

# Clinical Biochemistry Laboratory Workload Trends 2007-2016 Including Liver Function Test in a Tertiary Care Centre

Dr. Meera.S<sup>1</sup>, Dr. Rangaswamy R<sup>2\*</sup>

<sup>1</sup>Professor, Department of Biochemistry, Mysore Medical College & Research Institute, Mysore, Karnataka, India

<sup>2</sup>Assistant Professor, Department of Biochemistry, Mysore Medical College & Research Institute, Mysore, Karnataka, India

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\*Corresponding author: Dr. Rangaswamy R

## Abstract

**Introduction:** Laboratory tests are important for the confirmation of the diagnosis of the disorders and also they are required to see the prognosis or to monitor the effects of the treatment of diseases. Many laboratory tests are ordered inappropriately, some of the ordered tests reports have not been utilized neither for the diagnosis nor for the assessing the prognosis of the disorders. **Methodology:** Source of data was obtained by documentation maintained in the inpatient registers for routine and emergency tests. Study type and design is Descriptive Cross Sectional study. **Results:** The percentage of total number of investigations increased was calculated from the year 2007 to till 2016. In our study we found that there was more than 1000% increase in the laboratory workload over a period of 10years both for elective and emergency (around 742%) sample analysis. **Discussion:** There is an increase in the workload of both routine and emergency tests which were done in Central Biochemistry laboratory and found out the normal value reports in some samples, which were required neither for the diagnosis nor for the prognostic purpose of the disorders. **Conclusion:** The study revealed gross overuse of laboratory; the ordered tests were required neither for the diagnosis nor to see the prognosis or to monitor the treatment of the disorders. This inturn affect the patients and organization in terms of direct cost & indirect cost. Inappropriate tests may increase the laboratory overload which affects laboratory results adversely in terms of the quality and availability of the laboratory resources.

**Keywords:** Inappropriate, Routine and Emergency tests, LFTs: Liver function tests.

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## INTRODUCTION

Laboratory tests are required to make the diagnosis of the disorders. It helps in assessing the prognosis and in monitoring the effects of treatment of a disease. For decades, there has been the perception that many laboratory tests are ordered inappropriately, too many superfluous lab tests are ordered. Occasionally some of the ordered tests reports have not been utilized neither for the diagnosis nor for the assessing the prognosis of the disorder. Hence, the ordered tests have become underutilized. This clearly implies wasting of laboratory resources and exposing patients to unnecessary risk and financial burden. It is also noted that this problem is worse in academic and teaching institutions where the new trainees or the concerned ward nurses are given the responsibility of ordering tests. Unnecessary ordering the lab test increases the Phlebotomy services, Specimen reception and its analysis. This in turn increases the direct and indirect cost, both for the patient and laboratory and also the turnaround time of the sample processing is

increased. For the past few years there was an increase in total number of investigations in our Central Biochemistry Laboratory. This increase in sample size caused many problems, such as 1) Lot of reagent consumption causing financial burden to the institution 2) Frequent breakdown of the fully automated equipment, resulted in non processing of the samples, 3) Which inturn delays the processing of the samples especially emergency tests like Blood Glucose, Urea, Creatinine, Electrolytes were forced analyzed by semiautoanalyzer, resulted in increase in analysis time. 4) Extra manpower taken to meet the increased workload & 5) Lead to increase in chances of errors in the laboratory results.

In order to minimize the above consequences & to assess the cause for increasing sample size and also to find out control measures for the smooth functioning of the laboratory, this study was planned with the following objectives.

## OBJECTIVES

1. To determine the annual increase in total number of routine & emergency investigations in Central Laboratory, Department of Biochemistry.
2. To assess the percentage of normal laboratory results – (the Liver function Test parameters were considered as an example for the present study)
3. To assess whether the requested tests are really mandatory for the diagnosis and to see the prognosis or to monitor the treatment of the disorder of a patient
4. To implicate to order the first line of tests which are essential for the diagnosis, to screen, to see the prognosis or to monitor the treatment of the disorder of a patient

## METHODOLOGY

Source of data: The data was obtained by documentation maintained in the IP registers for routine and emergency tests of Central Laboratory, Department of Biochemistry, Mysore Medical College & Research Institute, Mysore.

**Type of Study:** Descriptive Study.

**Study design:** Cross Sectional study.

**Sample size:** All the samples received to Central Laboratory, Department of Biochemistry in 10 years

(2007 to 2016) and samples received as emergency tests for about 6 years (2011 to 2016)

**Sampling Technique:** Census Method, complete enumeration of all sampling units was available and taken for the study.

**Method of data collection:** Using census method all the samples received to Central Laboratory, Department of Biochemistry in 10 years (2007 to 2016) and samples received for emergency tests for 6 years (2011 to 2016) was obtained. The data was kept anonymous. A pre-tested and semi-structured proforma was used to collect the information. The proforma includes the total number of requests for liver function tests from inpatient register, (Which includes name of the tests, normal and abnormal values of the analyte & total number of investigations from inpatient registers and emergency duty registers). For assessing the laboratory overload all investigation data was considered. To analyse the normal and abnormal percentage of liver function test samples data was taken as an example from inpatient register for the month of April 2016.

**Plan of Analysis / Statistical Tools:** The data was entered in excel and analyzed using Epi-info Software version 3.4.3. Descriptive statistics like frequencies and percentages were calculated. Ethical clearance certificate was obtained by Ethical Committee of the Mysore Medical College, Mysore.

