Summer Training at
Fortis Hospital, Anandapur
Kolkata
(April 09-June 2,2012)

Turn Around Time for Inpatient Laboratory Investigation

By
Samir Banzal

Under the guidance of
Dr. J.P. Singh

Post Graduate Diploma in Hospital and Health Management
2011-2013

Institute of Health Management Research,
Jaipur
2012

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Certificate

This is to certify that Dr.Samir Banzal has undergone summer training at Fortis Hospital, Anandapur, Kolkata from 9th April to 4th June 2012.

The candidate has carried out all the studies related to the summer training himself. His approach to the studies has been sinceare, scientific and analytical. This summer internship training is partial fulfillment of the course requirement. He is recommended for the award of Post Graduate Diploma In Hospital And Health Management.

I wish him success in all future endeavors.

Dr. P.R Sodani

Dean (Academic and student affairs)
IIHMR , Jaipur

Dr.J.P.Singh

Assistant Professor
IIHMR, Jaipur

Fortis HOSPITALS

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Date: 4th June 2012

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Dr. SAMIR BANZAL from IIHMR, Jaipur successfully completed his summer internship programme from 9th April 2012 to 2nd June 2012 from Fortis Hospitals, Anandapur, Kolkata.

During the program he completed his project on **"Turnaround Time for Inpatient Laboratory Investigations"**. He also actively worked with the quality team for the NABH Accreditation process.

During the tenure, he was found to be hardworking and sincere in his efforts. He was also found to be a good team person with good communication skills.

We wish him success in all his future endeavours.

Richa S Debgupta

Facility Director

Fortis Hospitals Limited

ACKLOWLEDGEMENT

I wish to express my sincere gratitude to Mrs. Richa S. Debnath, Facility Director, Fortis Hospitals, Anandapur, Kolkata for giving me the opportunity to do my Summer Internship at her highly esteemed Organization.

I am grateful to Mr. Jacob and Mr. J. P. Singh for their valuable guidance, advice, suggestion and encouragement rendered to me at every stage.

I am also extremely thankful to Dr. Sameer Sital Raj , Dr.Sanchyita Roy for giving me information and valuable guidance during the period of internship. Without their encouragement and guidance this project would not have materialized. The guidance and support received from all the members who contributed to this study was vital for the completion of this study. I am grateful to all of them for their constant support and guidance either directly or indirectly towards completion of my study.

CONTENT

LIST OF ABBREVIATIONS

PGDHHM- Post Graduate Diploma in Hospital & Health Management

FEHI- Fortis Escorts Heart Institute, Okhala, New Delhi

JCI: Joint Commission International

WHO: World Health Organization

NABH: National Accreditation Board for Hospitals

CABG: Coronary arterial bypass grafting

CAG: Coronary Angio Graph

PTCA: Per cutaneous Trans luminous coronary angioplasty

HMIS: Hospital Management Information System

HCC: Heart Command Centre

CRR: Cath Recovery

RR: Recovery area

FOS: Fortis Operating System

Cath. Lab. - Cardiac Catheterization Laboratory

CCU - Critical Care Unit

EMS – Emergency medical services

HR- Human Resource

ICU -Intensive Care Unit

PICU – Pediatric Intensive care unit

IPD- In-Patient Department

OPD- Out-patient Department

PICU- Pediatric Intensive Care Unit

ER - Emergency room

AED – Automated external defibrillators

CPR – Cardiopulmonary Resuscitation

ECC – Emergency cardiovascular care

ROSC – Return of spontaneous circulation

BLS – Basic life support

ACLS – Advanced cardiac life support

DNAR – Do not attempt resuscitation order

ITD – Impedance threshold device

APACHE - Acute physiology and chronic health evaluation

EURO Score – European system for cardiac operative risk evaluation

PROLOGUE

As an integral part of the **PGDHM course**, the summer training helps us in understanding the overall functioning of the hospitals from a managerial point of view. Keeping this factor in view, I tried to understand different operating procedures in various department of **FORTIS HOSPITALS,KOLKATA** with a special focus on understanding the various procedures in place. I visited different departments, met the department In-charge and interacted with the doctors, nurses and other staff.

1.1-HOSPITAL PROFILE

FORTIS HOSPITAL,KOLKATA is a renowned name in the field of cardiac surgery, interventional cardiology and cardiac diagnostics and other multispecialty units. The institute formally came into existence in August 2010 ; and was set up as a dedicated multispeciality hospital to bring to India the best curative care to the doorstep of west Bengal.

. Fortis health care is the fastest growing hospital network in India. Fortis Healthcare is led by the vision of late *Dr. Parvinder Singh* for creating an integrated healthcare delivery system in India.

Fortis hospital has set benchmark in cardiac care with its path breaking work over the past 20 years. Today, it is recognized world over as a center of excellence providing the latest technology in Cardiac Bypass Surgery, Minimally Invasive (Robotics), Interventional Cardiology, Non invasive Cardiology, Pediatrics Cardiology Surgery. The hospital is backed by the most advanced laboratories performing complete range of investigative tests in the field of Nuclear Medicine, Radiology, Hematology, Transfusion medicine, Microbiology.

Fortis hospital has a vast pool of talented and experienced team of doctors, who are further supported by a team of highly qualified, experienced & dedicated support staff & cutting edge technology like the recently installed Dual CT Scan Currently, more than 200 cardiac doctors and 1600 employees work together to manage over 14,500 admissions and 7,200 emergency cases in a year.

