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PLENARY LECTURE

PL-01

Rational Laboratory use and Algorithms

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Total health expenditure in 2018 is about 165 billion TL in Turkey, according to the "Health Expenditure Statistics" of TurkStat. It has been stated that financial burden of laboratory tests is about 4-11% of health expenditure in different countries. As these costs increase, many countries developed different strategies to improve cost-effectiveness. In US, clinical laboratory tests get paid, if only each requested test has medical basis during diagnostic process. In Turkey, Ministry of Health started "Rational Laboratory Use Project" to increase the clinical usefulness of laboratory tests and to reduce the unnecessary laboratory test requisition. Expectations from clinical laboratory tests can be listed as risk assessment of diseases, screening of the diseases, making or excluding a diagnosis, sufficient data for evaluation of launching or termination of a medical intervention, assessment of prognosis. In this case, laboratory specialists have some problems, such as the increasing workload and risks, lack of time, increase of new sources and technology, the change in patient population and their expectations, and of course the increasing costs. Solution is evidence based medicine and evidence based laboratory. Evidence for the performance of diagnostic tests can be considered as a pyramid, all of which are important in the decision-making process. This pyramid comprises technical and diagnostic performance, clinical and organizational impact and cost-effectiveness. Laboratories have an important role in decision making process. There are different approaches in requisition of laboratory tests such as setting up a hypothesis, targetting, pattern recognition and medical algorithms. Diagnostic performance specification of laboratory tests (sensitivity, specificity, positive and negative predictive values) is another significant point as well. There are many studies emphasizing the bad aspects about unnecessary test requests. In a study, it was stated that unnecessary test request was about 25-40% in outpatient services, while other study implies its frequency could be up to 50% for inpatient services. It was reported that excessive and false test requests both undermined the diagnosis and increased the rate of malpractice. In Turkey, Ministry of Health implemented "Rational test request procedure" and "Reflex and reflective test procedure" to reduce the number of unnecessary tests required from medical laboratories in healthcare providers, in order to ensure the correct diagnosis to the patient and increase the clinical usefulness of the test results. In this scope, laboratory professionals and clinicians should always be in contact to provide more efficient healthcare, especially in terms of laboratory test use.

PL-02

Blood Gases and Preanalytic Stage

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Assessment of acid-base balance and respiratory function is performed by arterial blood gas analysis. Additionally, glucose, electrolytes, kidney functions, bilirubin, lactate and hemoglobin levels can be monitored in arterial blood gas analysis in devices developed with the latest technology. Thus, information about the patient's metabolic status can be obtained. The preanalytical steps of the test should be perfectly coordinated to ensure that the patient receives appropriate and timely treatment in response to analytical results. The process extends from choosing the right tests to ensuring that the sample is delivered to the instrument correctly. Accordingly, CLSI has published two main documents related to blood gas testing: GP43-A4 "Procedures for the collection of arterial blood specimens" approved standard-4th ed., and C46-A2-"Blood gas and pH analysis and related measurements" approved guideline–2nd ed. In this speech, the pre-analytical processes in blood gas measurements and their effects on the measurements will be explained with theoretical and patient examples.

PL-03

Thyroid Autoantibodies and Analysis Techniques

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The thyroid gland is the body's single largest organ specialized for endocrine hormone production. It is mainly responsible for secreting an appropriate amount of the thyroid hormones, primarily 3, 5, 3', 5' tetraiodothyronine (T4) and lesser quantity of 3, 5, 3' triiodothyronine (T3). Most of the T3 arises from extrathyroidal deiodination of T4. Their receptors are located in nucleus. Thyroid hormones increase heart rate, cardiac output, basal metabolic rate, ventilation rate, catabolism of proteins and carbohydrates and promote growth and central nervous system development.

Thyroid hormones synthesis is dependent on iodine. Thyroid cells are organized into follicles. Follicles are spheres of thyroid cells surrounding by a core of viscous substance, colloid. Major component of the colloid is thyroglobulin, an iodinated glycoprotein consists of tyrosine residues. Iodine is actively transported into thyroid cells by the Na+/I-symporter on the basement membrane, diffuses to the apical part of the cell and transport into colloid. Thyroid peroxidase (TPO) a membrane bound enzyme, oxidizes iodide ions and leads to incorporation of iodine atoms into tyrosine residues of thyroglobulin. Monoiodothyronine (MIT) and diiodothyronine (DIT) are the end-products. TPO also cataseenlyzes the coupling reaction of two tyrosine residues. Thyroid stimulating hormone stimulates the endocytosis of the colloid. The endocytosed vesicles fuse with the lysosomes of the follicular cell. The lysosomal enzymes cleave the T4 from the iodinated thyroglobulin.

