From the Symposium President

Dear participants

I greet you all respectfully on behalf of the board of directors of our association and myself. We are happy to be with you at the Clinical Biochemistry Specialists Association "Management and Control of Laboratory Process Symposium".

We are having very difficult days. The last year has been a year in which we lost our relatives and loved ones. I remember with respect all my colleagues, especially Covid-19, who left us. We gave the names of our symposium sessions in order to keep the memory of our colleagues alive.

We held a total of 8 plenary lecture sections in our symposium. The laboratory processes and patient safety, and the lean laboratory applications will be shared in Ismet Caral session. The general theme of the Sacit Barutcuoglu session will be Covid-19 diagnostic and follow-up tests and approaches. Ibrahim Onur session on Sunday, information on the quality control and analytical phase will be shared. In the Sualp Palabiyik session, the post analytical phase in organic acid, thyroglobin and urine analyzes will be discussed. Oral presentations will be presented at the Ozgur Bagubek, Okhan Akin, Nesrin Akay and Lutfu Cetinkaya sessions.

I would like to thank all our speakers who supported the scientific program of the symposium. I would like to thank Sarsted for their unconditional support to the symposium. I would like to thank Aliskon company, which organized the symposium.

I believe my symposium will contribute to our scientific development. See you again, best regards.

Dildar Konukoglu

Symposium President and Clinical Biochemistry Experts Association President

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	Ozlem Gulbahar
	Turan Turhan
	Ugur Fahri Yurekli
	Yunus Goren

Symposium program

17-18 April 2021

Opening ceremony

10.00-10.10

ISMET CARAL SESSION

10.10 Patient safety and management of laboratory phases- Dildar Konukoglu

11.00 Lean laboratory applications in clinical biochemistry- Cigdem Karakukcu

OZGUR BAGUBEK OTURUMU

12.30-13.30 Oral presentation

SACİT BARUTCUOGLU SESSION

14.00 Analytical Stage in the molecular diagnosis of Covid-19: RT PCR test and its Steps- Yunus Goren

15.00 Overview and rational use of antibody tests in the diagnosis and follow-up of Covid-19- Ugur Fahri Yurekli

16.00 Covid-19 and -Dimer- Banu Isbilen Basok

OKHAN AKIN SESSION

17.00-18.00- Oral presentations

18 April 2021

IBRAHIM HONOR SESSION

10.00 Management and improvement of preanalytical-analytical and postanalytical process in External Quality Control- Erhan Cuneyt Canbulat

11.00 Verification 3N; Why, When, How?- Murat Cihan

NESRIN AKAY

12.30-13.30 Oral presentations

SUALP PALABİYİK SESSION

14.00 Evaluation and interpretation of results in amino acid and organic acid analysis- Ridvan Murat Oktem

15.00 Post-analytical process management in thyroglobulin testing- Ozlem Gulbahar

16.00 Effects of preanalytical phase on analytical and post-analytical phases for urine analysis- Mustafa Erinc Sitar

LUTFU CETINKAYA SESSION

17.00 -18.00 Oral presentations

PLENARY LECTURE

PL-01

Patients Safety and Management of Laboratory Phases

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Objectives: Patient safety is the absence of preventable harm to the patient in the healthcare process and the risk of unnecessary healthcare-related harm to an acceptable minimum. It is typically result-dependent and focused on preventing patients from experiencing negative consequences while receiving medical care. Patient safety is a serious global public health issue. According to the data of the World Health Organization, the probability of a patient being harmed during health care is one in 300. One of the most common errors is diagnostic errors. In particular, developments in the health system and technologies have facilitated the access of physicians and patients to the test, and test-based diagnostic errors have gradually increased. Laboratory medicine has a great importance in the development of evidence-based medicine; laboratory services have become one of the most important elements of the patient safety process.

Aims: The goal of evidence-based laboratory medicine is to provide the physician with the best laboratory evidence needed to make a correct decision. Up to 70-80% of all medical decisions affecting patient diagnosis and treatment depend on laboratory data.

Results: Laboratory patient safety culture is a culture where people can investigate and discuss laboratory errors and their effects on patients. Diagnostic errors are the failure to provide an accurate and timely explanation of the patient's health problems and/or to communicate this explanation to the patient. The concept of "diagnostic errors" links laboratory-related errors strictly to patient safety issues. 'Inappropriate' or 'unnecessary' laboratory tests are testing whose results are unlikely to be 'medically necessary' for proper clinical management of the patient. Recent research shows that the majority of laboratory-related diagnostic errors occur in the pre-pre analytical and post-post analytical phases. Based on the concept of "brain-brain cycle" described by Lundberg, the total testing process (TTP) begins with the clinicians' clinical question (pre-preanalytical) and ends when the test result is interpreted (post-post analytic). The development of external quality assurance (EQA) programs, improvement of internal quality control (IQC), standardization of analytical techniques, and automation and computerization of laboratory processes play an important role in minimizing analytical errors. The International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) "Laboratory Errors and Patient Safety" (WG-LEPS) Working Group, defining a Quality Indicators Model (MQI) with data is very important for laboratory patient safety. The use of defined quality indicators by laboratories has provided an increase in quality management and TTP management standards and has enabled the development and spread of patient culture in the laboratory. It is important for lab professionals to analyze quality indicators data periodically to reduce error rates and improve laboratory performance. Improvements in the testing processes of the projects completed by the IFCC (harmonization of fasting status, patient and blood tubes identification, color-coding of blood collection tubes the sequence of blood tubes to be followed during blood drawing and harmonization of preanalytical quality indicators, the gguidance on local validation of blood collection tubes and phlebotomy guidelines) are also very important in terms of patient safety. On the other hand, both the certification (ISO 15174, ISO 9000) and the risk assessment techniques recommended by ISO/TS 22367 or CLSI EP18-A2 make very important contributions to patient safety. The "Rational Laboratory Use Project" of the Ministry of Health of the Republic of Turkey is based on patient safety.

Conclusion: Laboratory medicine is a constantly evolving clinical discipline, and the challenges that arise require revision and improvement of operational flows to increase quality and safety in patient care. For this, laboratory professionals must have a high level of skills to achieve efficiency and effectiveness in delivering laboratory services. It is essential that laboratory medicine professionals participate in interdisciplinary teams and encourage professional expertise.

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PL-02

Lean Laboratory in Clinical Biochemistry

Cigdem Karakukcu

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Objectives: The laboratory is a unit in health care where "lean" thinking may be seen as very beneficial. With all of its complexities, finding ways to cut test times and streamline the work environment without compromising safety is becoming a huge topic of discussion in the laboratory. The efficient operation of a clinical laboratory and the effective delivery of medical laboratory services to clinicians and their patients require a

complex interdigitating of expertise in medical, scientific and technical areas [1, 2]. The "lean" means in term "removing waste". A lean laboratory is a system focused on delivering the most efficient laboratory test results in terms of cost and / or speed with the most efficient use of resources. The three corners of the "Magic Triangle" are quality, resources and time must be balanced to achieve success [3, 4]. Laboratory management task is to integrate and coordinate organizational resources so that quality laboratory services can be provided as effectively and efficiently as possible. Organizational resources include 3 key words: 3Ps; personnel, process and product. Six Sigma is another quality management strategy for continuous quality improvement processes and focuses on the identification and removal of defects according to root-reason analysis. Lean Six Sigma (LSS) is a marriage of two different strategies that reduce inefficiencies and increase quality more [3-6]. This paper is dedicated to discussing lean and how laboratory settings can improve in Clinical Biochemistry Laboratories.

Material and Methods: For a lean laboratory management, a good starting point would be to make an assessment of your current situation and optimization of the working laboratory environment. This is defined as cleanliness (Lab 5S) in nine areas that could be improved. Laboratory 5S is a method of organization of work environment created from five Japanese terms (Seiri, Seiton, Seiso, Seiketsu, Shitsuke) which represents the ordering, sequencing, polishing, standardizing, and sustaining. 5S is a workplace optimization system. The goal is to apply each of these 5S steps to your lab workplace. The steps of a lean laboratory are 1. Cleaning and optimization of the working area 2. Value stream mapping and defining value added and non-value added steps 3. Elimination of waste (non-value adding processes) 4. Standardization and optimization and 5. Continuous improvement

Results and Discussion: The result of these applications; everything that is unnecessary is eliminated, what is left is sorted and organized, and everything becomes more ergonomic and easily accessible. Items and their locations should be clearly labeled and the workplace should be kept clean. Once optimization is complete, the current situation can be maintained by implementing a regular 5S audit. A lean laboratory looks neat and clean. The samples arrive the laboratory at a constant speed in a continuous flow. Results are in line with the targeted turn around time. Less staff is needed for the same output. Sample rejection is reduced. No stock or expiry problem is faced and less spent than budgeted. Employee and customer satisfaction increases [7-10]. In a lean laboratory improved quality is inevitable, with accompanying decreased cost and time.

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PL-03

Analytical Phase in the Molecular Diagnosis of COVID-19

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Objectives: This viral disease, which is thought to have spread from a live animal market in Wuhan, Hubei Province, China in December 2019, resulted in pneumonia, acute respiratory failure (Acute Respiratory Distress Syndrome ARDS), serious complications and death in infected people. Routine verification of COVID-19 cases is based on the detection of specific sequences of virus RNA with a test such as real-time reverse transcription polymerase chain reaction (rRT-PCR) and, when necessary, verification with nucleic acid sequence analysis method. Among the existing methods, the most preferred is the PCR test defined as the "gold standard". (Ustun, Aygormez et al. 2020), (Advisory 2020)

Material and Methods: Polymerase Chain Reaction (PCR) was discovered in 1985 by Biochemist Dr. Kary Banks Mullis and won him the Nobel Prize in Chemistry in 1993. PCR is a common name given to reactions applied to enzymatically amplify a specific region between two segments of known sequence within DNA or RNA (Chemistry 1993). It is a method that makes it possible that an organism or a human gene (DNA or RNA) can be replicated in vitro. rRT-PCR application is applied with diagnostic applications approved by the Ministry.The method consists of an "Extraction step" in which nucleic acids are isolated, a "Preparation Step" in which PCR components are prepared, and an "Amplification Step" where the reaction is performed and evaluated (Mullis, Faloona et al. 1986).

Results: As of April 2021 in Turkey PCR test capable of 473 approved diagnostic laboratory is doing about 300,000 tests each day. Since the beginning of the pandemic, approximately 41 million tests have been carried out and 3 million 800 thousand people have been diagnosed with Covid-19. 33 thousand of these people lost their lives (Turkey 2021).

