

**ORIGINAL RESEARCH ARTICLE****ASSESSMENT OF BIOCHEMISTRY REQUEST FORMS****S Singh^{1*}, S Khatiwada²**¹Department of Biochemistry, KIST Medical College and Teaching Hospital, Lalitpur, Kathmandu, Nepal.²Department of Pharmacy, Central Institute of Science and Technology, Pokhara University, Kathmandu, Nepal**Correspondence to: Dr. Shruti Singh, Department of Biochemistry, KIST Medical College and Teaching Hospital, Lalitpur, Kathmandu, Nepal.**Email: shrutisngh@hotmail.com***ABSTRACT**

Oversight of information on biochemistry requisition forms may lead to laboratory errors. The aim of this study was to evaluate the level of completion of these forms. The observational cross-sectional study was conducted between December 2014 and March 2015 in the biochemistry department of a tertiary hospital in Kathmandu after approval by the Institutional Ethical Review Committee. Two thousand and thirty nine request forms were randomly assessed for the completeness of information provided by the requesting physician. Microsoft excels software and SPSS-17 was used for analysis. Patient confidentiality was maintained. Out of 2039 request forms examined, the only 100% documented parameter was the patient's name. Date of specimen collection was recorded in 79.74% of forms and age in 98.53%. The working diagnosis was recorded in 28.44% but no information regarding patient preparation. While the consultants name were stated in 13.29% of cases, drug history in 0.24%. Parameters like gender were recorded in 98.82%, sample type in 0.29%. Whether the patient was present in the ward or in the outpatient department was documented in 15.11% whereas patient number in 38.35%. Doctors were more likely to sign the forms rather than providing their name/designation. This study demonstrates that the custom of completion of request forms was poor. As laboratory data plays a significant role in medical diagnosis and research, incomplete data provided to the laboratory could significantly impact on the comments and successful outcome of treatment. Closer interaction between clinicians and laboratory personnel by means of request forms can improve the quality of services to patients.

Key words: *Laboratory, Patient, Request forms***DOI:** <http://dx.doi.org/10.3126/jcmc.v5i3.16521>**INTRODUCTION**

Insufficient data on laboratory request forms can make interpretative comments difficult and may delay communications with the requesting physician.¹ One study had shown in their study that 43% of request forms lacked complete information.² Specific missing items of information included the physician's name. Misidentification of patient and requested test were also frequently encountered.¹ It is important that critical results are dispatched without delay.³

Rationale for the study:

Incorrect or incomplete data provided to the laboratory could significantly impact on successful outcome of treatment that patient receives. In some instances, the correct interpretation of result may depend upon the provisional diagnosis indicated on the request forms. Taking example of creatinine, as a GFR marker, it is convenient and cheap to measure but is affected by age, sex, exercise, certain drugs (e.g., Cimetidine, Trimethoprim), muscle mass, nutritional

status and meat intake.⁴ The plasma creatinine concentration is theoretically a more reliable guide both to renal function and to whether the patient should be haemodialyzed, but some methods of measuring creatinine are subject to interference by bilirubin and produce invalid results in patients with jaundice.⁵

Modern medical practice is increasingly dependent on reliable clinical laboratory service.⁶ Medical errors are known to impact negatively on patient's outcome.⁷ It has actually been demonstrated that laboratory results influence up to 70% of medical diagnoses.⁸

In our practice, there are no uniform biochemistry request forms. Moreover, we hardly reject them, if incomplete. In many instances the reception staff in the laboratory may not know the significance of the missing data.¹ Due to this, laboratories are experiencing significant problems with incompletely filled request forms, since laboratory data plays a significant role in medical diagnosis and research.