Thyroid disorders can range from a small, harmless goiter that needs no treatment to life-threatening cancer. Hypothyroidism, hyperthyroidism are functional disorders. Among structural abnormalities goiter (enlargement of the thyroid gland) is most commonly seen. Subclinical hypothyroidism or hyperthyroidism presents only abnormal thyroid function tests without any clinical symptoms. For the diagnosis of thyroid disorders, thyroid function tests are very informative and helpful. TSH is the most useful test for assessing thyroid function. It is considered as the first-choice test for evaluation of the thyroid functions. Depending on TSH levels, free T4 measurement is also being ordered. Free T3, total T3, and T4 are used for further investigation. Many diseases of thyroid gland are related to autoimmune processes. In that case, the antibodies against thyroid tissue exhibit variable responses. The classic autoimmune thyroid disorders, Graves' disease (GD) and Hashimoto's thyroiditis (HT), are characterised by the presence of elevated levels of serum antibodies directed against thyroid antigens, namely thyroglobulin antibody (TgAb) and thyroid peroxidase antibody (TPOAb). Other autoantibodies in autoimmune thyroid disorders include thyroid stimulating hormone receptor antibody, which is specific for Graves' disease.

There have been considerable developments in the methods used to detect thyroid antibodies which have been firstly identified six decades ago. Thyroid autoantibodies can be measured by hemagglutination, ra-

dioactive immunoassay, enzyme linked immunassay and chemiluminescence. Current techniques are sensitive and generally reliable, although exact cutoff values for positivity still remains uncertain. This reflects a fundamental philosophical issue, which is that very low levels of such antibodies, particularly represents low affinity. The prevalence of antithyroid autoantibodies in the normal population has been reported to be from below 1% to over 15% according to investigators although it is generally accepted that the prevalence is higher in females, and that of anti-thyroglobulin antibody is lower than that of anti-thyroid peroxidase antibody. Until haemoglobin, bilirubin and triglyceride reach very high levels, they don't effect thyroid autoantibodies results. Heterophilic and monoclonal antibodies, high titers of rheumatoid factors, high biotin and thyroglobulin levels and antibodies against streptavidin or ruthenium could lead to interferences.

PL-04

Ethanol Analysis and Pre → Post Analytical Phases

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Alcohol has been used as a delighting, tranquilizing, sedative substance and also as a drug since ancient history. Despite it's well known harmful effects, it is one of the eldest psychoactive substances and it is the most consumed one than coffee. Alcohol analysis are generally requested after trafic accidents or from individuals who act to ruin the order of the society. That's why, ethanol analysis is very important and it is among the most problematic tests that biochemistry specialists have to work with. There are problems about preanalytical, analytical and postanalytical phases of ethanol analyses. To minimize these problems, preanalytical, analytical and post-analytical variables are need to be well known. Common preanalytical problems are endogeneous ethanol production, gender-related differences, consumption of other athanol containing substances, while anaytical problems are interferences caused by toxic alcohols and high lactate/lactate dehydrogenase levels and problems in evaluation of results can be accepted as post-analytical issues. In the Clinical laboratories Guide Line published by Ministry of Health in 09/10/2013 date and 28790 numbered official gazette; The working Essentials of clinical laboratories statement 12 declares that: 'The ministry of health determines the working principles of the laboratories analysing illegal and abused drugs and substances and also the laboratories serving in alcohol and substance abuse treatment centers'. Under the directions of this guideline, work flow and obligations for laboratories doing blood ethanol analysis was determined and published in 11.07.2017 with the number 95966346. Ethanol analyses from whole blood, serum/plasma, urine and body fluids like sweat are carried out by enzymatic or chromatographic methods in clinical biochemsitry laboratories for legal, social and health relate dissues. Osmolar gap and Widmark formula are also used to calculate ethanol levels in laboratories. However, for many problems caused by analysis technique or legal procedures are expected to be solved by biochemistry specialists, and that's why the evaluation of ethanol results need sexperience and certain accumulation of knowledge.

PL-05

Consultation in Medical Biochemistry and Algorithm Examples

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Consultation is a traditional medical process that provides interdisciplinary cooperation to produce solutions to clinical problems outside the experience of the referring physician. Although it is a daily practice among clinicians, it is not common to be part of the consultation process as laboratory specialists at least in official terms. There is an undeniable need for the clinical laboratory consultation for the appropriate and cost-effective use of laboratory tests which are expensive to perform and difficult to interpret. Besides, the increasing use of point-of-care testing and patient-initiated testing further increases this demand.

