A Study to Analyse the Turnaround Time of the Department of Biochemistry in Barala Hospital & Research Centre, Chomu, Jaipur.

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INTRODUCTION

- There are many factors that determine a Hospital's ability to provide services that satisfy consumer needs, wants and expectations; Turnaround Time (TAT) is one such parameter that plays a role in assessing this standard.
- TAT does not have a certified definition. Hence, we have taken the liberty to define it as:

The time elapsed between when a clinician orders a clinical/diagnostic test, to the time when he receives the results of the same.

- Another classification of time in laboratory differentiates the process into three phases:

1. Pre-Analytical
2. Analytical, and
3. Post-Analytical.

- These divisions are frequently used to classify errors and delays, and hence, are often used for description of TAT. (1)
- To achieve the desired TAT, all the above aspects of the laboratory testing process must be considered.
- This study is focused on improving the laboratory workflow by analysing the process flow of the laboratory and the overall TAT.

RESEARCH QUESTIONS

- What is the average TAT across all three phases of laboratory testing for the IPD, OPD and ER?
- What are the reasons for increased TAT, if any?
- How can the process be improved in order to minimize delays?

OBJECTIVES

This study has been conducted in order to improve the quality of services at the Department of Biochemistry in Barala Hospital & Research Centre, Chomu.

To meet this objective, the following steps were to be taken:

- Develop an understanding of the Process Flow at the Department of Biochemistry, across the ER, IPD and OPD.
- Calculate the TAT in each phase (Pre-Analytical, Analytical and Post-Analytical)
- Identify the reasons for delay, if any.
- Suggest measures to improve the overall TAT.

REVIEW OF LITERATURE

Author	Paper Tittle	Summary
Robert C Hawkins	'*Laboratory Turnaround Time*' (2007)	Set out with the aim being to provide a benchmark of data for setting TAT goals, while stating the importance of monitoring TAT in order to improve quality. His study included the summarizing of measures, definitions and approaches to reduce TAT. In the study, the results suggested that a 90% completion time of less than 60 minutes was an acceptable initial goal. (1)
Hara P Pati et al	'*Turnaround Time (TAT): Difference in Concept for Laboratory and Clinicians*' (2014)	Stated that more importance was normally given to the reliability of tests from the laboratories point of view. Whereas, a clinician gave more importance to how soon a report would be made available to them. In the article, it was realized that there was no clear definition of TAT. For different interested parties such as patients, clinicians and laboratory personnel, TAT had a different meaning. (3)

Author	Paper Tittle	Summary
Andrew Worster	*A Role for Root Cause Analysis in Laboratory Medicine'* (2007)	Was able to attribute the increase in length of stay for the patient was directly proportional to the delay in laboratory testing. The what, why and how of the issues related to performance were identified using root cause analysis. Only a few studies have made use of this approach as a solution tool. Although, amongst its limitations, generalisation to other organisations would be ineffective. (6)
Joan H. Howanitz and Peter J Howanitz	'*Timeliness as a quality attribute and strategy'* (2001)	Stated the importance of timeliness in reporting results at clinical laboratories. Test Results directly affect the patients, and the average length of stay at the hospital. It also affects the clinician and their time taken to provide healthcare services to each patient. The study found that the overall laboratory TAT would be improved substantially by monitoring all the steps involved in reporting, and hence need to monitored diligently. (4)

Author	Paper Tittle	Summary
Abhinav Dileep Wankar	*'Study of determination of laboratory turnaround time in tertiary care hospital in India'* (2014)	Found that there were a number of reasons that contributed to the overall turnaround time. All the three stages namely, Pre, Analytical and Post-Analytical stages need to be monitored and improvements should be made to achieve set standards. (5)
Dr. Bhagyashree K Bhuyar	*'Monitoring of Turnaround time (TAT) in Biochemistry Laboratory of a tertiary care hospital in Karwar'* (2017)	Analyses all the three stages that represent the overall laboratory turnaround time to understand their contributions individually. The Post-Analytical stage represents an opportunity of improvement by implementing an automated process for delivery of verified reports post analyses. (2)

METHODOLOGY

- Study Area – The study was carried out in the Department of Biochemistry Laboratory Services of Barala Hospital & Research Centre, Chomu, Jaipur.
- Study Design – Cross-Sectional Observational Study.
- Study Duration – The study was conducted for a period of three months (1st June 2020– 31st August 2020).
- Study Population – Test ordered for diagnostic services.

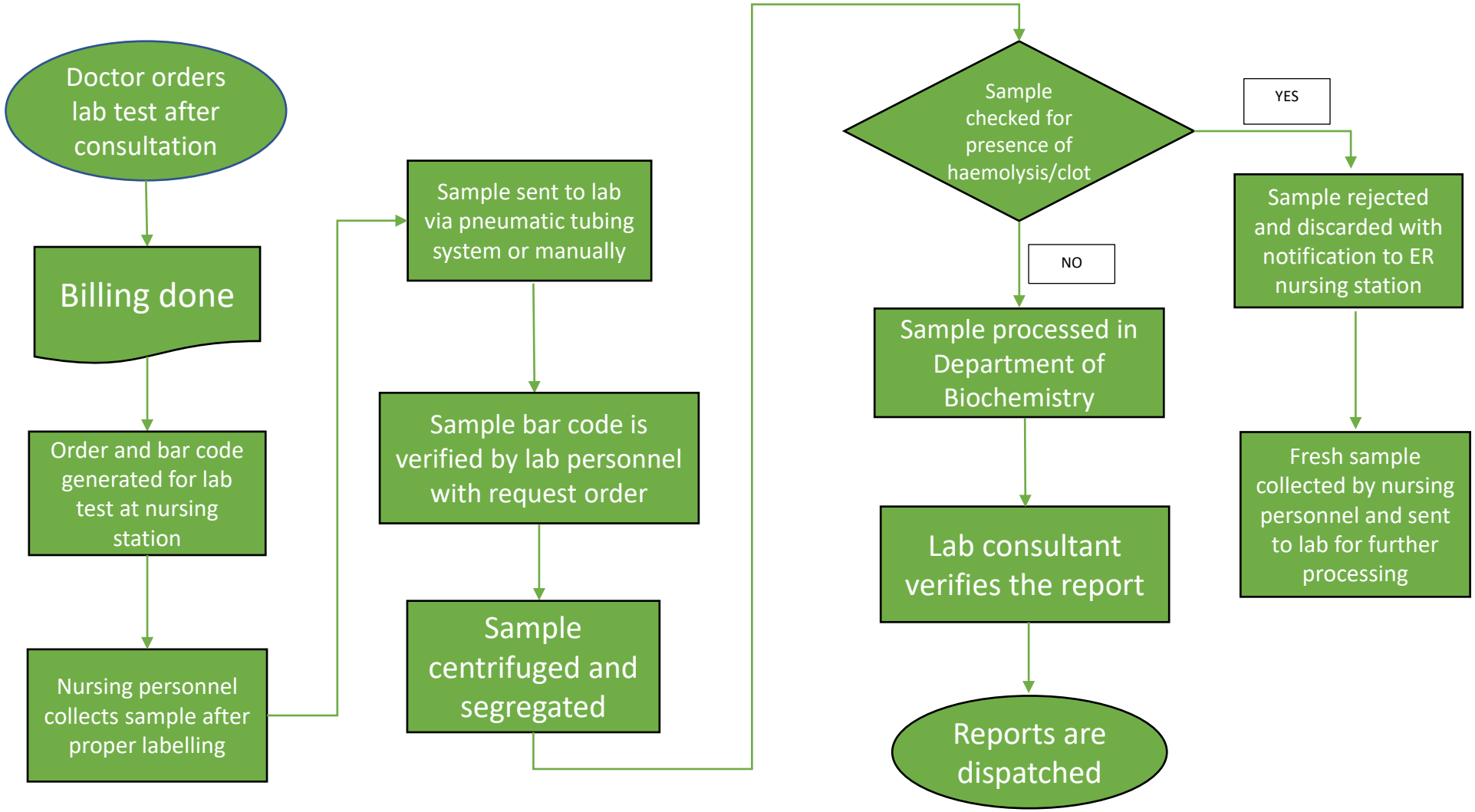
➢ Inclusion Criteria - All the reports generated from the Department of Biochemistry received from the ER, IPD and OPD which were ordered between 10:00 AM to 6:00 PM at Barala Hospital & Research Centre, Chomu.

