A STUDY ON DETERMINATION OF LABORATORY TAT FOR OPD AT A TERTIARY CARE HOSPITAL USING LEAN SIX SIGMA

Presented by:

Sudeshna Dey

1011

Guided by:

Dr. Susmit Jain

Associate Professor

IIHMR University

TABLE OF CONTENTS

INTRODUCTION

- **TAT is often cited as one of the most important metrics of service quality.**
- **Rapid testing in the lab TATs is essential for clinicians to make timely diagnoses and treat patients.**
- **Appropriate and timely clinical decisions influence patient outcomes, which are reliant on timely reporting.**
- **Laboratories should maintain quality in entire laboratory processes and simultaneously keeping an eye on cost effectiveness.**
- **Despite accounting for only 5% of total healthcare spending, laboratories have a substantial impact on greater than 70% of condemnatory medical decisions, such as admitting, treating, & discharging patients. On the other side, clinical laboratories are under growing pressure to minimize costs while sustaining or even growing quality.**
- **To achieve this goal, not only the analytical phase, but also the pre- and post-analytical phases, must be simplified and "waste" eliminated.**
- **The goal of this study is to use lean six-sigma to determine the current Laboratory TAT for OPD and its process flow.**

RESEARCH QUESTIONS

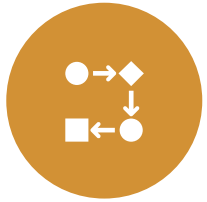
WHAT IS THE CLINICAL LABORATORY'S PROCESS FLOW ACROSS THE OPD?

WHAT IS THE AVERAGE TURNAROUND TIME FOR THE OPD'S PRE-ANALYTICAL, ANALYTICAL, AND POST-ANALYTICAL LABORATORY TESTING PHASES?

WHAT IS THE TYPICAL TURNAROUND TIME FOR EACH OF THE TEN STEPS OF OPD LABORATORY TESTING?

WHAT IS THE VALUE-ADDED AND NON-VALUE-ADDED TIME?

WHAT FACTORS CONTRIBUTE TO A RISE IN TAT?



HOW CAN THE PROCEDURE BE MADE MORE EFFICIENT IN ORDER TO REDUCE DELAYS?

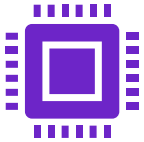
OBJECTIVES

To develop an understanding of the process flow of the clinical laboratory across OPD using lean six sigma

To determine the TAT in each phase (pre-analytical, analytical, and post-analytical) & in each step (patient at counter to report verification).

To construct a value-stream mapping of the Laboratory Department's process flow for OPD.

To determine the non-value-added time in the process flow using value-stream mapping.



Make recommendations for how to improve the overall Laboratory TAT for OPD.

METHODOLOGY

- **Research type**

descriptive cross-sectional study (Prospective)

- **Research period**

22nd March 2021 to 21st June 2021

- **Study setting**

The Mission Hospital, Durgapur

- **Sample size**

A total of 576 samples were analysed from the Department of Biochemistry, Haematology & Serology.

- **Sample Technique**

Convenient sampling technique

- **Data Collection procedure**

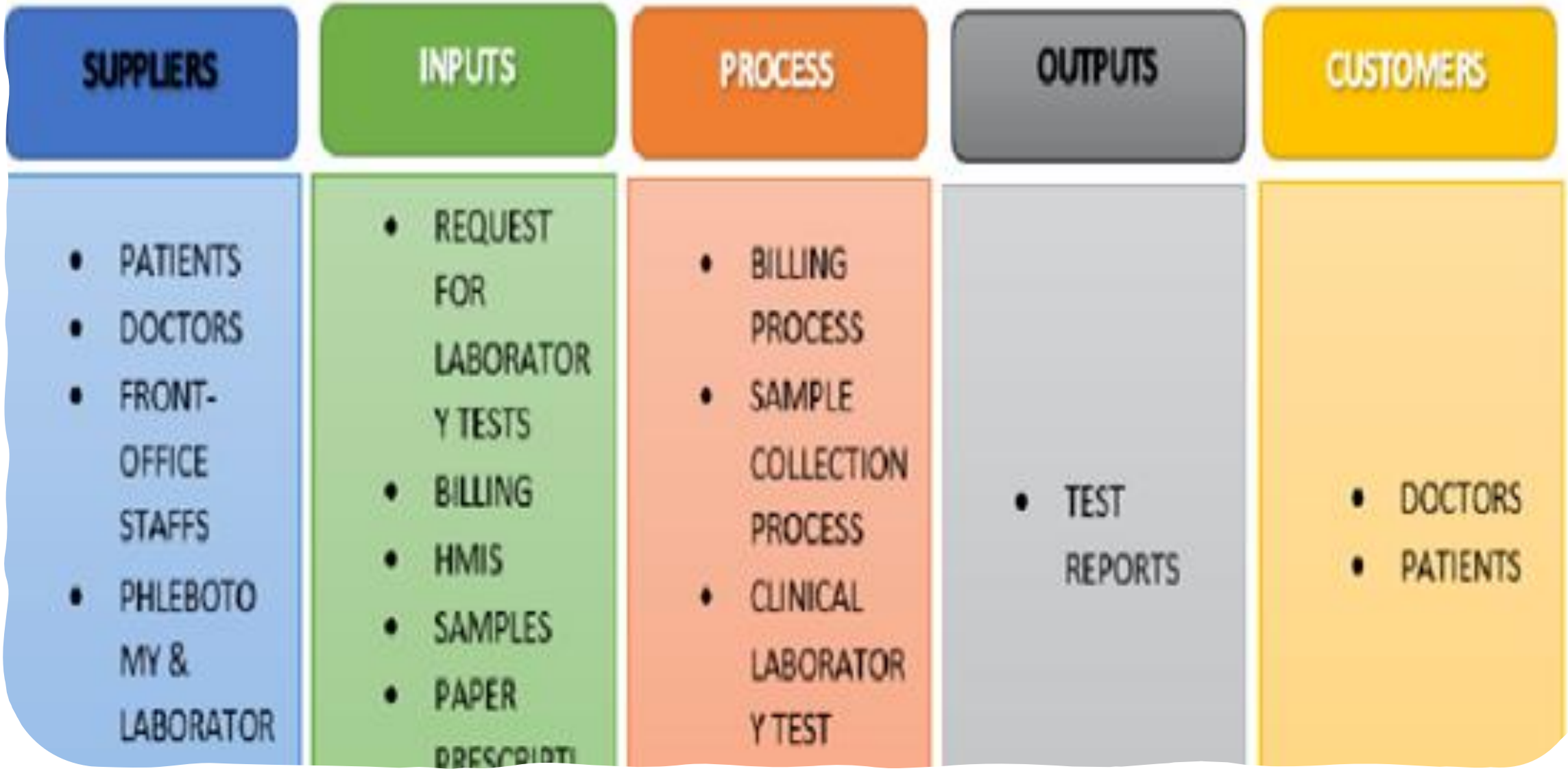
Primary data collection (through interview, observation, laboratory information system)

