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

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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 hematology 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. Quality assurance in the hematology laboratory is intended to ensure laboratory users of standardized, reliable test results. Errors arising in the hematology laboratory sample processing are generally categorized into Pre-analytical, Analytical and Postanalytical. 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 (July 2015-June 2016) 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.

<table>
<thead>
<tr>
<th>Pre-analytical error</th>
<th>Number of samples</th>
<th>% error</th>
<th>% error in total samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clotted samples</td>
<td>573</td>
<td>47.05%</td>
<td>0.47%</td>
</tr>
<tr>
<td>Quantity not sufficient</td>
<td>213</td>
<td>17.49%</td>
<td>0.17%</td>
</tr>
<tr>
<td>Hemolyzed samples</td>
<td>176</td>
<td>14.45%</td>
<td>0.14%</td>
</tr>
<tr>
<td>Improper requisition form</td>
<td>114</td>
<td>9.36%</td>
<td>0.09%</td>
</tr>
<tr>
<td>Improper container</td>
<td>92</td>
<td>7.55%</td>
<td>0.08%</td>
</tr>
<tr>
<td>Diluted samples</td>
<td>50</td>
<td>4.10%</td>
<td>0.04%</td>
</tr>
<tr>
<td>Total</td>
<td>1218</td>
<td>100%</td>
<td>1.003%</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Post Analytical Errors</th>
<th>No. of sample</th>
<th>% of error</th>
<th>% in total sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed dispatch</td>
<td>107</td>
<td>50.23%</td>
<td>0.09%</td>
</tr>
<tr>
<td>Printing error</td>
<td>69</td>
<td>32.40%</td>
<td>0.05%</td>
</tr>
<tr>
<td>Misplaced report</td>
<td>37</td>
<td>17.37%</td>
<td>0.03%</td>
</tr>
<tr>
<td></td>
<td>213</td>
<td>100%</td>
<td>0.17%</td>
</tr>
</tbody>
</table>
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 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 Naz et 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 V et 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 V et 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 V et al9.

Delayed dispatch of report or prolong turnaround time was noted in 50.23% of cases. Sadiq F et 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

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