Conclusion: Introduced in mid-1990, Real Time PCR eliminated many of the limitations of the standard End-Point PCR. Developed Real Time PCR devices allow real-time fluorescence monitoring of PCR reaction steps. The technology is flexible and there are a variety of alternative instruments and fluorescence probe systems. Real Time PCR analyzes can be completed with responsiveness and full because post-amplification manipulation is not required. RT-PCR, is important for rapid diagnosis and rapid and effective isolation of the carrier. Thanks to the pandemic that proved the importance of Molecular Science, it is obvious that more studies are needed in this field.

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PL-04

Overview and Rational use for Antibody Tests During the COVID-19 Pandemic

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Objectives: The coronavirus genomes encode 4 major structural proteins: spike (S), envelope (E), membrane (M), and nuclecapsid (N).SARS-CoV-2 RNA, SARS-CoV-2 antigen and SARS-CoV-2 antibody test are used for diagnosis of Covid-19 disease. Target antigens are Nükleocapsid (N) ve Spike (S). Common target site for S protein, drugs, vaccines, and neutralizing antibodies. Isotypes detected in antibody tests, which are our subject, IgM, IgG, IgA, Total. The antigen to be selected is important in terms of cross-reaction risk with seasonal coronaviruses. N protein is sensitive, S protein is sensitive. Looking at the use targets of antibody tests, kits in the market detect antibodies against S protein. Ab Kits in the market; Abbott Architect I2000SR, Roche Elecsys, Siemens Atellica-IM, Euroimmun Anti-SARS-CoV-2 ELISA, Beckman-Coulter Access.

Material and Methods: We used Roche Elecsys anti-SARS-CoV-2 test in our study. We used SARS COV-2 total antibody against nucleocapsid protein for 128 persons and spike protein for 130 persons. In a person who has never been vaccinated; Testing positive for an antibody against N or S indicates previous natural infection. In a vaccinated person; Positive test for antibody against vaccine antigen target such as S protein and negative test for other antigens is the vaccine-induced antibody response that is not infected with SARS-CoV-2. An antibody positive test result that is not vaccine induced such as the N protein indicates SARS-CoV-2 infection before or after vaccination.

Results: Antibody tests against the N protein were detected in 68 of 100 PCR-negative individuals as a result of the antibody tests examined at least 28 days after vaccination in healthcare professionals. Antibodies against N protein were detected in all 28 PCR positive individuals. Everyone had antibodies against the S protein.

Conclusion: A new area of use has been opened for existing vaccines for SARS-CoV-2 antibody tests. However, limited information is available on the performance of quantitative SARS-CoV-2 antibody tests. It can be assumed that the upper measurement limits can be exceeded frequently in most tests, which may require additional dilution steps not yet considered by the manufacturers. As a result, a good correlation was found between all tests evaluated. Advantages of serological tests; easy and practical, they give results in a short time and economical but, since the primary immune response develops within 7-21 days in tests investigating ab, it may be false negative at a very early stage, antibody response does not develop in patients with early treatment and immunodeficiency and does not provide guidance for the use of personal protective equipment.

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PL-05

COVID-19 and D-DIMER

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A new coronavirus was detected, rapidly reaching pandemic proportions in late 2019. The World Health Organization defined the disease caused by the virus (severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]) as coronavirus disease 2019 (COVID-19). Individuals with COVID-19 have coagulation abnormalities that create a hypercoagulation state. The cause of the hypercoagulopathy seen in COVID-19 is not yet understood. The predominant coagulation abnormalities in COVID-19 patients suggest hypercoagulability and are consistent with uncontrolled clinical observations of increased risk of venous thromboembolism (VTE). Thromboinflammation or COVID-19 associated coagulopathy (CAC) appears to differ from disseminated intravascular coagulation (DIC), but DIC has been reported in severely affected patients. In the early stages of CAC, thrombus formation is localized in micro to medium-sized vessels in the lung and may not be detected by CT pulmonary angiography. Patients develop mild to moderate symptoms and need oxygenation. At this stage, only elevated levels of D-dimer and fibrinogen are seen. In the DIC phase, patients may develop VTE and extrapulmonary thrombosis in the intestine, kidney, and liver. D-dimer levels are higher than in the early stage, and other markers tend to show consumption coagulopathy. CAC is associated with an increase in inflammation markers (eg CRP). Unlike classical DIC caused by bacterial sepsis or trauma, aPTT and/or PT prolongation is minimal, thrombocytopenia is mild (platelet count ~ $100x10^9$/L), and laboratory results supporting microangiopathy are rare. Rarely, patients with severe COVID-19 infection and multiple organ failure progress to coagulopathy meeting the International Society of Thrombosis and Hemostasis (ISTH) DIC criteria. These criteria include moderate to severe thrombocytopenia (platelet count <$50x10^9$/L), prolonged PT and aPTT, extremely high D-dimer levels, and decreased fibrinogen (<1.0 g/L).

Patients with severe infections are more likely to have CAC than patients with mild infections, and those who die of COVID-19 are more likely to meet the ISTH criteria for DIC than survivors. The elevation of D-dimer at admission and the exponential increase (3 to 4 fold) of D-dimer levels indicate clotting activation from infection/sepsis, cytokine storm, and organ failure and is associated with high mortality. The worsening of these parameters, especially D-dimer, indicates that the COVID-19 infection is progressing and predicts that more aggressive critical care may be needed. Improvement of these parameters together with a stable or improving clinical condition assures that aggressive therapy is reduced. The mechanisms of D-dimer elevation seen in COVID-19, clinical use of the test, preanalytical, analytical and postanalytical processes affecting

the test, and laboratory performance and measurement problems of the D-dimer test will be discussed further at the presentation.

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PL-06

Verification: When, Where and Why?

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Several global workgroups exert much effort in establishing protocols and guidelines to rule the process of verification in medical laboratories. Method verification is the main step in the process of enhancing the quality of laboratory results and a cornerstone in accreditation. Despite the presence of several updated guidelines used to determine the performance characteristics of new methods in clinical chemistry laboratories. However, real practice raised several concerns with the application of these guidelines which need further consideration in the upcoming updates of these guidelines. Globally, all medical laboratories seeking accreditation should meet international quality standards to perform certain specific tests. Quality management program provides disciplines targeted to ensure that quality standards have been implemented by a laboratory in order to generate correct results. The hallmark of the accreditation process is method verification and quality assurance. Before starting a complete evaluation of a new measurement procedure, kit, or instrument for in vitro diagnostic use, it is often necessary to make a preliminary decision about its acceptability. This initial performance check is neither a rigorous investigation into the procedure's long-term performance, nor an evaluation of the many factors that can affect results produced by the device. The primary purpose of this document is to help detect problems that are severe enough to warrant immediate correction, referral to the manufacturer, or expanded investigation. Before introducing a new method in your laboratory, it is important to assess certain performance characteristics that reflect the concept of method verification.

Accreditation is a valuable resource for medical laboratories. The development of quality systems based on ISO 15189 has taken place in many laboratories in the European countries but data about accreditation remain scarce. Also, in this field there are large differences between countries. The accreditation of medical laboratories in the European countries is mostly carried out in cooperation with national accreditation bodies (NAB). These NAB work together in a regional cooperation, the European Cooperation for Accreditation (EA). Accreditation is mandatory (Belgium, France, Hungary, Ireland and Lithuania). accreditation process is according to ISO 15189 standard. However, 12/29 (41%) countries are also using ISO 17025 as additional standard. In some countries, NAB are also using other national or international standards as Joint Commission International (JCI) in Turkey, Clinical Pathology Accreditation (CPA) in the UK and Ireland or CCKL Code of Practice in the Netherlands. An exception is made for Serbia, where Agency for accreditation Health Care Institute, which is not the NAB, accredits laboratories as part of the health care institution in accordance with national standards, based on the International Society for Quality in Healthcare (ISQUa) standards and ISO standards. Method verification is a less rigorous form of performance assessment. The experiments require fewer data points, but sometimes more complicated data analysis. The assumption of these studies is that the performance claimed by the manufacturer is acceptable for the intended medical use, therefore the laboratory only needs to verify the manufacturer's claims. The verification process is supposed to confirm that the method performs "as advertised."

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PL-07

Postanalytic Process Management in Thyroglobulin Assay

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Thyroglobulin (Tg) is a large glycoprotein located in the follicular lumen of the thyroid and used as the substructure of thyroid hormones [1, 2]. Serum Tg levels are commonly measured in clinical biochemistry laboratories. Thyroglobulin is a significant tumor marker especially used in the follow-up of differentiated thyroid cancer (DTC) patients [3]. However, if Tg antibodies (Tg Ab) are present in the patient's serum, it cannot be used for this purpose [1]. Because these antibodies might yield false results especially in Tg measurements made by immunometric analysis (IMA). This may cause missed recurrence or residue [3]. Therefore, the correct interpretation of Tg test results is extremely critical for the prognosis of DTC patients. Proper management of the post analytical process will facilitate the correct interpretation of Tg results. It is essential to know the Tg measurement methods well in terms of interpreting the results and guiding the clinician correctly. There are various reasons for falsely low/undetectable Tg results measured by IMA in the presence of TgAb, either method-related or independent of the

method [3]. It is stated that, in these cases TgAb can be used as "surrogate tumor marker" instead of Tg [1]. Since TgAb is present in approximately 20-30% of patients with DTC, TgAb levels should definitely be measured at the same time as Tg measurements [1]. The change seen in TgAb levels over time is considered in the evaluation of recurrence risk [3]. However, more sensitive IMA methods, also called second-generation or high-sensitive kits, are used today for Tg concentrations [1]. If high-sensitive Tg (hs-Tg) kits are used for Tg measurement and Tg levels are at undetectable levels, additionally, if TgAb levels tend to decrease, a low risk of recurrence can be mentioned [4]. Even in these patient groups with TgAb positive, it has been shown that hs-Tg measurements have a high negative predictive value and are sufficient to avoid the need for TSH stimulation and strict USG follow-up in the follow-up of many patients who underwent thyroid ablation [4].