After successful completion of one year, Fortis has extended its service to advanced specialities like interventional radiology, interventional broncho-thoracoscopy along

with their existing super specialities - cardiac care, bone and joint care, brain and spine care, digestive care, kidney care, lung care, emergency and critical care and many other associate specialities.

“Fortis Hospital combines technological advantages and best in class clinical team providing tertiary care. Our team of clinicians across the area of cardiac care, orthopaedics, neuro sciences, minimal access surgery, uro & Nephro and Digestive care are some of the fine expertise who have contributed phenomenally in their respective fields in India and abroad,” said Richa S Debgupta, Facility Director, Fortis Hospitals, Kolkata.

Speciality clinics

To continue their patient centric support services Fortis has launched exclusive medical units like

- Headache clinic
- Epilepsy clinic
- Spine clinic
- Liver clinic and
- Fortis Heart Team

State-of-art technology at Fortis, Anandapur

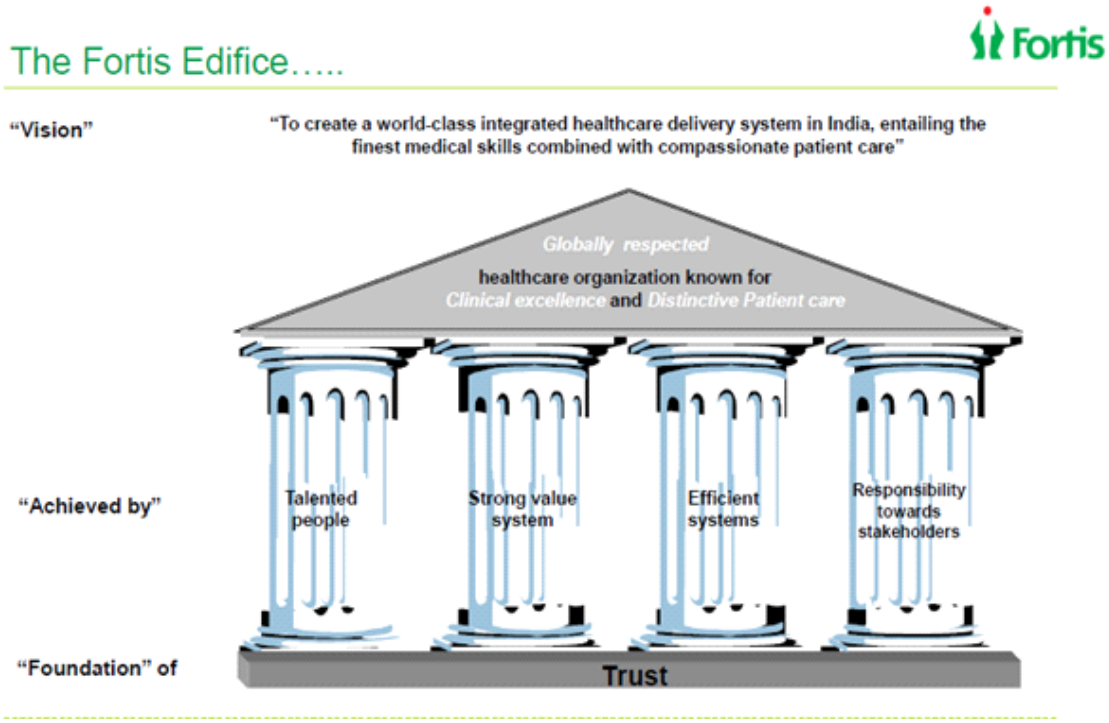
- 64-slide Siemens Somatom CT Scan and 1.5 Telsa 18 Channel Siemens Avanto MRI machine
- ICU is well equipped which includes MICU, CCU, recovery and isolation beds with separate high dependency units
- 64 beds in twin sharing cubicles for the attendants of ICU patients
- A nephrology department with 28 advanced dialysis units and chemotherapy beds
- Advanced neurophysiology lab equipped with EEG machine of international standards

1.2-MISSION

"To create a world-class integrated healthcare delivery system in India, entailing the finest medical skills combined with compassionate patient care"

Late Dr. Parvinder Singh,

Founder Chairman, Fortis Healthcare Ltd



1.3-VISION

Globally Respected Healthcare Organization recognized for Clinical Excellence and Distinctive Patient Care.

1.4-VALUES

- **Honesty**

Conduct everything we do with highest standards of professional and ethical integrity

- **Excellence**

Pursue excellence and continuous improvement in technology, skill, services and quality of interaction.

- **Attentiveness**

Be responsive to the physical and emotional needs of patients and their families, and expectations of the society.

- **Respect**

Show respect, compassion and truthfulness towards patients, co-workers and all persons we encounter.

- **Teamwork**

Recognize that working together can create a power greater than the sum of individual activities, and that mutual respect demands collegiality, consensus seeking and cooperation.

1.5-HOW FORTIS HOSPITAL,KOLKATA HAS ACHIEVED THIS

- By providing state-of-the-art world standard healthcare that exceeds expectations of patients and families.

