

## **Preanalytical errors in a hematology laboratory of a tertiary care hospital in Sri Lanka: A Six Sigma analysis**

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Precision and accuracy of laboratory results are vital for clinical diagnostics, but preanalytical errors can impact the test reliability, patient safety, and treatment efficacy. Six Sigma was reported as one of the best quality indicators for evaluating laboratory errors and performance; however, its applicability in the preanalytical phase of hematology laboratories in Sri Lanka is limited. Thus, this study aimed to evaluate the preanalytical errors of a hematology laboratory in a tertiary care hospital in Sri Lanka using Six Sigma analysis. A retrospective observation study was conducted from October 2023 to March 2024. Data regarding preanalytical errors was manually retrieved from the paper records maintained in a hematology laboratory of a tertiary care hospital in Sri Lanka. The distribution of errors was determined using descriptive statistics and subjected to converting defects per million opportunities and Sigma values using the Sigma scale and Sigma calculator available at <https://westgard.com>, respectively. During the study period, 411 preanalytical errors were detected with an error rate of 0.9% from 45,490 test samples. Out of nine preanalytical errors detected, the majority of errors were due to clotted samples (62.5%). The next most common errors noted were insufficient samples (8.3%) followed by inappropriate containers (6.1%), mismatched samples (5.85%), incomplete request forms (5.4%), and absence of request forms (5.1%). Furthermore, 6.8% of the errors were attributed to hemolyzed samples, delayed samples, and wrong anticoagulant-to-blood ratio. Six Sigma analysis indicated that the overall Sigma values were above 4 among which the lowest sigma of 4.1 was observed for clotted samples followed by 4.7 for insufficient samples. The highest sigma value of 5.1 was observed for hemolyzed, delayed, and wrong anticoagulant-to-blood ratio samples. Results indicated that Six Sigma is a valuable tool for evaluating preanalytical errors in hematology laboratories. Implementing Six Sigma analysis for preanalytical error determination in hematology laboratories in Sri Lanka is recommended.

**Keywords:** *Pre-analytical errors, Hematology laboratory, Six Sigma, Sri Lanka*