Recently, LC-MS / MS methods have been developed for Tg measurement [1]. This method is advantageous compared to IMA methods as it is not affected by TgAb interference [1, 3]. Studies have shown that the Tg results of some patients with positive TgAb are found to be false negative by IMA, but can be detected by LC-MS/MS [1]. However, the functional sensitivity of this method is lower than the sensitivity of hs-Tg kits [1]. Therefore, it may be possible that some patients cannot be detected by LC-MS/MS. Although more clinical research is needed on this subject, it is considered an important confirmation method because it is not affected by antibody interference. Furthermore it is stated that the RIA method, which was widely used in previous years, is more advantageous than IMA methods in terms of TgAb interference [3]. However, the possibility of RIA methods to be false negative or false positive due to different antibodies should be considered. In addition, the RIA method has lower functional sensitivity than the IMA method.

In summary, the TgAb test should also be studied in every patient in whom Tg is desired. Although it is not a problem for patients with negative TgAb results, patients with positive TgAb results may have false negative Tg levels measured by IMA. In this case, if possible, it should be worked with the LC-MS / MS method, which is not affected by antibody interference; if this is not possible, it should be tried to be verified by RIA method. However, while interpreting the Tg result, the disadvantages of these alternative methods should be taken into account. In addition, these suggestions have started to be discussed again with the hs-Tg kits used today. These situations should be considered in order for the Tg test to be interpreted correctly in patients with DTC and to guide the clinician correctly.

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PL-08

Effects of Preanalytical Phase on Analytical and Post-Analytical Phases for Urine Analysis

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Urinalysis holds one of the most important places in routine clinical biochemistry practice and it is also among one of the most frequently requested tests. More than 70 % of the errors encountered in medical laboratory analysis procedures occur at the preanalytical phase [1]. These preanalytical errors can cause negativity in medical decision making, repetition of tests, increased costs and also they may lead to the development of a trust/communication problem in the clinician-laboratory-patient triangle. Sample timing, contamination, identification process, patient preparation, suitable temperature and proper sample transfer are the processes where preanalytical problems are most commonly taking place [2]. Taking into account the duration of the urine in the bladder and its concentration characteristics, morning mid-stream urine should be preferred before breakfast, except for emergencies [3]. It will be sufficient to clean glans penis and introitus without using soap or other sterilization solutions [4]. Identification of the samples is the process in which the most dramatic errors can occur. For this process, it is necessary to take measures such as double-controlled sample identification, usage of barcode labels, and sticking these labels to the container rather than to the container lid. Detailed history taking about pharmacotherapy including over the counter medications usage will help us in detecting interferences in the analytical phase. 12 mL sample volume for spot urine and 30 mL sample volume for toxicology should be preferred while 2-3 liter container can be used for 24-hour urine collection. Regarding preservatives, recommendations of the sample container, reagent and/or urine auto analyzer device manufacturers should be taken into consideration and each requested test should be evaluated differently [5]. Transfer duration and temperature are the most important determinants for sample transfer. While spot urine samples can be kept at room temperature for a maximum of 1 hour, for toxicology analysis, urine can be stored at 2-8 Celsius for 5 days [3]. If transfer time prolongs and analysis is late, chemical composition of the urine may change, cells and particles may be broken down, bacteria may overgrow, glucose concentration and pH status may change [3]. It is also highly recommended that these processes be secured using internal and external quality materials together. The frequency of use of quality controls may vary depending on the weekly or daily sample load of the laboratory. In addition to all these factors, communication with clinicians is always for the benefit of the patient. It is strongly advised to create a fixed flow chart for urine analysis, to conduct in-service trainings continuously, to provide plain information documents containing illustrated instructions for patients, portioning samples before analysis when necessary and to follow quality management requirements and/or accreditation standards without compromise. It is in our hands to contribute to the analytical process by reducing preanalytical errors and thus to make positive contributions to the health of patients.

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PL-09

Evaluation and Interpretation of Results in Amino Acid and Organic Acid Analysis

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Objectives: Amino acid and organic acid analyses are used in the diagnosis and follow-up of metabolic diseases frequently. The amount of data obtained after analytical studies of these tests is large and requires clear evaluations. Additionally, differences in analytical test methods, analytical performance, test contents, and sample types increase evaluation difficulties. The aim is to summarize and share current international approaches, guidelines and clinical laboratory experiences in the interpretation of these test results.

Material and Methods: Information and accumulated clinical laboratory experience in the current guidelines are used.

Results: It is an appropriate approach to divide all the information that should be included in the reports into two separate sections in order to be more clear and understandable. While the interpretation section contains information and comments specific to the patient result and the sample, the explanation section includes the analytical method, analytical performance characteristics, interpretation details, responsibility, contact information, etc. In short, the interpretation part is patient result and sample specific and variable, while the explanation part is a fixed section that should be included in all reports.

Currently, ion chromatography and LC-MS/MS are widely used analytical methods for amino acid analysis in clinical laboratories. Differences in specificity, sensitivity, and amino acid number between these two methods affect the interpretation of results.

In addition to all these factors, qualitative and quantitative assessment options should also be evaluated for organic acid analyses. Information on this subject should be included in the reports.

It is necessary to be able to distinguish "normal" results correctly for an adequate and appropriate interpretation before anything else. It will take a lot of time and will need a lot of "normal" results to gain this experience.

When it comes to interpreting pathological results, increase and / or decrease in amino acids or organic acids, metabolites from alternative reactions and patterns should be included in the assessment. In addition to these, the effects of physiological changes, preanalytical factors, disease specific changes, additional diagnostic test recommendations for differential diagnosis and follow-up requirements should also be the parts of the interpretations.

Pattern evaluation is important for the interpretation of both amino acid and organic acid results. The evaluation of preanalytical factors, physiological conditions and disease-specific patterns will add additional value to the report interpretation. Besides, interpreting different test results of the same patient like amino acids, organic acids, acylcarnitines etc. will give different points of view.

Conclusion: The results should be evaluated and interpreted in amino acid and organic acid analysis, Meanwhile, the analytical method, sample type, preanalytical and physiological factors should be taken into consideration. When it comes to interpreting pathological results, increase and/or decrease in amino acids or organic acids, metabolites from alternative reactions and patterns should be included in the assessment.

ORAL PRESENTATION

OP-01

Determination of Reference Interval of Vitamin B12 Using Laboratory Data

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Objectives: Comparison with reference limits is the main approach in clinical interpretation of laboratory results, except in cases where clinical decision limits exist. It is recommended that laboratories define their own reference range for the analyzed tests so that the results can be reported and interpreted more accurately. In our study, we aimed to calculate reference interval using samples' results accepted to our laboratory as the reference group for Vitamin B12.

Materials and Methods: The study was designed according to the CLSI EP28-A3C guideline. Vitamin B12 test results, which were performed in the laboratory between November 1, 2020 and February 28, 2021, were obtained through the laboratory information system. Samples were analyzed in Roche Cobas 6000 e601 device using the electrochemiluminescence immunoassay method. The manufacturer specifies the common reference range as 197-771 pg/ml. Since the instrument and kit's analytical range is 30-2000 pg/ml, the data between these values were included in the calculation. Besides, the data of people between the ages of 1-70 were used in the study. While calculating the reference values, it is aimed to obtain a general value according to all data and also values according to gender. The compliance of all groups to the normal distribution was evaluated using the Kolmogorov-Smirnov test. Reed method was used to extract outliers. Since the data obtained did not comply with the normal distribution ($p<0.001$), 2.5 and 97.5 percentiles were obtained by the non-parametric method. In calculating the lower and upper reference values, the formulas $r^1=0.025$ (n+1), $r^2=0.975$ (n+1) were used for 2.5 and 97.5 percentiles, respectively. The difference between the genders was evaluated using the Mann-Whitney U test, and the statistical significance was accepted as $p<0.05$. Statistical analysis was performed via MedCalc 19.1.4.

Results: A total of 14915 patient data were obtained. As a result of exclusion, calculations were made over 13263 data. No outlier was found according to the Reed method. The reference value calculated according to all data was found to be 143 - 806 pg/ml. There was no statistically significant difference between the genders due to the Mann-Whitney U test ($p>0.05$).

Conclusion: Since the reference range calculated by the indirect method is not found different according to gender, it has been seen that the general reference value could be used for both genders. Also, it has been shown that the reference interval suggested by the manufacturer is not suitable for our laboratory. Reference value studies for each test could be difficult to perform with healthy volunteers. For this reason, it is thought that determining the laboratory-specific reference range by data mining for the tests being studied could strengthen both laboratory and patient safety.

OP-02

Evaluation of The COVID-19 Pandemic Effect on Pre-Analytical Stage with Sigma Metric

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Objectives: We aimed to determine the preanalytical error sources and frequency. Besides, evaluating the effect of the pandemic on preanalytical process with six sigma and Pareto analyzes.

Materials and Methods: This retrospective study was carried out from March/April/May 2019 and March/April/May 2020 by three-month intervals in Fikret Biyal Medical Biochemistry Laboratory of Istanbul University-Cerrahpasa. These samples were retrospectively examined and compared with each other in categories of clotted, hemolyzed, lipemic, gelled, diluted, sample taken below/above the mark line, sample taken in wrong/broken tube, improper test prompt, barcode error, insufficient sample. Sigma value was calculated by determining the total number of errors, the Pareto graph was drawn, and statistical analysis was performed.

Results: March/April/May 2019 rejection rates were found as 0.45/0.47/0.59 total sigma levels 4.2/4.3/4.1 respectively. March/April/May 2020 rejection rates were found as 0.85/1.1/1.06 total sigma levels 3,9/3,8/3,9 respectively. The rejection rates for 2020 increased statistically significant compared to 2019 ($p<0.05$). Emergency laboratory rejection rates were calculated as following: March (0.93%), April (0.63%), May (0.99%) for 2019; March (1.4%), April (1.3%), May (1.18%) for 2020 respectively. Rejection rates of emergency laboratory in 2020 increased statistically significant compared to 2019 ($p=0.02$). As the central and emergency laboratories were compared, we found that 65.78% of rejected samples in 2019 and 91.37% in 2020 belonged to emergency laboratory. Blood gas test was found to be the most rejected test group between the rejected samples at the emergency laboratory in 2019 and 2020 during three-month period. No statistically significant differences were found between 2019 and 2020 when comparing the percentages of emergency laboratory sample rejection causes. When the central and emergency laboratory were evaluated together, the reasons for rejection in the three-month period of 2019 and 2020 were the clotted sample, then the sample below/above the mark line and the insufficient sample, respectively by order.

