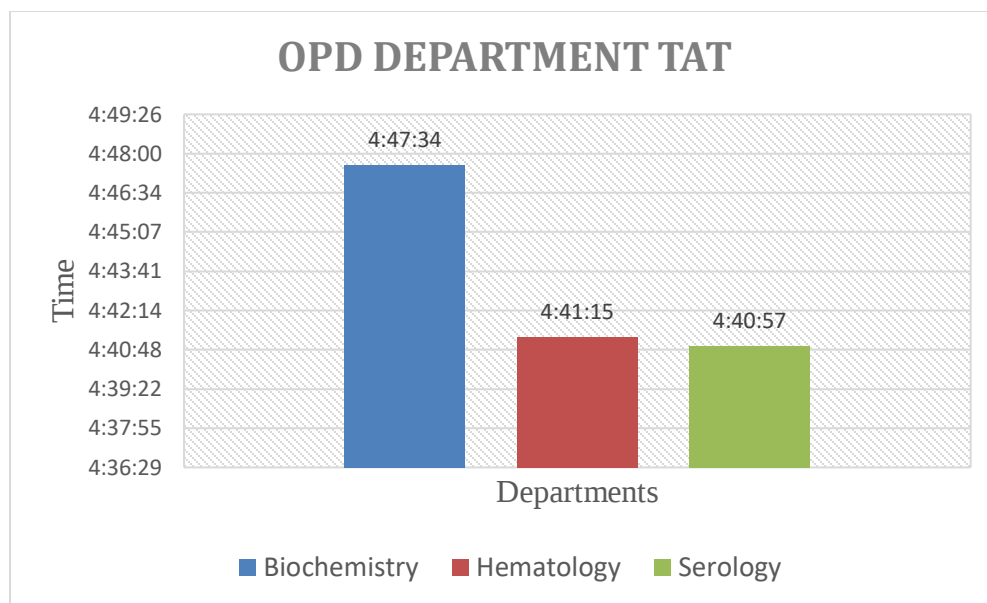


Figure 6 Average OPD Department wise TAT

The following graph shows that in Biochemistry Department the highest average time was taken by the laboratory consultants to verify the test reports which was 2 hours 30 minutes followed by Hematology and Serology.

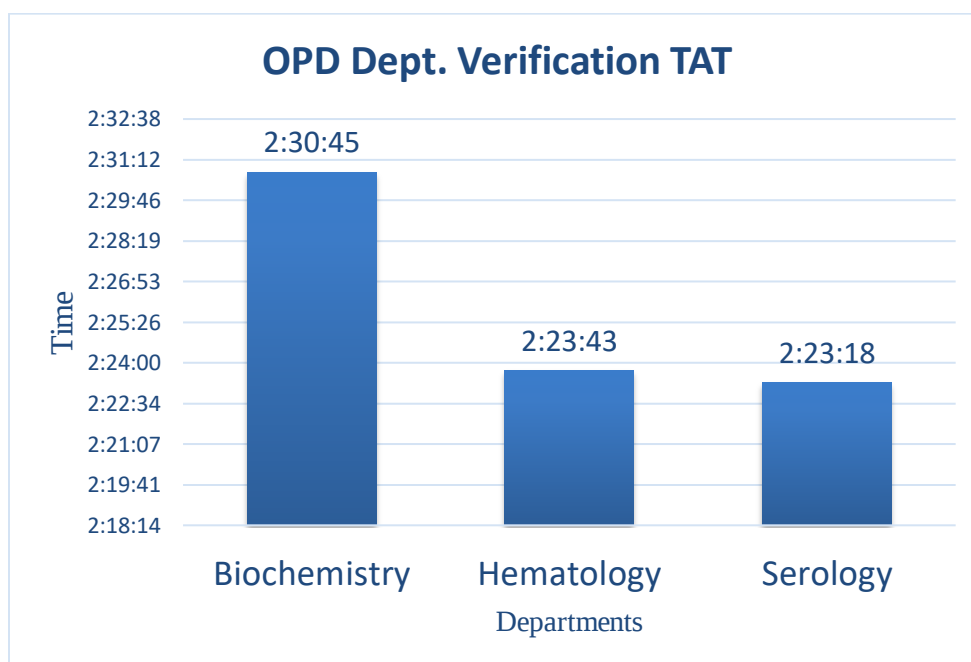


Figure 7 Department wise Verification TAT

The below graph shows the Average STAT TAT for different phases of study. Phase 4 showed the highest turnaround time for STAT or Emergency samples which was 5 hours 9 minutes and the least was noticed in Phase 3.