In Nepal, there has been no study on the trend of incompletely filled laboratory request forms. Audit of laboratory request forms presented to the laboratories will provide valuable information that will assist both laboratory health personnel and clinicians in improving the standard and quality of laboratory results. This is expected to also impact positively on patient care.⁶ A study done in South Africa showed

that laboratories were experiencing significant problems with incompletely filled request forms and the standard of completion of request forms was poor and represented a threat to patient safety and quality of laboratory services.⁹ There are three components involved in laboratory auditing, these are: pre-analytical, analytical and post-analytical. Previously, laboratories focused their attention on eliminating or reducing errors in the analytical phase.¹⁰ However, it has been demonstrated that currently, pre- and post-analytical processes in the laboratory are more vulnerable to errors than the analytical steps.¹¹ In a report by Plebani and Carraro, up to 68% of laboratory errors occurred in the pre-analytical phase.¹² This phase includes procedures which are not under the control of laboratory personnel and are mostly performed outside the laboratory; such as: completion of laboratory request forms, specimen identification, phlebotomy, sample handling and transportation to the laboratory.¹³ Laboratory errors have recurrently been demonstrated in the preanalytic phase, influencing patient outcomes and cost.^{10,14,15} Therefore, Evaluation of laboratory request forms is a pre-analytical audit.⁶ Laboratory request forms provide information about the laboratory test requested for. They contain demographic data such as name, date of birth, patient's address, age, and sex.⁶

The objectives of this study were to assess request

forms submitted to the biochemistry laboratory to determine the frequency of incompletely filled forms.

MATERIALS AND METHODS

The observational cross-sectional study was conducted between December 2014 and March 2015 in the biochemistry department of KIST Medical College and Teaching Hospital, Imadol, Lalitpur after approval by the Institutional Ethical Review Committee. With the Permission to access patient files, data were collected with the help of staff working in the patient records section. Two thousand thirty nine request forms were assessed for the completeness of information provided by the requesting physician. For the purpose of this study, in- and out- patient or Emergency request forms were not separated. No inclusion or exclusion criteria were set. All forms received within the four month period were examined after the tests were complete. Patient confidentiality was maintained.

The information provided on 2039 random request form was recorded in Microsoft excel software and evaluated using SPSS version 17. No identifying information (name, hospital identification number) was included on the data record sheet and patients were identified by a study number only.

RESULTS

A total of 2039 request forms reviewed with the following results (Table 1).

Out of 2039 request forms examined, the only 100%

documented parameter was the patient's name but with 5.68% patient name on form were illegible handwriting. Age and Gender were indicated in 98.53% and 98.82% with an illegibility of 0.98% and 0.15% respectively. Date of sample collection was recorded in 79.74% of forms and sample type in 0.29%. The working diagnosis was mentioned only in 28.44% but there was no information regarding patient preparation. Unknown abbreviations like HT, DPL, FUO were used in 3.28%. While the consultants name were stated in 13.29% of cases, drug history in 0.24%. Whether the patient was present in the ward or in the outpatient department was documented in 15.11% whereas patient numbers in 38.35%. Even the patient numbers were illegible in 0.73% forms. Doctors were more likely to sign the forms rather than providing their name leading to an illegibility of 13.68%. Parameters like time of collection and weight were not recorded in any of the request forms.

Table1:Parameters on biochemistry request form

Items documented	Number	Percentage (%)	Illegible percentage (%)
Patient name	2039	100	5.68
Gender	2015	98.82	0.15
Age	2009	98.53	0.98
Opd/ward only	308	15.11	0
Ward / OPD name	413	20.26	0
Consultant in-charge	271	13.29	13.68
Patient number	782	38.35	0.73
Working diagnosis	580	28.44	3.28
Sample type	6	0.29	0
Date of collection	1626	79.74	0
Time of collection	0	0	0
Drug History	5	0.24	0
Patient Preparation	0	0	0
weight	0	0	0