Conclusion: The process of controlling Covid-19 pandemic has once again demonstrated the key role of the clinical laboratory in the stages of diagnosis, treatment and follow-up. In this context, analyzing the preanalytical process, identifying the sources of errors and taking considerations has become even more essential. In our study, it was found that central and emergency total rejection rates increased during the pandemic period, while the causes of rejection did not change. It was found that the distribution of rejected samples increased in favor of the emergency laboratory during the pandemic period. Due to the pandemic, it was thought that these were related to the appointment of staff outside their departments, the frequency of shifts and the change of employees in the blood collection unit, the closure of outpatient clinics and the increase in patient applications to the hospital, especially the emergency department. In addition, the work of frequently changing and inexperienced new staff, especially in the emergency department, can also increase the frequency of preanalytical errors in this unit.

OP-03

Evaluation of Substance use Habits in Karadeniz Eregli

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Objectives: Substance abuse give rise to very important problems effecting the population. A total struggle is needed to solve the problem of substance abuse that comprises all segments of the society. Early diagnosis and effective intervention play an important role in determining substance use disorder [1]. However, less than half of the patients are diagnosed and directed to treatment at a low rate. Drug of Abuse testing has an important role to provide this struggle. Different measurements techniques using different sample matrices are available with advantages and disadvantages [2, 3]. The most common technique is based on enzyme immunoassay, which is a fast, easy-to-perform and screening technique, but may lack specificity resulting from cross-reactivity with other compounds [4, 5]. This study aims to evaluate substance use habits in individuals diagnosed with substance use disorder in Karadeniz Ereğli district.

Material and Methods: 205 patients who were admitted to the emergency service of the Karadeniz Ereğli State Hospital between 2020 and 2021 and who were suspected of having a diagnosis of substance use disorder were included in this study. The files of the patients were recorded retrospectively. All participants' results obtained with urine immunoassay screening test (parameters; cocaine, opiate, cannabis, amphetamine and benzodiazepine, MDMA and methamphetamine) were evaluated.

Results: The substances identified in the study were amphetamine (64), cannabis (54), MDMA (17), methamphetamine (15), opiates (3), benzodiazepines (2) and cocaine (0), respectively. 35 patients have used 2 or more substances. The age range of the female patients is between 19 and 65 (n=14), and the males are between 18 and 65 (n=191). The substance screening test results of 101 patients were found to be negative. 165 patients were under 40 years old.

Conclusion: Screening tests have a significant role in the diagnosis of substance use disorders. It was reported that cannabis is the most commonly abused illicit substance [6]. It was determined that amphetamine is mostly abused substance and the cannabis is second in Ereğli in the present study. It was found that substance abuse is more common in men in the Ereğli. Substance use disorder is more common, especially in individuals under the age of 40. The increased number of drug screening is recommended in suspected cases in order to combat drugs and reduce substance use among young people. It might be ensured that important steps are taken in the fight against drugs by determining the substance use habits in Ereğli with this study.

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OP-04

Comparison of Spermiograms of Men Presenting Due to Infertility Before and During the COVID-19 Pandemic

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Objectives: Following the rapid global spread of the novel coronavirus SARS-CoV-2, the World Health Organization declared COVID-19 a pandemic on March 11, 2020. Over the intervening year, there has been interest in the impact of both SARS-CoV-2 infection and pandemic-induced social restrictions on male reproductive health. This study aimed to evaluate the spermiogram values of men who presented to a urology clinic due to infertility during the pandemic and compare the results with those in the previous two years.

Materials and Methods: Patients who presented to the urology outpatient clinic of Medical Park Antalya Hospital Complex for the first time due to infertility were included. The patients' age, semen volume, and spermiogram results were recorded. The patients were divided by presentation date into pre-pandemic group 1 (March 2018 - February 2019), pre-pandemic group 2 (March 2019 - February 2020), and the pandemic group (March 2020 - February 2021) for comparison.

Results: A total of 594 patients were included in the study. There was no significant difference between the three groups in terms of the number of patients who presented (207, 190, and 197 patients, respectively; p=0.691). The mean age was 36.6±7.2 in pre-pandemic group 1, 35.5±7.1 in pre-pandemic group 2, and 33.1±6.3 in the pandemic group. Patients who presented during the pandemic were significantly younger (p<0.001). There was no difference in semen volume among the groups (p=0.910). Analysis of spermiogram results revealed no significant differences in normospermia and pathological spermiogram rates by year (p=0.222).

Conclusion: In the first year of the COVID-19 pandemic, there was no significant difference in the number of men who presented for infertility or in their spermiogram results compared to 2018 and 2019. However, it is noteworthy that the patients were significantly younger during the pandemic than in the previous two years.

OP-05

Levels of Zinc, Copper, and Iron Minerals, Which Have Important Roles in Immune System in COVID-19 Patients

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Objectives: It is the discussion of whether these minerals can be used in the treatment or prophylaxis of the disease as a result of examining the levels of zinc (Zn), copper (Cu), and iron (Fe) minerals involved in the regulation of the immune response in COVID-19 patients.

Material and Methods: A total of 100 participants, 50 females and 50 males, who were admitted to Dr. Rıdvan Ege Hospital, Faculty of Medicine, Ufuk University and diagnosed with COVID-19 with rRT-PCR test result, were included in the study. The zinc levels of the patients were measured in the ImproGen brand kit; copper, and iron levels were measured in the Abbott Architect c8000 Chemistry System brand-model device with the Abbott brand kit. Reference ranges given in the original package inserts of the reagents were used to evaluate the test results.

Results: Zn levels were low in 67%, Cu levels were low in 23%, and Fe levels were low in 62% of all participants. The rate of participants with normal levels in all three parameters was determined as 17% whereas the rate of patients with low levels of all three parameters was determined as 11%. It was observed that 5% of the participants had low Zn-Cu levels, 39% had low Zn-Fe levels, and 1% had low Cu-Fe levels whereas 7% had low Zn levels only, 6% Fe levels only, and 6% Fe levels only. It was observed that there was a moderate correlation between Zn and Fe levels ($r=0.528$, $p<0.001$) whereas there was no correlation between Zn and Cu ($r=0.038$, $p=0.333$) and Cu and Fe ($r=0.070$, $p=0.487$) levels when the correlations between the variables were evaluated by Spearman's Rho correlation analysis.

Conclusion: Significant low rates of Zn and Fe levels in these patients and a moderate correlation was found between these two test levels as a result of our study on Zn, Cu, and Fe levels, which are known to play an important role in immune modulation in patients diagnosed with COVID-19. Recent studies have shown that patients experience the disease more severely and the need for intensive care increases in the absence of these minerals. Therefore, Zn, which is known to inhibit the replication of various RNA viruses such as SARS-CoV-2, is recommended as oral supplements to stop the burden of COVID-19. In addition, it has been shown that the levels of inflammatory markers such as IL-6 and CRP increase in anemic patients, they experience COVID-19 more severely, and their hospital stay is prolonged. Ensuring the balance of Fe, which is known to increase antioxidant activity as well as proliferation and differentiation of T lymphocytes, is predicted to reduce the severity of the disease and the incidence of complications in COVID-19 patients. However, it should be kept in mind that increased iron load is increasingly blamed in the pathogenesis of COVID-19 due to inflammation, hypercoagulation, and immune dysfunction. For this reason, excessive Fe load should be avoided when trying to correct the anemia table and provide systemic Fe homeostasis.

OP-06

Evaluation of the Analytical Performance of Tests run on the Same Brand Devices with six Sigma Metrics

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Objectives: Whether the analytical tests are of the desired quality and the numerical value of the quality can be determined with six sigma. Six Sigma metrics are used to evaluate the method quality of the tests presented to laboratories, to compare method performance between devices, and to review quality control procedures. The aim of this study is that evaluate the analytical performance with six sigma metrics between the same brand devices actively working in the laboratory and answer the question of which tests will be performed on these devices according to the laboratory test working rates.

Material and Methods: In the research, all tests were studied on Abbott brand, Architect c8000, and Architect ci4000 model devices for 6 months. Glucose (Glc), blood urea nitrogen (BUN), creatinine (CREA), aspartate aminotransferase (AST), total cholesterol (CHOL), triglycerides (Tg), sodium (Na), potassium (K), chlorine (Cl) parameters were evaluated in the sigma values were calculated according to the performance approach. The comparisons were made between devices. Total allowable error (TEa) is derived from the Clinical Laboratories Improvement Act (CLIA) guidelines. Bias was determined based on proficiency test data. The coefficient of variation (CV) for biochemical analytes was obtained from the IQC records of our laboratory. Sigma metrics were calculated according to the formula (SM)=(TEa-% Bias)/CV%.

Results: In the comparative follow-up performed for 6 months, the determination of the parameters to be worked on which device on monthly basis varied. Since the sigma values of the glucose, urea and creatinine tests, which are the most studied in our laboratory, are lower in the Architect ci4000 device than the Architect c8000 device. It was decided to run these tests only on the Architect c8000 device. All metrics have been obtained as of October 2019. An increase in the sigma value was detected with the start of working of electrolytes on a single device six months later.

Conclusion: Six sigma metrics should be used monthly to monitor tests with particularly low biological variation to evaluate the method performance of same-brand devices which is used for thousands of tests.

OP-07

Case Report: Warm Type Autoimmune Hemolytic Anemia with Reticulocytopenia

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Objectives: Autoimmune Hemolytic Anemia (AIHA) is a disease characterized by autoantibodies against erythrocyte antigens causing hemolysis of erythrocytes and anemia. In warm type AIHA which is a subtype of AIHA there are Ig G autoantibodies against erythrocyte antigens. Since these antibodies are active at 37°C, it is called Warm Type AIHA. The main tests in the examination of hemolysis are complete blood count, peripheral blood smear, determining of LDH, bilirubin and haptoglobin levels and evaluating hemoglobinuria. One of the most significant findings of hemolysis is reticulocytosis. In this case, we aimed to show that a 46-year-old male patient may have AIHA with reticulocytopenia.

Materials and Methods: A 46-year-old male patient with coronary artery disease, hypertension, DM and chronic kidney disease was admitted to the emergency room with subarachnoid hemorrhage one month ago. After cranial surgery although the patient's clinical condition was stable, his hemoglobin (Hb) levels began to decrease. After excluding the bleeding focus with computed tomography and ultrasonography, the patient was transferred to the internal medicine service to find the cause of the persistent anemia. Routine biochemistry and hormone tests, CBC haptoglobin tests were performed. Peripheral smear was examined. Autoantibodies and serological tests were performed. The reticulocyte count was measured by the fluorescent-dyed light scattering method in the Mindray BC-6800 device of the blood taken into the EDTA tube.