The Average STAT TAT which was noticed of all the phases was 3 hours 31 minutes.

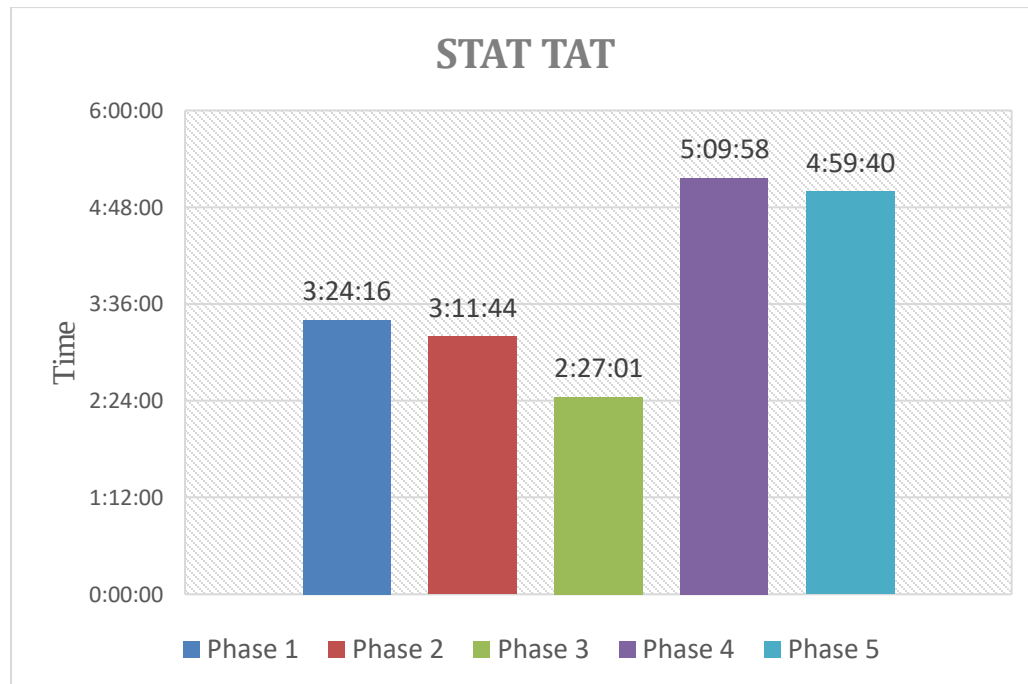


Figure 8 Average STAT TAT

The following graph shows the STAT TAT at various stages the highest verification TAT for STAT test samples was reported in Phase 4 which was 2 hours 58 minutes and the least in Phase 1.

The highest Result generation Turnaround time was seen in Phase 4 which was 1 hour 42 minutes and the highest Sample Acceptance TAT was noticed in Phase 5.