DISCUSSION

An incompletely filled Biochemistry request form is a common problem faced by the laboratory. It is mostly taken as a neglected medical document which merely serves the purpose of enlisting tests for the patient and not as a means of communication between the clinicians and the laboratory. A previous study has shown that manually completed forms can lead to insufficient, incorrect or illegible data on request forms.² The study showed that date of sample collection was recorded in 79.74% of forms and sample type in 0.29%. The sample types could be many like whole blood, plasma, serum, ascitic or pleural fluid, cerebrospinal fluid or urine, etc. Taking the example of glucose, we know that the reference range for blood glucose, plasma glucose, serum glucose, ascitic fluid glucose, urine glucose

or cerebrospinal fluid glucose is different. So if the laboratory does not get the appropriate sample type, the results might get interpreted against the reference value of a different sample type. Also the processing and handling of different fluids are also different. Like the cerebrospinal fluid should be well preserved because of its scanty quantity and difficult technique of its collection to reduce chances of repetition. This fact is also supported by the study done by Adegoke et al. which states that the type of specimen obtained is important where bloody tap of other body fluid like pleural and cerebrovascular fluid may be confused with blood, resulting in the use of inappropriate reference range and therefore misleading result and interpretation.¹

The date and time of sample collection are also of important. The consecutive dates of sample collection can help trace patients' progress of treatment. The time of collection can help the laboratory to decide doing those tests whose values may degrade with time. For example the serum glucose values falls 5-10 mg/dl every hour because of continued glycolytic activity of the Red Blood Cells. To avoid this, the test should be performed as soon as possible if glycolytic inhibitors are not added for sample collection or else the serum separation should be done as soon as possible. This problem can generally be ruled out by the collection counters.

The results also show that the working diagnosis was mentioned only in 28.44% and there was no information regarding patient preparation. This can also be observed in a similar study conducted by Edeghonghon Olayemi and Rebecca Asiamah-Broni in Ghana which showed that no clinical detail was provided on 22.7% of the request forms sampled. Taking example of a known case of diabetes mellitus under medication and a new patient whose diagnosis of diabetes mellitus is to be made. If the laboratory happens to get the value of post prandial blood glucose lower than that of the fasting blood glucose values, how is the laboratory personnel going to find out if it is an analytical error which is to be repeated then and there in the laboratory or is it a true report suggesting changes to be made in the hypoglycemic medications?

Patient preparation is also equally important. The patient might have taken a heavy meal of meat, cheese the last night giving rise to falsely elevated lipid profile and also creatinine values. For this the patient can be suggested to wait for 3-5 days if it is not an emergency or else the test can be repeated after that time which will give a different report. But this is not a laboratory error as at times the laboratory seems to be held responsible for. Since some analytes have diurnal variations, some may be affected by diet, some by age and gender, some by different drugs the patient is taking. A very common cause of

falsely elevated sodium values in intensive care unit or ward patients is taking blood from the same intra venous line used for infusing sodium rich solutions.

The study also shows that the consultants name were stated in 13.29% of cases, whether the patient was present in the ward or in the outpatient department was documented in 15.11% whereas patient numbers in 38.35%. If the laboratory wants to consult regarding any sample or any confusion, where to consult and whom to consult is the problem. As observed in a study of 150 serum glucose requests with critical results of severe hyperglycaemia, the clinician could not be traced in 8 (5.3%) cases. This challenge leads to a variety of problems like delay in result, institution of therapy, unclaimed reports and increased expense when tests have to be repeated or duplicate reports are issued.¹

This study demonstrated that overall, the laboratory test request forms are always partly filled by the requesting clinicians. There is need therefore to adopt practical strategies and policies to reduce this trend. The inadequate transmission of clinical information observed in this study suggests a gap to be bridged between the two.

It is very true that our clinicians are extremely busy. The meager number of hospitals has always made a disproportionate doctor to patients' ratio especially in a developing country like Nepal. This has overburdened our clinician which may also be a

contributing factor for the incomplete filling of the request forms. But even under these situations for quality laboratory services the laboratory requires an adequately filled request forms. Therefore may be assistants can help the clinician fill up the form by giving appropriate provisional diagnosis or drug history or preparing the patient regarding his diet or time of sample collection.