Results: Hb level was 10-11 g/dl at the first admission to the hospital and started to decrease to 7.3 g/dL after the 20th day of the patient's hospitalization. After the administration of 2 units of erythrocyte suspension to

the patient, hb level increased to 9.8 g/dl. During a few days of follow-up, hb level regressed to 7.7 mg/dl again. Other parameters are as follows, MCV 84 fl, Rbc 2.46x10^{12}/L (reference range: 4-6.2×10^{12}/L), reticulocyte 4.5×10^{9}/L (reference range: 50–100x10^{9}/L), LDH 1105 U/L, haptoglobin<8 mg/dL (reference range: 50-220 mg/dL), direct coombs test positive (IgG 4+), bilirubin levels were within reference range. In the peripheral smear, anisocytosis and spherocytes were observed in the erythrocyte series. During his hospital stay, the patient continued to have significant hemolysis and reticulocytopenia, requiring 6 units of erythrocyte suspension. Vitamin B12 and folic acid levels, thyroid and liver function tests were normal. Serological tests for mycoplasma pneumonia, human immunodeficiency virus, hepatitis C virus, parvovirus B19, toxoplasma, Epstein-Barr virus, cytomegalovirus were normal. Computed tomography of the skull, chest, abdomen and pelvis excluded neoplasia. Since the patient had low haptoglobin, increased LDH and reticulocytopenia, bone marrow examination was performed to distinguish pure red cell aplasia from AIHA. Mildly hypercellular, erythroid series in the bone marrow; slightly increased colonization and maturation was observed. With all these findings it was thought that the patient might have warm type AIHA. Steroid therapy was initiated and the Hb level was increased to 10 mg/dl without transfusion during the patient's follow-up.

Conclusion: Reticulocytosis is often expected as a laboratory finding in AIHA, but it should be kept in mind that patients with reticulocytopenia count may also have AIHA.

OP-08

Uncertainty of Measurement for Thyroid Function Tests

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Objectives: The accuracy of the test result is affected by many factors. The existence of various factors affecting the measurement prevents the result of the measurement from being an exact single number. Factors in all steps leading up to the reporting of the result cause uncertainty in the measurement. Therefore, when the total uncertainty of measurement are calculated the factors that contribute the least to the uncertainty are excluded while the factors that contribute the most to the uncertainty are corrected. By this way, the uncertainty of measurement can be calculated for each test. In this study, it was aimed to determine the uncertainty of measurement for thyroid stimulating hormone (TSH), free T3 (fT3) and free T4 (fT4) hormones and to inform the clinicians about the uncertainty of measurement.

Materials and Methods: The uncertainty of measurement for thyroid function tests was calculated in accordance with the European Accreditation Guideline and European Technical Report that were defined in the Nordest guideline and the ISO/TS 21748 standard.

Results: The uncertainty of measurements (%) for thyroid function tests with 95% confidence interval were calculated as TSH±9.34, fT3±14.14, fT4±14.78 in DXI-800/605752 instrument; TSH±9.33, fT3±11.70, fT4±11.95 in DXI-800/603398 instrument; TSH±9.40, fT3±12.05, fT4±12.07 in DXI-800/603205 instrument; TSH±9.54, fT3±12.38, fT4±14.12 in DXI-800/603678 instrument, respectively. These results calculated in our laboratory were found to be lower than the total allowable error value (15%) determined by Clinical Laboratory Implementation Amendments (CLIA 88).

Conclusion: This study will guide clinicians on the diagnosis with examination findings especially when the measurement results are close to reference intervals for thyroid function tests. Also, indicating the uncertainty of measurement with the test results will give additional information about the quality of the measurement.

OP-09

Sigmametric Assessment of Rejected Sample Rates in Medical Biochemistry Laboratory and the Effect of Training for Hospital Personnel on Sigma Values

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Objectives: More than 70% of medical laboratory errors occur in the pre-analytical phase. Analysis and recording of errors are necessary for the evaluation and prevention of errors. This study aimed to evaluate the pre-analytical process performance with the six sigma method and investigate the impact of hospital staff training on sigma.

Material and Methods: The total number of samples and rejected samples were obtained retrospectively from Hospital Information Management System (HIMS) in Ordu University Training and Research Hospital Medical Biochemistry Laboratory between March 2020-March 2021. Data analyzed according to the reasons and sigma values were also calculated as monthly.

Results: The 372876 samples were accepted from our laboratory in twelve months' time interval and 2673 of them were also rejected. The process sigma level was calculated as 4.0 for twelve months. While the sigma value for the ten months before education was 4 it was calculated as 4.1 for the two months after the training. The results of Pareto analysis revealed that the most common causes of rejection were clotted (38.38 %), hemolyzed (29.33%), and insufficient of samples (15.82 %), respectively.

Conclusion: It was determined that most of the errors in the preanalytical stage were caused by mistakes in the blood collection process. The observation of Sigma values is useful for evaluating the preanalytical phase. The improvement observed in the sigma value after the training to the hospital staff reveals the importance of training to elimination of preanalytical errors.

OP-10

Hemolysis Problem in Emergency Departments

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Objectives: The hemolysis rate is most often seen in blood samples sent from the emergency department compared to all samples accepted to the laboratory. Tests affected by hemolysis are not analyzed and a new blood sample is requested. The delay in laboratory results causes dissatisfaction both in patients and health professionals. In this study, it was planned to hold a meeting with emergency nurses to share information about hemolysis and preanalytical errors to prevent discussions and provide better health care. It is aimed to determine the effect of the meeting by conducting a survey before and after the meeting.

Material and Methods: A presentation was made to 22 emergency department nurses in a training meeting. Ten questions related with these subjects were prepared and 22 nurses were asked to answer them before and after the presentation. The data related to the answers to the questions were evaluated according to the numbers and ratios. Besides, the statistics of hemolyzed specimens were taken from the hospital's information system.

Results: When the answers before and after the questionnaire were compared, it was seen that the percentage of correct answers increased con-

siderably on the issues of what hemolysis is, its causes, and what can be done to prevent it.

Conclusion: It is thought that, an awareness was created about hemolysis in nurses responsible for blood collection in emergency department. It is very important to give information about hemolysis, which is a problem that slows the patient circulation in the emergency room. Similar interactions with clinical departments will help to understand the role of Medical Biochemists in delivering accurate test results.

OP-11

2-Methylbutyrylglycinuria: Case Report

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Objectives: 2-methylbutyrylglycine(2 MBG) is an intermediate product in isoleucine metabolism. In 2-methylbutyryl CoA dehydrogenase deficiency, urinary excretion of 2-methylbutyrylglycine increases. It is caused by the SBCADD(Short/branched chain acyl-CoA dehydrogenase) gene defect. Most cases of SBCAD deficiency are detected by neonatal screening shortly after birth. Malnutrition, lethargy, vomiting and neurological signs such as difficulty walking, loss of balance, inability to hold the neck are usually the first symptoms of 2-Methylbutyryl glycinuria. Prevalence of the 2-methylbutyryl CoA dehydrogenase deficiency is less than one in a million.

Material and Methods: A one year old male patient was brought by his family to the pediatric metabolism department of Bakırköy Training and Research Hospital with complaints of fever, loss of balance and inability to hold his neck. Anamnesis of patient was taken. Neurological examination of the patient was performed, and the patient's findings were evaluated for metabolic diseases. In the patients anamnesis, it was learned that his parents were 1st degree relatives. The patients brother was healthy. Diagnosis of encephalitis is ruled out. Organic acid analysis, quantitative serum amino acid analysis, lactate and routine biochemistry tests were requested from the patient.

Results: Patient's serum amino acid profile was found to be normal. Serum lactate value was found to be slightly high (26.3 mg/dl) (n<19.8). Patient's urine 2-methylbutyrylglycine (56.4 mmol/mol creatinine) high in organic acid analysis was determined. It was considered that the patient may have 2-methylbutyrylglycinuria and it was recommended that a genetic analysis test be performed. 2-methylbutyrylglycinuria was diagnosed with SBCAD gene mutation as a result of genetic analysis. The patient was given a diet of 1 gram of protein per kilogram and 1.6 grams of essential amino acid per kilogram by a child metabolism specialist. The patient was followed by periodic examinations. At the last control patient was 3 years old and 2-MBG value down to 27.4 mmol/mol creatinine. His seizures disappear and his gait was seen to be improved. The understands what's being said but can't speak. Clinical findings and laboratory values of the patient are monitored monthly.

Conclusion: SBCAD gene defect presents usually as a benign condition. Most patients are now diagnosed through newborn screening by tandem mass spectrometry. Metabolism laboratory and metabolism clinic cooperation is very important in diagnosing and monitoring rare metabolic diseases.

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OP-12

Comparison of Protein Precipitation Agent for an Effective Liquid Chromatographic Analysis

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Objectives: Liquid chromatographic techniques are considered as fast, selective and sensitive methods for analysis of biological matrixes such as plasma and serum. Sample preparation is most critical step in the analysis affecting quality of analytical data [1]. One of the purposes of sample preparation is to remove potential interferences in the biological matrix like proteins, salts or lipids. Among these interferences, proteins that present in a large amount in plasma or serum can be irreversibly adsorbed onto the chromatographic column, which causes the disruption of separation [2]. A common procedure to remove proteins in biological samples by protein precipitation (PP) is adding a reagent (organic solvent, acids or salts).In this study, three different PP protocols for Acetonitrile (ACN), Trichloroacetic Acid (TCA) and Ammonium Sulphate with different volumes and concentration for removing proteins to biological matrix were investigated [3-5].

Materials and Methods: Following protein precipitation solutions were prepared: Aqueous trichloroacetic acid (TCA) and ammonium sulphate with different ratios (w/v) 10%, 20% and 30% respectively. In this study, serum pool was prepared from the waste serum samples of the patients who applied to Gülhane Training and Research Hospital Medical Biochemistry Clinic. Total protein measurement was performed with Beckman Coulter 5800 autoanalyzer. First, the total protein level of the unprocessed serum sample was measured and recorded. Then, 1: 1, 1:1.5 and 1: 2 ratios of acetonitrile and 10%, 20%, 30% (w/v) concentrations and 1: 1, 1:2 ratios of trichloroacetic acid and ammonium sulfate were added to 1 mL of serum samples, respectively. All samples were vortexed for 1 minute and centrifuged at 1990 rpm for 10 minutes. Then, the supernatants were separated, and total protein levels were determined in the autoanalyzer.