➢ Exclusion Criteria – All reports generated from the Department of Clinical Pathology, Histopathology, Cytopathology, Hematology, Microbiology and Serology at other units of Barala Hospital & Research Centre.

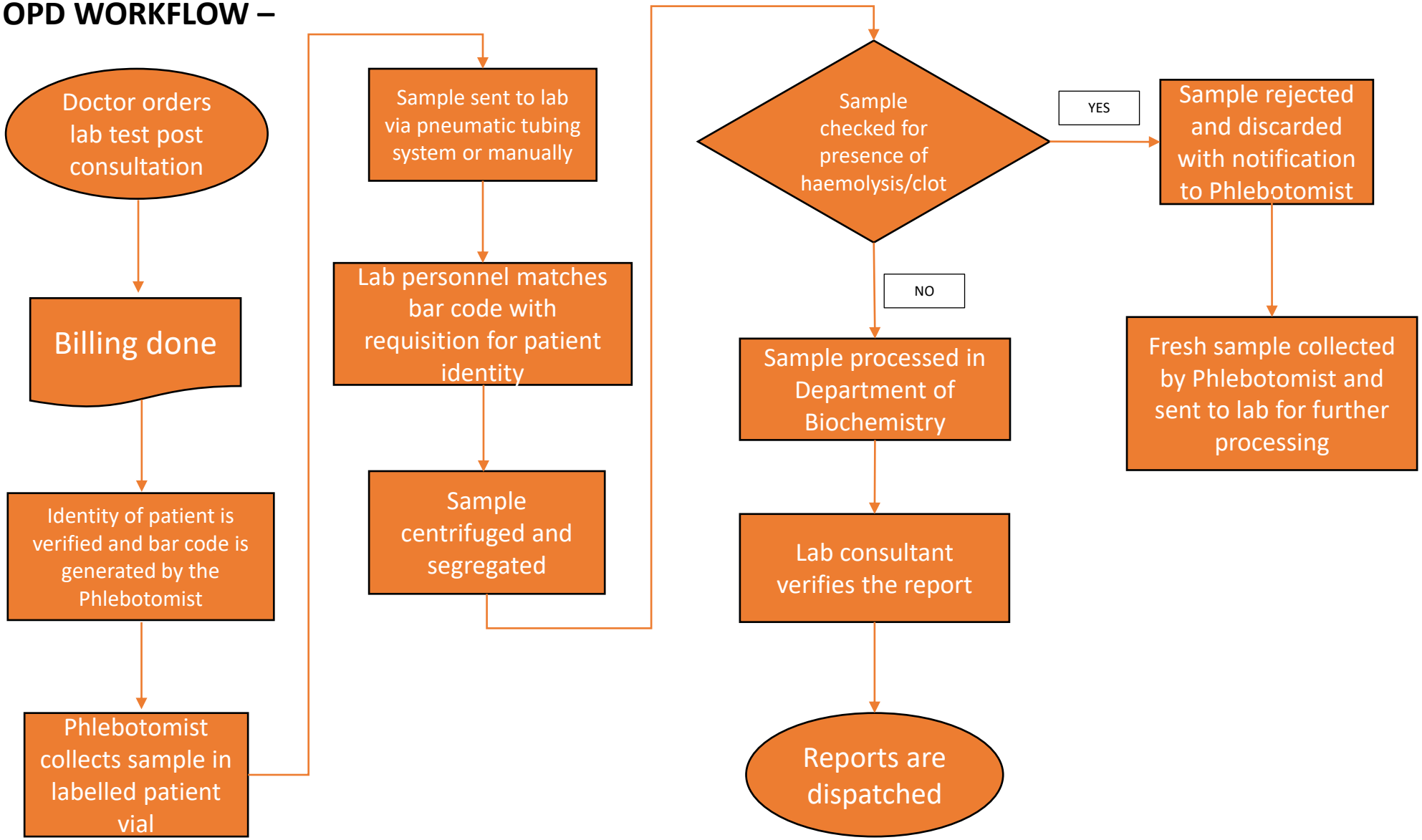
➢ Sample Size – A total of 1,140 samples were analysed from the Department of Biochemistry for this study.

- Sampling Technique – The data analysed was selected at random from the available secondary database of the LIS.
- Study Tools – The data for the study was collected through checklists and secondary data from Laboratory Information Systems in use at Barala Hospital & Research Centre, Chomu.