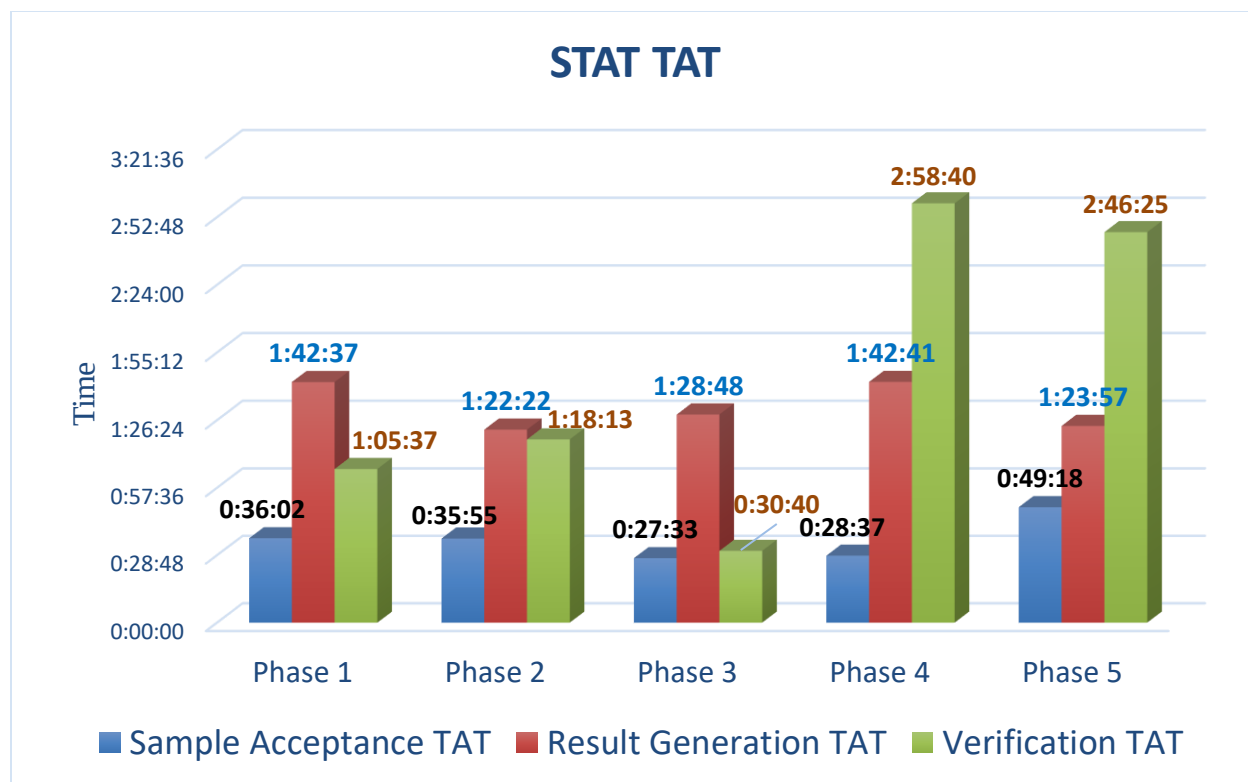


Figure 8.1 Average STAT TAT

The below graph shows the department wise turnaround time of STAT samples. Serology TAT was the highest followed by Biochemistry and Hematology.

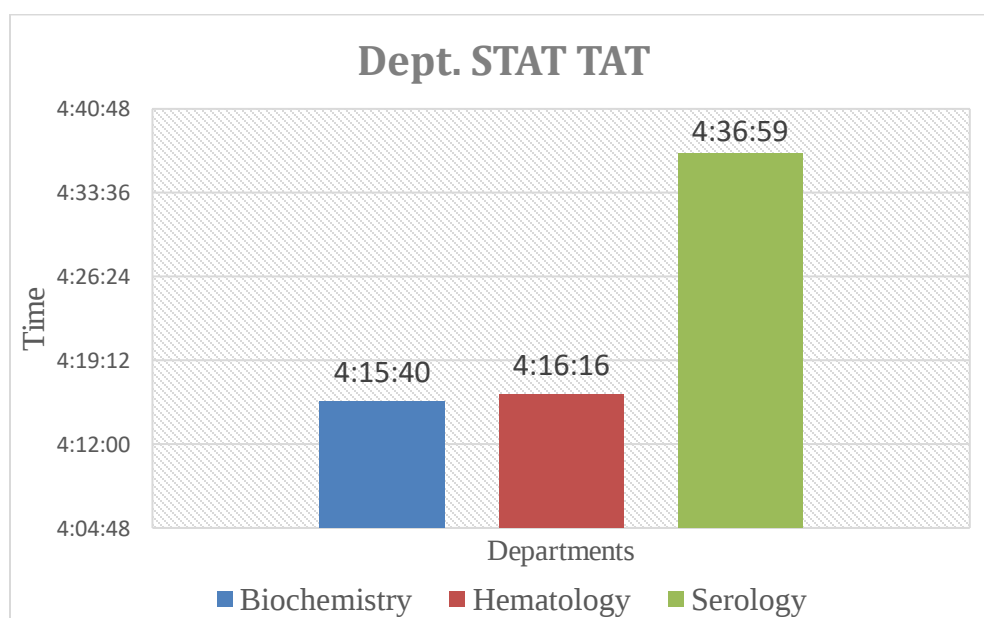


Figure 9 Department wise STAT TAT

NO. Of Reports

Biochemistry= 58
Hematology=42
Serology= 14

The following graph shows the Department wise Verification Turnaround time. It shows that it took 2 hours 29 minutes for Serology consultants to verify the test reports whereas the Verification TAT for Hematology and Biochemistry was same.

