ORAL PRESENTATIONS ABSTRACTS

OP-001 THE EFFECTS OF TWO DIFFERENT BLOOD COLLECTION TUBES AND DIFFERENT STORAGE CONDITIONS ON AMMONIA CONCENTRATIONS

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Objectives: We aimed to evaluate the effects of two different blood collection tubes (Barricor™, Lithium heparin [BecktonDickinson]) on blood ammonia concentrations and also to evaluate the effects of different storage conditions on blood ammonia concentrations collected in Barricor™ tubes.

Materials and Methods: 15 healthy subjects were included in the study. We draw blood samples into one lithium heparin tube and three Barricor™ tubes from every participant. The blood collected in lithium heparin and Barricor™ tube ammonia concentrations were immediately measured and then these tubes were stored at +4 °C and the ammonia concentrations were measured again at 4th, 24th and 48th hour. Besides, one of the remaining two Barricor™ tubes were stored at -20 °C and the other tube were stored at -80 °C and then ammonia concentrations were measured at 4th, 24th and 48th hour. Ammonia concentrations were measured with spectrophotometric method using biochemistry autoanalyzer.

Results: No differences were observed between lithium heparin and Barricor™ tubes at zero point in terms of ammonia concentrations (p = 0.008). We also observed no differences between Barricor™ tubes stored at -20 °C (p = 0.570), -80 °C (p = 0.256) and zero point

Conclusions: Barricor TM tubes can be used routine analysis. The stability of samples collecting with Barricor TM tubes at -20 °C and -80 °C until 48 hours determined as an advantage.

Key words: Lithium heparin, BarricorTM, Ammonia

OP-002 SAMPLE STABILITY AND OTHER PREANALYTICAL FACTORS IN ACTH MEASUREMENT

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Objective: ACTH is a 39-amino acid peptide hormone, with diurnal rhythm. Plasma ACTH is important in the differential diagnosis of hypo/hypercortisolism. It is usually measured along with cortisol or under stimulation/suppression tests. Preanalytical conditions during blood sampling, transport to laboratory, processing and storage may affect laboratory results. In this study, the effect of preanalytical factors on ACTH measurement was investigated.

Materials and Methods: Prospective and retrospective studies were conducted. First, all ACTH requests were collected from December 2017 to April 2018 and the stability of ACTH was determined in the second tube. Plasma ACTH pools were prepared at three-different concentration levels, and plasma samples were stored at 2-8 °C and at -80 °C for up to 72 hours after ACTH measurement. Plasma ACTH levels were repeated.

Results: In the retrospective study, 84.6% of the laboratory admissions for the ACTH test were observed to be done until 10:30 in the morning. In total 62.2% of samples were taken in the first 30min after the request, and 64% in the first 60 min. Laboratory acceptance was found in 29.9% of the samples in the first 30 min and 61.6% in the first 60 min. It was determined that 20.1% of all specimens were transported to the emergency laboratory first and then to the central laboratory, and the mean waiting time was 13.45 hours at 2-8 °C after plasma was withdrawn. The stability test showed a decrease of 3%, 11% and 15.3% at 2-8 °C, respectively. The decrease in samples stored at -80 °C was less.

Conclusion: Ensuring proper analytical stability at the preanalytical stage is important for obtaining reliable results. It is recommended that ACTH measurement should be transported directly to the hormone laboratory in our hospital.

Key words: ACTH, diurnal rhythm, stability, preanalytical variables

OP-003 INSUFFICIENT SAMPLE VOLUME OF VACUUM TUBES EFFECT ON BIOCHEMICAL PARAMETERS

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Objective: Insufficient results are one of the most important sources of medical error. Hemolysis occurs when blood is taken in an insufficient amount of vacuum tubes. It has been known for many years that hemolysis is a source of errors in laboratory tests for a variety of reasons, such as the release of erythrocytes outside the cell, dilution, interference with tests on similar wave lengths. In this study, it aimed to determine the effects of hemolysis on biochemical parameters in blood samples taken in missing volumes.

Materials and Methods: Venous blood samples were taken from 32 patients who had two blood tubes during blood test (Barricor, trypsin and laboratory) and 35 blood samples were collected in the Central Laboratory of Cebeci the University of Ankara Medical School. When taking samples from these patients, 5 mL tube was filled completely so that no vacuum was left, and ml of blood was withdrawn as the second tube remained vacuum. The samples were centrifuged at 2000 RPM for 10 minutes. Blood samples from both studies were sampled in the Beckmann Coulter 5800 autoanalyzer with serum indices.

