International Journal of Research and Review
www.ijrrjournal.com E-ISSN: 2349-9788; P-ISSN: 2454-2237

Original Research Article

Physician Goals and Monitoring of Turn Around Time in Clinical Biochemistry

Ashima Badyal[1], Sanjeev Kumar[2]

[1]Lecturer, Department of Biochemistry, Government Medical College Jammu.
[2]Physician, Sub-District Hospital, Hiranagar, District Kathua.

Corresponding Author: Ashima Badyal

ABSTRACT

Laboratories are focusing on accuracy of test results, patients and clinicians however are interested in rapid, reliable and efficient service from them. 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.

The present study was conducted on 200 samples taken from patients in OPD and Indoor departments, simultaneously over a period of time in the clinical biochemistry laboratory of GMC Jammu, but excluding the results of investigations like hormone assays, tumour markers, etc. The time expended in various phases was retrieved from the recorded data at suitable stations and then statistically analysed. Average TAT in OPD and IPD was found to be 172.5±34.3 and 153.8±41.7 minutes respectively. Pre and post-analytical phases were contributing at the rate of 52.6% to 58.4% of the total time laps or turn around time.

Time lapsed during analytical phase could be reduced by using fully automated machines with higher throughput, adoption of efficient quality control procedures, etc, but the manual dispatch of the reports could be replaced by Information Technology based e-prints and messages to reduce the time lapse and correct delivery. The biggest impediment for prompt TAT seemed to be the lack of automated facilities for sample transport. With the changing times, this could be immediately looked upon for an effective systemization and modern practises in the profession.

Keywords: Turn around time, Inpatient department, Outpatient department, Clinical Biochemistry.

INTRODUCTION

Turn around time can be classified by test (glucose urea, creatinine), priority (urgent or routine), population served (inpatient, outpatient). 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. [1] The therapeutic "TAT" is sometimes used to describe the interval between when a test is requested to the time a treatment decision is made. [2] 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. [3] Such an approach will necessarily underestimate TAT since non-analytical delays may be responsible for up to 96%of total TAT. [4] Intra laboratory TAT can also vary in its definition with possible start points of sample receipt time, registration time or analytical sampling time

and end points of analytical completion time, result transfer to electronic medical record time and report printing time.

Another classification of time periods separates the steps into pre analytical (order to preparation), Analytical (Analysis) and post analytical (reporting to action) phases. [5] World class provider industries are characterized by their attention to reducing waits and delays. In contrast, timeliness of results reporting has not been a major focus in clinical laboratories. [6] Since voluntary accreditation is made possible by National Accreditations Board for testing and calibration of laboratories (NABL) in developing countries like India, the analytical quality of laboratory test results have improved. However it is not only the accuracy or reliability of test result that satisfies the patients or the physicians but the speediness of availability of laboratory test result also is important. The turn around time the timeliness with which laboratory personnel delivers the test results, is suggested as one of the quality indicators of the standard of laboratory performance by which the clinicians [7] and the accreditation organizations judge a laboratory. [8] For indoor patients timely, accurate and reliable lab test result hospital stay, enhance the safety and satisfaction of the patient. This equally applies to outdoor patients also. Therefore it is the responsibility of laboratory to make improvement in TAT. Most of the labs fail to do this as aim improving the TAT is a difficult task. Therefore the present study was planned to determine the turn around time of clinical biochemistry laboratory. To evaluate the contribution of pre-analytical and post-analytical phases as compared to analytical phase to the turn around time (TAT) and to see the number of samples being reported outside the defined TAT. Various steps were also evaluated by which the total turn around time can be reduced.

MATERIAL AND METHODS

The present study has been conducted on samples received in the clinical biochemistry laboratory of GMC Jammu The lab is equipped with the latest instruments like fully automated Siemens dimension clinical chemistry system biochemistry analyzer for routine chemistries, fully automated ARCHITECT Chemiluminescence microparticle immunoassay for hormone assays, tumour marker assay. In the pre-analytical phase, the samples from outdoor patients were collected in the sample collection area by trained lab technicians whereas the samples from indoor patients were drawn by the staff nurses of their respective wards. The samples were transported to the laboratory from both outdoor and indoor patients by their respective attendants. In the subsequent phase, the samples received in the laboratory were first screened for any pre-analytical errors followed by their processing. Quality control samples were run daily in the laboratory for all the analyses to identify any intra-assay variation. The samples received in the laboratory were processed in the order in which they were received with the exception of samples received from emergency which were run on stat mode as soon as they were received. After the sample was analyzed for all requested parameters and the reports were validated in the software which were then dispatched and manually distributed by the laboratory attendant to the respective outdoor departments and wards, in the post-analytical phase. The samples were run in batches and the reports were also dispatched in batches after complete analysis. The time period/ duration in each phase was retrieved from the recorded data at suitable stations or from the registers maintained for the purpose at OPD, IPD and Lab as well. Correct time entry is mandatory in near precise hour and minutes.