Results: Total protein level of unprocessed serum was measured as 7.5 g/dL. Total protein level was recorded as 0.0 g/dL in all serum samples treated with acetonitrile and TCA. While the total protein level was measured as 3.8 g/dL in serum samples treated with ammonium sulfate in all concentrations at 1: 1 ratio, the total protein level in 10% and 20% solutions added at 1:2 ratio was measured as 2.6 g/dL and 30% solution added at the ratio of 1:2 was measured as 2.1 g/dL.

Conclusion: In this study three PP techniques of ACN, TCA and ammonium sulphate using different concentrations and ratios were evaluated for analysis of total protein level in serum. Among three techniques; while ACN and TCA completely precipitated serum proteins, ammonium sulphate partially precipitated. For this reason, according to this study the use of ACN and TCA as protein precipitators will show that more effective results in liquid chromatographic analysis.

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OP-13

Evaluation of Measurement Uncertainty for LDH Test

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Objectives: Measurement uncertainty defined in the International Vocabulary of Metrology (VIM) as "a parameter characterizing the dispersion of the quantity values being attributed to a measurand" and is reported together with the measurement result. In other words, it is a quantitative indicator of the quality of the work [1]. It is recommended that measurement uncertainty should be lower than the allowable total error (TEa), an estimated upper limit of error taken into account with random and systematic error components. If the total error of a measurement system is less than the TEa, the analytical method performance is acceptable [2]. Currently, various biomarkers are under investigation for their role in determining the prognosis of patients with COVID-19. Lactate dehydrogenase (LDH) is an investigated biomarker, mainly since high levels of LDH associated with worse outcomes in patients with other viral infections in the past [3-5]. A meta-analysis has confirmed that LDH levels can be used as a COVID-19 severity marker and predict survival [6]. This study aims to calculate the measurement uncertainty for LDH according to the Nordtest technical report 537 [7], which intended to provide a common, understandable and practical application in measurement uncertainty calculation and comparing these calculated values with CLIA 2019 TEa% [8] values.

Material and Methods: This study was performed in the Central Laboratory of Karacabey State Hospital. The measurement uncertainty for LDH was determined with the calculation model defined in the Nordtest guide consisting of 6 steps using the LDH kit (Cobas c 501 autoanalyzers, Roche Diagnostics, Tokyo, Japan). Internal (IQC) and external quality control (EQC) data were recorded from March to August 2020.

Results: Using IQC samples, the coefficient of variation (CV%) values were calculated. For two levels of IQC, CV1=1.42, CV2=1.37, and u(Rw)=0.99 were found. In the calculation of the standard u(bias) component of uncertainty from EQC data, the square root of the average of different bias values (RMSbias) and u(Cref) values was used. RMSbias calculated as 1.8 and u(Cref) found 0.38. All uncertainty components were converted to the standard uncertainty value (u(bias)) and determined as 1.84. The combined uncertainty value calculated using standard uncertainty components was found as uc=2.09. The expanded uncertainty value (U) was obtained by multiplying the combined uncertainty value by the coverage factor (k). In most cases, k=2, providing a level of confidence of approximately 95%. In our study, the measurement uncertainty for LDH was calculated as 4.18% and found below the CLIA 2019 TEa value of 15.

Conclusion: Knowing measurement uncertainty, a specialist in laboratory medicine can accurately evaluate the measurement result and ensure reliable patient care and safety [9]. This practice provides that results are clear and understandable, facilitating the decision-making process for physicians, especially when results are close to defined cut-off points for clinical decision-making. Reporting test results without analytical uncertainty increase diagnostic uncertainty and lead to errors that can seriously affect patient health.

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OP-14

Determination of Analytical Performance in Clinical Biochemistry Laboratory with 6 Sigma Methodology

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Objectives: Six sigma methodology provides a quality system that offers many useful tools for managing quality and measuring performance in medical laboratories. In this study, it was aimed to evaluate the analytical performance of 15 biochemistry test parameters with six sigma methodology and to propose solutions for test parameters with low performance.

Material and Methods: The study was conducted in the clinical chemistry laboratory of Yerkoy State Hospital. The six-months data of internal and external quality control were retrospectively reviewed for the parameters: Albumin, Glucose, Chloride, Creatinine, Lactate dehydrogenase (LDH), Sodium, Total protein, Urea, Alkaline phosphatase (ALP), Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), High density

lipoprotein-cholesterol (HDL-C), Total cholesterol and Triglycerides. External quality control data were used in the calculation of bias and internal quality control data was used in the coefficient of variation (CV%) calculation. Sigma metrics for each analyte were calculated over the Total allowable error (TEa) ratios determined by the CLIA and Turkey Analytical standardization and blending committee with the formula of Sigma=(TEa- Deviation%)/% CV, separately for Level 1 (low level) and Level 2 (high level) control levels. Sigma <3 was considered as low performance.

Results: When the Sigma values for Level 1 and Level 2 control levels were calculated over the National TEa ratios, none of the test parameters had insufficient performance (sigma <3). Both control levels of Alkaline phosphatase and Level 2 controls for HDL-C and Urea performed high performance (sigma ≥6). When CLIA criteria are used in the calculation, it was observed that sigma values of both two levels of quality control materials for Glucose, Chloride, Creatinine, Sodium and Total protein parameters and Level 2 quality control material for Albumin, LDH and Urea parameters were below 3. Sigma value for HDL-C Level 2 was more than 6.

Conclusion: According to the results, it was concluded that the use of National TEa ratios is more suitable for our laboratory, and it may be beneficial to follow more strict quality control rules for test parameters with low performance.

OP-15

Maple Syrup Urine Disease: Case Report

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Objectives: Maple syrup urine disease (MSUD) is an inborn error of metabolism caused by the deficiency of the branched-chain ketoacid dehydrogenase (BCKDH) complex. The BCKDH complex is involved in the metabolism of the branched-chain amino acids (BCAA): isoleucine (Ile), leucine (Leu), and valine (Val). MSUD can be divided into 5 phenotypes: classic, intermediate, intermittent, thiamine-responsive, and dihydrolipoyl dehydrogenase (E3)-deficient, depending on the clinical presentation and response to thiamin administration. Classic MSUD, the most common and most severe form, presents in the neonate with feeding intolerance, failure to thrive, vomiting, lethargy, and maple syrup odor to urine and cerumen. If untreated, it progresses to irreversible mental retardation, hyperactivity, failure to thrive, seizures, coma, cerebral edema, and possibly death. Maple syrup urine disease affects an estimated 1 in 185.000 infants worldwide. The disorder occurs much more frequently in the Old Order Mennonite population, with an estimated incidence of about 1 in 380 newborns.

Material and Methods: A 10 days-old male infant was born at term after an uneventful pregnancy and a normal vaginal delivery. The patient presented with slight irritability and poor feeding in the second week of life. The patient was thereafter admitted to our hospital where he exhibited irritability, hypotonicity, high-pitched cry, and sleepiness. On physical examination, he was found to be normothermic, normotensive but tachypneic and had reduced deep tendon reflexes. The patient's skin was dry and the skin turgor pressure decreased. Organic acid analysis, quantitative serum amino acid analysis, lactate, routine biochemistry tests and abdominal ultrasound were requested from the patient.

Results: Laboratory testing revealed metabolic acidosis (serum HCO_3=13 mmol/L), ketosis (urine ketones >80 mg/dL), and mild hyperammonemia. The patient had seizures during observation. Antiepileptic treatment was started during hospitalization. Abdominal ultrasound of the patient showed no abnormalities. The patient's blood serum amino acid test showed a elevated levels of isoleucine, leucine, and valine. The patient was administered with a low-protein, BCAA restricted diet, was given hemodialysis treatment. The diagnosis of MSUD is confirmed by identification of biallelic pathogenic variants in BCKDHA, BCKDHB, or DBT.

Conclusion: MSUD is a rare autosomal-recessive disorder of BCAA metabolism. Onset of clinical symptoms and protein levels in the blood and urine may vary depending on the amount of protein in the feeding regimen. Treatment of MSUD aims to normalize the concentration of BCAA by dietary restriction of these amino acids. Because BCAA belong to the essential amino acids, the dietary treatment requires frequent adjustment, which is accomplished by regular determination of BCAA and allo-isoleucine concentrations. Orthotopic liver transplantation has been used with success and is an effective therapy for MSUD. Clinical and laboratory sciences are of great importance in diagnosing patients with maple syrup urinary disease and starting early treatment.

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OP-16

Effects of Trace Elements on Hypertension

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Objectives: Hypertension has a high prevalence worldwide. Some of the hypertension complications like intracerebral hemorrhage, chronic kidney disease, heart failure, and ischemic stroke endanger public health. Well-known risk factors of hypertension are age, obesity, high sodium diet, alcohol consumption, physical inactivity. Secondary factors such as drugs, Cushing syndrome, and primer hyperaldosteronism can also lead to hypertension. The present study aimed to investigate whether trace elements measured in blood or urine are a risk factor in developing hypertension.

Material and Methods: The National Health and Nutrition Examination Survey (NHANES) data set comprised of 1572 concomitant trace element results, body mass index, blood pressure, and demographical information obtained from the Centers for Disease Control and Prevention. The logistic regression analysis was performed to investigate possible risk factors for hypertension.

Results: Blood lead concentration was higher in hypertensive patients than those with normal blood pressure (median: 0.058 vs. 0.043, p<0.001). The predictor variable blood lead and urine thallium levels in the logistic regression analysis contributed to the model. The un-

standardized Beta weight for the constant was B=-3.59, SE=0.596, Wald=36.3, p<0.001. The unstandardized Beta weight of the blood lead concentration and urine thallium level were B=5.83 (Wald=28.7, p<0.001) and B=-1.49, (Wald=5.43, p=0.02), respectively. The estimated odds ratio favored an increase of 341 fold for hypertension every one µmol/L (OR: 341, CI:40-2882) of blood lead concentration and a decrease of 78% for hypertension every one µg/L (OR: 1.64, CI 1.22-2.21) of urine thallium level.

Conclusion: The toxic element, thallium, reduced the risk of hypertension, probably due to its hypotensive effects. While evaluating the etiology of hypertension, it should be kept in mind that lead exposure, as shown in the present study, is a significant risk factor (OR: 341) for hypertension.