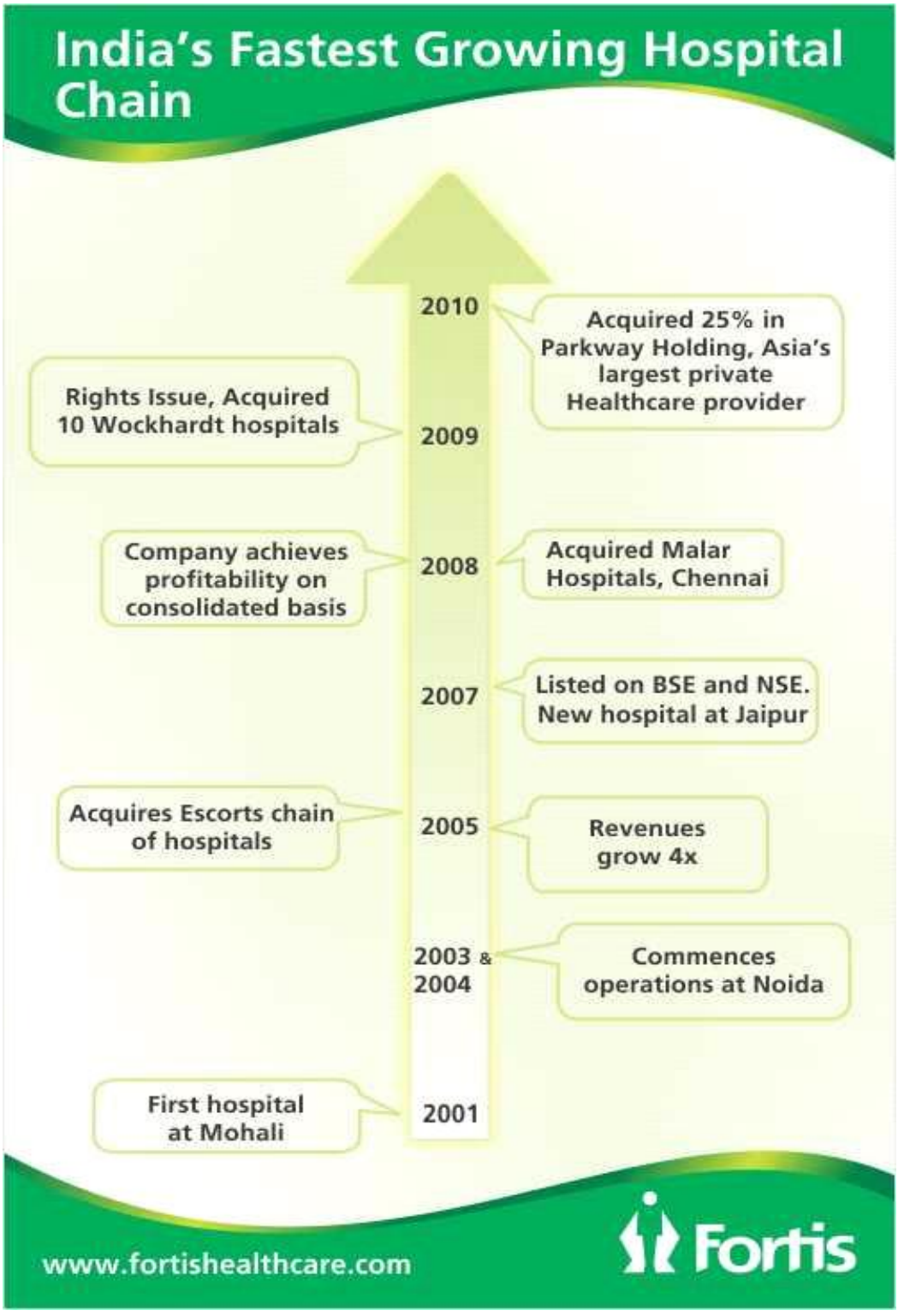
- Pursuing independent as well as collaborative research in all aspects of cardio-thoracic medicine and surgery.

- By establishing a network of joint ventures and satellite centers to extend the availability of quality health care to the population at their doorstep.

- Providing expert training for medical, paramedical, nursing and other professionals in the field of heart care.

- Networking with other organizations to promote health and well being in society through education, preventive checkups and community outreach programs.

1.7- HISTORY


India's Fastest Growing Hospital Chain
2010
Acquired 25% in Parkway Holding, Asia's largest private Healthcare provider
Rights Issue, Acquired 10 Wockhardt hospitals
2009
Company achieves profitability on consolidated basis
2008
Acquired Malar Hospitals, Chennai
2007
Listed on BSE and NSE. New hospital at Jaipur
Acquires Escorts chain of hospitals
2005
Revenues grow 4x
2003 & 2004
Commences operations at Noida
First hospital at Mohali
2001
www.fortishealthcare.com
Fortis

1.8-LOCATION

FORTIS HOSPITALS,ANANDPUR,KOLKATA.

Our Address:

Fortis Hospital
E M Bypass Road, Kokata- 107(INDIA)
Phone: 033-6628-4444
email: www.fortishospitals-kolkata.com

1.9-HOSPITAL LAYOUT

Fortis Hospital is a renowned name and has one building. The main building and the rehabilitation centre both the blocks are on the opposite sides of the road which is connected through an underground tunnel which is basically meant for shuttles to take patients from one building to another. Each of the blocks would be dealt in details below

(A)MAIN BUILDING

Basement -

- Blood bank
- Laboratory
- Pediatric Echo Lab
- Finance department.
- Engineering department.
- Laundry
- Purchase Department.
- Stores.
- Nursing Office
- Corporate office
- Library
- Auditorium

Ground Floor-

- Emergency.
- Heart Command Centre I, II

- Heart Station I and II
- Day Care Centre
- Nuclear Medicine
- Administration
- Patient Care Service
- Medical Superintendent Office
- Director's Office
- Food and Beverages
- Cafeteria
- Dietician
- Security
- Personnel
- Pharmacy
- Counseling
- Billing
- Lounge
- International desk.
- TPA department.
- Board Room