## RESULTS

**Table-1: Total number of investigations year wise**

Years	Total Number Of Investigations	% increase in work load
2007	67195	100.00 (Baseline)
2008	132937	97.84
2009	249499	271.30
2010	323421	381.31
2011	420785	526.21
2012	413754	515.71
2013	539425	702.77
2014	641874	855.24
2015	840249	1150.46
2016	849919	1164.85

In our study we found that, from 2007, every year there is an increase in the total number of investigations. The percentage of the work load was analysed by taking the year 2007 as the baseline. There was increase in total number of investigations and the

percentage increase in workload year by year as mentioned in the table 1. There was more than 1000% increase in the laboratory workload over a period of 10years. There was mild decrease in the work load in 2012 compared to the year 2011.

**Table-2: Total number of investigations done on emergency basis.**

Years	Total Number Of Investigations	% increase in work load
2011	42757	100.00 (Baseline)
2012	64128	49.98
2013	122741	187.06
2014	238943	458.83
2015	359984	741.92
2016	216815	407.08

Table 2 reveals the investigations done on emergency basis which was started in the year 2011. The percentage of the work load was analysed by taking the year 2011 as the baseline. There was increase in total number of investigations and the percentage

increase in workload year by year as mentioned in the table 2. There was more than 741.92% increase in the laboratory workload over a period of 5years. Almost 7 times increase in the workload was observed.

**Table-3: Liver Function Test April (2016) Inpatient**

Tests	Total	Abnormal	Normal	Normal %
BID	2210	752	1458	66.0
BIT	2210	672	1538	69.6
SGOT	2624	788	1836	70.0
SGPT	2624	693	1931	73.6
ALB	2213	607	1606	72.6
TP	2213	432	1781	80.5
ALP	2213	313	1900	85.9

To analyse the normal and abnormal investigations percentage, liver function tests data was taken as an example from inpatient register for the month of April 2016. In our study we found that around 86% of the samples were normal in ALP, followed by TP which was 80.5% , SGPT which was 73.6 % , ALB which was 72.6 % , SGOT which was 70.0 % , BIT which was 69.6 % , and least was BID which was 66.0%.

## DISCUSSION

The present study was conducted to know the reasons for the increase in the workload of both routine and emergency tests which were analyzed in Central Biochemistry laboratory. Table 1 & 2 clearly depicts the increase in the percentage of investigation work load from the year 2007 to 2016. There is mild decrease in percentage of investigation work load in the year 2012, this decrease in percentage was due to frequent breakdown of the equipment resulted in delay in processing or not processed samples. The sample size was also decreased in the year 2016. This decrease is due to, the clear instructions was circulated to all the wards by Head of the Institution and Medical Superintendent of the Hospital to send the relevant investigations which were required for the diagnosis and to see the prognosis of the disorders. Moreover, in this regard, the orientation program was conducted to the new trainees and ward nurses. This program avoided the unnecessary investigations request sent to the laboratories. Table 3- revealed the normal and abnormal values of LFT's parameters. We correlated the requested LFT's with the diagnosis of the disorder. It was found that 66% to 86% LFT's showed normal values, which were not required for the purpose of diagnosis or to monitor the treatment. It clearly indicates that these tests were responsible for increase sample size, which inturn results in overburden to the analyzers. Moreover the reagent consumption for these many tests leads to the financial burden to the hospital as well as to the patients. A study conducted by Arora about diagnostic workup of acute onset jaundice, they found that about 6049 aspartate aminotransferase (AST) estimations in 1024 patients did not contribute anything

more than what was inferred by alanine aminotransferase (ALT)[1]. This laboratory overload adversely affects the quality and availability of laboratory results. Therefore, a test should only be advised, if positive or negative result would dictate a change in patient management.

Another study conducted by Astion M found that the main reasons for overutilization of lab tests are Patient pressure, Incomplete understanding of the effect of low pre-test probability on the diagnostic value of a test, Failure to understand the harmful consequences of overutilization and Defensive testing perverse financial incentives (more testing = more revenue)[2].

Studies are also conducted about how to improve lab utilisation and they found that Physician education by itself is a weak intervention [3], Patient education by itself is a weak intervention [4] and computerized physician order entry (CPOE) can improve laboratory utilization if thoughtfully implemented [5]. Education can be made more effective by combining it with other methods that make the desired behaviour more likely. These methods include CPOE, changes to manual requisitions, use of send out and other formularies, requiring higher level approval, and the use of physician utilization report cards with performance feedback. The best approaches to improving laboratory utilization combine multiple interventions [6]. Interventions must stay in place or behaviour will drift back to the unwanted condition.

One more study by May et al shared their experience trying to curtail unnecessary testing. It would seem that their strategy had its greatest impact on the overutilization of tests used in monitoring. Basically, they restricted recurring daily orders. It seems that this intervention worked, producing a 12% decrease in inpatient test volume and a 21.5% decrease in inpatient phlebotomies [7].

## CONCLUSION

This study revealed gross overuse of laboratory services, the ordered tests were not required

neither for the diagnosis nor to see the prognosis or to monitor the treatment of the disorders, which in turn affect institute in terms of direct cost & indirect cost as uncalled tests were performed in the patients sample. Inappropriate tests may increase the laboratory overload results in increasing the turnaround time which may affect adversely the quality of laboratory tests results. Therefore, a test should only be advised which are relevant and essential. The concerned staffs ought to provide the proper clinical information to the laboratory for the correlation of the tests results, so that the repeatability of the tests can be avoided. Paramedical staffs (laboratory personnels, ward nurses) must be orient towards effective utilization of available resources appropriately. The over usage of laboratory facility may addressed in accord with, interns, post graduate students and concerned consultants or physicians. This may help in decreasing the turnover of each sample and to issue a quality and timely report.

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