Results: Creatinine, cholestrol, L DH, total protein, AST, iron, RF were significantly higher (p <0.05), Glucose, total protein, Na values were significantly lower in the vacuum remaining tubes. When the % change rates were examined, all tests were below the CLIA and biological variation total allowable error values (glucose (%1,39), cholesterol (%0,75), T. Protein (%0,83), LDH (%1,16), AST (%4,6), iron (%2,17), RF (%1,22), Na (%0,42)). There was no difference in hemolysis index as well as no visible hemolysis in the samples. Conclusions: This study was observed that hemolysis did not make a difference affecting hemolysis index but statistically significant differences were found in hemolysis affected parameters. It should not be forgotten that the % change values in the affected parameters will increase the total error rate even through the CLIA and the biological variation are below the total allowable error values.

Keywords: Insufficient sample volume, hemolysis, CLIA, biological variation

OP-004 THE USE OF LUER ADAPTER IN EMERGENCY DEPARTMENTS ON THE HEMOLYSIS INDEX

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Objective: Frequently encountered insamples of Emergency Department, hemolysis is one of the most important preanalytic errors affecting the laboratory test results and quality. The aim of this study is to investigate the effect of using Luer Adapter (LA) during blood-letting in Emergency Department on their hemolysis index.

Materials and Methods: Three different types of injection were used in the blood-letting process. Luer adapter tube, luer tip and an injection tube. As a control, blood samples were distributed to the personnel drawing blood in the Emergency Service on 27 February 2018 and they were asked to use LA needles (BD) instead of injectors. By choosing the dates before LA (5-25February 2018) and LA (5-25March 2018) and the Hemolysis indices of samples that came from the emergency service and were placed in a biochemistry device were taken from the LIS to be analyzed. LHI levels were semiquantitatively measured in theBeckman Coulter AU 5800 device with the original kit and the results were reported in the interval of normal +5 positive.

Results: Throughout the study, the number of samples that came for biochemistry analysis were 2475(51.7%) before LA, 857(48.3%) after LA, and 5155 in total. Regarding the distribution according to age and gender; there was no difference before LA (age:47.3±21.2, M:47.7%, W:52.3%) and after LA (age:46.2±20.9, M:48.5%, W:51.2%). The rate of samples with hemolysis was 48.9% before LA and 38.9% after LA, which was found to be significantly low (Chi-square test, p<0.0001). Lipemia was determined respectively as 10% and 8.2% before and after LA; whereas icterus was determined as 3.5% and 1.8%. Comparing the degree of hemolysis; a decrease was observed in all levels of hemolysis index after LA; however, this result was not observed in lipemia and icterus.

Conclusion: In order to enhance especially the quality of sampling, it is required to increase the cooperation between the laboratory and the relevant unit in units like emergency department where there is a great density of patients. By considering the features of units to which the laboratory renders service; it is recommended to make error proofing plans jointly. It is also recommended to discuss the procedure of blood-letting from the vascular access.

Keywords:Sampling, Preanalytic error, Hemolysis index, Luer Adapter

OP-005 STABILITY OF FULL BLOOD COUNT PARAMETERS UNDER DIFFERENT STORAGE CONDITIONS

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Objectives: In this study, we aimed to evaluate the stability of complete blood count in response to changes in different storage conditions and also evaluated acceptable levels according to clinical decision levels.

Materials and Methods: Thirty-six volunteers were included in this study. Two K2EDTA blood samples from each volunteer were taken. Randomly both tubes were analyzed within 15 minutes on the Sysmex XN-1000 CBC analyzer (the results were accepted as basal values). After the analysis, one of the two EDTA blood samples were stored at room temperature; 24 hours, and the second blood sample was stored at 2-8 °C for 24 and 48 hours until reanalysis. The difference between each result with the 24th hour and with the 48th hour was calculated. After the 24th hour, hemolysis index as well as no visible hemolysis in the samples.

Results: The difference between the baseline and the at room temperature

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results of WBC, Hb and PLT were not statistically significant (p>0.05) with the exclusion of RBC (p=0.002). There was statistically significant difference between the baseline results and the values at 24. and 48. hours (refrigerated at 2-8°C) (all p<0.05) with the exception of WBC (24 hour refrigerator p = 0.410) NO statistically difference was found in the test results which were examined in terms of clinical decision level.

Conclusions: There was no significant difference in terms of clinical decision level; WBC results seem to be stable both at room temperature and in the refrigerator (24 hour) whereas the results of RBC, Hb and PLT were not stable. 