First Floor-

- Pediatric ICU- II.
- Recovery I, II, III, IV
- Anesthesia Room
- OT
- IT department

Second Floor-

- CSSD

- Biomedical Engineering
- Regional director's Office
- MD office
- CEO Office
- Doctors' Office
- Catheterization Lab
- CATH Recovery I, II, III

Third floor-

- CATH Recovery IV
- Block A (Old) Ward- Bed no. 301 to 331F
- Block B (New) Ward- Bed no. 332 to 353, (Deluxe room 358, 359)

Fourth Floor-

- Cardiac Care Unit.
- Block A (Old) Ward- Bed no. 401 to 431F
- Block B (New) Ward- Bed no. 432 to 453, PS I and II

Fifth Floor-

- Pediatric ICU- I.
- Pediatric Ward.
- Ward bed no. 501 to 516.
- Step down I- Bed no. 517 to 521.

- Step down II- Bed no. 522 to 526.

(B) REHABILITATION CENTRE (Red Building)

Lower Basement

- Medical Records department
- Pathology Laboratory

Upper Basement

- Executive Health Centre

Ground Floor – (OPD Block)

- Help Desk
- OPD Billing
- Sample Collection Room
- X-Ray
- Echo
- ECG
- TMT
- Mammography
- Bone Densitometry
- Pharmacy
- Report Room
- Dialysis Center

- Consultant Rooms
- Administrator's Office

First Floor- (OPD Block)

- OPD Billing
- Three nurse counters
- Nineteen consultation chambers where specialized doctors in the following fields are available- Pulmonology
- Neurology
- Gastroenterology
- Ophthalmology
- Laparoscopic and General Surgery
- Psychiatry
- Thoracic surgery
- Pediatric surgery
- Urology
- Dermatology
- Diabetology
- Cardiology
- Cardiac surgery
- Vascular surgery
- Pediatric cardiac surgery
- Pediatric cardiology
- Pacemaker Clinic.

Second Floor

- Café Jam Ja Jee

Third Floor

- Centre for sight

Fourth Floor

- Quality department
- Human resource department
- Marketing department

Fifth floor

- Corporate offices

Sixth floor

- Physiotherapy
- Gym

INTRODUCTION

Laboratory is the operational core of the hospital and is imperative in clinical decision making and delivery of quality care. They generate very important data and information which plays a major role in deciding the line of treatment by the doctors; it also helps to know the effect of a treatment on an individual.

Increasing awareness and affordability in- turn increases load on the labs, making efficiency and process management important to generate profits. Laboratories today focus on reliable, timely and cost effective results with reproducibility. This is possible in the modern laboratory run by advanced software and industrial robots. It improves quality, ensures repeatability of results, reduces error rates, and optimising procedures and also reduces the labour cost.

Quality can be defined as the ability of a product or service to satisfy the needs and expectations of the customer. Laboratories have traditionally restricted discussion of quality to technical or analytical quality, focusing on imprecision and inaccuracy goals. Clinicians however are interested in service quality, which encompasses total test error (imprecision and inaccuracy), availability, cost, relevance and timeliness. Clinicians desire a rapid, reliable and efficient service delivered at low cost. Of these characteristics, timeliness is perhaps the most important to the clinician, who may be prepared to sacrifice analytical quality for faster turnaround time (TAT). Despite technical, transport and information technology improvements in recent decades, TAT continues to be a cause of customer dissatisfaction with the laboratory service. . TAT is one of the most noticeable signs of a laboratory service and is used by many clinicians to judge the quality of the laboratory. Unsatisfactory TAT is a major source of complaints to the laboratory regarding poor service and consumes much time and effort from laboratory staff in complaint resolution and service improvement. Despite advances in analytical technology, transport systems and computerisation, many laboratories have had difficulties improving their TATs. With the increasing interest in the extra-

laboratory phases of the testing process, more laboratories are including TAT as a key performance indicator of their service but often have problems meeting their internal goals.[9,10]

This review summarises the literature regarding laboratory TAT, focusing on the different definitions, measures, expectations, published data, associations with clinical outcomes and approaches to improve TAT. It aims to provide a consolidated source of benchmarking data useful to the laboratory in setting TAT goals and to encourage introduction of TAT monitoring as a performance indicator.

Inspection of the literature reveals a variety of different approaches to definition of TAT. TAT can be classified by test (e.g. potassium), priority (e.g. urgent or routine), population served (e.g. inpatient, outpatient, ED) and the activities included. This last area is the greatest source of variation in reporting of TAT. The steps in performing a laboratory test were outlined by Lundberg, who described the brain to brain TAT or "total testing cycle" as a series of nine steps: ordering, collection, identification, transportation, preparation, analysis, reporting, interpretation and action.[11,12] The term "therapeutic TAT" is sometimes used to describe the interval between when a test is requested to the time a treatment decision is made.[13–15] Although the laboratory can and perhaps should be involved in all these steps, many laboratories restrict their definition of TAT to intra-laboratory activities, arguing that other factors are outside their direct control and that timing data for extra-laboratory activities are not readily available.[16] Such an approach will necessarily underestimate TAT since non-analytical delays may be responsible for up to 96% of total TAT.

