



Study of Pre-Analytical and Post-Analytical Errors in Hematology Laboratory in A Tertiary Care Hospital

Authors

Dhiraj Kumar B. Shukla¹, Sujata R. Kanetkar², Suchi G. Gadhiya³, Shivani Ingale³

¹Assistant Professor, Department of Pathology, Krishna Institute of Medical Sciences, Karad

²Professor and Head, Department of Pathology, Krishna Institute of Medical Sciences, Karad

³Tutor, Department of Pathology, Krishna Institute of Medical Sciences, Karad

Corresponding Author

Dr Dhiraj Kumar B. Shukla

Assistant Professor, Department of Pathology, Krishna Institute of Medical Sciences, Karad

Email: drshukla.patho@gmail.com

ABSTRACT

Introduction: Laboratories play an important role in the diagnosis and management of the disease. In the modern day diagnostics, with the advent of technologies and automation in the laboratories, the manual workload has decreased. Automation has reduced the number of errors but still few errors do occur. Present study was undertaken to evaluate different types & frequencies of pre-analytical and post-analytical errors in hematology laboratory of a tertiary care hospital.

Methods: Present study is a prospective study. All the samples received in hematology laboratory of our hospital over a period of one year were included in the study. All the pre-analytical variables such as clotted samples, quantity not sufficient, wrong sample, sample without label, wrong label and post analytical variables such as printing error, delayed dispatch of report and reports misplaced were noted & studied.

Results: In the present study total 1, 21,470 samples were received in hematological laboratory over a period of one year. Preanalytical errors were noted in 1,218 samples. Clotted sample was noted in 573 cases, inadequate quantity in 213 cases, hemolysed sample in 176 cases, improper requisition form in 114 cases, improper container in 92 cases & diluted sample in 50 cases. Post analytical errors were noted in 213 samples. Delayed dispatch of report was noted in 107 cases, printing errors in 69 cases and misplaced reports in 37 cases.

Conclusion: Preanalytical and post analytical errors in hematological laboratory can be reduced by regular analysis of the variables & regular education and training of staff concerned with blood collection & handling of blood samples.

Key Words: Postanalytical errors, Hematology, Training.

INTRODUCTION

Laboratories play an important role in patient care and diagnoses in a tertiary care hospital. With recent advances in technologies and introduction

of automation in hematology & clinical pathology, the incidences of human error have reduced but still there are many variables which can influence the laboratory results.¹ Modern day diagnoses are

heavily dependent upon reliable laboratory data. It is therefore pertinent to ensure credibility of the results, emanating from the clinical laboratories.² Quality assurance in the hematology laboratory is intended to ensure laboratory users of standardized, reliable test results.³ Errors arising in the hematology laboratory sample processing are generally categorized into Pre-analytical, Analytical and Postanalytical.^{4,5,6,7} Out of these three groups of error, Pre-analytical and post analytical errors accounts for the maximum errors. The present study was undertaken with an objective to evaluate different types and frequencies of Pre-analytical and post analytical errors in hematology laboratory of a tertiary care hospital.

METHODS

Present study is a prospective study. All the samples received in hematology laboratory of our hospital over a period of one year (July2015-June2016) were included in the study. All the pre-analytical variables such as clotted samples, quantity not sufficient, wrong sample, sample without label, wrong label and post-analytical

variables such as printing error, delayed dispatch of report and reports misplaced were noted & studied.

RESULT

During the study period of one year, total 1, 21,470 samples were received in hematology laboratory.

Total errors reported were in 1431(1.18%) samples. Pre-analytical errors were noted in 1218(1.003%) cases and post analytical cases were noted in 213(0.17%) cases. No analytical error was reported during the study period. The Pre-analytical errors noted were Clotted samples, Quantity not sufficient, Hemolyzed samples, improper requisition form, improper container, and Diluted samples (Table 1). Clotted sample (47.05%) was the most common pre-analytical error followed by quantity not sufficient (17.49 %). Hemolyzed was received in 14.45% of cases whereas samples with improper requisition constituted 9.36% cases. Use of improper container was noted in 7.55% of cases and diluted samples were received in 4.10% cases.

Table 1 – Distribution of cases with pre-analytical errors.

Pre-analytical error	Number of samples	% error	% error in total samples
Clotted samples	573	47.05%	0.47%
Quantity not sufficient	213	17.49%	0.17%
Hemolysed samples	176	14.45%	0.14%
Improper requisition form	114	9.36%	0.09%
Improper container	92	7.55%	0.08%
Diluted samples	50	4.10%	0.04%
Total	1218	100%	1.003%

Post analytical errors noted were Delayed dispatch of reports, printing errors in reports and misplaced reports (Table 2). Most common post analytical error noted was delayed dispatch of reports

accounting for 50.23% of cases followed by printing error (32.40%). Misplaced reports were observed in 17.37% of cases.

