Asian Pac. J. Health Sci., 2017; 4(1):4-6 e-ISSN: 2349-0659, p-ISSN: 2350-0964

Document heading **doi: 10.21276/apjhs.2017.4.1.2** **Research article**

Study of Preanalytical errors in hematology laboratory of a tertiary care hospital

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ABSTRACT

Laboratories play an important role in the diagnosis and management of the disease. Errors are part and parcel of human nature. Its human tendency to make errors. Automation in laboratories has reduced the number of errors but still few errors do occur. Present study was undertaken to evaluate different types & frequencies of pre-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 Preanalytical variables such as clotted samples, quantity not sufficient, wrong sample, sample without label, wrong label 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, hemolyzed sample in 176 cases, improper requisition form in 114 cases, improper container in 92 cases & diluted sample in 50 cases. **Conclusion:** Regular check on the complete process in laboratory along with training of staff can help in reducing the Preanalytical errors in hematological laboratory. Educating the staff about the source of errors and measures to reduce them can be of great help in proper functioning of the laboratories.

Keywords: Preanalytical 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 [4-7].Out of these three groups of error, Pre-analytical errors accounts for the maximum errors. The present study was undertaken with an objective to evaluate different types and frequencies of Pre-analytical errors in hematology laboratory of a tertiary care hospital.

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.Materials and methods

The Present study is a prospective, analytical study conducted over a period of one year from July2015 to June2016 in a hematology laboratory of a tertiary care hospital. All the samples received during the study period were included in the study. Samples were collected in the vacutainer by nursing staff and laboratory personnel. All the samples were checked for any errors in preanalytical phase. The Preanalytical variables were noted as clotted samples, quantity not sufficient, samples without label, wrong labeling, improper requisition, diluted samples, lipemic samples, improper vacutainer and hemolysed samples.

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%

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 al [8] 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 Carraro[4] in their study observed preanalytical error to be the major source of error in laboratory and similar finding was reported by Bonini and colleagues[5].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 al [9] and Sumera Naz et al [2].The common reason of which is improper mixing of sample and inadequate EDTA. During the collection of blood in the Vacutainer when blood fills the container slowly due to prolonged use of tourniquet or manipulation of vein, there are chances of formation of a clot in vitro [9].One more reason for the clot in the sample is excess of blood in the tube as compared to anticoagulant [9].Quantity not sufficient was the reason for 17.49%of Preanalytical errors. Bharat V et al [9] in their study observed 16.66% and 25.49% cases of inadequate sampling in IPD and OPD cases respectively. Various causes reported are difficult veins in children, patients with chronic debilitating diseases etc [9]. Hemolyzed sample was noted in 14.45% of cases. Bharat V et al [9] in their study had 21.56% of cases with hemolyzed sample. Akan et al [10] and Sadiq F et al [8] in their study observed that frequency of hemolysis was more during night shifts. Improper requisition form was noted in 9.36% of cases. Bharat V et al [9] 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 V et al [9].

Conclusion

Regular check on the complete process in laboratory along with training of staff can help in reducing the Preanalytical errors in hematological laboratory. Educating the staff about the source of errors and measures to reduce them can be of great help in proper functioning of the laboratories. Hematological laboratories should establish the rejection criteria's and should follow them strictly. Quality control needs to be adopted in all phases of diagnostic processes to deliver quality reports.

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Source of Support: Nil
Conflict of Interest: None