Several reports have emphasized the institution of formal laboratory consultation as a means of shortening the diagnosis time, reducing improper test requests, containing cost-effectiveness, and hence improving the quality of patient care by reducing medical errors. However, the clinical laboratory professional is at a disadvantage in terms of the abilities required to function as an effective consultant compared with the clinical specialist mostly due to lack of training. Therefore, it is important to establish some basic standards and algorithms for laboratory consultation procedures within a laboratory service that can serve as guidance for laboratory professionals when they serve as consultants.

In 2018, the "Consultation Procedure (Annex-1)" was published within the scope of the project titled as "Rational Use of Medical Laboratory Service (RUMLS)" carried out by the Ministry of Health, Directorate of Health Services, Department of Etude and Diagnosis Services to provide communication, technical consultancy, and information exchange among clinicians and medical laboratory specialists. As a tertiary hospital with 992-beds, our hospital is one of the largest hospitals in Izmir that provides diagnosis, treatment, surgical, and intensive care services for both children and adult patients. The numbers of out-patients (except Emergency Room) and who admitted to the phlebotomy units in 2019 were approximately 7500 and 1500 per day, respectively. For 2018, inpatients', emergency interventions', and operations' numbers were 52679, 371480, and 60201, respectively. To meet the intensive service with a certain quality, a formal consultation procedure was already available for clinics through the hospital information system (HIS), but laboratory disciplines were not part of it. Before the project, when laboratory consultation was necessary regarding a biochemical test, clinicians often preferred verbal communication without any formal procedure. As of the end of 2018, the official consultation service for the biochemistry laboratory has started to provide through HIS within the scope of the RUMLS project.

To standardize our consultation approach and create general standards, relevant information on consultations such as the clinics requesting consultations, and the purposes of consultations evaluated, in first. The majority of the cases (77%) were from endocrinology, of which 44% of those were from pediatric endocrinology (44%). The other consultations requested from pediatric gastroenterology and pediatric oncology (12% of each). When the purposes for consultations examined, the most frequent consultation was regarding elevated alkaline phosphatase (ALP)(44%) and suspicion of macroprolactin (44%) due to possible macromolecule interference that requested by pediatrics. Only one adult patient from endocrinology requested to consult for incompatible thyroid function tests. The consultation procedures and algorithms were prepared to standardize the processes including the steps that the laboratory specialist should follow in addition to the "patient anamnesis form" that also newly prepared for ease of evaluation and archiving. Laboratory infrastructure, device and equipment, and available materials were taken into consider-

ation while preparing the algorithms. The first algorithm summarizes the studies that should be followed as a minimum in case of suspicion of a macromolecule (ALP, prolactin, etc.). In the second algorithm, basic steps defined to determine the presence of any interference that can lead to clinical discordant test results.

In addition to its scientific perspective, consultation is a case-tailored medical practice with ethical, financial, and legal interests. Since the presence of a macromolecule and the suspicion of interference are the most common consultation requests in our setting, the algorithms that define the fundamental steps to follow have put into practice. Updating existing algorithms or even developing new algorithms can contribute to the improvement of the consultation processes of medical biochemistry laboratories. However, it should note that whenever a consultation procedure or algorithm is preparing, the information regarding the capacity of the health institution, referring clinics, consultation requests or laboratory readiness should take into consideration.

Laboratory medicine is one of the most important sources of big data in healthcare. In the near future, by utilizing artificial intelligence and machine learning techniques, the evaluation of big data might result in more sophisticated and technically advanced consultation processes and algorithms. In this case, clinicians and laboratorians' cooperation and sharing information might be needed perhaps more than ever.

References

1. Burke MD. Clinical laboratory consultation: Appropriateness to laboratory medicine. Clin Chim Acta. 2003;333:125–9.
2. Marques MB, Fritsma GA, Long JA, Adler BK. Clinical pathology consultation improves coagulation factor utilization in hospitalized adults. Am J Clin Pathol. 2003;120:938–43
3. Marques MB, Anastasi J, Ashwood E, et al. The clinical pathologist as consultant. Am J Clin Pathol. 2011;135:11–2.
4. Taylor JR, Thompson PJ, Genzen JR, Hickner J, Marques MB. Opportunities to Enhance Laboratory Professionals' Role On the Diagnostic Team. Lab Med. 2017;48(1):97–103.
5. The Rational Use of Medical Laboratory Service (RUMLS), Consultation Procedure (Annex-1). Available at: https://tetkikteshis.saglik.gov.tr/TR,32608/akilci-laboratuvar-kullanimi-konsultasyon-is-e proseduru-yayinlandi.html (Accessed Feb 20, 2020).
6. Usubütün A, Balcı S, Yörükoğlu K. The Situation of Consultation Practice in Pathology in Turkey. Turk Patoloji Derg 2012, 28:195-203.
7. Alonso-Cerezo MC, Martín JS, García Montes MA, de la Iglesia VM. Appropriate utilization of clinical laboratory tests. Clin Chem Lab Med. 2009;47(12):1461–5.
8. Kratz A, Laposata M. Enhanced clinical consulting—moving toward the core competencies of laboratory professionals. Clin Chim Acta. 2002;319:117–25.
9. Shirts BH, Jackson BR, Baird GS, Baron JM, Clements B, Grisson R, et al. Clinical laboratory analytics: Challenges and promise for an emerging discipline. J Pathol Inform 2015;6:9.