OP-17

The Relationship Between Serum Uric Acid and C-Reactive Protein, Total Oxidant Status, Total Antioxidant Status, and Oxidative Stress Index in Coronary Artery Disease

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Objectives: It is known that endothelial dysfunction, oxidative stress, free radical, and thrombus formation may develop more quickly at the increased uric acid levels, which is the final product of purine metabolism. As a result of all these, atherosclerosis was observed more frequently (1, 2). Since these factors are known to play a crucial role in the development of coronary artery disease (CAD), we aimed to investigate the relationship between serum uric acid levels and C-reactive protein (CRP), total antioxidant status (TAS), total oxidant status (TOS), oxidative stress index (OSI) in patients with and without CAD.

Materials and Methods: The patients who applied to the cardiology outpatient clinic between April 2017 and October 2017 were retrospective. Patients with active infection, chronic obstructive pulmonary disease, congestive heart failure, malignancy history, hematological disease, and moderate to severe valvular disease were excluded from the study. The uric acid, CRP, TAS, TOS values of the patients were recorded.OSI was calculated from formula TOS/TASX100. IBM SPSS Statistics 21.0 program was used for statistical analysis. P<0.05 was considered statistically significant.

Results: CAD was detected in 16 patients, CAD was not detected in 14 patients. The average age of patients with CAD was 62.60 ± 8.39, in patients without CAD were found to be 57.87±8.30 years. While BMI was 31.63±3.68 in the group with CAD, it was 34.03±4.19 in the group without CAD. The uric acid level was found 4.70±1.28 mg/dl in the group with CAD, 4.83±1.40 mg/dl in the group without CAD. While CRP was found 4.53±5.14 mg/dl in the CAD group, it was found to be 3.31±3.74 mg/dl in the group without CAD. While TAS was found 0.78±0.15 in the CAD group, it was found to be 0.77±0.16 in the group without CAD. While TOS was found 11.23±2.56 in the group with CAD, it was 9.83±1.30 in the group without CAD. While OSI was found 1443.56±239.89 in the group with CAD, it was found to be1334.36±474.9 in the group without CAD. However, in the correlation analysis, no significant relationship was found between serum uric acid levels and CRP and oxidative stress parameters (p>0.05).

Conclusion: In our study, no relation of uric acid, also known as an antioxidant, with CRP, TAS, TOS, OSI was found in patients with and without CAD. Our findings need to be supported by more extensive studies.

OP-18

Evaluation of Neutrophil-Lymphocyte Ratio and Platelet-Lymphocyte Ratio Values According to Vitamin D Levels

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Objectives: Vitamin D deficiency is one of the most widespread and prominent public health problems [1]. The vitamin D receptor (VDR) and enzymes involved in the metabolism of vitamin D are expressed in the reproductive tissues of women [2]. Infertility is estimated to affect about 10% to 15% of couples in the reproductive-aged population worldwide. Infertility is defined as a failure in achieving a successful conception after at least one year of regular unprotected intercourse [3]. In the late 1997s and early 2001s research findings demonstrated that vitamin D has the potential significant role in human reproductive processes. Recent studies have shown that vitamin D deficiency had decreased the possibility of fertility [4]. The researchers represented that calcitriol significantly reduced interleukin (IL)-1β and TNF-α-induced inflammatory responses, mediated by IL-8 expression and prostaglandin activity, and inhibited viable ESCs numbers [5]. Thus, vitamin D deficiency may play a role in increasing the risk of developing infertility. Also, the regulation of the immune system is performed via the 1,25(OH)2D3. Therefore, the inflammation and proliferation in endometriotic cells might be modulated through vitamin D. Routine whole blood counts used in the hospital show the presence of infection and inflammation. The neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) determined depending on hemogram documentation in patients could be used to assess systemic inflammation [6]. On the other hand, in the body, a decrease in serum vitamin D level may worsen the clinical results of patients with infertility and an increase in serum vitamin D level may improve clinical outcomes in those patients (Alipio 2020) The purpose of this study is to investigate the relationship between neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) with vitamin D levels in infertile women.

Material and Methods: A total of 192 women with diagnosed infertility were examined retrospectively between 2015 and 2020 from Gaziantep University Sahinbey Hospital database. The ages of participants with diagnosed infertility were between 18-45. The results of 25(OH)D levels were evaluated simultaneously at the same time with CBC values. The normal ranges of CBC values were accepted as following that: lymphocyte (normal values: 1000-4800/mm^3), platelet (normal values:150.000-450.000/mm^3) and neutrophil (normal values:1500-8000/mm^3).

The inflammatory markers were neutrophils, platelets, lymphocytes, NLR and PLR. The complete blood cell counts were measured using SYSMEX SF 3000 (Japan) automatic cell counter. Vitamin D levels were studied by using the method of ECLIA (Electrochemiluminescent immunoassay) via commercial kits (Beckman coulter Diagnostics, Germany). Vitamin D status was classified as vitamin deficiency (<20 ng/ml) and non-deficiency (≥20 ng/ml) according to Holick et al. [8].

The normality of distribution of continuous variables was tested by Shaphiro Wilk test. Kruskal Wallis and Dunn multiple comparison tests were used to compare non-normal data across three groups. Statistical analysis was performed with SPSS for Windows version 24.0 and a P value<0.05 was accepted as statistically significant.

Results: There were considerable variations in platelet to lymphocyte ratio (p=0.001) and neutrophil to lymphocyte ratio (p=0.005) between vitamin D sufficient and vitamin D insufficient groups. Vitamin D had a significant negative correlation with PLR (p<0.001) and NLR (p<0.001). Our limitations of this study contain the weaknesses of being a retrospective study. Dependent on available data, the effect of BMI and seasonal differences could not be detected.

Conclusion: We found a statistically significant association between serum 25(OH)-D levels and NLR and PLR in infertility. Platelet, PLR, and NLR values were significantly higher in the vitamin D deficiency group. Elevated PLR and NLR may be the indicator of underlying serious vitamin D deficiency. We suggest that sufficient vitamin D treatment in infertility should be evaluated according to the neutrophil-lymphocyte ratio (NLR) and the platelet-lymphocyte ratio (PLR) values.

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OP-19

Our Experience of Autoverification in Mindray CAL8000 Hematology Automation System with BC6800 Plus Blood Counter

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Objectives: In laboratories with very high out-put, misidentification (mislabeling) of the samples is a very big problem, especially in hospitalized patients'. The autoverification (AV) has been shown to be useful in dealing with preanalytical incompatibilities. We aimed to investigate the compatibility between the AV and the expert (manual) approval.

Material and Methods: Mindray CAL8000 Hematology Automation with BC6800 Plus blood count system is in use in our hospital as of November 2020; the number of samples per day exceeds 1.200. In addition to providing specialty training for hematology, oncology, endocrinology, nephrology, etc., so we should take technological advantages of the AV (the Mindray LabXpert software) in providing more precise and faster access to the results because of these patients' profiles. According to the literature, delta check values were used as 12.7% for red blood cell (RBC), 37.4% for platelet (PLT), 3.9% for mean corpuscular volume (MCV) and 13.8% for hemoglobin (HGB) [1]. We used 45 days as the delta check time interval for RBC, MCV, HB, and 15 days for white blood cell, neutrophil, reticulocyte and PLT. In the laboratory information management system (Alis), the compatibility between the autoverification (AV) and the expert (manual) approval was examined as those that do not require expert approval and those that require expert approval by the kappa statistical method (SPSS v.18). The change in "pass-rate" rates was evaluated with simulation. We also examined length of time from admission in the laboratory to the approval of the result as the turn-around- time (TAT).

Results: Examining data from 3.476 patients, it was found that there was a significant relationship between the AV and the expert (manual) approval (kappa value: 0.982; $p<0.001$). Mean value of 6-day pass-rate was found 80.1%. Mean TAT decreased from November-December 2020 (21 minutes) to February-March 2021 (14 minutes).

Conclusions: Mature RBCs survive in blood circulation 100 to 120 days before being removed from the circulation. At steady state under physiologic conditions, the production and destruction of erythrocytes is equivalent [2]. So, we preferred 45 days as the delta check time interval for erythrocyte indices. A larger maximum time interval will include more patients in the AV and thus increasing the error detection capacity [3]. It tends to be more effective than clinical chemistry parameters at discriminating mislabeled specimens in complete blood count parameters, especially due to the very low individuality index for MCV [4]. It is shown that the use of AV can be more beneficial by evaluating the manufacturer's recommendations and expert opinions of the biochemistry specialists and making the necessary updates in accordance with the joint decision. Especially in laboratories where a large number of samples are studied, it is better to use the time more efficiently (by the specialist) and to share the flag data of the blood counter with the clinician via the laboratory information management system.

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OP-20

Evaluation of Rejected Sample Frequency Using six Sigma

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Objectives: The vast majority of laboratory errors occur in the preanalytical phase. Preanalytical errors often result in samples that are not suitable for analysis. In this study, it was aimed to determine the frequency of rejected samples based on total and reasons. In addition, it was aimed to evaluate these results with six sigma.

Material and Methods: This study was designed retrospectively. The numbers of accepted and rejected samples between 01.04.2020 and 3.03.2021 were obtained using the laboratory information management system. The results obtained were grouped according to the tube types. In addition, the reasons and numbers of rejection of the samples were determined. Then, rejection frequencies and six sigma values were determined according to the tube types and rejection criteria.

Results: The total sample rejection rate was calculated as 0.38%. The most common reasons for rejection were detected as clotted sample (59.62%). The sigma value for the total number of rejections was calculated as 4.2. The sigma values calculated separately according to the refusal reasons were found between 4.4 and 5.9.

Conclusion: Six sigma values calculated according to the results we obtained, and the frequency of rejection were found to be acceptable.

OP-21

Assessment of iSED Erythrocyte Sedimentation Rate Analyzer Using Westergren Method

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Objectives: In addition to the original Westergren method, which is accepted as the gold standard by the International Council for Standardization in Hematology (ICSH), various methods have been developed for the Erythrocyte Sedimentation Rate (ESR) measurement. The iSED, which performs erythrocyte sedimentation rate (ESR) measurement using the photometric rheology method, is a fully automatic device that shortens the analytical measurement time and reduces blood. This study aimed to determine the agreement between iSED and the Westergren method in ESR measurement.

