ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

Determination of Turn Around Time (TAT) in NABL (National Accredited Board of Laboratory) accredited hematology and clinical pathological laboratory

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Manuscript Info

Manuscript History:

Received: 15 July 2013
Final Accepted: 22 July 2013
Published Online: August 2013

Key words:
Turn Around Time (TAT), National Accredited Board of Laboratory (NABL)

Abstract

SUMMARY: The study was performed to analyze Turn Around Time (TAT) in NABL accredited hematology and clinical laboratory. Number of samples and the reasons for delay were analyzed. Increasing staff, regular audit and corrective actions lead to improvement in TAT.

INTRODUCTION: Along with accuracy and reliability, timely reporting of laboratory test result is now considered an important aspect of service provided by a laboratory. The aim of this study is to evaluate the cause of delay in TAT and scope for improvement.

METHOD AND MATERIALS: This was a retrospective study from January 2011 to December 2012, where the TAT of stat tests were analysed. TAT was specified as the time from sample collection to final dispatch of report. The delay was categorized in to 0-30min, 30 min-1 hour, 1-2 hours, 2-5 hours, 5-10 hours and >10 hours. Reasons and time of the day in which delay were looked into.

RESULT: Total 102331 sample were received, out of which 6989 (6.8%) sample were reported out of range for acceptable TAT. Most delays (59.29%) were limited to the first 30 minutes. Most common delay was noted during lunch breaks and early mornings. Common source of delay was the pre-analytic phase (sample transport and pre-analytical processing).Significant improvement in TAT from year 2011 (8.02%) to 2012 (5.4%) was due increasing staff, regular audit and corrective actions.

CONCLUSION: Regular audit of data helps in evaluation of the efficiency of laboratory which is then followed by appropriate measures that lead to improvement in service to patients and physicians.

Introduction

Along with accuracy and reliability, timely reporting of laboratory test results is now considered an important aspect of the services provided by the clinical laboratory. Whether or not, faster turnaround time can make any medical difference, patients and their physicians want reports as rapidly as possible.

It has also been shown that outcomes in certain situations such as operation theaters and in emergency departments have been affected by timely reporting of laboratory tests results.[1] Hence, rapid laboratory turnaround times is important both from a medical and commercial point of view.

A recent review of laboratory turnaround time indicated that analysis of this time interval has helped in determining the cause of delay, which is then followed by the improvement in turnaround time. This issue is very important and in general, laboratories do not stress enough on its significance.

Appropriate and timely clinical decisions depend on timely reporting, which in turn affects patient outcome. The statement "Justice delayed, Justice denied" can be rephrased in our setting as "Report Delayed, Treatment denied".[10]

The aim of this study was to evaluate the delay, reasons of delay, time of the day in which delay of turnaround time (TAT) of stat tests in the section of

clinical and hematological laboratory and improvement after increasing staff, regular audit and corrective actions.

Materials and Methods

This retrospective cross-sectional study was conducted at Shree Krishna Hospital from January 2011 to December 2012.

Hospital laboratory caters to stat tests not only from in-patient but also received on outpatient basis. A stat test mostly comes from patients admitted in emergency department (ER), intensive care unit (ICU), coronary care unit (CCU) and neonatal intensive care unit (NICU). Our study was restricted to the clinical and hematology section of the laboratory.

It includes complete blood counts(120 min), coagulation studies (APTT & PT)(90 min for each), erythrocyte sedimentation rate (ESR)(150 min), differentiated count (DC)(90 min), absolute eosinophilic count(90 min), hemoglobin(90 min), malaria smear(90 min), malaria serology(90 min), peripheral smear for cell morphology(PS for CM)(120 min), routine semen examination(180 min), routine micro fluid examination(120 min), reticulocyte count(RC)(150 min), total WBC count(90 min), urine routine and microscopy(U-RM)(120 min), histogram(90 min), platelet count(90 min), peripheral smear for band cell and toxic granules (150 min)and pack cell volume(PCV). There are 19 parameters on Stat testing list in the section of clinical and hematological laboratory.

The physicians order stat tests in the respective departments and blood is collected by medical officers, residents, phlebotomist or nurses. The samples are then transported to the laboratory by the porter to the receiving bench of the concerned area of the laboratory. Outpatient stat samples are collected by the phlebotomist or brought from outside the hospital.