- **Data Analysis**

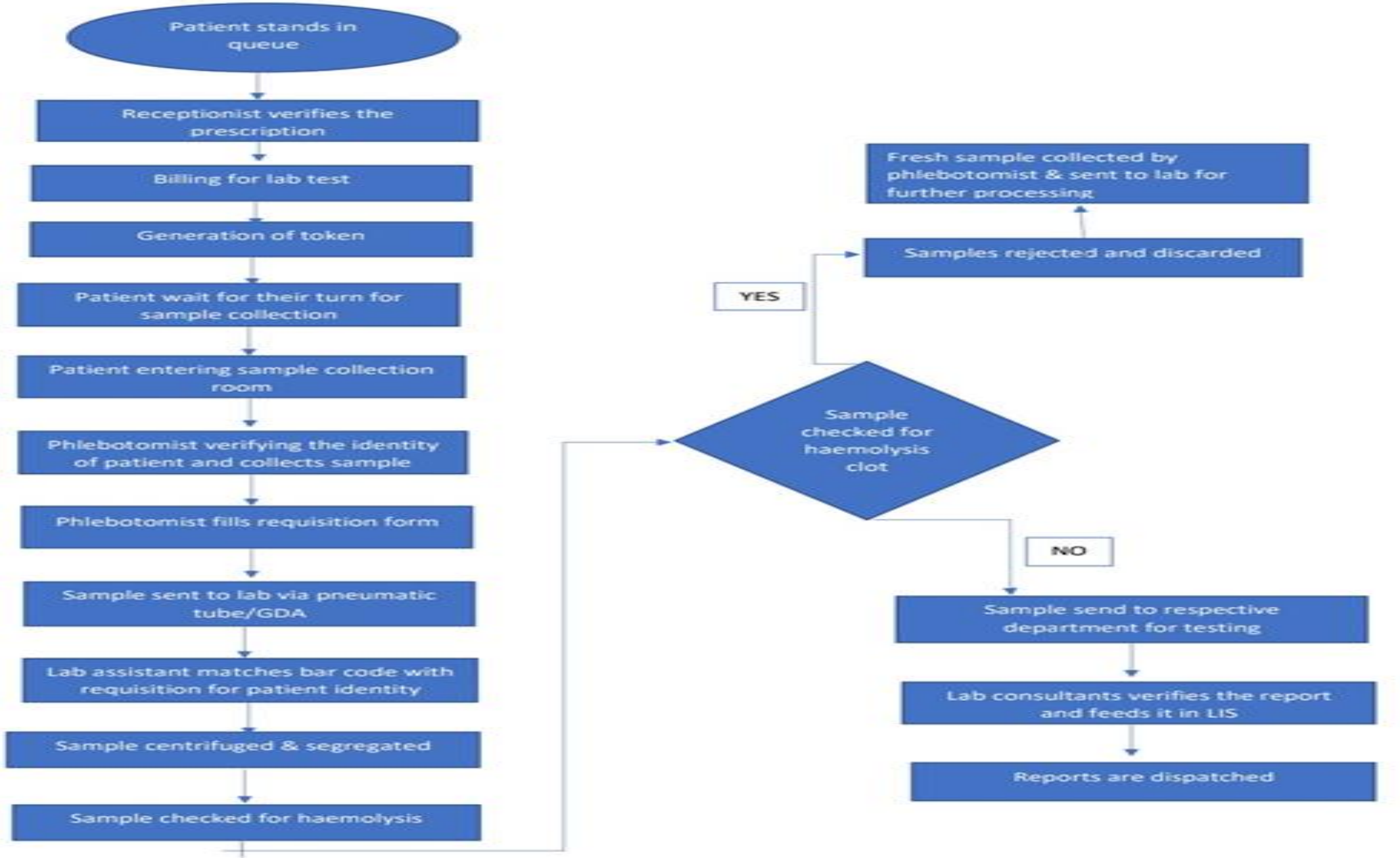
The data was analysed using Microsoft-excel