PL-06

Internal QC Problems

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Modern medical laboratories first responsibility is produce test results as possible as faster and quickly. All the individulas and physicians are very impatient. If any daily qc failed we face two big problem; serious waste of time and lot of client complaints. When laboratory workflow is abruptly interrupted by an out-of-control QC , we need to complicated technical investigation, and a lot of questions must ask , such as:

- "Is the qc failed really?"
- "Do we have a problem with the analytical system?"
- "When did it start and how many patient samples are affected?"
- "What should I do first?"

The test system and qc system

Test system or the control system may be the cause of the out-of-control condition. Before the complicate technical investigation we ought to check test system and qc system.

The test system includes the reagents, hardware, and software. The laboratory firstly investigate those few things in the test system that ar have a history in the lab of causing problems. (Reagent integrity, the tubing and pumps used for sample and dispense, and the light source.)

The control system consist of the control materials, the mean and Levey-Jennings chart, and the process control rules applied. Any of these could be the cause of the out-of-control condition. The technician should verify the control materials for storing conditions,prepare ,open vial stabilities and out of date.

The mean and standard deviation must be calculated using sufficient data collected over a period of time, allowing for multiple calibrations, multiple reagent lots, maintenance, and multiple operators.

Recalibration is often the first reaction to an out-of-control condition but generally mistaken habit. Every laboratory calibrates creates additional measurement error.

Random error and systematic error

If the quality control system is appropriate and effective, then technical investigation begins. The type and approximate size of the error must be characterized by using control data from previous QC events (recent and historical QC).

If It suggests random error, then the laboratory should investigate to random error sources. If a error source can be isolated, corrective action is taken. After then the laboratory should perform comprehensive instrument maintenance followed by recalibration. If the control results are in control, then all patient samples are retested and reported.

If the qc pattern suggests systematic error, Laboratory should investigate to systematic error sources. İdentification of systematic error is much easier than random error. The difficulty is affecting number of patient samples between QC testing events really important.

İf the source of systematic is found and corrected, the test is recalibrated. Quality controls are retested. When the qc results are in control, then all patient samples are retested and reported.

PL-07

Effect of Autoverification Process on Laboratory Productivity

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Laboratory approval support systems or autoverification process are applications that work with user rules, minimize errors, save time in laboratory operation, and assist the laboratory specialist. There are scientific studies on the use of approval support systems. There are application examples used in clinical chemistry, immunoassay, hematology, and urine analysis fields of approval support systems, which are also included in laboratory and diagnostic guides. Laboratory device manufacturers and laboratory information system (LIS) software companies carry out pioneering work in this regard. We use an approval support system (ASS) for complete blood count (CBC) analysis in the hematology laboratory in our hospital. For ASS, we have based on the auto-verification program, Extended-IPU, developed by the device manufacturer and the association of French-speaking hematologists. After a six-month study in 2018, first, we included outpatients in October and then all patient groups on 1st January 2019. We compared the number of CBC analysis approved samples in 2019 with the period when ASS was not used and we found that nearly half (48.7%) of samples were approved through ASS. We compared test completion times, test repeat rates and sample rejection rates, which we assume are important parameters in laboratory efficiency, before and after autoverification implementation process. We have seen that autoverification provides advantages in these parameters.

PL-08

Age-Related Biological Variances and Reference Intervals

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Neonatal period begins immediately after birth with transition from fetal circulation to extrauterine circulation and follows infancy, childhood and adolescence periods respectively, until it reaches to adulthood. During these periods where growth and development is very intense and rapid, a series of remarkable structural and functional changes occur in many organs and tissues, particularly in the hematological system, immune system, musculoskeletal system and, endocrine system. This dynamic growth and development also profoundly influence concentrations of biochemical parameters. All of these growth- and development-related changes observed from birth until to the end of adolescence are physiological and, cause the biochemistry of infants and children to differ in many aspects than adults. In addition, the spectrum of diseases seen in infancy and childhood is quite different from adults such as congenital diseases, hereditary disorders and infectious diseases are more common in these individuals and, the types of cancer that occur are also usually different from adults. For all these reasons, using reference intervals established for adult in the interpretation of pediatric test results may lead to erroneous clinical decisions.