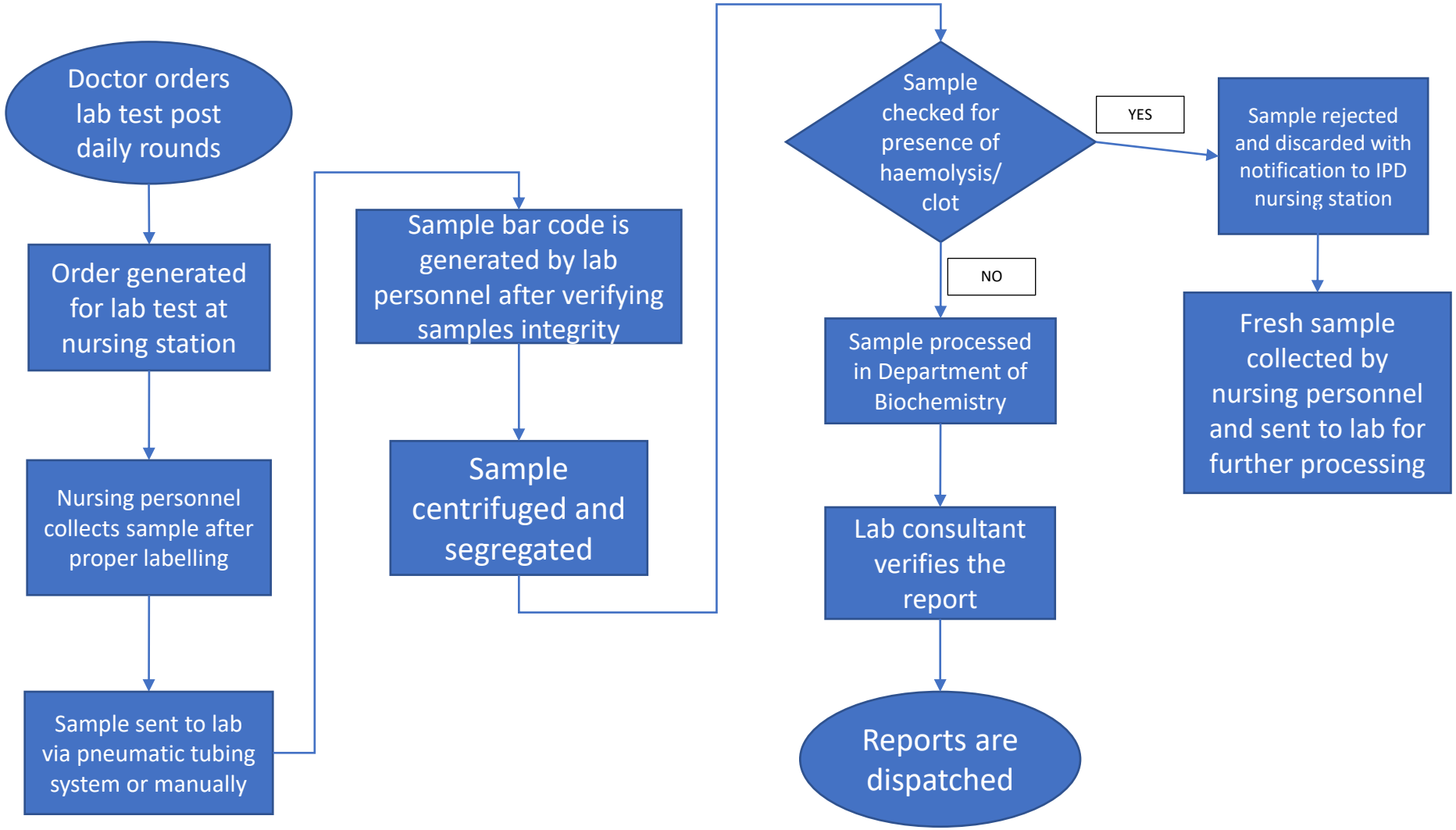
ER WORKFLOW –


Doctor orders lab test after consultation
Billing done
Order and bar code generated for lab test at nursing station
Nursing personnel collects sample after proper labelling
Sample sent to lab via pneumatic tubing system or manually
Sample bar code is verified by lab personnel with request order
Sample centrifuged and segregated
Sample checked for presence of haemolysis/clot
YES
Sample rejected and discarded with notification to ER nursing station
Fresh sample collected by nursing personnel and sent to lab for further processing
NO
Sample processed in Department of Biochemistry
Lab consultant verifies the report
Reports are dispatched

OPD WORKFLOW –



IPD WORKFLOW –



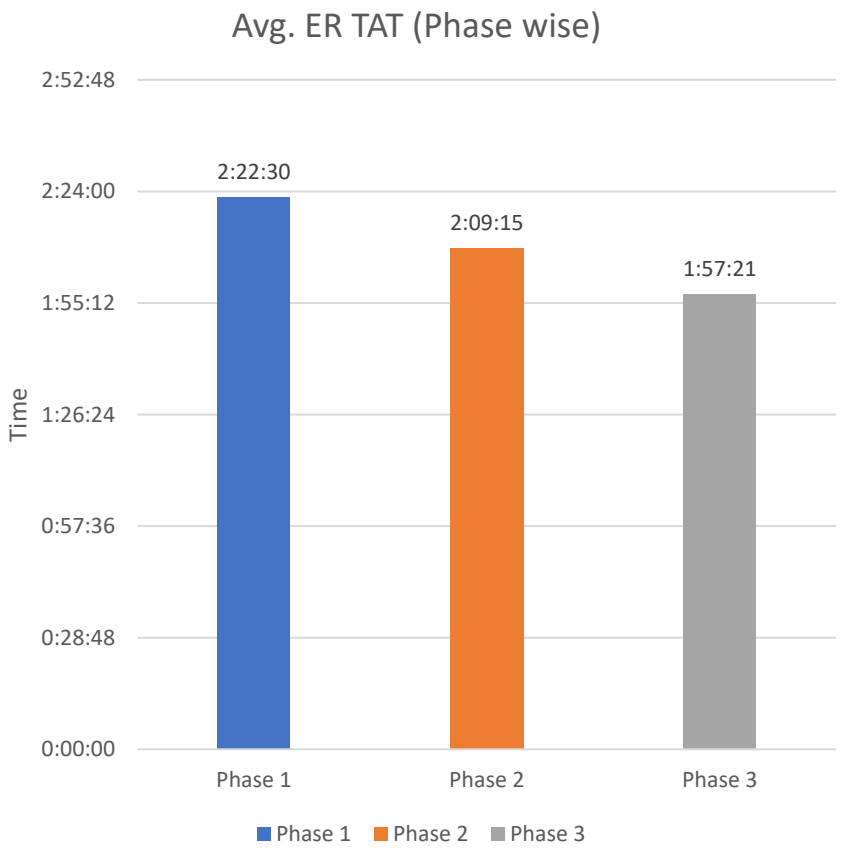
ANALYSIS AND INTERPRETATION

The study included a total of 1140 samples that were collected and analysed from the Department of Biochemistry which were received from three sources namely –