But this study does not include the results of investigations like hormone assays and tumour markers and also situations arising out of machine breakdown and lack

of uninterrupted electricity. In this study, we are presenting the TAT of 200 samples out of which 100 were received from outdoor patients and 100 from indoor patients in the clinical biochemistry laboratory of GMC Jammu.

Statistical Method

As the data was normally distributed over various phases, it was represented for its mean and standard deviation. As the factors involving time spend under variable conditions was involved while defining the range of various time intervals and while defining TAT, it was given the form of its median and interquartile range. Thus, 75th percentile was taken as the optimal cut-off value for defining TAT. A p value of <0.05 was considered to be statistically significant for extracting inferences.

RESULTS

TAT was monitored in 200 samples taken from patients in OPD and Indoor departments of GMC Jammu simultaneous, over a period of time. The time taken to complete the pre-analytical, analytical and post-analytical phases is hereby shown in Table 1. The findings revealed an average turnaround time in OPD and IPD to be 172.5±34.3 and 153.8±41.7 minutes respectively. The time taken for pre-analytical phase was 65.5±15.8 minutes in OPD (12.2±7.7 minutes for phlebotomy and 53.3±10.1 minutes for transport of sample from phlebotomy area to the laboratory) and 62.1±17.7 minutes in IPD (which includes only transport of sample). The time taken to complete the analytical phase was 71.7±24.3 and 72.2±39.4 in OPD and IPD respectively, which did not vary much in either case. The time taken to complete the post analytical phase, including the time taken for manually distributing the reports, was 35.3±18.5 in OPD and 29.5±20.9 in IPD, which showed the comparative efficiency of disposal of work in IPD. The time taken for completing the analytical phase in both OPD and IPD was significantly less than the combined pre and post analytical time in either OPD (100.8±22.4 minutes) or IPD (91.6±28.5 minutes). (p=0.038)

Table 1: Analysis of turn around time (TAT) (in three phases)

	Pre-analytical Phase I	Analytical Phase II	Post-analytical Phase III	Combined Pre and Post analytical Phase	TAT (minutes) (mean±SD)
OPD	65.5±15.8	71.7±24.3	35.3±18.5	100.8±22.4	172.5±34.3
IPD	62.1±17.7	72.2±39.4	29.5±20.9	91.6±28.5	153.8±41.7

Table 2: Contribution of pre and post-analytical time (AT) to total TAT

	Total TAT %	Pre and Post AT %	Analytical time to TAT %
OPD	100	58.4%	41.6%
IPD	100	52.6%	47.4%

The contribution of analytical time of the total TAT in OPD (41.6%) and in IPD (47.4%) is less than the contribution of combined pre and post analytical time in OPD (58.4%) and in IPD (52.6%) (Table 2). Out of the total 200 samples, 32% samples in OPD and 28% samples in IPD have been found to be reported outside the defined cut-off value of TAT, which is 190 minutes in OPD and 188 Minutes in IPD (Table 3).

Table 3: Percentage of samples crossing the cut-off value of TAT

	Defined TAT (minutes)	Number of samples crossing threshold	% Samples
OPD	190	27	27
IPD	188	23	23

Analysis of time taken to report 100 samples in OPD and corresponding 100 samples in IPD showed that the maximum number of samples have been analysed between 120-180 minutes in both OPD and IPD (101 out of the total 200) (Table 4).