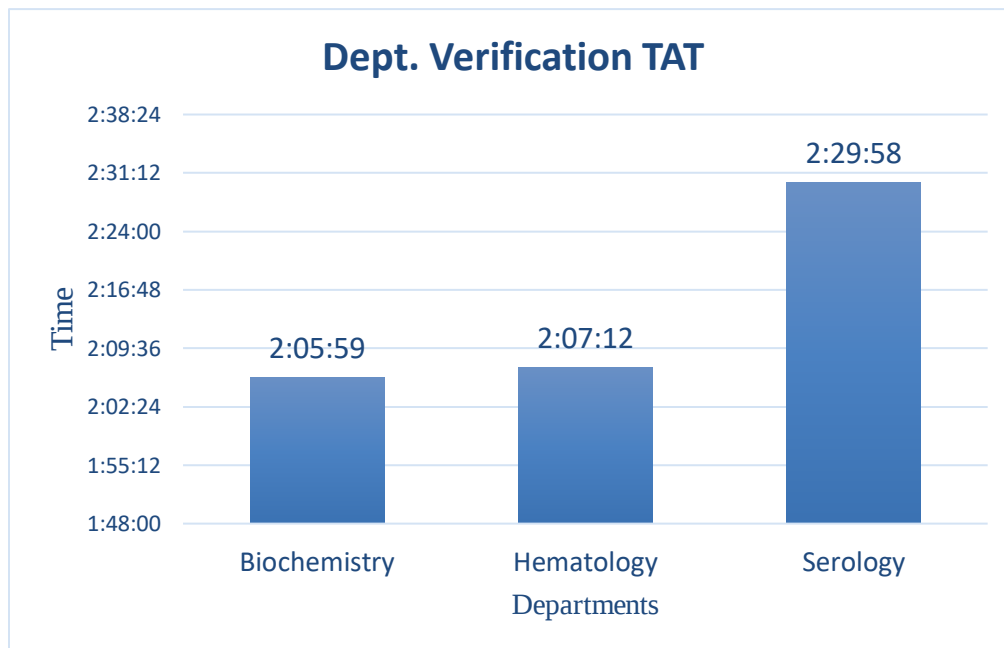


Figure 10 Department wise Verification TAT

The graph below shows the Average turnaround time of IPD, OPD and for STAT samples. OPD TAT was the highest followed by IPD and STAT.