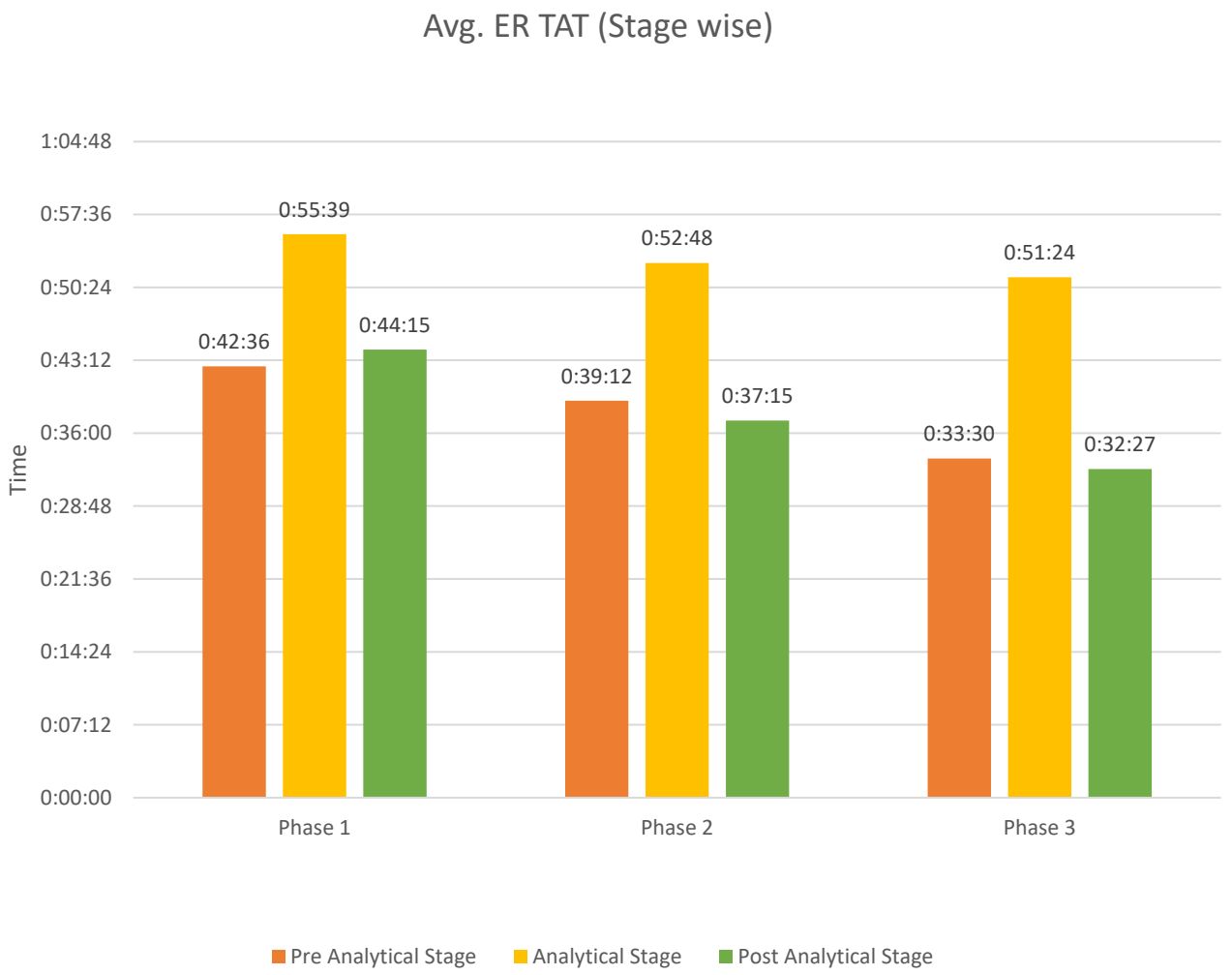
- Emergency Room – 60 test samples
- Out – patient Department – 180 test samples
- In – patient Department – 900 test samples

The study was divided into three phases depending on the time frame of the requisition of the test. Phase 1 samples were analysed between 10:00 AM to 12:30 PM, Phase 2 samples were analysed between 12:31 PM to 3:45 PM and Phase 3 samples were analysed between 3:46 PM to 6:00 PM.

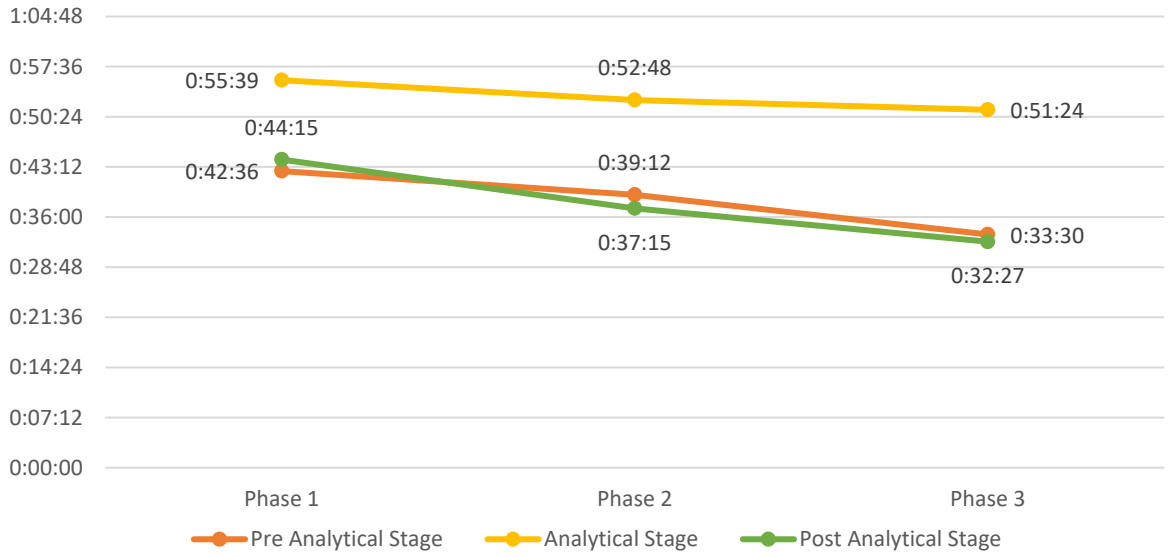
The graph represents the average TAT across the three phases that were recorded in the Emergency Room. It was noted that the highest TAT was recorded during the Phase 1 (10:00 – 12:30 PM) which was 2 hours 22 minutes and 30 seconds and lowest TAT was recorded during Phase 3 (3:46 – 6:00 PM) which was 1 hour 57 minutes and 21 seconds.