Material and Methods: A total of 170 patients aged between 18 and 90 presented to Koc University Hospital were enrolled in this prospective study. Blood samples were obtained by venipuncture into K2-EDTA vacuum tubes and analyzed within 2 hours. According to ICSH recommendations, a minimum of 40 samples was tested in 3 different groups of ESR values: 1–20, 21–60, and more than 60 mm. Intraclass Correlation, Bland-Altman, and Passing-Bablok analyses were performed to compare the methods.

Results: The iSED and Starrsed ST's mean ESR values were 16 and 13 mm/h, respectively. The intraclass correlation coefficient between the iSED analyzer and the Westergren method was 0.941 (95%CI: 0.920-0.957). The Passing- Bablok regression analysis revealed a good agreement (y=1.6429+1.0357x, 95% CI: intercept 0.6000 to 2.000, and slope 1.000 to 1.1000) (p<001) between the methods. The bias was -2.1 mm/h according to the Bland–Altman scatter plots using the Westergren method as the reference. (95% CI: -19.2 to 15.0 mm/h).

Conclusion: iSED sedimentation analyzer showed a good correlation and a low bias with the Westergren method. Despite the bias between the two methods increases in the high ESR values, iSED is a reliable analyzer for ESR assessment in laboratories with high workloads.

OP-22

Hemolysis, Icterus and Lipemia Interference on Coagulation Tests

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Objectives: In coagulation analyzes, the most common interference due to preanalytical error sources is hemolysis (40%), while interference because of lipemia (1%) and bilirubinemia (1%) is less common. The effects of hemolysis, icterus, and lipemia (HIL) on coagulation tests depend on the activation or inhibition of the platelet and coagulation system by the compounds released from the cell, and the free hemoglobin and bilirubin absorbance overlap with the spectral ranges in which the measurements are made. Turbidity due to lipemia causes light scattering and therefore optical interference. The aim of our study is to investigate the HIL interference on APTT, PT, fibrinogen, and D-dimer tests on the Sysmex CS-5100 analyzer.

Material and Methods: Plasma samples analyzed in our laboratory were used to prepare normal and pathological plasma pools for APTT, PT, fibrinogen, and D-dimer tests. Free hemoglobin prepared by freeze-thaw method, bilirubin standard and Clinoleic 20% (triglycerides emulsion) were used to stimulate hemolysis, icterus and lipemia interference, respectively. The final interferant concentrations of the plasma pools were spiked to be up to 1000 mg/dL for hemoglobin and lipid, and 40 mg/dL for bilirubin. Each measure was replicated five times as recommended in the CLSI EP07 third edition interference testing in clinical chemistry. The maximum allowable bias was accepted as 10% and interference was considered if confidence interval of the results at a specific interferant concentration exceeds this limit.

Results: The highest interferant concentrations not exceeding 10% bias were given below. When lipemia interference is evaluated, PT and D-dimer are not affected up to 1000 mg/dL triglyceride concentrations, while this limit reduced up to 250 and 500 mg/dL for APTT and fibrinogen, respectively. Second, we evaluated icterus interference and observed that the limit for APTT and fibrinogen was found to be 20 mg/dL bilirubin concentrations, however there was no interference up to 40 mg for PT and D-dimer. Third and last, we assessed hemolysis effect and found the interference limits to be 1000 mg/dL hemoglobin concentrations for APTT, PT, and D-dimer, but 250 mg/dL for fibrinogen.

Conclusion: Considering the tested interferant concentrations, we obtain these results. The effects of hemolysis, icterus, and lipemia interference on PT and D-dimer are minimal. While the APTT is primarily affected by lipemia, the interferences of icterus and hemolysis are less. For fibrinogen which the most sensitive to interference, the effect of lipemia and hemolysis are more noticeable compared to icterus.

OP-23

Investigation of Plasma Free Carnitine Levels in Patients with Acute Pancreatitis

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Objectives: Acute pancreatitis (AP) is a common pancreatic inflammatory disease caused by early activation of pancreatic enzymes. Carnitine is an amino acid derivative that is involved in the passage of long-chain fatty acids through the mitochondrial inner membrane. In this study, it was aimed to compare free carnitine, as well as different acylated carnitine levels in the blood of both Appatients and This may increase our understanding of the pathophysiology of AP and aid in diagnosing and determining potential therapeutic targets.

Material and Methods: The study included 47 acute pancreatitis patients, their mean ages 58.38±12.23 years and their amylase and lipase levele were 677.99±12.89 U/L, 873.10±93.12 U/L repectively.The study also included 35 healthy control group (17 women, 18 men), mean ages 75.70±12.6; their amylase and lipase levels were 221.61±27.89; U/L and 253.19±13.23 U/L respectively Total Cholesterol in both patients and controls were 170.42±24.59 mg/dl and 160.0±13.59 mg/dl while HDL levels were 54.06±40.71 mg/dl and 43.46±21.02 mg/dl. In patients and controls respectively. Both serum free carnitine and acyl carnitine were determined using Whatman filter paper and read in the LC-MS/MS Shimadzu spectrometer. Amylase, Lipase, total cholesterol and HDL were measured via Abbott C16000 automated analyzer.

Results: The values of free carnitine in patients and controls were repectively found,to be 8.40±3.29 mg/dL and 32.36±10.27 mg/dL. While the

values (mg/dl) of acyl carnitine in both patients and controls were as follows: C2 acetyl canitine (1.62±0.465; 16.52±7.354), C3 propynyl carnitine (0.177±0.084; 1.500±0.665), C5: 1 tiglyl carnitine (0.050±0.0075; C 0.0183±0 00648), (C5OH iso oils lcarnitine (0.058±0.009; C 0.090±0.0357), C8 octanoyl carnitine (0.0267±0.027; C 0.045±0.022), C8: 1 octenoyl-carnitine (0.052±0.0527; C0.1317±0.123) C10 decanoyl carnitine; (0.0447±.0297; C 0.0483±0.0316) (C10: 1 decenoyl carnitine) (0.077±0.024; C 0.0670±,0364), C10 DCsebacil carnitine (0.0127±0.0046; 0.032±0.008), 12 dodecanoyl carnitine (0.0267±0.011; 0.016±.0077), C14 myristoyl carnitine (0.020±.0066; 0.060±0.02181), C16 palmitoyl carnitine (0.044±0.0140; C 0.589±0.229), C16: 1palmitoleyl carnitine (0.014±0.0051; 0.0517±.020), C18 steraoyl carnitine (0.022±0.007; C 0.390±0.146), C18: 1olei lcarnitine (0.0207±0.0458; 0.504±0.239), C18: 2 linoleyl carnitine (0.0107±0.0046; C 0.219±0.1044). A statistically significant difference wa detected when above values compared in patients and controks ($p<0.05$). No statistically significant difference was found cocerning other values (mg/dl) of C6 hekzanoil (0.0233±0.0072; 0.0240±.01102) C6DCadipil (0.0153±0.0516; 0.0134±0.01450) when compared between patient and controls ($p>0.05$).

Conclusion: Free and acyl carnitines increase energy production by transferring palmitate to mitochondria and maintaining acetyl CoA/CoA ratio. By scavenging free radicals and removing excess palmitate so it reduces oxidative stress and lipotoxicity, and ultimately reducing the rate of apoptosis [6, 7]. In our study, a significant decrease in both free carnitine and acyl carnitine levele (C2, C3, C4, C5, C5: 1, C5OH, C6, C6DC, C8, C8: 1, C8DC, C10, C10: 1, C10DC, C12 C14: 1, C14: 2, C18: 1 OH) was observed ($p<0.05$). These results show that carnitine may have a role in dyslipidemia, which is one of the major independent risk factors in patients with acute pancreatitis [8]. Hypertriglyceridemia in kidney patients may be associated with decreased carnitine synthesis [9]. Determination of serum carnitine levels in acute pancreatitis showed carnitine dyslipidemia in acute pancreatitis [5, 10].

Conclusion, Carnitine metabolic pathways was affected in acute pancreatitis patients. Canibine parameters could be used as helpful biomarkers in diagnosis and follow-up acute pancreatitis.

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OP-24

Determination of Laboratory Staff's Knowledge Level in Routine Laboratory Practices and In-Service Training Requirements

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Objectives: The aim of this study was to reveal the professional knowledge of the technical personnel who also work in medical laboratories outside of working hours in routine laboratory practices and to determine whether they need for in-service training with a survey study.

Material and Methods: Within the scope of the study, a survey about routine laboratory practices was prepared and the personnel working in the hospital laboratories in 4 districts and 1 city center in Konya were asked to answer this questionnaire. 54 people accepted to participate in the survey. The data obtained from the survey study were analyzed with the SPSS statistical program and presented in percentages and graphs.

Results: Of the 54 participants, 81.5% stated that they chose their profession willingly and 79.6% of them had more than 10 years of professional experience. 81.5% of the respondents stated that they approved to tests outside of working hours. When the participants were asked what they paid attention to when approving laboratory tests outside of working hours, 20.1% of the participants answered, 'whether the sample is hemolyzed or not', %20,5 of them answered 'whether the test result is compatible with the previous result or not' and 17.1% of them answered 'whether the test result is too high/low or not'. Interestingly, in this question, 4.3% of the participants stated that they paid attention to the time of requesting the test and 7.7% of them paying attention to the clinic requesting the test from the patients. When asked what area do, they need training on, 19.5% of the participants answered, 'measurement methods', while 14.6% of them answered 'the clinical use of the laboratory tests'. The least marked items in this question are 'control evaluation (8.5%)', 'device usage (8.5%)' and 'device maintenance (8.5%)' options. In addition, 29.3% of the participants stated that they do not need training. While 86.2% of the participants gave the correct answer that it should be reported a panic value for glucose, 75.8% of them correctly answered that potassium was the most affected parameter in hemolyzed blood among the items in the survey. But 19.7% of the participants incorrectly stated that sodium will be affected mostly by hemolysis. The most incorrectly answered question among the questions in the survey is 'which parameter can be negative in blood gases?'. While only 55.6% of the participants gave the correct answer 'base excess' to this question, 37% marked the answer 'I have no idea'.

Conclusion: With this survey study, the knowledge of the personnel who have already approved the laboratory tests outside of working hours about the device and tests was evaluated. It was observed that there were incomplete and incorrect information in some of the questions, which were quite simple and inspired by daily laboratory practices. As a result, we think that the level of knowledge of the laboratory technical personnel about laboratory processes should be determined with similar surveys. Thus, it may be possible to determine in which areas laboratory technical personnel need in-service training and to increase their knowledge level for quality laboratory service.