In conclusion, this study demonstrated that the increasing trend of incomplete laboratory request forms may lead to the misinterpretation of result and affect adequate and important comments from the laboratory. Although this study was limited to a teaching hospital, it is probable that the result would be comparable for other teaching hospitals in the country. The laboratory should also improve upon the request forms so that the clinicians can fill it up swiftly and efficiently.

There should be closer communication between laboratory personnel and clinicians. Medical students should be effectively exposed to the medical laboratory and how it functions. They should be aware of their primary responsibility to request the investigations appropriately for the benefit of the patient and patient care. The laboratories should be more closely involved in organizing orientation programs for newly employed doctors, especially interns and medical officers. At such programs the importance of providing all relevant information to

the laboratories for the right diagnosis to be made would be re-emphasized. This will benefit the patient management; the doctor, the laboratory and the hospital as well.

REFERENCES

1. Adegoke O A, Idowu A A and Jeje O A. Incomplete laboratory request forms as a contributory factor to preanalytical errors in a Nigerian teaching hospital. *Afr J Biochem Res* March 2011; 5(3):82-85.
2. Burnett L, Chesher D, Mudaliar Y. Improving the quality of information on pathology request forms. *Ann Clin Biochem* 2004;41: 53-56.
3. Lundberg GD. When to panic over abnormal values. *Med Lab Obs* 1972; 4: 47-54.
4. Lamb E, Newman DJ, Price CP. Kidney Function Tests. In :Tietz NW, Burtis CA, Ashwood ER, Bruns DE. *Tietz textbook of clinical chemistry and molecular diagnostics*. 4th ed. St. Louis, Mo: Elsevier Saunders, 2006, pp 797-835.
5. Marshall WJ, Bangert S K. The Liver. In *Clinical Chemistry*. 5th ed. Edinburgh :Mosby, 2004, pp 85-104.
6. Olayemi E, Broni RA. Evaluation of request forms submitted to the haematology laboratory in a Ghanaian tertiary hospital. *Pan African Medical Journal* 2011; 8:33.
7. Carraro P and Plebani M. Errors in a stat laboratory: types and frequencies 10 years later.

- ClinChem 2007; 53 (7): 1338-1342.
8. Nutt L, Zemlin AE and Erasmus RT. Incomplete laboratory request forms: the extent and impact on critical results at a tertiary hospital in South Africa. *Ann ClinBiochem* 2008; 45(5): 463-466.
 9. Zemlin AE, Nutt L, Burgess CJ, Eiman F and Erasmus RT. Potential for medical error: incorrectly completed request forms for thyroid function tests limit pathologist's advice to clinicians. *South African Medical Journal* 2009; 99(9): 668-671.
 10. Bonini P, Plebani M, Cerioti F and Rubboli F. Errors in laboratory medicine. *Clin Chem* 2002; 48(5): 691-698.
 11. Plebani M. Errors in Clinical Laboratories or Errors in Laboratory Medicine? *Clin Chem Lab Med* 2006; 44(6): 750-759.
 12. Plebani M and Carraro P. Mistakes in a Stat laboratory: types and frequency. *Clin Chem* 1997; 43 (8): 1348-1351.
 13. Vanker N, Wyk JV, Zemlin AE and Erasmus RT. A Six Sigma approach to the rate and clinical effect of registration errors in a laboratory. *J Clin Pathol* 2010; 63 (5):434- 437.
 14. Lippi G, Guidi GC, Mattiuzzi C, Plebani M. Preanalytical variability: the dark side of the moon in laboratory testing. *Clin Chem Lab Med* 2006a;44: 358-365.
 15. Lippi G, Bassi A, Brocco G, Montagnana M, Salvagno GL, Guidi GC. Preanalytical error tracking in a laboratory medicine department: Results of a 1 year experience. *Clin Chem* 2006b; 52: 1142-1143.