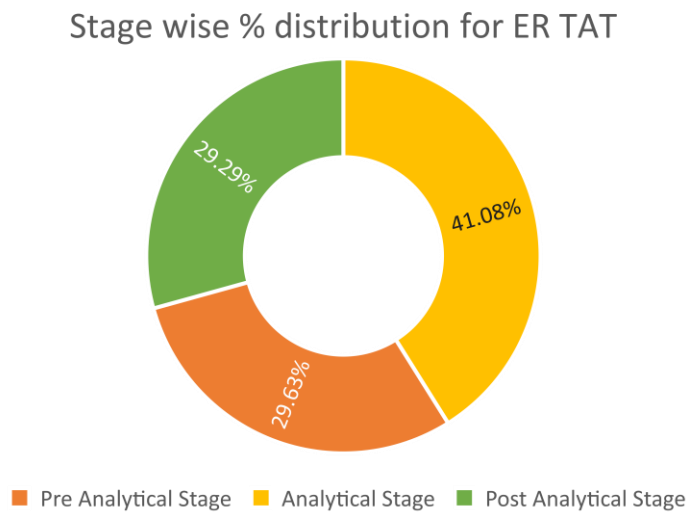
The next graph represents the average TAT's recorded across the three stages in each phase that were analysed in the Emergency Room.
It was seen that the Analytical Stage recorded almost similar average turnaround times across the three phases with the highest turnaround time recorded in Phase 1 with an average TAT of 55 minutes and 39 seconds and the least in Phase 3 with an average of 51 minutes and 24 seconds.
The Pre-Analytical Stage recorded the highest average turnaround time in Phase 1 with an average TAT of 42 minutes and 36 seconds and the least in Phase 3 with an average TAT of 33 minutes and 30 seconds.
The Post-Analytical Stage also recorded the highest turnaround time in Phase 1 with an average TAT of 44 minutes and 15 seconds and the least being in Phase 3 with an average TAT of 32 minutes and 27 seconds.



A trend across each stage with time was observed which was believed to be a decrease in average turnaround times across the three stages.
The average decreases in turnaround time for the Analytical Stage was 2 minutes and 7 seconds where Pre and Post-Analytical stages recorded 4 minutes and 33 seconds; 5 minutes and 54 seconds respectively.

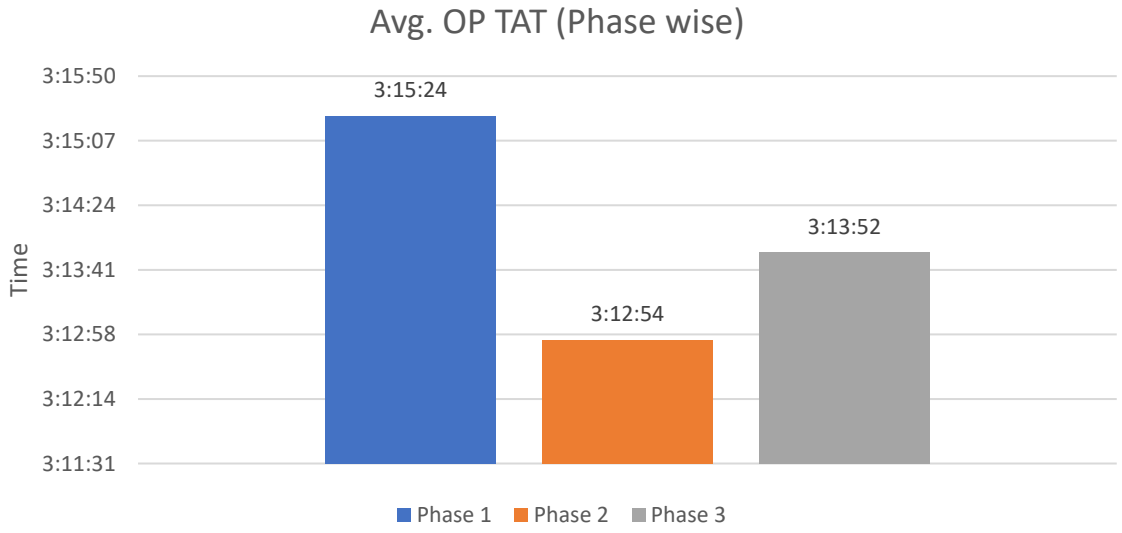


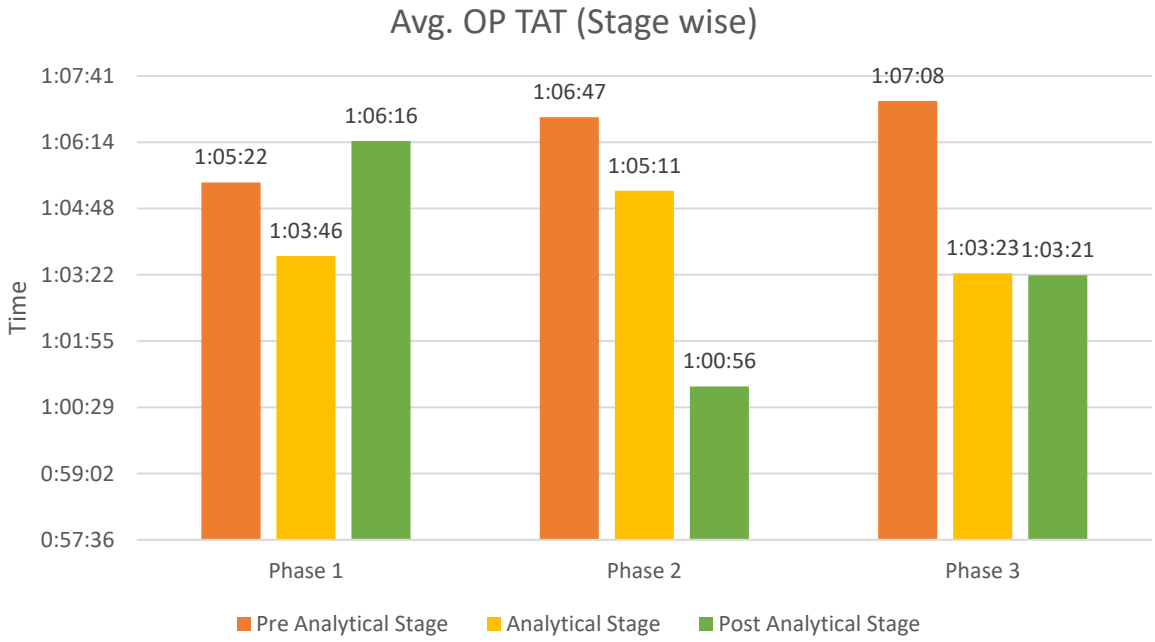
The pie chart represents the percentage (%) that accounted for the overall average TAT generated for the Emergency Room.
The Analytical Stage contributed 41.08 %, where the Pre and Post-Analytical Stages were 29.29 % and 29.63 % respectively giving them a total contribution of 58.92 %.