On the other hand, the growth rate exhibits wide inter-individuals differences among genders and age groups, as well as, ethnicity, hereditary factors, nutrition, socioeconomic status and environmental factors in pediatric population. These factors cause serious challenges in the field of pediatric laboratory medicine, in the availability of accurate and reliable age-specific reference intervals for laboratory tests based on healthy neonates, children and adolescents. Unfortunately, many clinical laboratories are forced to use adult reference intervals to interpret pediatric test results, which can lead to erroneous and inaccurate test result interpretation. Since children are not small adults, in order to monitor health status and growth and, to make accurate clinical decisions age- and gender-specific reference intervals should be used in the interpretation of laboratory results in pediatric population. It also should be kept in mind that even using appropriate reference intervals, due to biological variations sometimes test result of a pediatric individual may be significantly outside the reference range without any apparent pathology. As a result, in the pediatric population, the laboratory test results should be evaluated cautiously and, even if it is age- and gender-specific, a fixed reference interval may not be sufficient for interpretation of test results, but also the compatibility of the reference interval with the measurement method used should also be considered.

PL-09

Preanalytical Error Cost

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The preanalytical errors may cause wrong decisions in treatment, re-invasive intervention, patient discomfort and consequently additionally costs sourced from "re-collection (sample collection equipment, time of employees), prolonged hospitalization and improper treatment. The direct costs of re-analysis could group under main headding of consumables, employees, analytical processes and instruments and related other issues like Laboratory Information System (LIS)/Hospital Information System software and management. Additionally, all transportation costs, instrument spare part and maintenance management costs also should be included.

Another point to consider is the indirect costs which are operational spending of hospitals per patient and improper treatment costs.

When the related literature checked some data could be reachable. One of them belongs to the cases that reviewed between January 2000 and December 2007 in the printed press in Turkey which shows that 4.1% of malpractice cases pointed the wrong laboratory results. We could assume easily the rate of preanalytical ones took place nearly ¾ of total. In another paper which is written by S.F.Green and published in Clinical Biochemistry in 2013, it has been shown that burden of poor sample quality was between 0.23% and 1.2% of total hospital operating expenses. Just for now we do not have any national published cost related laboratory preanalytical work. If we assume a model based on the cost rates of previous mentioned paper for an Turkish Training and Research Hospital with 850 beds in Istanbul (we have the real data for the amount of operating of that 850 bed hospital was 308.901.081 TL as total expense for 2018). Then we can estimate the limits for preanalytical costs of the hospital. 308.901.081 TL *0.0023=710.472 (For Lower Limit) and 308.901.081 TL *0.012=3.706.813 TL (For Upper Limit)

We can confirm if the estimated amounts are true or false. We can calculate the direct costs of preanalytical phase error expenditures with our last tender prices and the error rates for the same hospital. The result founded within the limits as estimated with Green's work. For the hospital, the rates of hemolysis, presence of clot, insufficient sample and wrong labelling in 2018 for 2.000.000 sampling/year, reported 3.72%, 1.3%, 1.4% and 0.7% respectively. Only the direct cost items like all sampling materials, staff payment, IT management, transportation, were included and calculation made with current tender prices. Instrument spare part and maintenance costs and all indirect costs were excluded. The result was 2.609.211 TL only for 142.400 of preanalytical error which are recorded in LIS for the year 2018.

All the data shows that the preanalytical phase is not important for only the safety of the patient, but also is an important parameter for burden of the health budget.

ORAL PRESENTATION

OP-01

A First in Turkey: Laboratory Coordinator and Patented Laboratory Coordination Information System

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Objectives: Laboratory coordination information system (LCIS) is the computer software used for the management of functions. In this study, it was thought that the laboratories, which take an important place in the scope of health protection, development and sustainability, to provide effective and efficient services in accordance with today's technology, and to prepare a system in which economical measures can be taken and plans will be made in line with the studies in the field of quality in our developing country. In this way, by adding artificial intelligence, which is one of the needs of today, to the operation of experienced personnel and equipped devices, which constitute an important part of laboratory operation, laboratory operation will be strengthened. In addition, when the literature on the subject is analyzed, it is seen that the number of research on the subject is a few, and no software system was used so far in Turkey. We aimed to contribute to the literature and laboratories by this research for this purpose.