The samples, after processing of patient data, are taken to the automated analyzer, followed by manual verifications if required, analyses and recheck if necessary. The final reports are then uploaded to the in-house Laboratory Information System and print outs made available in case of outpatients. It has been recommended that each laboratory should develop a written policy for handling initial and repeat critical values reports[2] and with the aid and assistance of computers, our center follows a foolproof policy in this regard while reporting results to both in and out patients.

A recent review of the laboratory turnaround time indicated that the most common way to monitor TAT is by recording some starting point and end point, and then analyzing the difference between the two.[3] In our study turnaround time (TAT) was specified as the time from sample collection to final dispatch of report. This mainly included the receiving of the sample, feeding of patient data in computer resulting in generation of an internal identification number, clotting time and separation of the serum, labeling the sample as STAT, transport and distribution of samples on appropriate benches, re-verification of sample and patient data, analyses on automated analyzer, transmitting the results from the analyzer to the laboratory information system, to verify the results in the computer and releasing the report.

Acceptable TAT for stat tests in our laboratory is different for different test as already written in the parenthesis of test. In this retrospective study of delay in TAT of stat tests we used data for 24 months (i.e. January 2011 till December 2012) in clinical and hematological laboratory. The delay was categorized in to 0-30min, 30 min-1 hour, 1-2 hours, 2-5 hours, 5-10 hours and >10 hours. Reasons and time of the day in which delay were looked into. Also compared delay TAT of year 2011 and 2012.

Results

Total 102331 samples were received during time period, out of which 6989 (6.8%) sample were reported out of range for acceptable TAT (Table 1).

Table 1: TAT of years of 2011 and 2012

Sample	2011	2012	Total
Total samples	54920	47411	102331
Result out of TAT	4407 (8.02%)	2582 (5.4%)	6989 (6.8%)

Most delays (59.29%) were limited to the first 30 minutes. The breakup for delay in reporting of stat tests for this period is given in table 2.

Most common delay was noted during lunch breaks and early mornings. Overall delay in reporting in morning shift was found to be of 2050 (29.33%) samples and in lunch break was found to be of 4139 (59.22%). In the evening and night shift 611 (8.74%) and 189 (2.70%) samples were found to be delayed respectively. Frequency of sample delay in each shift is given in table 3 and fig 1.

Table 2: Breakup report for delayed TAT for stat tests

Years	Total samples	0-30 min	30min-1 hour	1-2 hours	2-5 hours	5-10 hours	>10 hours	Total samples out of TAT
2011	54920	2526 (57.31%)	1503 (34.10%)	244 (5.54%)	96 (2.18%)	30 (0.68%)	08 (0.18%)	**4407 (8.02%)**
2012	47411	1618 (62.66%)	701 (27.15%)	186 (7.20%)	43 (1.67%)	28 (1.08%)	06 (0.23%)	**2582 (5.4%)**
Total	**102331**	**4144 (59.29%)**	**2204 (31.54%)**	**430 (6.15%)**	**139 (1.99%)**	**58 (0.83%)**	**14 (0.20%)**	**6989 (6.8%)**

Table 3: Frequency of sample delay in each shift

Years	Total samples	Early morning	Afternoon (Lunch break)	Evening	Night	Total samples out of TAT
2011	54920	1322 (30%)	2644 (60%)	353 (8%)	88 (2%)	**4407(8.02%)**
2012	47411	728 (28.2%)	1495 (57.9%)	258 (10%)	101 (3.9%)	**2582 (5.4%)**
Total	**102331**	**2050 (29.33%)**	**4139 (59.22%)**	**611 (8.74%)**	**189 (2.70%)**	**6989 (6.8%)**

Table 4: Reasons (sources) for delay

Total sample received	Pre-analytical	Analytical	Post analytical	Total
102331	5186 (74.2%)	720 (10.3%)	1083 (15.5%)	6989 (6.8%)

Common source of delay 5189 (74.2%) was the pre-analytic phase which included sample collection, sample transport, sample receiving and pre-analytical processing. Analytical causes were in 720 (10.3%) patients and post analytical in 1083 (15.5%) patients. (Table 4 and fig 2)