The laboratory turnaround time (TAT) is recorded in 3 phases and analyzes the time to complete each phase with relevant specimens. TAT is subdivided into pre-analytical, analytical, and post-analytical phases based on the 4 time points when data are entered automatically into the LIS. The pre-analytical phase consists of the following steps: requisite for investigation by the doctor; the wait for phlebotomy; phlebotomy; transport of the specimen from the blood-collection site to the laboratory via a housekeeping; acknowledgement by the laboratory ; barcodin the specimen wiyh an accession number ; and sending the sample to respective department. The analytical phase occurs in the auto

analyzer and consists of the following steps: barcode scanning; order retrieval from the CLIMS; analysis; and the result is sent to the CLIMS. The post-analytical phase consists of the following steps: the result is received by the CLIMS; verification (automatic or manual); and the report is sent to the HIS.

The analytical phase can be streamlined by complete automation of laboratories, use of machines with higher throughputs, use of plasma or whole blood samples, primary tube sampling, ensuring minimal downtime and adequacy of backup, adoption of efficient quality control procedures, automatic dilutions in case of results exceeding linearity, prompt validation of reports etc. It is also essential to ensure effective division of labor among the technicians so that sample processing and reporting occurs smoothly. The staff should be trained to handle urgent samples with utmost care and expedite their processing. The post analytical phase can be dramatically improved with the adoption of laboratory information services (CLIMS). This will abolish transcriptional errors and delays caused in report dispatch to the respective wards. In situation like ours, the report delivery can be speeded up by the deployment of additional personnel for this task .

After going through articles on laboratory automation and its effectiveness, We intend to study whether automating a laboratory improves the overall functioning of a laboratory and would improve its efficiency and if it does, then up to what extent.

PROBLEM STATEMENT

A quantitative analysis to study whether Turn Around Time for Fortis hospital is in accordance to the standard set by SRL laboratories

REVIEW OF LITERATURE

A cross sectional study was conducted by Laboratory Automation System, 2009; v. 14, p.94-105, Dhirendra Pratap Singh

Automation systems are evolving and now have the ability to improve services to the patient, physicians, and other healthcare providers by improving TAT and providing predictable throughput. Information-based LASs can provide support for care models that include the ability to provide reflex testing, repeat testing, test cancellation, and reduce financial risk for healthcare organizations ..All of the metrics show improvement in the laboratory operations at Aultman with a payback of 2.5 years. In the future, we as laboratorians will need data defining the operational characteristics of LASs. At this point, the data are lacking only as a result of the lack of implemented automation systems in India. We estimate that we will need 10–25 installed operational automation sites with at least 2 years of operating data to provide data that will have statistical significance. Until we have these data, laboratorians will be required to take a leap of faith in the implementation of LASs, perhaps based on the successful implementation of other systems in other environments such as nonmedical industries.

Turn Around Time (TAT) as a Benchmark of Laboratory Performance
Binita Goswami • Bhawna Singh • Ranjna Chawla • V. K. Gupta • V. Mallika*:*

Their study aimed to evaluate laboratory analytical turnaround time in our laboratory and appraise the contribution of the different phases of analysis towards the same. The turn around time (TAT) for all the samples (both routine and emergency) for the outpatient and hospitalized patients were evaluated for one year. TAT was calculated from sample reception to report dispatch. The average TAT for the clinical biochemistry samples was

5.5 h for routine inpatient samples while the TAT for the outpatient samples was 24 h. The turnaround time for stat samples was 1 h. Pre- and Post analytical phases were found to contribute approximately 75% to the total TAT. The TAT demonstrates the need for improvement in the pre- and post-analytical periods.

An observational study was done by Hee-jung Chung,Woochang lee, Sail schun, China 2007

In summary, They subdivided laboratory TAT into 3 phases, pre-analytical, analytical, and post-analytical. In the majority of specimens (98.0%) test results were reported within 60 min, and only 2.0% of specimens were delayed. For specimens reported between 60 and 90 min (89.5% of delayed specimens), the preanalytical phase was in need of improvement to shorten TAT, and the main target for improvement was the "waiting time for phlebotomy" step.

Manor [18] and **Rollo** et al [19]

They reported that non-analytical delays, such as transporting and reporting delays, are the main causes of lagging laboratory TAT. The 0.2% of specimens that were reported after 90 min comprised only 28 specimens. For one specimen from a child, the preanalytical phase took 72.4 min due to difficulty in blood collection. In another 20 specimens, retests had to be performed, which resulted in delays. In this group, the preanalytical and analytical phases accounted for 36.6 and 63.4% of overall TAT.

A Cross sectional study was conducted by Dr. Robert Hawkins on Turnaround time (TAT) Department of Pathology & Laboratory Medicine, Tan Tock Seng Hospital,Singapore,11

Turnaround time (TAT) is one of the most noticeable signs of laboratory service and is often used as a key performance indicator of laboratory performance. This review

summarizes the literature regarding laboratory TAT, focusing on the different definitions, measures, expectations, published data.

Several basic steps are required to assess TAT on an ongoing basis. An achievable and modest approach is preferable to one with unrealistic data collection plans and over-optimistic goals.