Material and Methods: Health Sciences University Şanlıurfa Mehmet Akif Inan Training and Research Hospital Health practice notification coded procedure lists of clinical biochemistry, clinical microbiology, blood transfusion center and medical pathology laboratories, device inventory list, employee staff list, purchase forms, tender decisions, waste management decisions, failure reporting forms were integrated with the hospital information management system, and laboratory information system software was created.

Results: This system includes a complete and accurate inventory of laboratory equipment, operation, maintenance and troubleshooting documents provided by the manufacturer, and preventive maintenance and repair records. Thus, with the laboratory coordination information system prepared fully integrated, an effective system was obtained to solve the problems that arise in laboratory management and an effective clinical service delivery. The use of this system in hospital provides important facilities in terms of patient care, business management, support procedures, laboratory performance and improvement of patient services. Adequate information management system ensures high performance and reliable results in the laboratory. Increasing safety for laboratory workers makes equipment more well-maintained.

Conclusion: A significant contribution was made to the literature by creating a single information management system to monitor the services and facilities provided by all laboratories consisting of clinical biochemistry, clinical microbiology, blood transfusion center and medical pathology, reduce workload, improve quality, ensure the safety of the laboratory and other personnel, and make purchases that supporting the national economy in meeting laboratory expenses.

OP-02

Comparıson of Vısual Inspectıon Vs Automatıc Detectıon of Hemolyzed Samples: Experiment of Public Health Laboratory

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Objectives: Hemolyzed, icteric and lipemic samples may affect the measurement of analytes, thus they should have take into consideration in the patient management. These preanalytical interference source should be detected using visual evaluation or automated assesment. Visual inspection is not only time consuming, but alsı highly-subjective, non-standardized and may be a potential source of error (1,2). In other hand, modern clinical chemistry analyzers are equipped with automated systems for detection of lipemic, icteric and lipemic samples.(3). Our aim was to evaluate and compare hemolyzed samples with both visual inspection and automatic detection.

Material and Methods: Our laboratory has implemented serum indicis in July 2019. We retrospectively evaluated the rejected samples because of hemolyzed at the time interval between January –June 2019 and used the hemolyzed indicis concentrations between July 2019-January 2020. Visual detection is performed by only one experienced laboratory technician. Automated detection was performed using Abbott Architect c8200 (Abbott, Abbott Park, IL, USA). Serum indicis values were determined and grouped in terms of the technical guide of autoanalyzers.

Results: We retrospectively evaluated the rejected samples of total 30.550 samples in the first part of the 2019. 45 samples had been rejected because of hemolyze. Proportion of rejection rate was found 0.014%. However; after the serum indicis had been implemented, 2162 of 40449 (5.1%) samples were found as positive for hemolyzed.

Conclusion: Successful detection and management of samples is one of the important issues in clinical laboratories. In addition to this, evaluation of hemolyzed samples is also important in public health laboratories, where samples are being transported in an difficult conditions. We should train our staff in order to missout the hemolyzed samples, that may be affected the management of patients.

OP-03

Preanalytical Phase in Hematological Parameters in VACUETTE® and MiniCollect Complete® Blood Collection Tubes

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Objectives: Drawing blood from children is technically very difficult and requires special skills, training and experience. The consequence of inexperience might be hemolysis, clots or especially insufficient blood volume. Inadequate volume drawn into anticoagulant tubes may cause erroneous results. In this study, MiniCollect Complete® K3EDTA tubes (MC) were compared with VACUETTE® K3EDTA tubes for hematology parameters.

Material and Methods: Whole blood samples were taken from 22 randomly selected patients. VACUETTE tubes with the nominal fill volume of 2 ml (full draw) were drawn from the first 11 patients; and a partially filled tube of 0.50 mL (partial draw) from the remaining 11 patients. From all 22

patients, blood was also collected into a MC tube up to the fill line of the tube (0.5 ml, full). All samples were analyzed on Mindray BC6800 within 4 hours after blood collection.

Results: No statistically significant difference was found for any results with VACUETTE® tubes (2 mL, full) and MC tubes (0.5 ml, full). However in the case of tubes filled to one-quarter, a statistically significant difference was found for some parameters (WBC, NEU, LYM, MON and MPV) between VACUETTE tubes 0.50 mL (partial draw) and MC tubes (0.5 ml, full).

Conclusion: Statistically significant differences for some parameters between the VACUETTE tubes (partial draw) and MC (full draw) tubes indicate a preanalytic impact of partially drawn tubes on incorrect results. Primarily for drawing pediatric samples with limited blood volume, MC tubes could be good alternative to VACUETTE tubes to provide reliable test results.