Key words: Stability, CBC, Temperature

OP-006 THE EFFECT OF EDUCATION AND A 4-YEAR EXPERIENCE OF A STATE HOSPITAL IN THE EVALUATION OF PREANALYTIC PROCESS

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Objective: Preanalytical errors have an important ratio in all laboratory processes. To reduce laboratory errors a working group on Laboratory errors Patient safety (WG-LEPS) developed laboratory quality indicators (QIs) for patient safety. The frequency of preanalytical errors; depends on fault definition, possibilities, error classification, laboratory error classification, laboratory error management

OP-007 ASSESSMENT OF SAMPLE REDUCES ACCORDING TO SIX SIGMA METHODOLOGY IN BILECİK CENTRAL PUBLIC HEALTH LABORATORY

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Objectives: Preanalytical process is the most common source of laboratory errors. The frequency of preanalytical errors; depends on fault definition, possibilities, detection system and sample type. According to Six Sigma Methodology, “efficiency sigma level” is an indication of efficiency and costeffectiveness and provides a holistic view of the process. Process sigma levels are calculated according to pre-analytical process errors. In this study, we aimed to evaluate the performance of the preanalytical process according to the Six Sigma Methodology. Materials and Methods: July 2017-December 2017 preanalytical quality indicator markers (inadequate sample, incorrect barcode, incorrect sample, hemolyzed sample, improper tube, incorrect transport, unsuitable transportation) were calculated in the six sigma calculator using Westgard site for every type of error. 4 sigma level target performance level was selected.

Results: For each error type, the process sigma level; It was over the target for six months. The highest error rates; “insufficient sample” ranked first, “clotted sample” second ranked for July, August, September, October; the “clotted sample” ranked first in November and December. The highest error rates for both are equal in December. When we look at total error rates, the lowest error rate was in July (50.06) and the highest error rate was december (50.16).

Conclusions: With our work, low process sigma level faults can be detected in our laboratory; these errors can be evaluated as a whole with analytical and postanalytical processes. The frequency of reported preanalytical errors is mostly in the sample intake phase. The preanalytical process performance evaluation based on the six sigma approach and the analysis of the frequency of errors can be done in universal dimensions to provide corrective, preventive actions with low sigma level. 

Key Words: Six Sigma, Error Rates, Preanalytical process

OP-008 A QUALITY ADVENTURE IN A PRIVATE HOSPITAL

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Objectives: We want to evaluate the quality indicators of our laboratory between 2006 and 2017.

Materials and Methods: Between 2006 and 2017, the quality indicators were determined due to the standards of Clinical and Laboratory Standards Institute (CLSI), Joint Commission International (JCI), ISO 15 189 and Quality Standards in Health Care from Hospital to Community: A guide for laboratory and analysed monthly. Data analysis was performed according to the contents of these indicators for preanalytical, analytical and postanalytical phases and errors.

Results: The indicators evaluated in January 2006 were The percentage of Wrong/Inappropriate Samples and Incorrect/Repeated Test. In October 2009, The percentage of Panic Value Notification Time, in January 2010 The percentage of Repeated Test. In May 2010 The percentage of Rejected Samples and finally in July 2017 The percentage of Inappropriate Performances in Internal/External Quality Controls were added. The target values were determined and updated annually. For the results above target value, corrective and preventive actions were initialized. By giving theoretical and practical education to the staff or by changing materials used, improvement in the indicator ratios was provided.

Conclusions: The results of medical laboratories affect 60% to 70% of the critical decisions to be made during the patient follow-up. Therefore, incorrect laboratory results can lead to medical errors. In order to have accurate and reliable test results, measurable, objective and continuously renewable quality indicators are needed to evaluate the potential errors and to prevent their repetition.

Key Words: Medical Laboratory, Quality, Indicators

OP-010 THE EFFECT OF DIURNAL VARIATION ON ERYTHROCYTE SEDIMENTATION RATE

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Objective: Despite the fact that some laboratory tests show diurnal variations, studies in this area are inadequate in the literature. Erythrocyte sedimentation rate (ESR) is one of the most frequently used parameters to evaluate acute phase response. ESR increases after 24 hours from the onset of inflammation and may last up to 1-2 days. Therefore, incorrect laboratory results during ESR’s diurnal variation. In this study we examined diurnal variation of ESR.

Materials and Methods: Blood samples were taken from 12 volunteers (8 males, 4 females) between 18-50 years of age into 3.8% sodium citrate tubes at 09:00, 12:00, 15:00, 18:00 and 24:00 hours. The ESR was studied by Westergren method. The samples taken at 09:00 were accepted as basal. The samples taken at 12:00, 15:00, 18:00 and 24:00 were compared with the baseline level. Statistical analyses were performed in the SPSS 15.0 package program and Bonferroni correction was performed, and p<0.0125 value (0.05 / 4 = 0.0125) was considered statistically significant.

