PRE-ANALYTICAL ERRORS IN HAEMATOLOGY AND CHEMISTRY AT HAYATABAD MEDICAL COMPLEX PESHAWAR

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ABSTRACT

OBJECTIVES

To determine the frequency of pre-analytical errors in haematology and chemistry at Hayatabad Medical Complex Peshawar.

METHODOLOGY

A descriptive cross-sectional study was conducted at the MTI/Hayatabad Medical Complex (HMC), Peshawar, from February to July 2022. Through the purposive sampling technique, 480 samples were collected. Each sample was tested to analyse and assess errors in haematology and chemistry. For statistical analysis, SPSS version 26.0 was used.

RESULTS

Four hundred eighty samples were studied during the project with the following pre-analytical errors, mainly 27.11% insufficient quantity, 22.91% clotted sample, 17.70% hemolysis, and 12.5% of the investigation were incorrect vacuum sealers or collection tubes. The analysis's error rate for the EDTA mix samples was 15.83, and 03.95% was the Hypervolumic sample in the study.

CONCLUSION

It was concluded that human error, technical error, and insufficient staff knowledge were the major errors in haematology and chemistry.

KEYWORDS: *Blood, Chemistry, Laboratory, Hematology*

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INTRODUCTION

Pre-analytical stages are often prone to mistakes. Most of the errors are attributable to procedures carried out by healthcare professionals away from the clinical laboratory's direct monitoring.[1] Recent research suggests that errors are more likely to occur during pre- and post-analytical procedures rather than during the analytical phase.[2,3] Over 70% of all errors in laboratory diagnostics are pre-analytical, and most of them are due to issues with patient preparation, sample collection, transportation, and preparation for analysis and storage.[4,5] Greater focus should be placed on sample transportation, even if patient preparation and sample collection (including patient and sample identification and specimen handling) are widely acknowledged as common sources of errors. The necessity for long-distance sample transportation results from the trend toward consolidating laboratory facilities, which calls for improvement measures in this area.[6,7] Pre-analytical mistakes make up the largest percentage

of them. Pre-analytical errors are estimated to account for 46.0% to 84.5% of all laboratory errors, according to several studies.[8] Pre-analytical errors are most frequently reported when they involve one of the following: a) missing sample and test requests; b) flawed or missing identification; c) infusion route contamination; d) haemolysed, clotted, and insufficient samples; e) inappropriate containers; f) erroneous blood to anticoagulant ratio; and g) improper transport and storage conditions.[9,10] It has been established that the pre-analytical stage accounts for approximately two-thirds of inaccuracies among the three stages of sample processing.[11] With the development of technology, the analytical stage has been improved and accounts for less than 15% of errors.[12] In addition, errors at the post-analytical stage are responsible for 20 to 50 per cent of the variance.[13,14] Communication with clinical coworkers, adopting a comprehensive error-detecting system, and education and training programs for staff members in charge of sample collection can all help develop quality improvement efforts to reduce laboratory errors.[15,16] Most importantly, education and training programs for phlebotomy teams are crucial for lowering pre-analytical mistakes. Pre-analytical errors must first be acknowledged, and their causes examined to be reduced. The most crucial element in avoiding pre-analytical errors is raising sample quality.[17] This study aims to assess the frequency of pre-analytical errors at Hayatabad Medical Complex Peshawar.

METHODOLOGY

A descriptive cross-sectional study was conducted in February-July 2022. Data were collected from 480 samples through the purposive sampling technique. Hayatabad medical complex (HMC) approved the ethical certificate of the study. A simple random sampling technique collected samples. Each sample sent for analysis was checked for errors. The error may be in the form of a hemolysis sample, short sample (insufficient volume), wrong tube (insufficient training) and diluted sample, which may be taken from the IV line during infusion or soon after infusion. In Inclusion Criteria, the Samples were sent for diagnostic purposes of admitted, OPD, and Emergency patients.

RESULTS

Table 1: Pre-Analytical Error/ Factor

S.No	Pre-Analytical Error/ Factor	Numbers
1	Quantity Not Sufficient	130 (27.11)
2	Clotted Samples	110 (22.91)
3	Hemolyzed	85 (17.70)
4	Wrong Vaccutainers/ Collecting Tube	60 (12.5)
5	EDTA Mix Samples	76 (15.83)
6	Hyper Volumic	19 (03.95)
	Total	**480**

DISCUSSION

The clinical laboratory plays an important role in diagnosis and follow-up monitoring after treatment and is responsible for reporting accurate and expeditious results. The requirement for credibility and accuracy in laboratory testing is gradually increasing in healthcare settings. However, various mistakes related to laboratory testing can occur in the process from ordering tests to reporting results, leading to laboratory errors. These mistakes can lead to inappropriate diagnosis or treatment, resulting in the additional unnecessary investigation, and dissatisfaction with healthcare services. Of the 471,006 samples that were received in the lab, the most frequent errors were clotting samples (1,332 samples, 0.28 per cent of the total samples), followed by insufficient volume (328 samples, 0.06 per cent), incorrect sampling (96 samples, 0.02 per cent) (22 samples, 0.005 per cent). The inpatient department regularly provided coagulant samples, albeit the precise amount could not be determined due to a lack of information.[17] Similar results were found in our study. A study was conducted in Nepal to identify the kinds and frequency of pre-analytical mistakes in a haematology laboratory at a tertiary hospital. Out of 15337 samples, 857 samples, pre-analysis mistakes were discovered (5.5 per cent). The most frequent mistake was inadequate sampling (25%) and was followed by erroneous sampling (20%), disintegrated sampling (20%), misidentification (14%), coagulated sampling (12%), and dilute sampling (9%). The complete blood count examination suffered the most. Samples from the patient's segment were the worst impacted.[18] The clinical laboratory is responsible for reporting accurate and expeditious results. However, the pre-analytical phase is directly related to the procedure of specimen collection and is mostly out of the direct control of the laboratory; further, most pre-analytical errors are related to human factors.

Therefore, education and training programs for the phlebotomy teams are considered the most significant and necessary measures to reduce these errors.

LIMITATIONS

The data was collected from a single hospital in Peshawar. Therefore, this study has less generalizability. Further studies are required to determine the reasons for such pre-analytical errors.

CONCLUSION

It was concluded that pre-analytical errors have increased in the laboratories. The major errors in haematology and chemistry were human error, technical error, and insufficient staff knowledge.

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