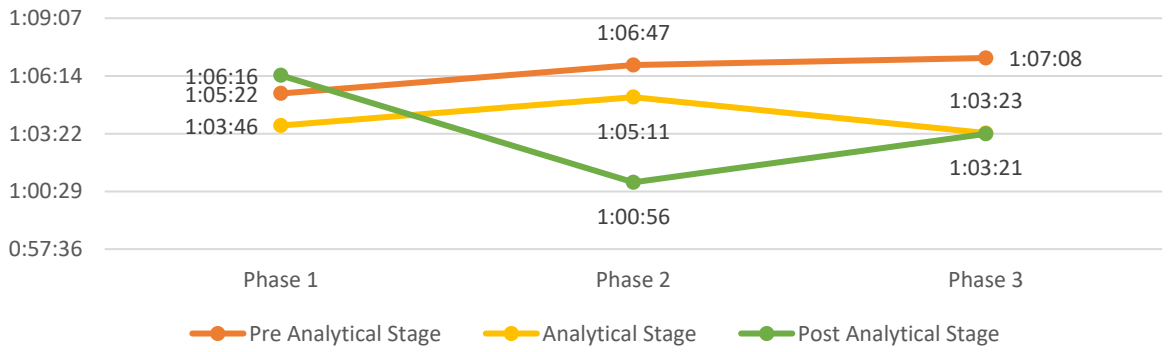
The below depicted graph shows the average TAT of the Out-Patient Department across the three phases.
The average OPD TAT was 3 hours 15 minutes and 24 seconds across Phase 1 where as it was 3 hours 12 minutes and 54 seconds and 3 hours 13 minutes and 52 seconds across Phase 2 and Phase 3 respectively.

The graph represents the average TAT recorded across the three stages of the Out-Patient Department stage wise.
The Pre-Analytical Stage recorded the highest average turnaround time of 1 hour 7 minutes and 8 seconds in Phase 3 and the lowest in Phase 1 which was recorded to be 1 hour 5 minutes 22 seconds.
The Analytical Stage recorded an average turnaround time of 1 hour 3 minutes and 46 seconds, 1hour 5 minutes and 11 seconds and 1 hour 3 minutes across Phase 1,2 and 3.
The Post-Analytical Stage recorded the highest average turnaround time in Phase 1 of 1 hour 6 minutes and 16 seconds and the least in Phase 2 of 1 hour and 56 seconds.

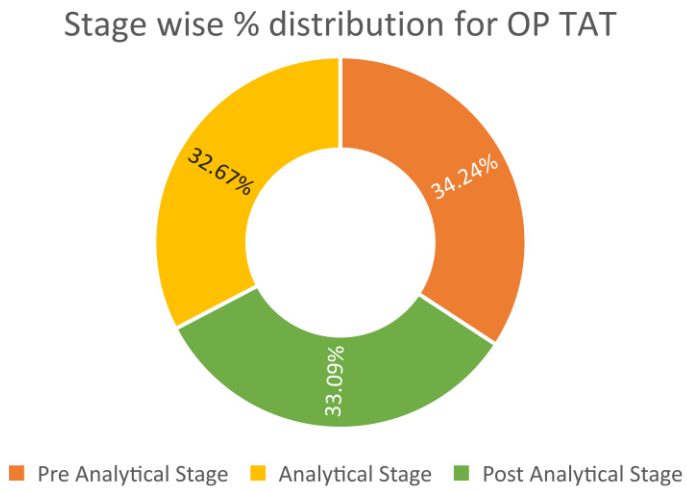




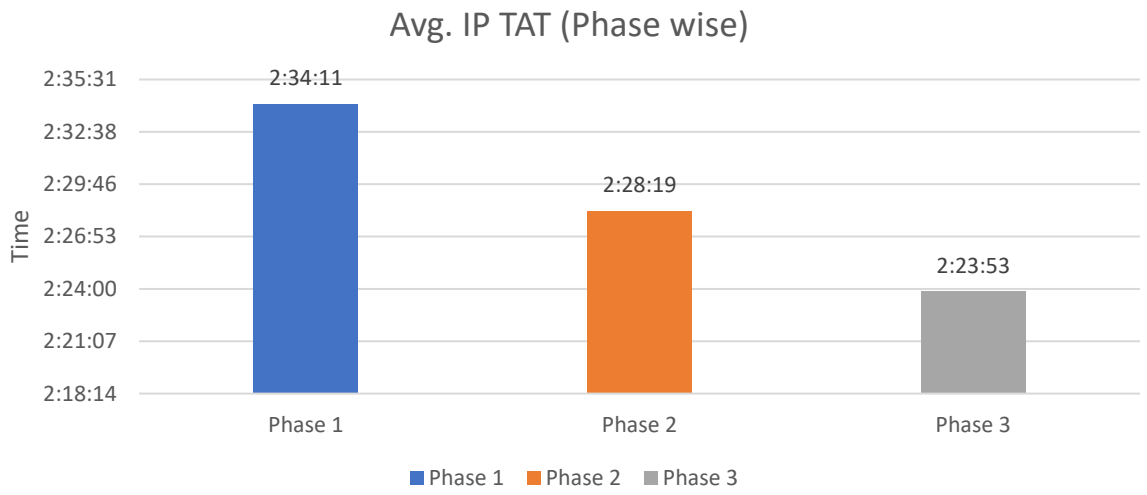
As noticed in the ER, a trend line was observed relating to the increase in the average turnaround time across the Pre-Analytical Stage with an average increase of 53 seconds across the three phases.



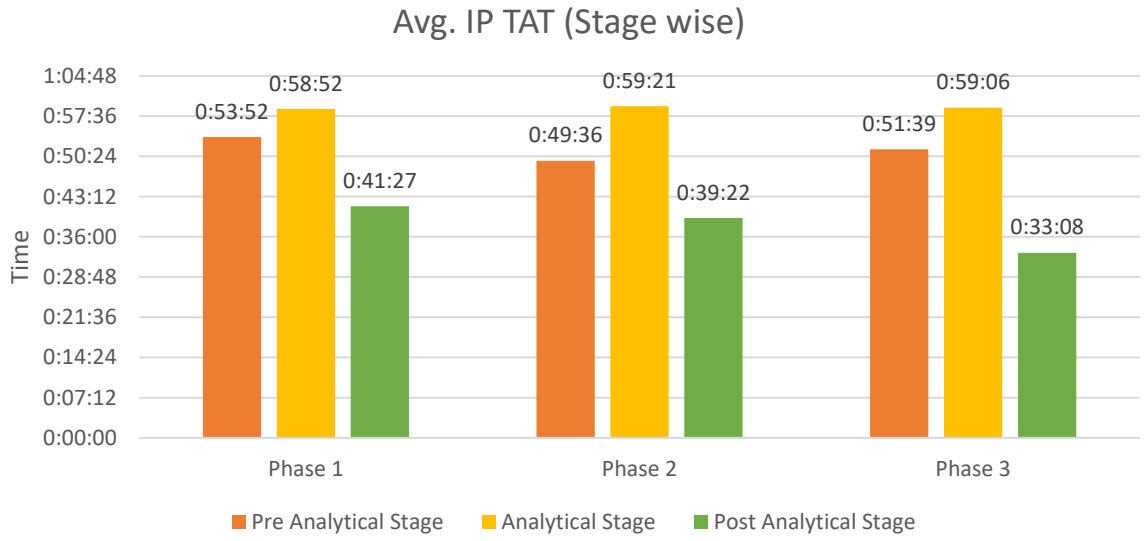
The below depicted chart shows the contribution of all the Stages to the overall average turnaround time of the Out-Patient Department.
The contribution across all the three stages were significantly similar with a percentage (%) of 34.24%, 32.67% and 33.09 %.
A combined contribution of 67.33 % was noted between Pre and Post-Analytical Stages to the overall average turnaround time.