1. Choice of appropriate analysis for monitoring. These should be chosen to reflect different service needs of the areas served by the laboratory but should probably be restricted to no more than four. A variety of different tests, priorities and locations should be chosen to cover the range of work provided by the laboratory.
2. Clear definition of TAT in terms of start points and end points. Despite the attraction of assessing both intra-laboratory and extra-laboratory TAT, such data are often not available and the laboratory must use the data that can be gathered easily, reliably and on an ongoing basis. With increasing availability of electronic timestamp data of clinician requesting and result reviewing times, a closer approximation to therapeutic TAT becomes possible. Intra-laboratory TAT may be the easiest to define, using start points of specimen receipt (or registration) and end points of result availability to requester (or hardcopy printing). However laboratories should ensure that the choice of timing points is relevant in their local context and that practices such as sample registration prior to sample collection (as is possible in an outpatient setting) or the addition of a test request to an existing sample requisition do not result in misleading time interval calculations. TAT histograms should be studied carefully to identify any unexpected patterns or the presence of anomalous data points.
3. Clear definition of measures to be measured. Medians, 90% (or 95%) completion times and outlier rates are preferred over Gaussian-based mean and standard deviation measures. Despite their attraction, 90% completion times are often not routinely calculated by laboratory information systems and may require offline analysis of extracted raw data. Outlier rates may be easy to obtain on an ongoing basis and can also be a source of cases for further investigation on a regular schedule (e.g. root cause analysis of delay for the slowest 20 troponin samples

every month). Similarly median values are less commonly available than mean values–the laboratory should work with the available measures while appreciating any inherent shortcomings.

4. Clear definitions of acceptable and unacceptable performance based on clinical evidence, benchmarking data and local expectations. These goals should be negotiated with users. A sample registration to result reporting 90% completion time of <60 minutes for common laboratory tests is a good starting point for discussion.[4]
5. Establishment of a system for long term monitoring of performance using available data.
6. Regular review (e.g. monthly) of performance measures looking for TAT monitoring is for unacceptable performance and trends.
7. The ideal choice of activity to illustrate the laboratory's commitment to providing a high quality service. Improved TAT can be the key to greater user satisfaction with the laboratory.

It aims to provide continuous quality improvement.

A 90% completion time (sample registration to result reporting) of <60 minutes for common laboratory tests is suggested as an initial goal for acceptable TAT.

RATIONALE OF THE PROJECT

Laboratories today have to cope up with the increase in patient load and at the same time they have to maintain the quality and profitability and to meet these needs, efficiency in terms of accuracy of results in the work flow is a must. Turnaround time (TAT) is one of the most noticeable signs of laboratory service and is often used as a key performance indicator of laboratory performance. Hence this study was done to analyse whether TAT for Biochemistry and Haematology Test are in accordance to the standard set by SRL .

RESEARCH OBJECTIVES

Objectives of the study is,

- To calculate average turnaround time for routine laboratory tests,
- To find out the areas of delay in the process of test requisition to final report generation
- To compare intra and extra laboratory turn around time
- To find out the common avoidable errors occurring in a laboratory.

RESEARCH METHODOLOGY

- **The Research design:** Comparative (analytic), Cross sectional study.

- **Sampling Technique:** Purposive non probability sampling.

- **Sample Size**: 100 samples tested for Hematology and Biochemistry in the laboratory for the period of Three weeks .

- **Inclusion Criteria** : Routine Hematology (CBC, Hb) and biochemistry (Na, K, AST, ALT) samples from inpatient department coming between 8 am – 2 p.m. were taken from level 7 and level 8 wards.

- **Exclusion Criteria :** Samples from Outpatient department**,** CCU , SICU and Emergency

TOOLS AND TECHNIQUES

The Study was conducted in SRL Laboratory of Fortis Hospital , Anandapur ,Kolkata . Initially the workflow and the standard operating procedures of the laboratories was observed and flowcharts depicting them were made. Each stage of the procedures carried out in the laboratory was carefully observed right from the reception, the phlebotomy section, the haematology and the biochemistry sections as well as the technical staff involved.

Data Collection :

Turnaround time (TAT) of common diagnostic tests were calculated as per the definition of turnaround time i.e. from request to report generation. The time taken at different stages of sample testing were noted from the time reqisisted for the test to the time report was generated by the Laboratory in the HIMS .

Different times noted to calculate TAT (request to report generation) were:

1. Time of requesting the test by clinician
2. Time the sample was acknowledged by the Laboratory.
3. Time the report generated by the machine into the hospital management information system

- **Laboratory turnaround time = Time the report generated from the machine – Time of requesting test by the clinician**

Along with this the delays and errors occurring at each stage of the whole process from the pre analytical, analytical as well as the post analytical phase would also be noted.

DATA ANALYSIS :

The Data obtained was coded and fed into excel and then transferred into statistical package for social sciences (IBM SPSS version 16.0). The statistical tool used was the t-Test.

The average turnaround time for each test was calculated using the table above .The turnaround times from both the hospital and the standard set by SRL were compared after being fed into SPSS and using t-Test to test whether there actually is a difference between the times and if there is, to find out whether the difference is significant.

The standard TAT for Biochemistry test on an average is 120 minutes and standard TAT for Hematology test on an average is 180 minutes.

The total time (test order time to report generation) and intra laboratory time was compared to the standard SRL TAT for Biochemistry and Hematology respectively using Two-Tailed T-Test.

Sigma for two-tailed t- test is 0.025

The result observed were as follows:

For Biochemistry:

Ho: Average TAT for Biochemistry =120 minutes

Ha: Average TAT for Biochemistry $\neq$ 120 minutes

After running one sample t- test it was observed that the significant value is 0 for total time and 0.003 for intra lab time which is less than 0.025 . Hence the null hypothesis is rejected. But is observed that the calculated mean for total time is 219 minutes a difference of 99 minutes compared to the normal standard mean and calculated mean for intra lab is 158 minutes a difference of 40 minutes compared to to the normal standard of

120 minutes. Hence it can be seen that the biochemistry department is an able to accomplish its standard TAT and more than 50% is due to extra laboratory factors.