Table 2- Distribution of cases with post analytical errors.

Post Analytical Errors	No. of sample	% of error	% in total sample
Delayed dispatch	107	50.23%	0.09%
Printing error	69	32.40%	0.05%
Misplaced report	37	17.37%	0.03%
	213	100%	0.17%

DISCUSSION

During the study period of one year, total 1, 21,470 samples were received in hematology laboratory.

Total errors reported were in 1431 (1.18%) samples. In the study done by Sadiq F et al⁸ errors were detected in 1.20% of samples which is in concordance with the present study.

Pre-analytical errors were noted in 1218 (1.003%) cases, which constituted the major source of error in the laboratory. Plebani and Carraro⁴ in their study observed preanalytical error to be the major source of error in laboratory and similar finding was reported by Bonini and colleagues⁵. Post analytical errors were noted in 213 (0.17%) cases. No analytical error was reported during the study period.

The present study revealed clotted samples (47.05%) being the most common Preanalytical error. Same result was found by studies done by Bharat V et al⁹ and Sumera Nazet al². The common reason of which is improper mixing of sample and inadequate EDTA.

Quantity not sufficient was the reason for 17.49% of preanalytical errors.

Hemolyzed sample was noted in 14.45% of cases. Bharat Vet al⁹ in their study had 21.56% of cases with hemolyzed sample. Akan et al¹⁰ and Sadiq F et al⁸ in their study observed that frequency of hemolysis was more during night shifts.

Improper requisition form was noted in 9.36% of cases. Bharat Vet al⁹ in their study observed this error in 13.72% of cases which is almost similar to our findings. Improper container was observed in 7.55% of cases. Similar observation was made by Bharat Vet al⁹.

Delayed dispatch of report or prolong turnaround time was noted in 50.23% of cases. Sadiq Fet al⁸ in their study observed delayed dispatch of report in 21.64% of cases. They observed that the reason for this is inadequate information to laboratory porters about shifting of patient from one ward to another location.

Printing error was observed in 32.40% of cases. Bharat V et al⁹ during their study observed this

error in 12.50% of cases. The main reason for this typing of error was illegible writing on the requisition form.

Misplaced reports were reported in 17.37% of cases. Bharat V et al⁹ during their period of study observed misplaced reports in 25% of cases which has been attributed to uncoordinated shifting of patient and clinicians not being informed about reports.

CONCLUSION

Preanalytical and post analytical errors in hematological laboratory can be reduced by regular analysis of the variables & regular education and training of staff concerned with blood collection & handling of blood samples.

REFERENCES

1. Chawla R. Goswami V. Tayal D. Malika V. Identification of types of pre-analytical errors in the clinical chemistry laboratory: 1 year study of GB Pant Hospital. Lab Med. 2010; 41: 89-92.
2. Sumera Naz, Arshad Mumtaz, Agha Sadaruddin. Preanalytical Errors and Their Impact on Tests in Clinical Laboratory Practice. Pak J Med Res, 2012; 51:27-30.
3. VikramNarang, HarsimranKaur, Pavneet Kaur Sethi & et al. Preanalytical Errors in Hematology Laboratory-an Avoidable Incompetence. Iran J Pathol. 2016; 11(2):151-154.
4. Plebani M, Carraro P. Mistakes in stat laboratory: types and frequency. Clin Chem Lab Med 1997; 43:1348-1351.
5. Bonini P, Plebani M, Ceriotti F, Rubboli F. Errors in laboratory medicine. Clin Chem Lab Med 2002; 48:691-698.
6. Plebani M. Errors in clinical laboratories or errors in laboratory medicine?. Clin Chem Lab Med 2006; 44:750-759.
7. Patra S, Mukherjee B, Das Kumar A. Preanalytical Errors In The Clinical Laboratory And How To Minimize Them.

International Journal of Bioassays
2013;2(3):551-553.

8. Sadiq F, Yasmeen F. Frequency of errors in clinical laboratory practice. Iranian Journal of Pathology. 2014;9(1):45-49.
9. Vinay B, Tiwari G. A reflection on pre and post analytical errors in Hematology Laboratories. Int. J. Adv. Biol. Sci. 2015;2(2):190-195.
10. Akan OA, Elmali E, Karaeren Z. Evaluation of pre-analytical errors in clinical laboratory. Lab Med 2006;37(8):478-480.