OP-04

The Effect of Blood Collection Tube in Serum Zinc Measurement

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Objectives: Zinc (Zn) measurement is important in disorders such as growth retardation, immunodeficiency, infertility, neurological disorder, and acrodermatitis enteropathy. For accurate measurement of a trace element, any exogenous contamination from the blood collection tube, which might cause interference during blood collection, should avoid. Serum tubes containing gel are used for Zn levels along with other tests due to ease of analysis and cost-effectiveness. In our study, it is aimed to compare the results in serum tubes containing gel with specially produced serum tubes for trace element measurement, to achieve accurate and reliable Zn results.

Material and Methods: Twenty randomly selected patients included in the study. Blood was drawn from the patients simultaneously into both clot activator gel tubes (SST II Advance, Vacutainer, Becton Dickinson and Company, USA) (SST) and trace element tubes without gel (Trace Elements Serum, Vacutainer, Becton Dickinson and Company, USA) (TES). SST and TES tubes were kept at room temperature for half an hour for clotting and centrifuged at 1200 g for 10 minutes. Serum Zn levels determined in the autoanalyzer (AU-5800, Beckman Coulter Inc., USA) by a colorimetric method (Zinc, Sentinel Diagnostic, Spain). The difference between Zn levels of the tubes evaluated both statistically and clinically.

Results: The mean and standard deviation of the SST and TES tube Zn levels were 65.9±7.4 µg/dL and 63.4±7.9 µg/dL, respectively. There was no statistically significant difference between them (p=0.163). However, the bias between the SST and the TES tube was 4.8%, and was above the allowable biological variation-based bias for serum (3.3%), and was considered clinically significant.

Conclusion: Interference was considered to be lower in trace element tubes for serum Zn measurement. Therefore, it recommended using specifically designed blood collection tubes for trace element analysis to produce accurate and reliable results for Zn and other trace elements.

OP-05

Leukocyte Stability in Hemogram Samples Waiting at Room Temperature

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Objectives: Management of preanalytical, analytical and postanalytic processes is essential to obtain reliable results in clinical biochemistry laboratories. One of the most important of these processes is ensuring sample stability. In this study, it was aimed to evaluate hourly changes of leukocyte parameters at room temperature for 24 hours.

Material and Methods: 30 randomly selected hemogram samples from Kocaeli University Faculty of Medicine Central Laboratory were included in the study. These samples were analyzed on the Beckman Coulter Unicel DXH 800 analyzer (Beckman Coulter, Miami, FL) immediately after being admitted to the laboratory (0. hour) and It was repeated after waiting in room temperature (23-25 °C) for 2, 4, 8, 24 hours. In the study, leukocyte, lymphocyte, basophil, neutrophil, monocyte, eosinophil parameters were evaluated with the GraphPad Prism 6 program. The values were expressed as mean±Standard deviation (SD). P values of <0.05 were considered statistically significant.

Results: A statistically significant difference was observed in the levels of leukocyte, lymphocyte, basophil, neutrophil and monocyte parameters. No significant difference was observed in eosinophil levels. It was determined that the earliest increase occurred in neutrophil and lymphocyte values at the 2nd hour ($p<0.001$). An increase in the 4th hour measurements was observed in basophil and monocyte levels ($p<0.001$).

Conclusion: Our study showed that leukocyte subparameters, neutrophils and lymphocytes were the earliest affected parameters. Our findings suggest that when the waiting times of hemogram samples exceed two hours, the results will not be reliable in terms of leukocyte subparameters.

OP-06

Rejection Rates of Patient Samples in Medical Biochemistry Laboratory

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Objectives: We aimed to determine the distribution of rejection rates by the cause and the clinics they were submitted from so that; based on the results, we could take necessary precautions, develop training modules to prevent patient and employee aggrievement, and increase the quality of results obtained in our laboratory.

Material and Methods: Blood and urine samples submitted to the Medical Biochemistry Laboratory of Ufuk University School of Medicine's Dr. Ridvan EGE Hospital were retrospectively retrieved from the laboratory information system, covering a 12-month period. The retrieved samples were reviewed to investigate causes for rejection and their distribution by the clinic and test panels.

Results: The total rejection rate of the samples submitted to our laboratory was found to be 0.43%. The analysis of the rejection rates by the cause revealed that the first three ranks accounted for hemolyzed samples at a rate of 30.6%, clotted samples at a rate of 26.28%, and inadequate sample/erroneous request at a rate of 17.19%, respectively. When we analyzed the distribution of the rejected samples by the clinic, we

observed that the first three ranks were held by the emergency department at a rate of 24.88%, the cardiology clinic at a rate of 8.51%, and the neonatal clinic at a rate of 7.77%. When the types of ordered test panels were examined, we found out that hematologic tests had the highest rejection rate with 36.94%.