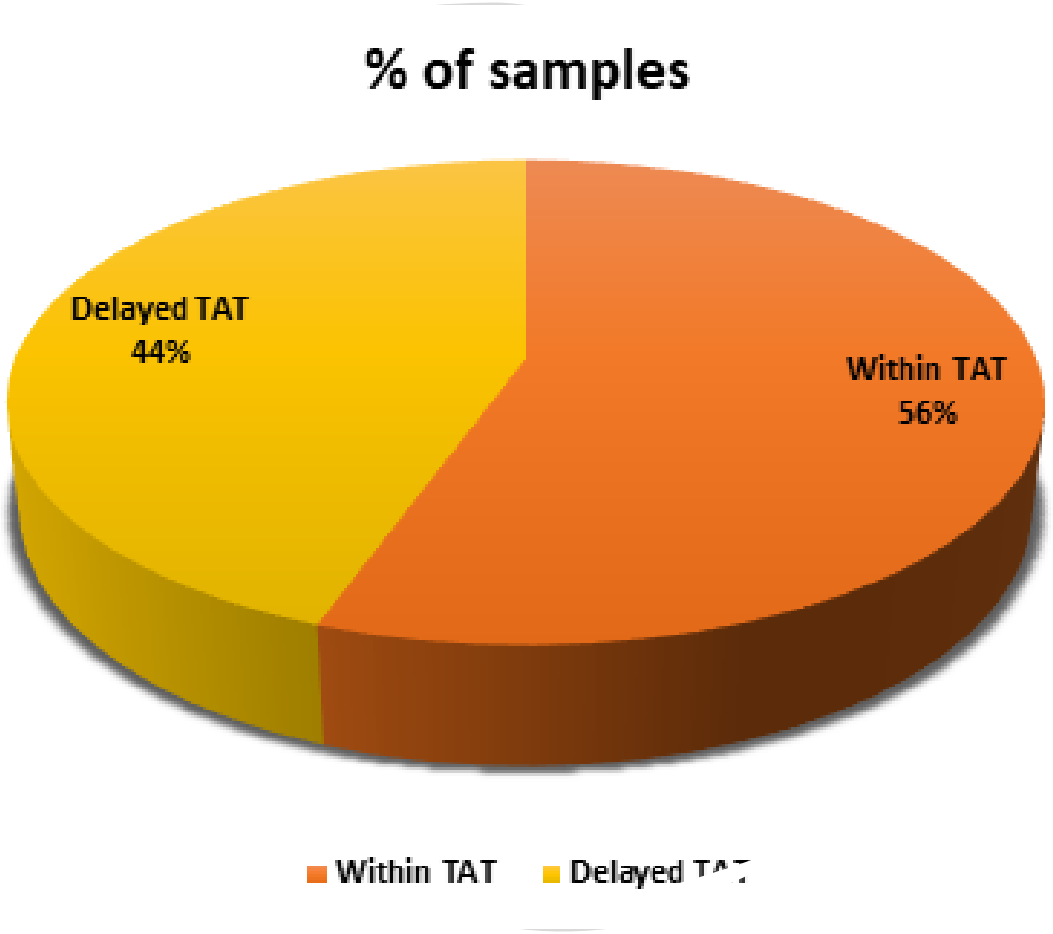
DATA ANALYSIS & RESULTS

SIPOC DIAGRAM



OPD Workflow



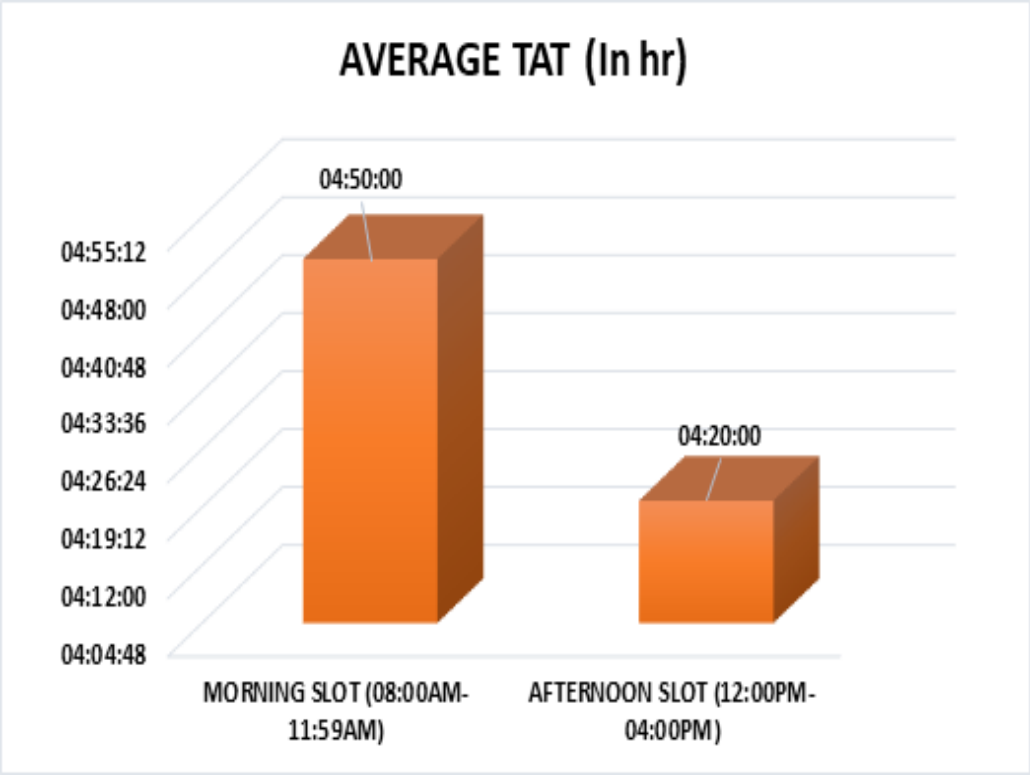


TAT FOR LABORATORY SAMPLES

- A total of 576 samples were collected for analysis from the OPD for clinical laboratory routine testing, with 320 (55.5%) samples arriving within the TAT time of 4 hours & 256 (44.5%) samples arriving late.
- For data analysis, primary data is obtained. Over the course of two months, each sample was followed and observed at each step.
- **OPD has a standard TAT of 4 hours in the laboratory**

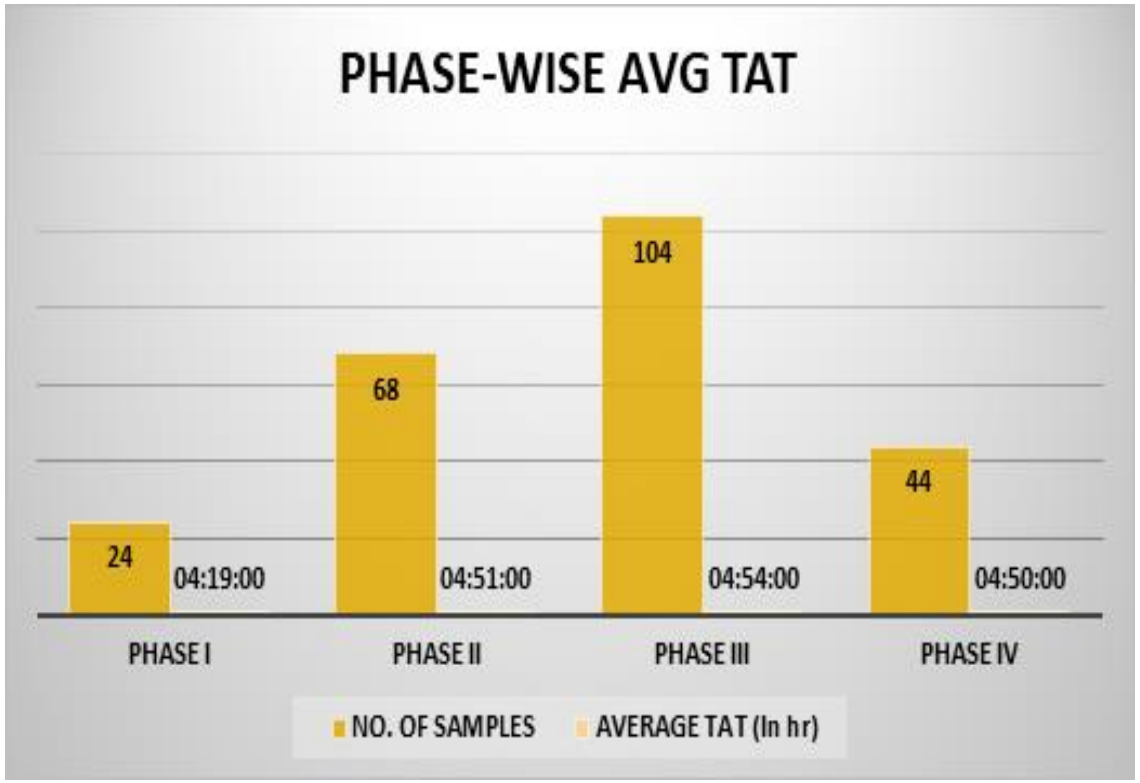
Lab TAT analysis according to slot

This research was split into two sessions, one in the morning and one in the afternoon, 8:00 am to 11:59 pm & 12:00 pm to 4:00 pm, respectively.



Laboratory TAT according to phases

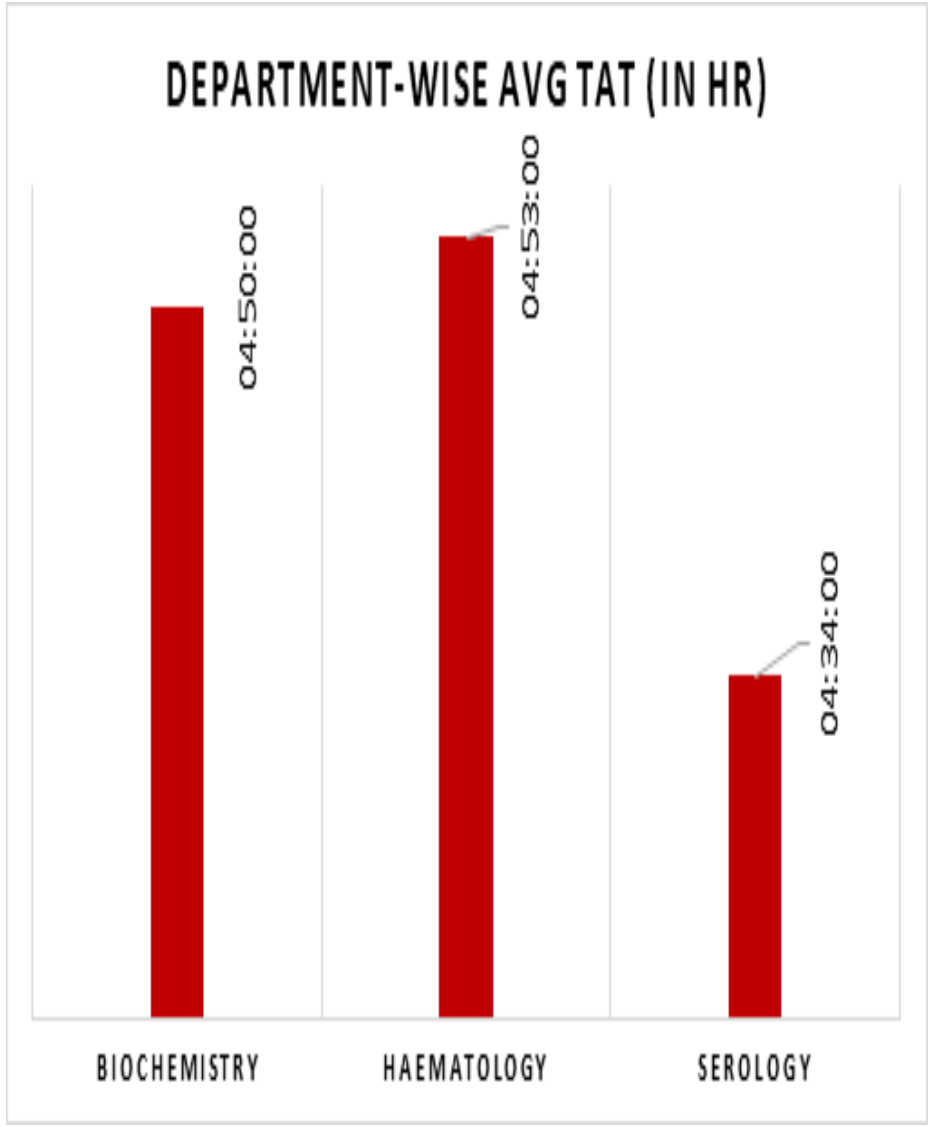
In addition, the AM slot was split into four segments. The morning slot was divided into four phases: Phase I (08:30AM-09:00AM), Phase II (09:00AM-10:00AM), Phase III (10:00AM-11:00AM), and Phase IV (11:00AM-11:59M).