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
TOTAL_TIME	54	219.26	98.100	13.350

One-Sample Test

	Test Value = 120					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
TOTAL_TIME	7.435	53	.000	99.259	72.48	126.04

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
intra_lab_time	54	158.70	92.828	12.632

One-Sample Test

	Test Value = 120					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
intra_lab_time	3.064	53	.003	38.704	13.37	64.04

For Hematology:

Ho: Average TAT for Hematology =180 minutes

Ha: Average TAT for Hematology $\neq$ 180 minutes

After running one sample t- test it was observed that the significant value is 0.019 for total time which is less than 0.025 and 0.145 for intra lab time which is higher than the sigma. Hence the null hypothesis is rejected only for the total time TAT but accepted for intra lab time. It is observed that the calculated mean for total time is 214 minutes a difference of 34 minutes compared to the normal standard mean and calculated mean for intra lab is 159 minutes a which is below to the normal standard of 180 minutes. Hence it was seen that the hematology department has achieved TAT for intra lad but is unable to accomplish its total standard TAT solely due to the external factors .

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
TOTAL_HEMATOLOGY	42	214.14	90.429	13.953

One-Sample Test

	Test Value = 180					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper

One-Sample Test

	Test Value = 180					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
TOTAL_HEMATOLOGY	2.447	41	.019	34.143	5.96	62.32

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
INTRA_LAB_HEM	43	159.26	91.602	13.969

One-Sample Test

	Test Value = 180					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
INTRA_LAB_HEM	-1.485	42	.145	-20.744	-48.94	7.45

CAUSE OF DELAY IN TAT

- Unavailability ,incompetency and over workload was found to be a major cause of delay in the transportation of sample in the pre analytical stage of sample testing by the housekeeping staff .Other than the transfer of specimen the housekeeping staff had the responsibility of other miscellaneous activity of the department. This resulted in delay in specimen to be delivered late.

- Availability of only two phlebotomist for the whole hospital resulted in the sisters collecting the sample which were sometimes found to be insufficient resulting in rejection of sample increasing the pre analytical TAT .

- It was conjectured delays reflected problems with staff not sending or retrieving specimens promptly and underlined the need to consider all aspects of workflow rather than just physical installation in the Laboratory.

- Irregular sample collection process resulted in samples reaching the laboratory in installments causing underutilization of the machines. This resulted in increase in waiting time for samples coming later increasing the intra TAT for the laboratory.

- Machine down time was found to be one of the factors resulting in increased intra laboratory TAT.

- Intra laboratory TAT was also found to increase due to the technicians were found involved in miscellaneous activities such as cleaning and washing of the equipments.

RECOMMENDATIONS

- Specimens transported to the laboratory by pneumatic tube systems, training of laboratory staff to expedite handling of urgent samples, utilization of urgent laboratory test.

- Increase in housekeeping manpower for each ward.

- Addition of an extra phlebotomist in work force for proper sample collection.

- Initiation of phlebotomy rounds earlier in morning, revision of work schedules to co-ordinate available manpower with workload needs, addition of personnel to process specimens and expedite transport of specimens to the laboratory, transportation of specimens to the laboratory in batches such that testing can begin on the first batch of specimens while phlebotomists return to the wards to collect a second batch.

- Introduction of backup machine to decrease delays due to machine downtime.

- Inclusion of a laboratory assistant to carry out the miscellaneous and secondary activities of the laboratory.

- Continuous training and motivation of the technical staff of the laboratory to improve quality by decreasing the reporting errors and lesser review time.

- Continuous monitoring of quality indicators for the laboratory.

ACTIVITY PLAN

The duration of the project is 7 weeks and hence the activities are allotted a specific duration and they are as follows:

The project planning and set up required one week which included meeting with the mentor, drafting a work plan and getting the work plan approved.

Literature review took two weeks where I went through every possible and available aspect of the proposed topic of the Project

Sampling required one week where the sample and the sample size was decided along with the inclusion and exclusion criteria

Data collection required three weeks where I went to the selected hospital wards at the decided time and noted down the required information.

Data processing included reviewing data, managing the collected data and analyzing it. It would be done in the 5^{th} and 6^{th} week after the sampling is completed.

And finally in the last week the report was drafted, went through a qualitative review and was delivered.