Fig 1: Frequency of sample delay in each shift

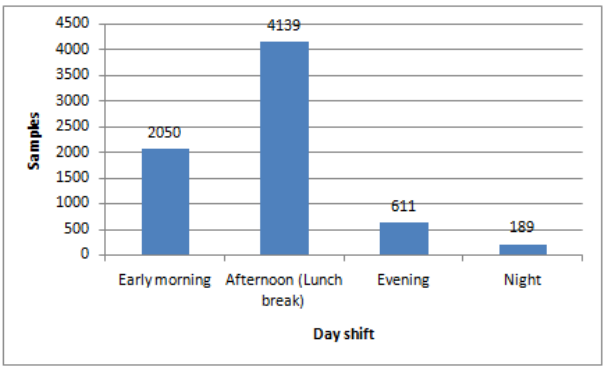
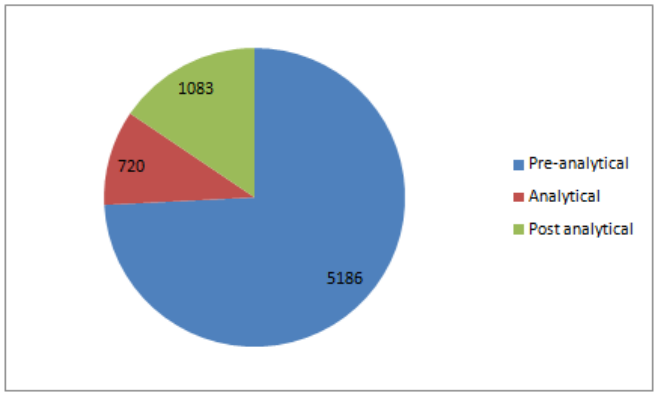


Fig 2: Reasons (sources) for delay



Significant improvement in TAT from year 2011 (8.02%) to 2012 (5.4%) was due increasing staff, regular audit and corrective actions. (Table 1)

Discussion

One of the most visible and talked about areas of laboratory service is how fast a test result is returned

to a caregiver.[3] Although stat tests are one of the most important features of clinical laboratory performance, the indexed literature is devoid of significant discussion on this subject.[4] In our study we have used receipt of patient sample to verification time to monitor our TAT of stat tests. Laboratory managers often equate TAT with this time interval as this is most directly under the control of laboratory managers.[5]

Our study reveals an outlier rate of 6.8 % while Steindel SJ, Novis DA (1999)[3] and F. Bilwani et al (2003)[10] reported it to be 10.4% and 2.03% respectively.

Most of the centers have used up to four analytes only in calculating delays in reporting time[6], however in our study we have included the whole battery of stat tests provided by our section (clinical and hematology laboratory) which approaches to 19 analytes.

It was found that most of the delay in TAT of stat tests were in first 30 minutes but F. Bilwani et al (2003)[10] reported that most of delay in TAT of stat tests were more than 60 min.

Most common reason for this delay was found to be pre analytic cause in 74.2% of samples but F. Bilwani et al (2003)[10] reported that most common reason of the delay was found to be machine breakdown in 163 (40%) of samples. This was in contrast to the reasons for the delay in analytical phase reported in other studies.[3] These have been attributed to shortage of highly trained personnel as the largest single cause in delay. Other reasons for delay in receipt to verification time reported in other studies are due to technical delays i.e. difficulty with instrument, specimen delay i.e. abnormal results requiring verification, laboratory accidents and clerical delay which involves data entry etc.[3]

Another interesting finding in our study was that most of the delay in TAT of stat tests occurred in the lunch break (59.22%) and early morning (29.33%) due to less staff members during these time and increase in workload at this time could well be a reason for delay in TAT at these times of the day. F. Bilwani et al (2003)[10] reported that most common delay in the morning shift (59.3 %). A College of American Pathologist Q - Probes Study had reported that pre analytical TAT increases during the day, which however indicates delays in transport and collection stages.[7]

Among other factors, which have been found to affect TAT of any laboratory, is the size. It has been reported that results were available sooner in non-teaching than teaching and in smaller rather than larger institutions.[8]

Emergency department physicians are generally not satisfied with the laboratory services[9] but in our case the interaction has been quite successful. Verbal feedback in informal manner was obtained from incharge of emergency room in this regard. The figures in delay of TAT available in the literature from the western world are higher as compared to our figures.

Take home message

The management of the section, regular quality assurance, meeting with the technical staff and strict vigilance are the key reasons of these low figures in our setting. However, these low figures do not justify the delays to be acceptable. A follow up study of similar nature with statistical analysis is required to prove the above hypothesis. Regular audit of data helps in evaluation of the efficiency of laboratory which is then followed by appropriate measures that lead to improvement in service to patients and physicians.

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