LAB TAT ANALYSIS ACCORDING TO DEPARTMENTS

DEPARTMENTS	NO. OF SAMPLES	AVERAGE TAT
BIOCHEMISTRY	208	04 hours 50 minutes
HAEMATOLOGY	36	04 hours 53 minutes
SEROLOGY	12	04 hours 34 minutes

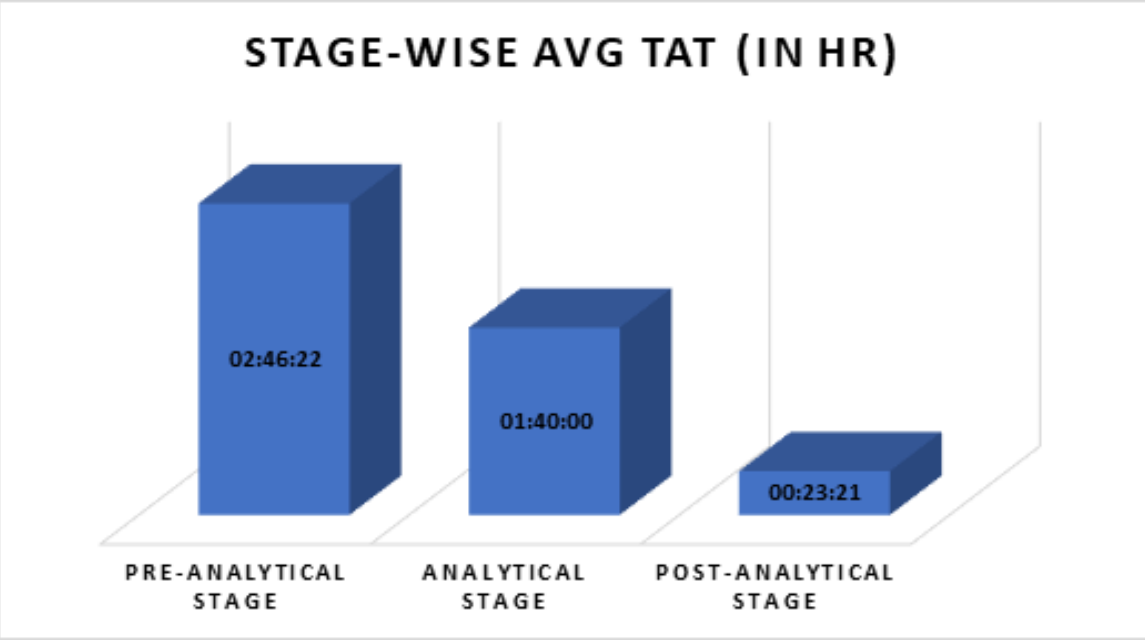
The Haematology Department had the maximum turnaround time of 04 hours and 53 minutes, followed by Biochemistry and Serology at 04 hours 50 minutes and 04 hours 34 minutes, respectively.

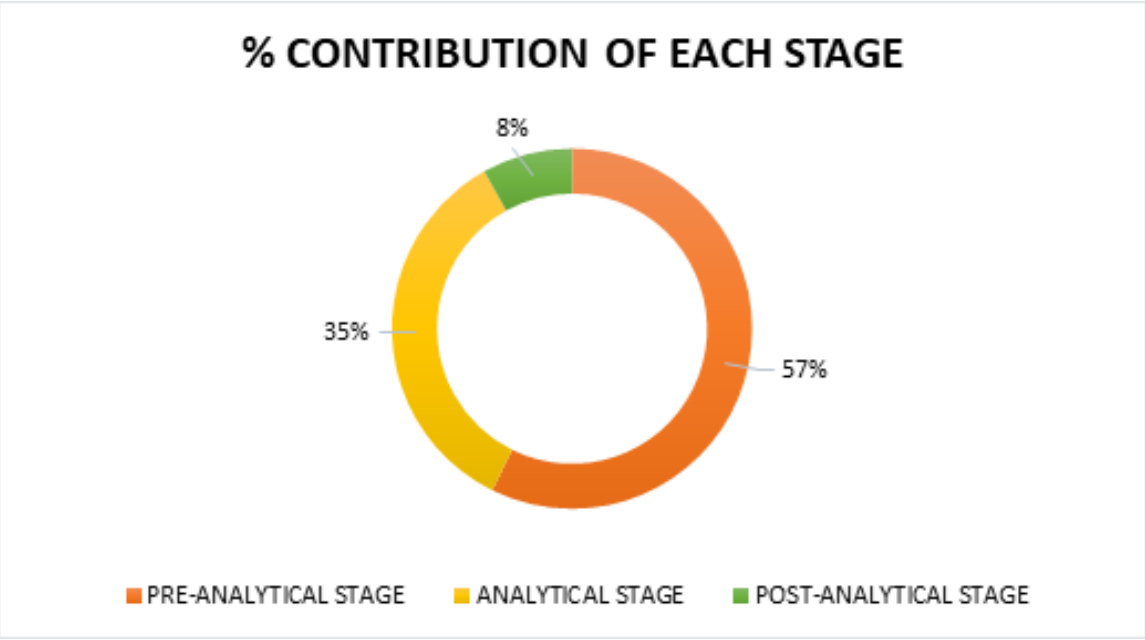


LAB TAT ANALYSIS ACCORDING TO STAGES

Numerous TATs were calculated to better scrutinize various variances in average TAT reported at three stages, including:

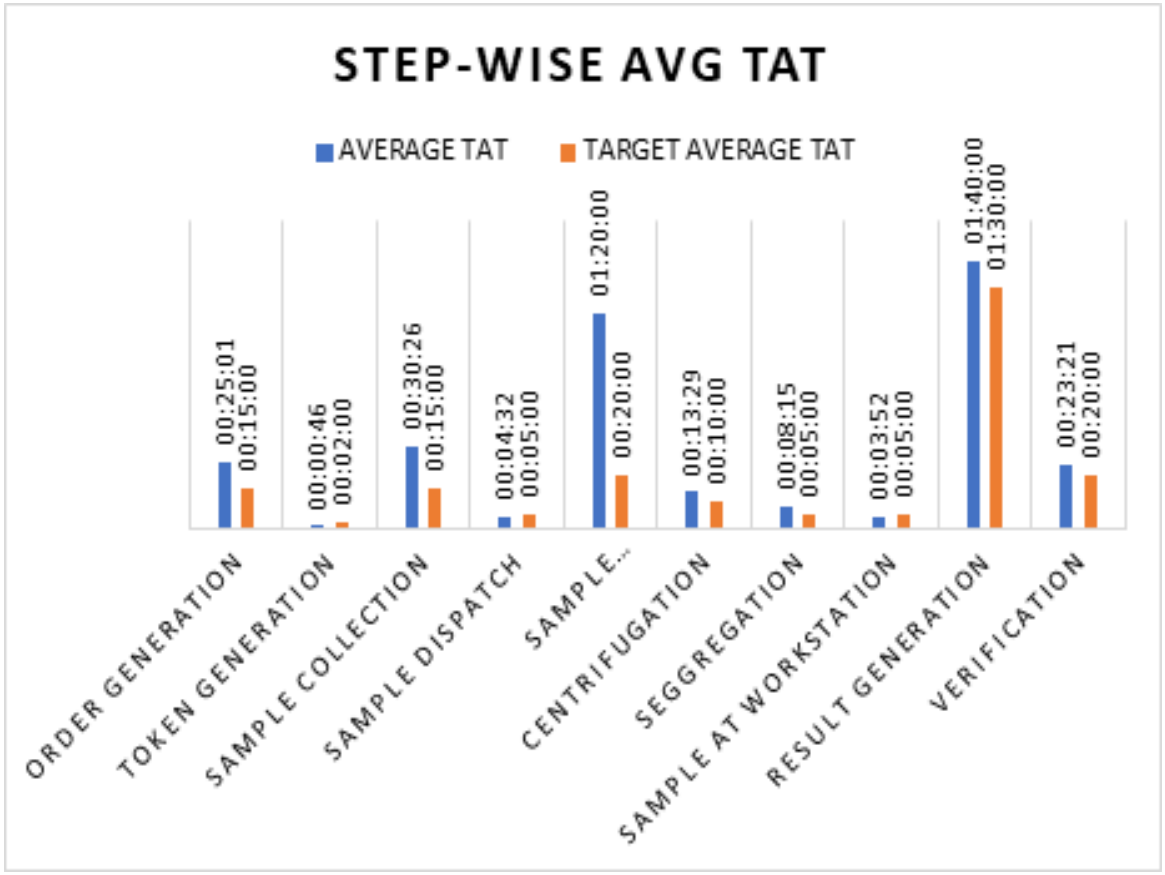
- **Pre-Analytical stage TAT**
- **Analytical stage TAT**
- **Post-Analytical stage TAT**