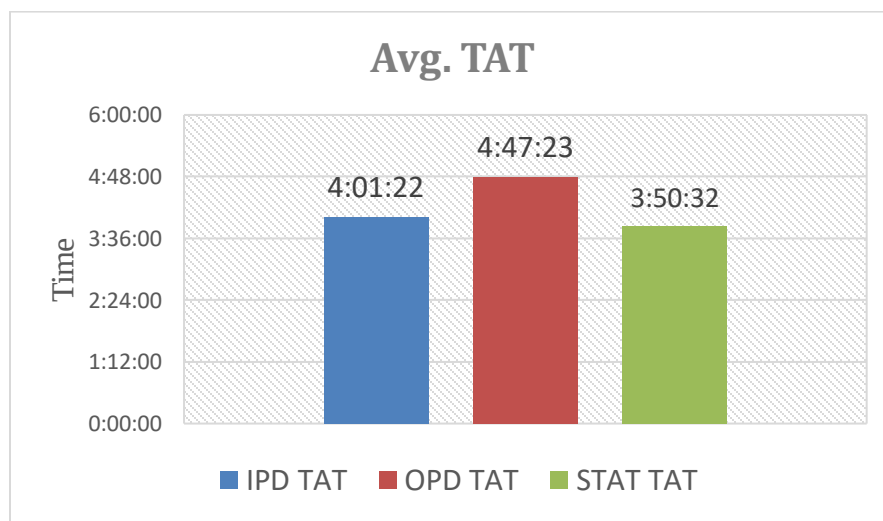


Figure 11 Average Lab TAT

Root Cause Analysis for Increased TAT

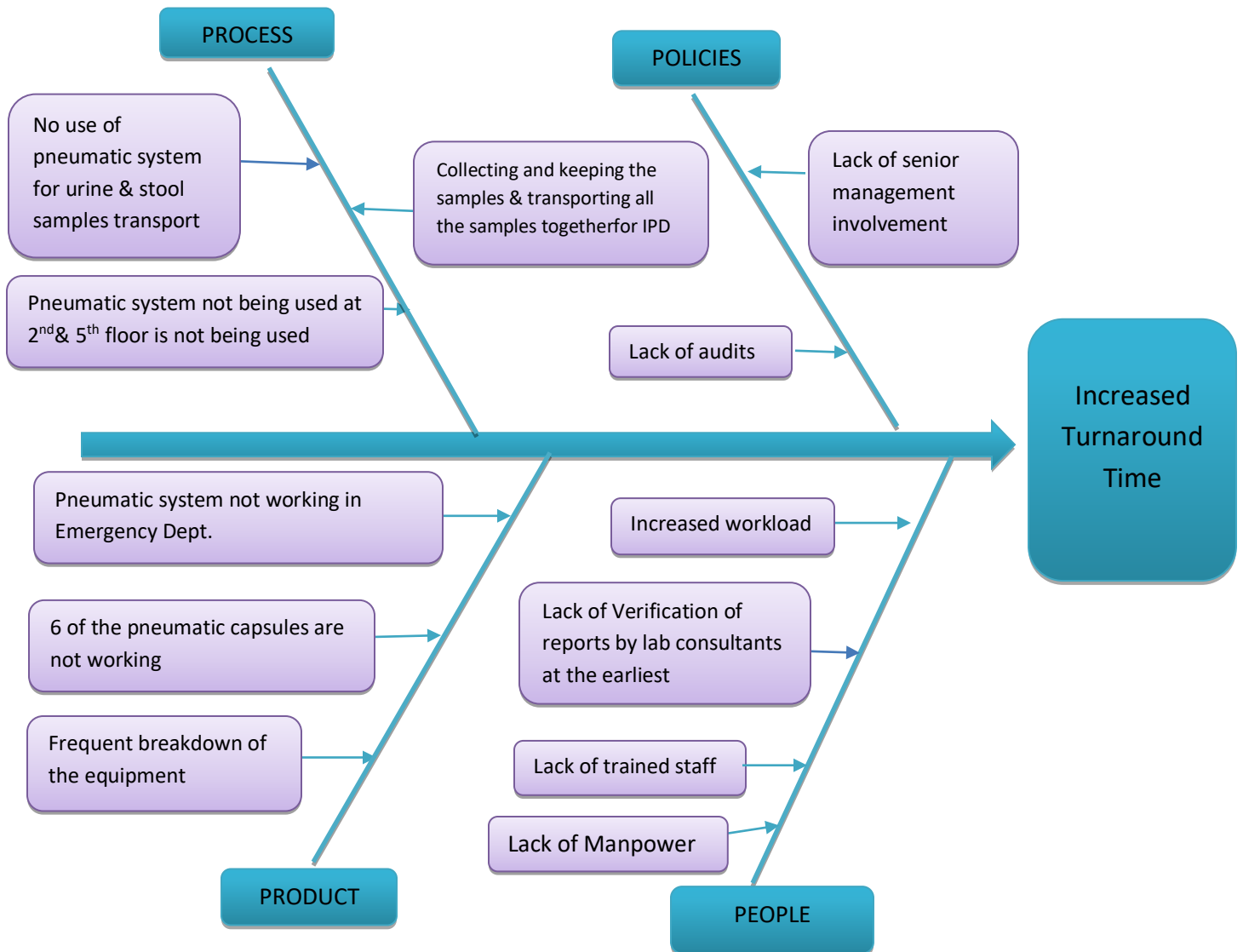


Figure 12 Root Cause Analysis for Increased TAT

SUGGESTIONS

- To improve TAT the management needs to get the pneumatic tube system rectified in ED.
- The nursing staff should be encouraged to use the pneumatic tube system at 2nd and 5th floor to decrease the transportation time of sample.
- The pneumatic capsules should be rectified to decrease the TAT.
- To improve the TAT equipment should be maintained properly as frequent breakdowns were noticed and preventive maintenance needs to do carried out at frequent intervals.
- Regular audits needs to be conducted for monitoring of TAT.
- Implementation of Dry Chemistry can help in improving the TAT.

CONCLUSION

The study states that there are many outliers which affect the TAT of the laboratory and to reduce the TAT one needs to work on all phases- pre-analytical, analytical and post analytical as these are interrelated and monitoring of these will not only help in improving the overall TAT but will help in ensuring quality control. It was noticed that main delay in TAT was due to delay in verification of test reports by the laboratory consultants followed by frequent equipment breakdown and manpower shortage during analytical phase increased the TAT of the result generation and pneumatic tube system breakdown and inefficient use on some places increased the sample acceptance TAT as the transportation was also taking more than required time.

To improve the TAT policies should be formed and implemented and audits should be conducted at regular intervals of time which will not help in patient satisfaction but will also help in reducing the length of stay of patients and fasten the discharge process as well in the hospital.

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