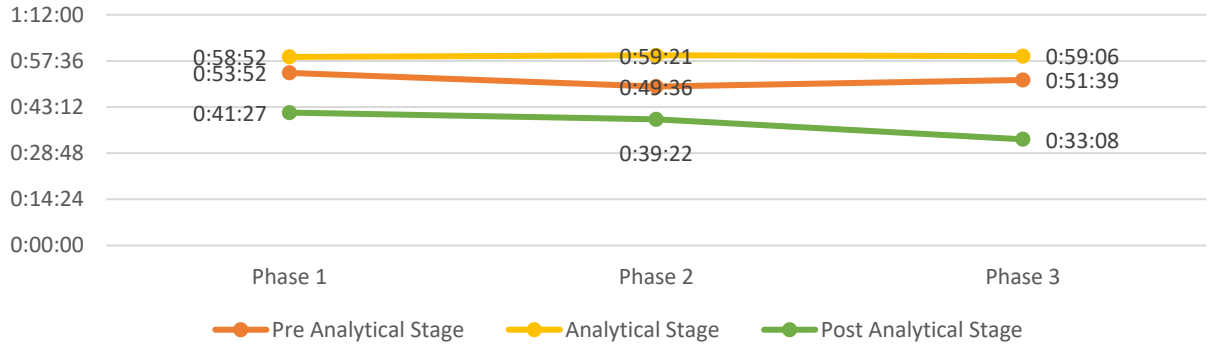
The below depicted graph is used to represent the average TAT recorded in the In-Patient Department across the three phases.
The highest being recorded in Phase 1 with a time of 2 hours 34 minutes and 11 seconds and the least in Phase 3 with a time of 2 hours 23 minutes and 53 seconds.



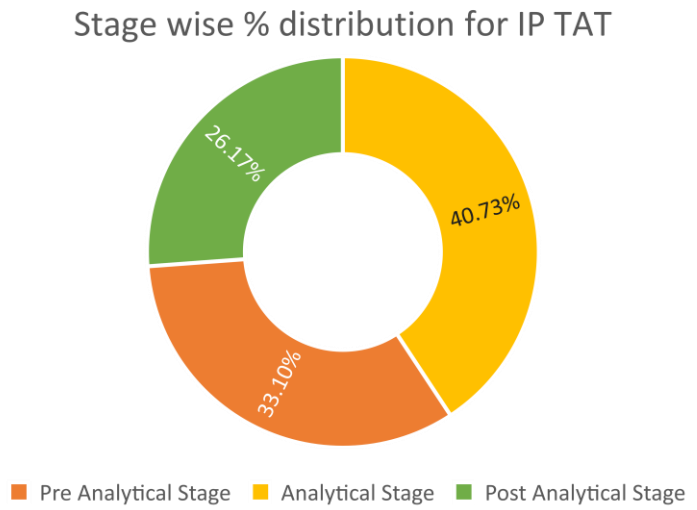
The below depicted graph represents the stage wise recorded average TAT across the three phases in the In-Patient Department.
The Pre-Analytical Stage recorded the highest average TAT in Phase 1 of 53 minutes and 52 seconds and the lowest in Phase 2 with a time of 49 minutes and 36 seconds.
The Analytical Stage recorded its highest average turnaround time in Phase 2 with a time of 59 minutes and 21 seconds and its lowest in Phase 1 of 58 minutes and 52 seconds.
The Post-Analytical Stage recorded its highest average turnaround time in Phase 1 and lowest in Phase 3 with a time of 41 minutes and 27 second and 33 minutes and 8 seconds respectively.



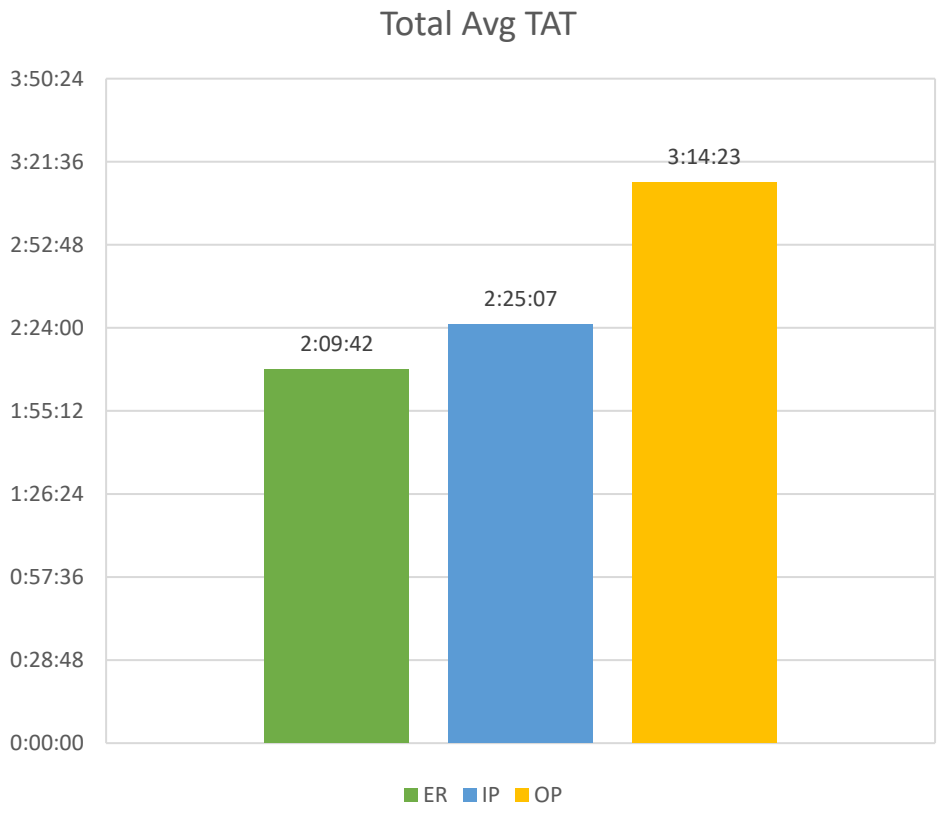
A trend was seen to be present with a decrease in average turnaround time in the Post-Analytical Stage across the three phases whereas an increasing trend was seen in the Analytical stage although being very minute in number.
The below graph depicts this trend with an average decrease of 4 minutes and 9 seconds recorded for the Post-Analytical Stage.