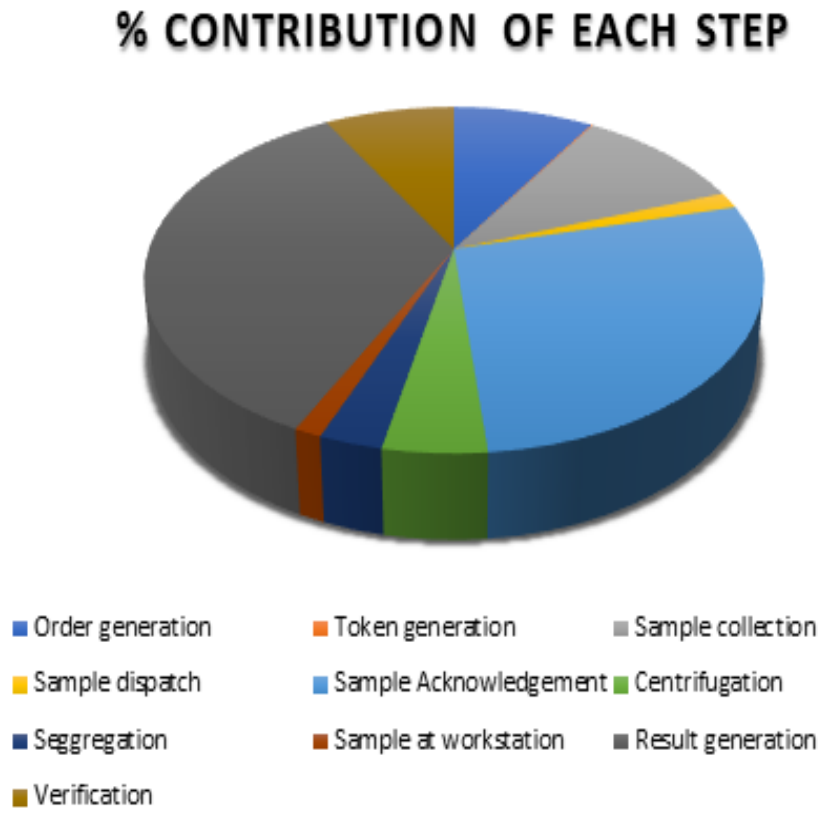




LAB TAT ANALYSIS ACCORDING TO STEPS

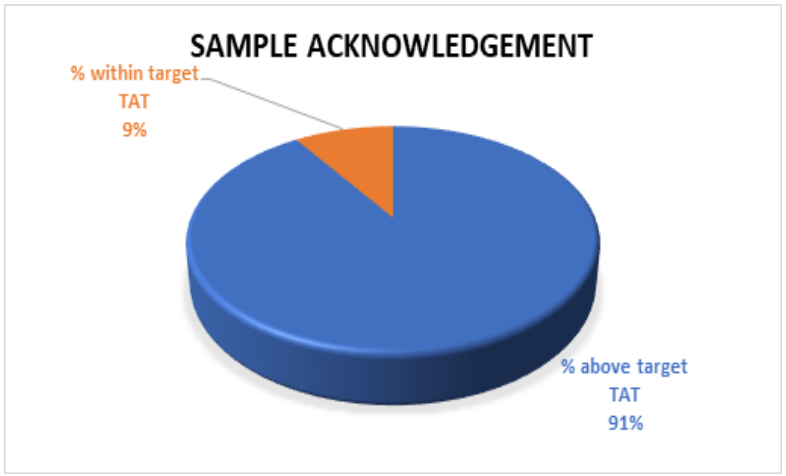
STEPS	AVG TAT	TARGET AVG TAT
Order generation TAT 1	25 minutes 01 seconds	15 minutes
Token generation TAT 2	46 seconds	1 minute
Sample collection TAT 3	30 minutes 26 seconds	15 minutes
Sample Dispatch TAT 4	04 minutes 32 seconds	05 minutes
Sample Acknowledgement TAT 5	01 hour 20 minutes	20 minutes
Centrifugation TAT 6	13 minutes 29 seconds	10 minutes
Segregation TAT 7	08 minutes 15 seconds	05 minutes
Sample at workstation TAT 8	03 minutes 52 seconds	05 minutes
Result generation TAT 9	01 hour 40 minutes	01 hour 30 minutes
Verification TAT 10	23 minutes	20 minutes