Table 4: Analysis of reporting of samples in OPD and IPD

	OPD	IPD
Time (Min)	Number of Samples	Number of Samples
≤60	0	1
61-120	14	18
121-180	52	49
>180	34	32

DISCUSSION

Steindel et al [9,10] has noted that there is an unsaid requirement of quick-delivery laboratory services, which means as to how fast a test result is returned to a caregiver. The earlier the delivery, the

treatment will start effectively and in time. It also increases the patient satisfaction. On the other hand, there are several factors beyond the control of the laboratory professionals which influence TAT and are responsible for the delays. [4] The study further demonstrates that the pre and post analytical phases are currently contributing @ 52.6% to 58.4% of the total time laps or turn around time, which is highly significant.

In case of pre-analytical phase, adoption of ideal phlebotomy practices, bar-coding of samples, use of computer generated requisition slips, and use of plasma and serum separator tubes will reduce the delays occurring as a result of illegible slips and wrong sample collection techniques. Mc Queen [11] found that inclusion of a pneumatic tubing system, in the transport and delivery practices, led to significant reduction of TAT.

Analytical phase can be reduced by using fully automated machines with higher throughput, adoption of efficient quality control procedures, etc. The post analytical phase can be reduced by adoption of lab information system. The manual dispatch of the reports can be replaced by Information Technology based e-prints and messages to reduce the time lapse and correct delivery. The current study intends to highlight the correct issues in the regard and help in reducing the turn around time to make the testing and diagnosis more effective.

CONCLUSION

There has been progress in the area of laboratory test result in TAT in recent years, with more explicit descriptions of TAT data in the literatures. Though it is a tedious process to monitor TAT, with the increasing availability of computer software, laboratory information system that help in the real time documentation and authentic retrieval of data, regular audit, providing training to the laboratory technicians and the resident doctors, discussion in the laboratory services meeting and the management support whenever needed to improve the TAT. It becomes possible to reduce patient waiting time and hence improving the satisfaction of the patients. The results of the study were discussed with the management of the institute following which the print-outs of reports of OPD patients are now taken in the sample collection area when the patient comes to collect the report. This has reduced the post analytical time taken for delivery of reports in OPD patients. The biggest impediment for prompt TAT in our setting is the lack of automated facilities for sample transport as we are dependent on manual courier for sample transport which is pre-analytical cause. As the time is changing, this delivery can be immediately looked upon and an effective systemization can bring things in place and encourage the most modern practises in the profession.

REFERENCES

1. Lundberg GD. Acting on significant laboratory results. JAMA 1981; 245:1762-3.
2. Fermann GJ, Suyama J. Point of care testing in the emergency department. J Point of care testing in the emergency department. J Emerg Med 2002; 22:393-404.
3. Saxena S, Wong ET. Does the emergency department need a dedicated stat laboratory? Continous quality improvement as judgement tool for the clinical laboratory. Am J Clin Pathol 1993; 100:606-10.
4. Manor PG. Turn around times in the laboratory: a review of the literature. Clin Lab Sci 1999; 12:85-9.
5. Truchaud A, Le Neel T, Brochard H, Malvaux S, Moyon M, Cazaubiel M. New tools for laboratory design and management. Clin chem. 1997; 43:1709-15.
6. Howanitz PJ, Cembrowski GS, Steindel SJ, Long TA. Physician goals and laboratory turn around times. A college of American pathologist Q-Probes study of 2763 clinicians and 722 institutions. Arch Pathol Lab Med. 1993;117(1):22-8.
7. Novis DA, Dale JC, Morning rounds inpatient test availability: a college of

American Pathologist Q-Probes study of 79860 morning complete blood cell count and electrolyte test results in 367 institution . Arch Pathol Lab Med 2000;124(4):499-503
8. Valenstein P. Laboratory turn around time. Am J Clin Pathol.1996; 105(6):676-88
9. Steindel SJ, Novis DA. Using outlier events to monitor test turn around time. A college of American pathologist Q Probes study in 496 laboratories. Arch Pathol Lab Med.1999; 123:607-14.
10. Steindel SJ, Jones BA, Howanitz PJ. Timeliness of automated routine laboratory test: A college of American Pathologist Q-Probes study of 653 institutions. Clin Chim Acta. 1996; 251(1):25-40.
11. Mc Queen MJ. Role of the laboratory in meeting the needs of critical care. Clin Biochem.1992; 26(1):8-10.

How to cite this article: Badyal A, Kumar S. Physician goals and monitoring of turn around time in clinical biochemistry. International Journal of Research and Review. 2018; 5(3):82-86.

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