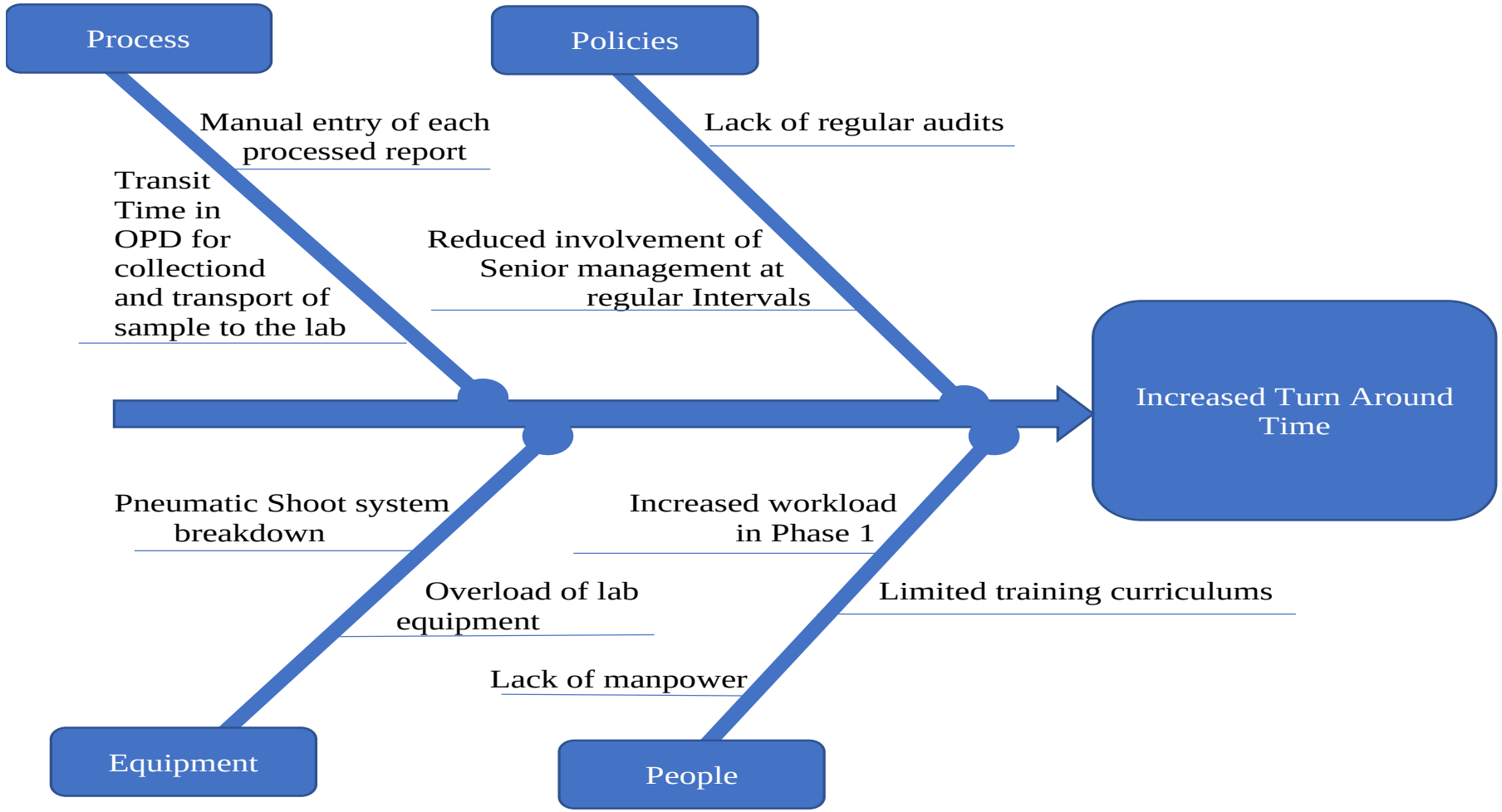
The below depicted pie chart signifies the overall contribution to the average turnaround time of the In-Patient department, the Analytical Stage contributed 40.73 % whereas the Pre and Post-Analytical Stages contributed 33.10 % and 26.17 % respectively. A combined contribution of 59.27 % was seen between the Pre and Post-Analytical Stage.



The average turnaround times in the Department of Biochemistry recorded across all the three department's namely, Emergency Room, Out-Patient Department and In-Patient Department.
The highest was recorded in the Out-Patient Department with an average turnaround time of 3 hours 14 minutes and 23 seconds and the lowest in the Emergency Room with a time of 2 hours 9 minutes and 42 seconds.



ROOT CAUSE ANALYSIS



SUGGESTIONS

- A comprehensive rooster to be developed where there is an increased presence of workforce available at our disposal for the peak hours witnessed by the hospital. This is primarily aimed to cater to the morning hours due to the increased workload witnessed by the unit.
- Placement of a satellite Phlebotomist bay for the OPD and providing directions to the same on OPD ticket hence making it more accessible to the patients in provisions of samples that need to be collected.
- Monthly maintenance schedule for the pneumatic system would ensure greater efficiency and would also lead to fewer breakdowns in the system.
- Adoption of efficient quality control procedures by maintaining a checklist for the process in the laboratory.
- Training of technical staff for equipment management as well as for nursing staff by implementing single prick policy.
- Generating a monthly feedback mechanism to cater to the technical issues, if any.
- With the recent adoption of the LIS, provision of keywords along with predesigned templates for routine investigations would greatly help in reducing the turnaround time by making the process a system driven modality.
- Creating of dashboards for consultants so as to make the reports more accessible as well as receive TAT alerts upon nearing a deadline.
- Developing an overall benchmarking system for laboratory turnaround time.
- Implementation of a quarterly audit schedule across the three phases to check and monitor the results achieved are as per set benchmarks.

CONCLUSION

- This study was carried out with the aim to analyse the turnaround time recorded in the Department of Biochemistry of Barala Hospital & Research Centre, Chomu. It was performed across three stages that contribute to the overall turnaround time of a laboratory test namely the Pre-Analytical Stage, Analytical Stage and the Post-Analytical Stage and significant effort needs to be put across all the three stages as they are interrelated so as to achieve results which in turn lead to quality of care as well as patient satisfaction.
- It was noticed that the major delay in the overall TAT was recorded during Phase 1 when attributed to time as a factor. Other major causes of delay in TAT were attributed to irregularities in policies due to reduced senior management involvement in monitoring and policy making, equipment breakdown, shortage of manpower as well as inadequate utilisation of LIS.
- Improving TAT is a continuous process and we need to have a wholesome approach for reducing the obstacles for optimum TAT.

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