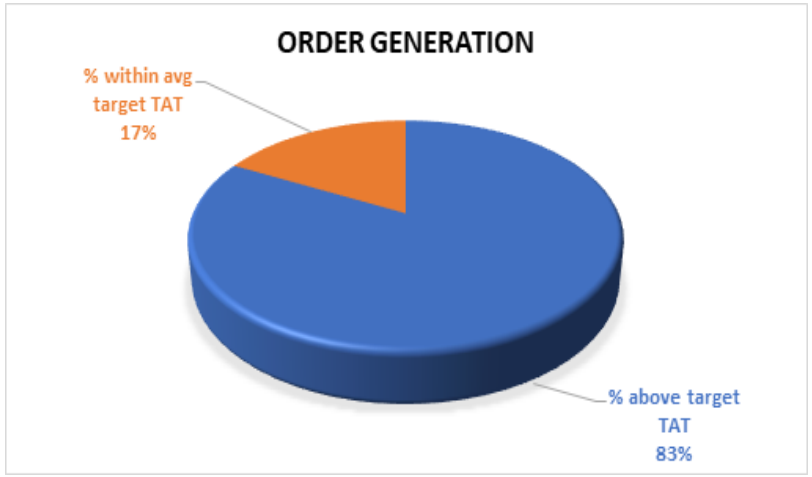


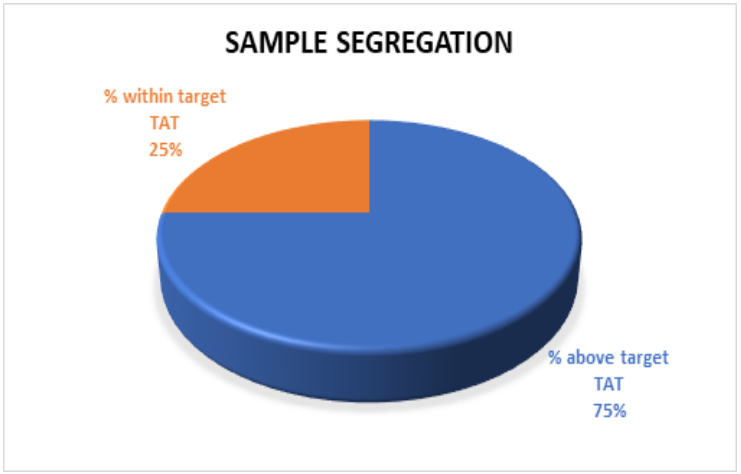


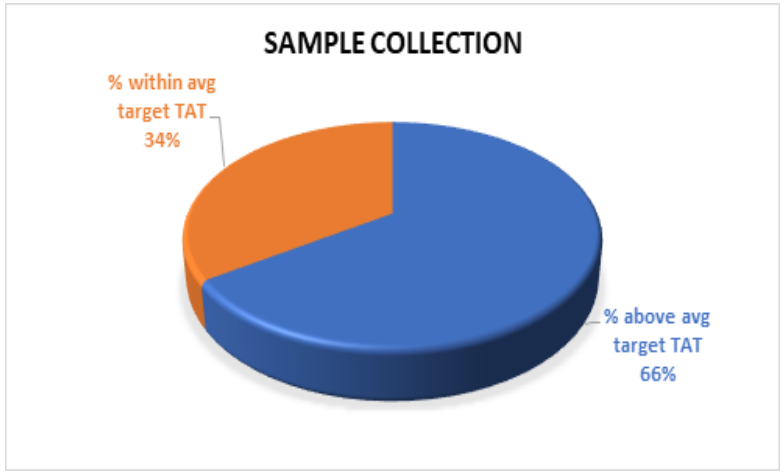
It was noticed that the major steps that did not met the target average TAT lied in **pre-analytical stage.**

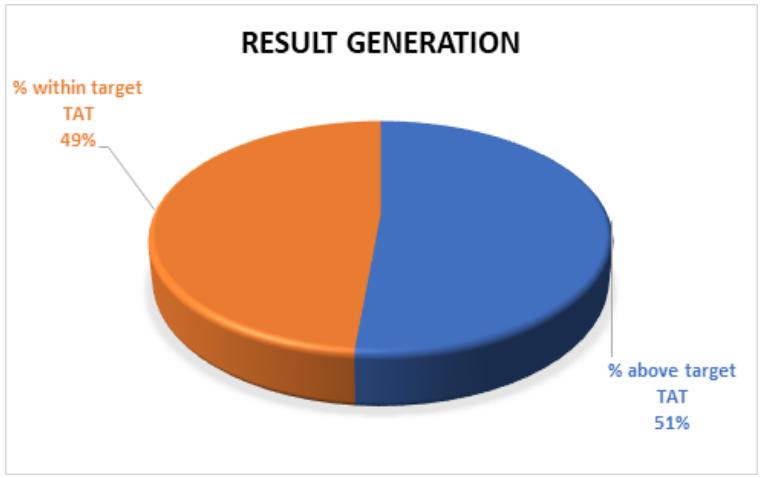
Among the ten steps involved in the process flow four steps had higher percentage above target average TAT for **sample acknowledgement, order generation, sample segregation, sample collection, result generation** was found to be **90.60%, 83%, 75%, 65.60%, 51.5%** respectively.



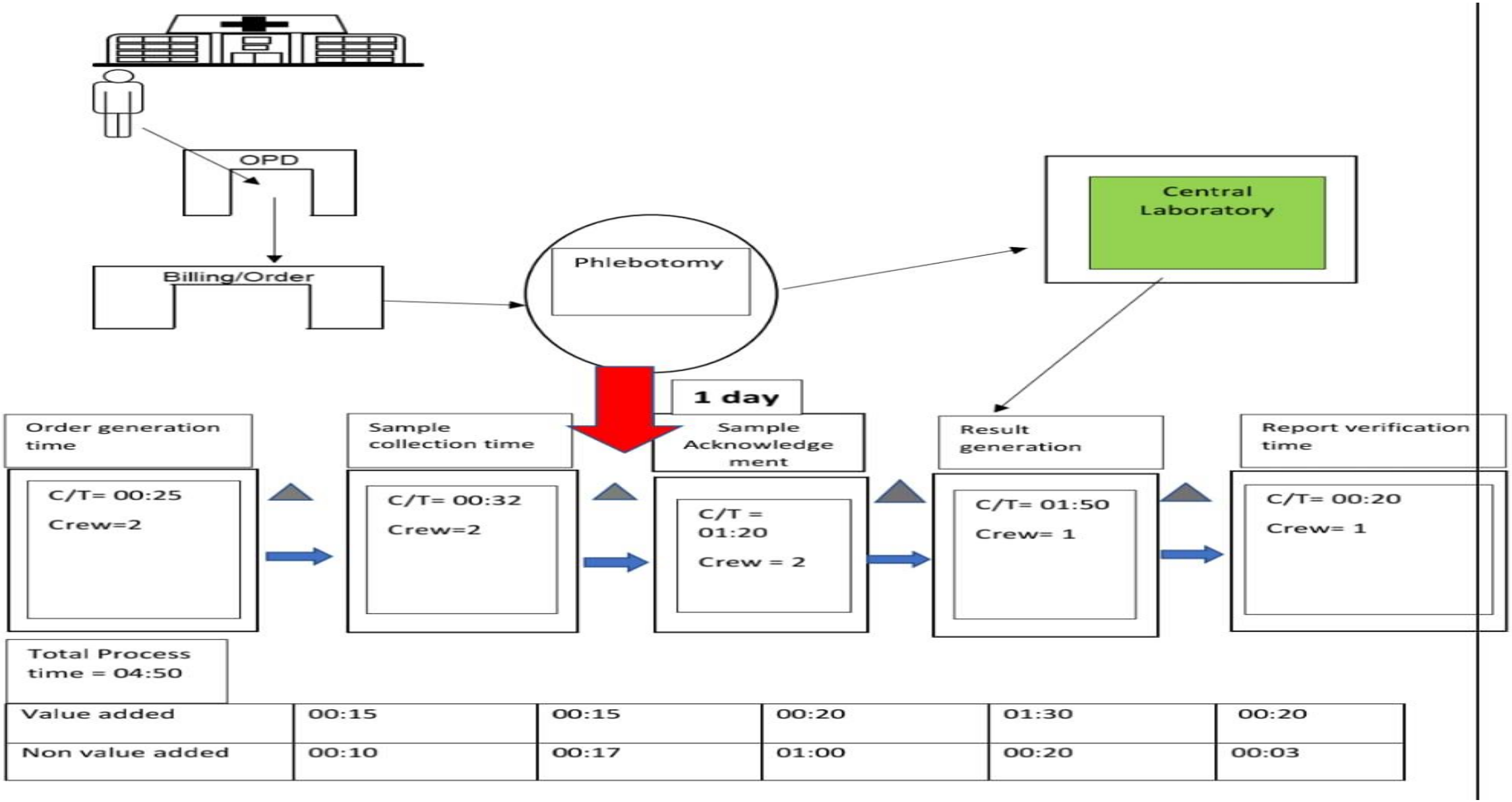








VALUE STREAM MAPPING



Value added	00:15	00:15	00:20	01:30	00:20
Non value added	00:10	00:17	01:00	00:20	00:03

- As a result, the total OPD procedure time is 04 hours and 50 minutes. The procedure that adds value to the customer and for which the consumer is ready to pay is known as value added time. The waiting time, move time, and inspection time are included in the non-value-added times. The amount of time it takes to conduct an action is referred to as value added time, which is the amount of time it takes to complete the task.