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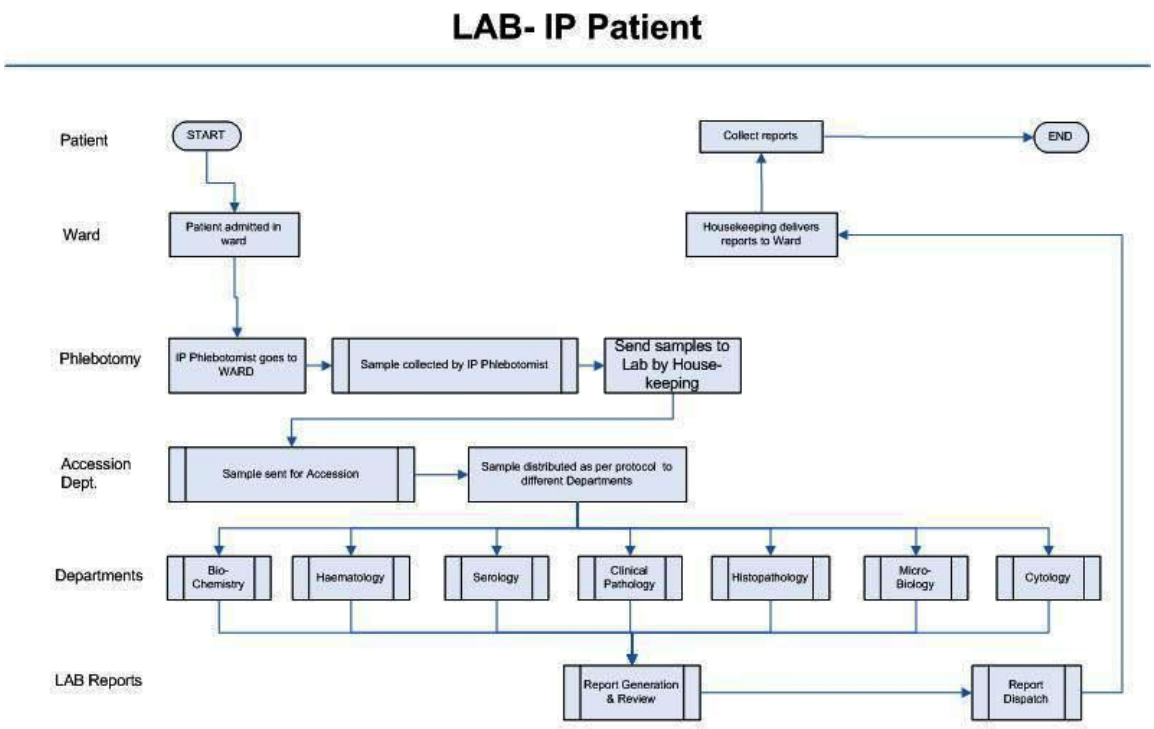
ANNEXURE:1

ANNEXURE:2 PROCESS MAP



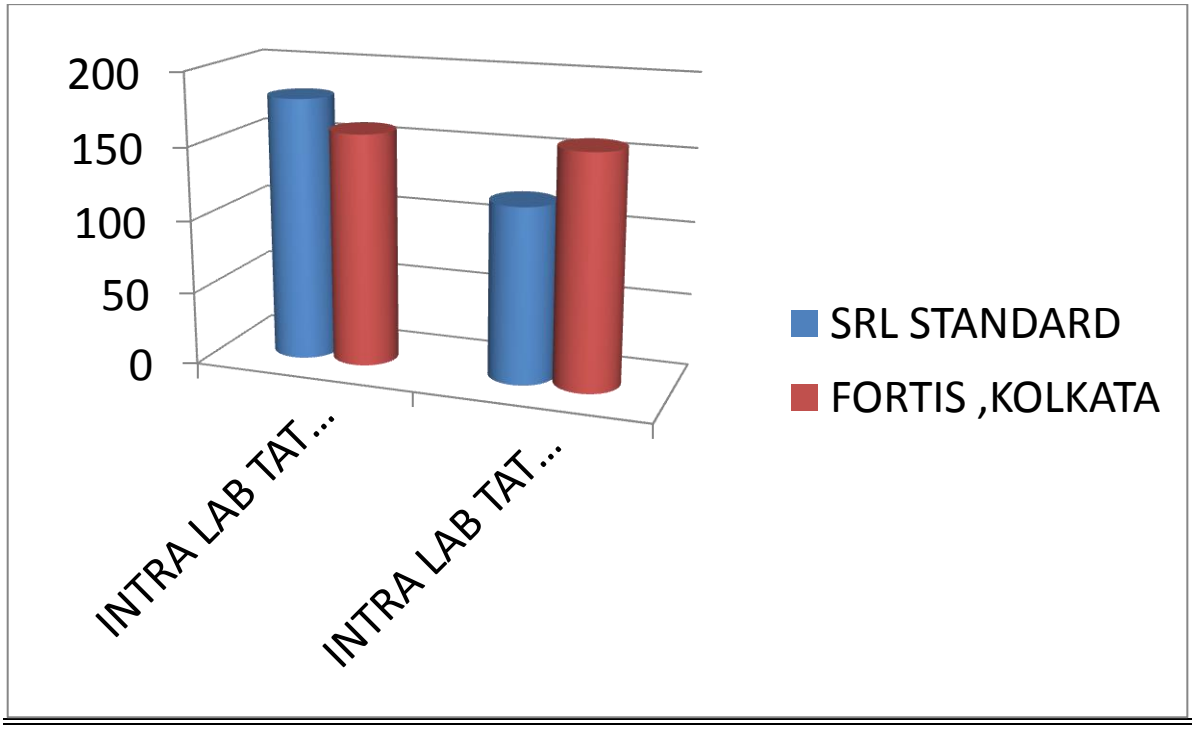
ANNEXURE 3:

COMPARISON BETWEEN THE TAT FOR FORTIS AND STANDARD SRL UNDER STUDY

TEST / TIME	REQUESTED BY CLINICIAN (A)	SAMPLE WAS ACKNOWLEDGED (B)	REPORT GENERATED BY THE MACHINE (C)	LABORATORY TURN AROUND TIME=A-C
HEMATOLOGY **1)CBC** **2)Hb**				
BIOCHEMISTRY **1)Na** **2)K** **3)AST** **4)ALT**				

ANNEXTURE:4

COMPARISON OF INTRA LABORATORY TIME AND STANDARD TIME BY SRL



ANNEXTURE 5: CAUSE AND EFFECT (FISH BONE) DIAGRAM