Abstract

Background: Turnaround time (TAT) is one of the key indicators of performance of a laboratory. Laboratories define it as the time from the receipt of sample/specimen to the reporting. A fast TAT helps clinicians in making early diagnosis.

Aim: To determine the turnaround time (TAT) of the biochemistry laboratory with evaluation of the contribution of pre-analytical and analytical phase to the total TAT.

Results: A total of 399 samples were analysed from three outpatient departments. Average pre-analytical turnaround time contribution was found to be higher as compared to the analytical time. Excess workload and delay in pneumatic shoot were the main causes of delay in pre-analytical phase.

Conclusion: Improved turnaround time is the key to clinicians’ and patients’ better satisfaction with the laboratory. It can be attained by minimising the bottlenecks within the process.

Keywords: Analytical, Laboratory, Pre-analytical, Turnaround time

Introduction

Laboratory turnaround time (TAT) is usually defined as the time from when a test is ordered until the result is generated.1 However, laboratories define it from the time of receipt of sample/specimen to the reporting of same.2,3 TAT is often judged as a quality indictor of laboratories. It is very important to have rapid TATs so that clinicians can make diagnosis early and treat the patient on time. It is also important for the hospitals to have a fast TATs to attain good bed turnover ratio for inpatient services. A quick report will help in discharging patients from casualty thereby improves it efficiency. There are chances of test being duplicated if the lab has a delayed TAT. This will overburden the laboratory and may also lead to patient dissatisfaction.2

The “total testing cycle” describes TAT as consortium of nine steps: ordering, collection, identification, transport, preparation, analysis, reporting, interpretation and action.4 TAT has also been classified as pre-analytical, analytical and post-analytical depending on the different phases of sample processing.5 The aim of the present study is to determine the turnaround time (TAT) of the biochemistry laboratory with evaluation of the contribution of pre-analytical and analytical phase to the total turnaround time (TAT). We also tried to analyse the cause of pre-analytical delays.

Materials and Methods

A prospective study was carried out for a period of two months from June to July 2018 at the Biochemistry lab of Amrita Institute of Medical Sciences, Kochi. Tests were carried out on automated analysers. Turnaround time was calculated for 30 commonly done routine tests that included Liver function test, Renal function test, Lipid profile, Thyroid function test, Electrolyte test, Blood sugar - fasting and post prandial and HbA1C. TAT was calculated for samples sent to laboratory from three major Outpatient departments of General Medicine, Cardiology and Endocrinology. Sample size was calculated to be 133 per OPD as per Solvin’s formula.

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Results

The turnaround time (TAT) was calculated for 133 samples from 3 OPDs - Endocrinology, Cardiology and General Medicine each. Table 1 shows the time taken to complete pre-analytical and analytical phases in all the three OPD samples. The average pre-analytical turnaround time in Endocrinology, Cardiology and General Medicine OPD were 29:09, 16:18 and 22:53 minutes and analytical time in respective OPDs were 55:33, 52:41 and 51:14 minutes.

Discussion

Laboratories with faster TAT is universally desirable. Literature search supports the belief “the timelier and rapidly testing is performed the more efficient and effective will be the treatment” and “it is almost axiomatic that providing a more rapid result saves time and therefore money”.6,8 The performance of lab is known by its TAT i.e. how quickly a test result is given to the clinicians.8 It surely helps clinicians in making early diagnosis and treatment.

<table>
<thead>
<tr>
<th>Outpatient department</th>
<th>Total sample</th>
<th>Pre-analytical time</th>
<th>Analytical time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Average time</td>
<td>Total time</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>133</td>
<td>0:29:09</td>
<td>64:38:00</td>
</tr>
<tr>
<td>Cardiology</td>
<td>133</td>
<td>0:16:18</td>
<td>35:51:00</td>
</tr>
<tr>
<td>General Medicine</td>
<td>133</td>
<td>0:22:53</td>
<td>50:44:00</td>
</tr>
</tbody>
</table>

The contribution of pre-analytical time to total TAT was 66%, 76% and 69% in the three respective OPDs - Endocrinology, Cardiology and General Medicine (Figure 1).

Figure 1.Contribution of pre analytical and analytical time in total turnaround time

The major problem areas or the causes of delay in pre-analytical time is given in Figure 2.

Figure 2.Causes of delay in turnaround time with their cumulative percentage

Workload and pneumatic shoot delay were the most common cause of delay with cumulative percentage of 68.27%.

This can be achieved even on the first visit and thereby thus improves clinician’s efficiency and increases patient satisfaction. However, there are many processes that affect TAT and not all of them are under the direct control of laboratory personnel. Such factors are usually responsible for a number of delays in TAT.10 This study demonstrates that pre-analytical phase contributes more to total TAT when compared to analytical phase. Out of the three OPDs, Cardiology OPD had the maximum pre-analytical phase contribution (76%) whereas Endocrinology OPD had maximum analytical contribution to the total Turnaround time (34%). If pre-analytical phase can be carried out as efficiently as possible, TAT can be reduced appreciatively.1

On further observation, it was seen that workload and pneumatic shoot delay were the most common causes of delay. Other causes included different location of OPD, lack of communication, waiting for more samples to run them in batches etc. This is similar to other studies in literature.8, 10-13 The analytical phase can still be reduced by using automated machines with higher throughput, establishing strict quality control measures and use of trained manpower. At our institute all reports are entered into the hospital information system that makes reports readily available and accessible to all clinicians.

Conclusion

Clinical laboratory services have a major effect on the clinical decisions that physicians, nurses and various other healthcare providers make with patient care. These decisions effect disease prevention, diagnosis, treatment and management of the disease.

Turnaround time is one of the ideal choices of activity that should be monitored to demonstrate and reinforce the laboratory’s commitment to provide a good quality service. Authors believe that improved turnaround time is the key to clinicians’ as well as patients’ better satisfaction with the laboratory. The current study is a useful study that
helps to find out the improvement in the turnaround time of the lab and it also help us to find out the bottlenecks in the pre-analytical phase. All attempts should be directed to minimize these bottlenecks to get the maximum benefit of the automation to the quality of patient care.

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**References**


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