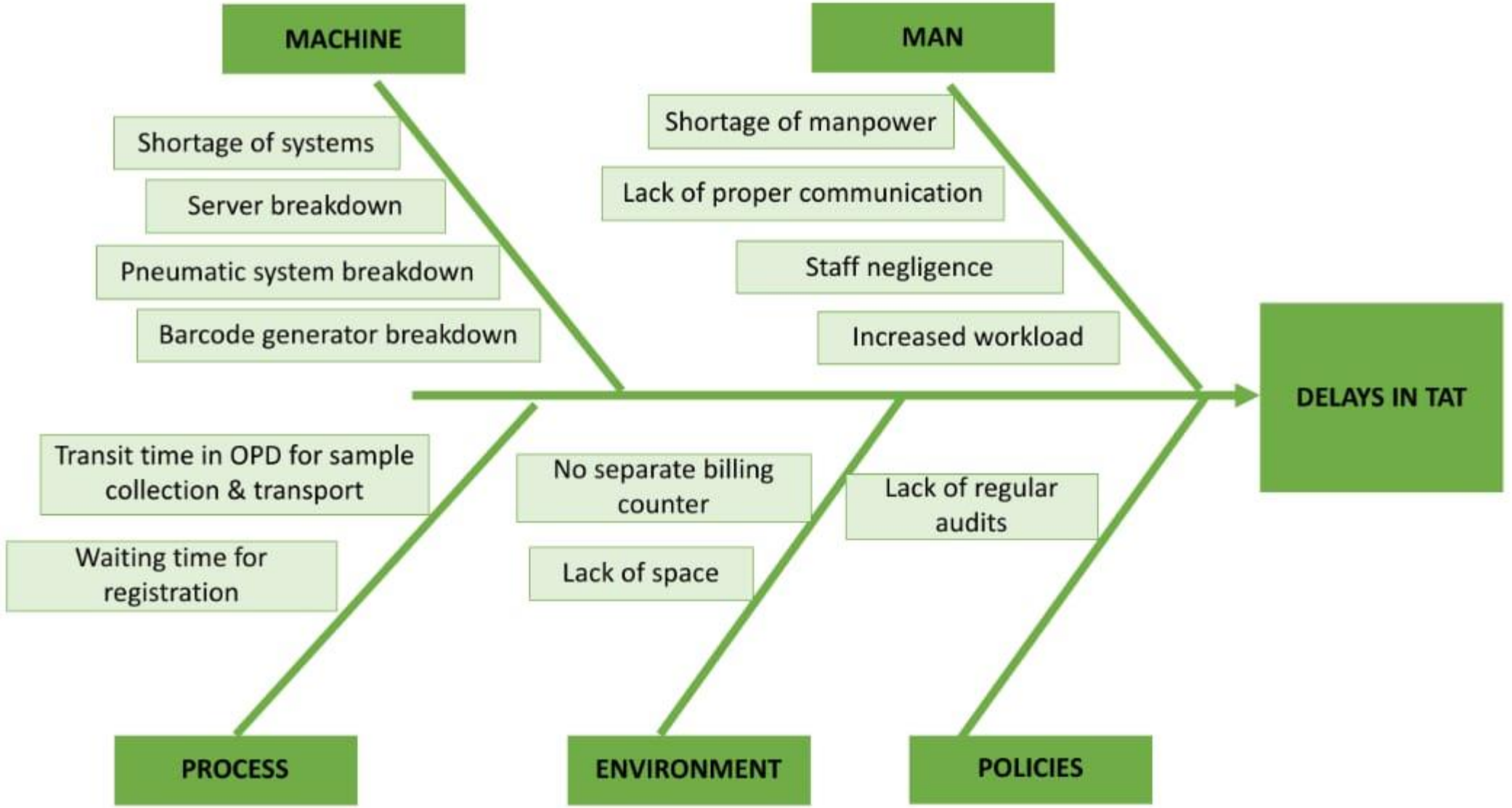
For OPD,

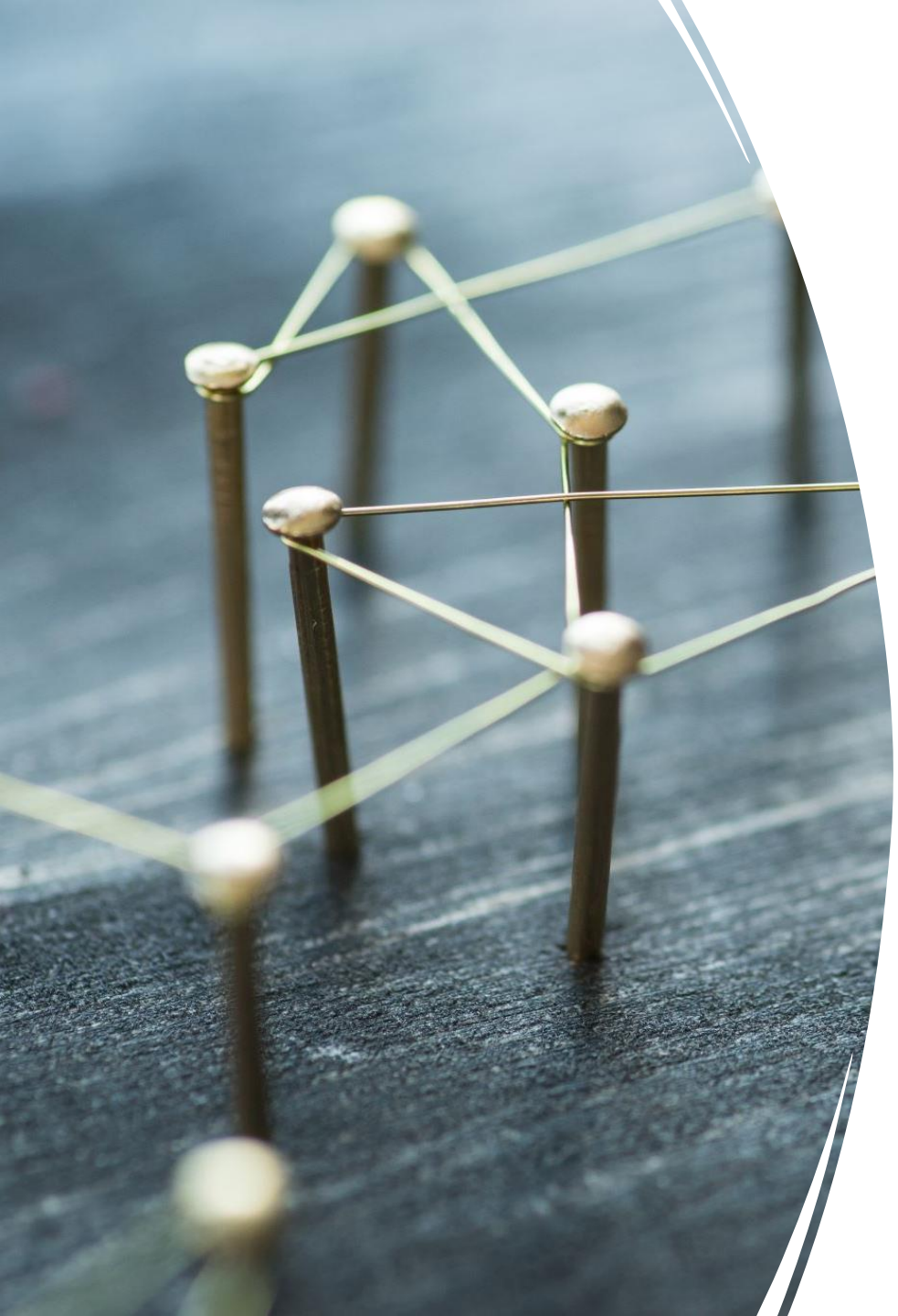
- The VAT = 3 hours
- The NVAT = 1 hour 50 min.