Findings: The mean age of the volunteers was 34.4 ± 5.79 (mean ± standard deviation) years old. The rate of erythrocyte sedimentation from volunteers was found to be lowest at 09:00 ([5.3 (3.9-9.1)]) [median (25 percentile – 75 percentile)] and the ESR of the samples taken at 12:00 and 24:00 hours were compared with the baseline level. Statistical analyses were performed in the SPSS 15.0 package program and Bonferroni correction was performed, and p<0.0125 value (0.05 / 4 = 0.0125) was considered statistically significant.

Conclusions: We found that ESR had diurnal variation in our study, and was at the lowest level at 09:00 am. We therefore think that the change of ESR in patients during the day should be taken into consideration.

Keywords: Erythrocyte sedimentation rate, diurnal variations, variance

OP-011 HOW TO OVERCOME THE EFFECT OF DELAYED ANALYSIS ON HEMATOCRIT RESULTS: CORRECTED HCT VALUES

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Objectives: It is a well-known fact that there may be some changes in results of complete blood count (CBC) analysis due to excessive time of EDTA whole blood samples. The aim of this study is to determine a correction formula estimating the initial value from measured hematocrit with duration of delay in cases of delayed analysis by using linear regression which is the methods of machine learning.

Materials and Methods: We designed training and test data sets to determine correction formula. Training set includes 10 K2 EDTA whole blood samples from 10 donors and 1 EDTA whole blood sample of 1, 3, 5, 7, 9, 11, 15, 20 and 25 hours. Test set includes 20 samples analyzed at 0th, 2nd, 4th, 6th, 8th, 12th, 24th and 30th hours. All samples were analysed with CBC with Sysmex XN-1000 hematology analyzer. Both simple and multiple linear regression (SLR, MLR)
studies were conducted to obtain correction formula. Only time was used as prediction parameter in SLR whereas hemoglobin, and erythrocyte were included along with time in MLR. The predictions were tested by using test set. R 3.4.3 (R Working Group, Vienna, Austria) was utilized for statistical analyses.

Results: Our training data showed us that time is not the only component for prediction. MLR model with time, hemoglobin and erythrocyte presented more compliant results with measurements than SLR model (R2=0.93, F=364.4 and R2=0.33, F=42.5, respectively). Correction formula for Hct was found as: \[ \text{Htc\_pred} = \text{Hct\_meas} (0.00294 \times \text{time(min)} - 0.78 \times \text{RBC} + 0.12 \times \text{Hb} + 0.36) \]

Conclusion: Prolonged waiting time prior to analysis is a subject of concern especially for samples collected during occupational screenings. Although the best way to overcome this problem is to obtain new samples, a correction formula may be a useful solution when resampling is not an available option.

Keywords: Linear regression, hematocrit, complete blood count, correction formula, machine learning

OP-012
AN EVALUATION OF PREANALYTICAL ERRORS IN COAGULATION TESTS
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Objectives: Coagulation tests in biochemistry laboratories are important. In coagulation tests, it is a priority to give accurate results with short turnaround time. Aim of study was to retrospectively investigate the causes of rejected coagulation samples in routine and emergency biochemistry laboratories in coagulation tests.

Materials and Methods: Between 1 July 2017-1 March 2018, the number of samples that rejected in emergency and routine biochemistry laboratories and delayed test results were obtained from the laboratory information management system (LIMS) and retrospectively reviewed. Rejected samples were classified by error sources, error percentages were calculated and sigma values were found.

Results: Number of samples for emergency laboratory coagulation tests was 28356 and total number of rejections was 339 (1.12%). Error rates were found as insufficient volume 139 (41.0%), inappropriate specimen container 108 (31.9%), clotted sample 70 (20.6%) and other causes 22 (6.5%). Number of samples for coagulation tests in the routine laboratory was 34513 and total number of rejections was 896 (2.59%). Error rates were inappropriate specimen container 630 (70.3%), insufficient volume 220 (24.6%) and clotted sample 46 (5.1%). The sigma values for preanalytical errors in the coagulation tests were 3.78 in emergency laboratory and 3.44 in routine laboratory.

Conclusions: To minimize the most common preanalytical errors in laboratories is necessary for accurate and timely results for accurate patient. In the case of these preventive plans, training of the blood collection staff is important, especially in order to reduce the rejected sample rates.

Keywords: Coagulation, preanalytical error, patient safety