- From the time the patient enters the department until the reports are generated, time is taken into account.

- As previously stated, the maximum time spent is during sample acknowledgement, which increases the time spent waiting for reports and so increases the activity's non-value-added time.

ROOT CAUSE ANALYSIS





DISCUSSION

- Due to a system shortage, the higher turn-around time for the OPD laboratory was caused by an increase in billing time at reception.

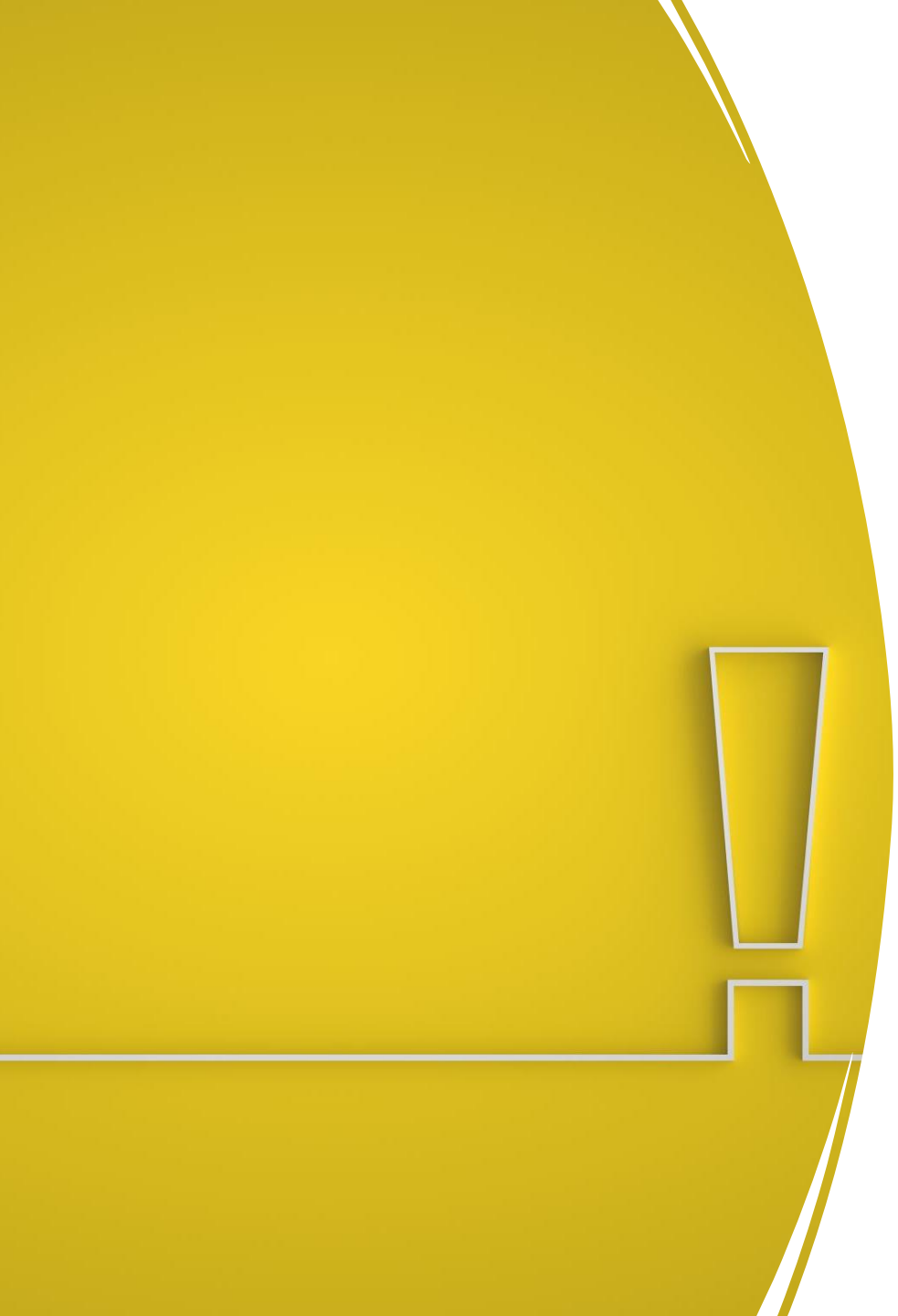
- Lack of active phlebotomists in the sample collection room/phlebotomy lead to higher TAT

- Frequent breakdown of pneumatic tube system and barcode generator was observed.

- Less appropriate space at the central laboratory and not allocating specific duties to the laboratory assistant increased the chaos and workload.

- Samples from the IPD and ER departments are also received in the central laboratory, which adds to the burden of the laboratory assistants on duty.

- The time taken to collect and transport samples in the OPD causes a pneumatic shoot delay.



RECOMMENDATIONS

Having a separate billing counter for laboratory tests will reduce delays during peak hours, reducing wait times for both patients seeking OPD consultation and those registering for laboratory testing. This would allow for efficient queue management.

Working together with health IT vendors to migrate doctors' manual prescriptions to electronic prescription printing.

Establishing a monthly feedback system to address any technical difficulties that arise.

Improving communication between employees by focusing on an assessment of present communication methods, streamlining communication routes, and giving every employee a voice and respecting their input.

A thorough rooster should be built, with a greater presence of employees accessible at our disposal throughout the hospital's peak hours. Because of the early morning hours, this is largely directed towards them. The unit has noticed an increase in workload.

Creating a ancillary Phlebotomist Bay for the out-patient department and including guidance on the OPD token, building it more convenient for patients gathering samples.

A monthly pneumatic system maintenance schedule would boost efficiency while reducing system malfunctions.

Adoption of effective quality control processes in the laboratory, including the use of a checklist.

Creating an overall laboratory turnaround time benchmarking system.

Implementation of a quarterly audit plan throughout all three phases to ensure that the outcomes achieved are in line with established benchmarks.

Open laboratory design must be taken into account.

Priority should be given to receiving OP samples over ward samples.

CONCLUSION

Increased workload, untrained workers, inefficient communication among staff, bad space management, unorganised workstation, extra transportation, and excessive mobility were all factors that contributed to the delay of laboratory reports. With the use of lean management technologies, these causes were discovered.

There are numerous outliers that affect the laboratory's TAT, and in order to minimise the TAT, one must exert at each and every step, included in all the three stages that is pre-analytical, analytical, and post-analytical, as these are all associated, and keeping an eye on these will not only help enhance the TAT altogether but also ensure quality control.

The main cause of TAT was delayed sample acknowledgement due to increased workload, which was followed by frequent equipment malfunction and manpower shortage during the pre-analytical stage, which exacerbated the TAT of the OPD Laboratory process flow.

To enhance TAT, policies should be developed and executed, and audits should be performed on a regular basis to aid in patient satisfaction.

REFERENCES

1. Hawkins RC. Laboratory turnaround time. Clin Biochem Rev. 2007;28:179-94.

2. Kilgore ML, Steindel SJ, Smith JA. Evaluating stat testing options in an academic health center: therapeutic turnaround time and staff satisfaction. Clin Chem. 1998;44:1597-603.

3. Hawkins RC. Laboratory turnaround time. Clin Biochem Rev. 2007;28(4):179-94.

4. Steindel SJ. Timeliness of clinical laboratory tests: a discussion based on five college of American pathologist Q-probe studies. Arch Pathol Lab Med. 1995;119:952-61.

5. Steindel SJ, Novis DA. Using outlier events to monitor test turnaround time. A college of American pathologist Q-probe study in 496 laboratories. Arch Pathol Lab Med. 1999;123:607-14.

6. Barnett RN, Mclver DD, Gorton WL. The medical usefulness of Stat tests. Am J Clin Pathol. 1978;69:520-4.


THANK YOU
HAVE A NICE DAY