Conclusion: It is known that pre-analytical errors hold the first rank as the causes of inadequacies in laboratory results. Therefore, we concluded that improvements can be achieved during the process starting from the sample collection until the laboratory submission after performing a complete evaluation of the patient. To achieve potential improvements; we suggest that attention should be paid to the training of the staff (physicians, nurses, and sample transporting staff) involved in this process; as well as the laboratory staff, and that the training curricula should be developed based on the rates we obtained in our study. We think that maintaining the sustainability of the designed training programs will contribute to reductions in rejection rates, improving the quality of results delivered by our laboratory.

OP-07

Evaluation of Preanalytical Rejection Causes in the Pediatric Emergency Department

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Objectives: Emergency departments, unlike other units, are units where the patient population is extensive, and panic and mess occur ordinary. Since these working conditions increase the frequency of errors, emergency services are among the units where preanalytical errors are also seen most frequently. In our study, we aimed to evaluate the reasons for rejection, and rejection rates of samples accepted from the pediatric emergency department to the biochemistry laboratory according to the types of preanalytical errors, and to raise awareness on sensitive pediatric samples.

Material and Method: In our study, we included samples accepted from the pediatric emergency department to the biochemistry laboratory between January 1 and December 31, 2019, and only rejected for preanalytical error. We evaluated the rejected samples by grouping them according to their rejection reasons and sample type (complete blood count, biochemistry, blood gas, urine, hormone, cardiac, coagulation). We calculated the percentage of errors for each group as the ratio of the number of errors to the total rejected samples, and to the all of the samples in the study group, and expressed them as a percentage.

Results: We found that 2.15% of the samples accepted from the pediatric emergency room to the biochemistry laboratory were rejected for preanalytical errors. When we evaluated all the study groups together, we found that the most common causes of errors were clotted samples (56.69%), insufficient samples (13.24%) and hemolysis (7.42%).

Conclusion: We have seen that the preanalytical error sources of the samples accepted from the pediatric emergency department to the biochemistry laboratory are much. In this regard, we think that achieving a retrospective analysis of laboratory test processes, determining errors, implementing corrective and preventive actions, and providing phlebotomy training to relevant personnel may contribute to decreasing errors.

OP-08

Carbohydrate Deficient Transferrin; Measurement and the Preanalytical Phase Errors

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Objectives: Acute and chronic alcohol use must be determined by medical laboratories due to medical treatments or legal processes. It is important to identify alcohol-related markers in order to evaluate excessive alcohol use. Ethanol measurement is not suitable for determining chronic alcohol use. Carbohydrate deficient transferrin (CDT) is a better biomarker for chronic alcohol use. Determination of CDT is based on the measurement of various degrees of sialization of transferrin. Healthy human serum samples include different transferrin isoforms as trisialo, tetrasialo, pentasialotransferrin. Normally, asialo, monosialo, disialo transferrin glycoforms constitute only 3 %. Chronic alcohol use is defined as consuming more than 50 grams of alcohol per day over seven consecutive days. In these people, asialo and disialo transferrin isoforms are increased. IFCC has identified disialotransferrin as the target analyte to be measured for CDT determination. In this study, we aimed to show the CDT test requests sent to our laboratory, and preanalytical factors limiting CDT measurement. It was also aimed to discuss (atypical) CDT patterns that cannot be interpreted by HPLC.

Material and Methods: In our laboratory, the CDT test is run with commercial kits (Eureka, Italy) on the HPLC instrument (Schimadzu, Japan). It is important to take the blood sample to be determined as CDT into a flat glass tube without gel. Serum normal transferrin distribution range was accepted as follows; asialotransferrin and monosialotransferrin are not measurable, and the normal range of disialotransferrin is 2-2.5%, trisialotransferrin 4.5-9.0%, tetrasialotransferrin 64-80%, pentasialotransferrin 12-18%.

Results: In our laboratory, 1300 CDT test samples have been studied in the last year. In these patients, disialotransferrin is distributed in the range of 0.12-8.8%. In 101 samples, disialotransferrin is higher than 2.5%. GGT examination was requested from 96 of these patients simultaneously and it was found under 50 mg/dl in 62% of the samples. On the other hand, the chromatographic separation could not be made completely in 55 samples for CDT analysis by HPLC and the results could not be obtained because the samples not prepared well and the desired sample quality to be given to the device before analysis not achieved well. These samples were thought to be taken in satiety and the average triglyceride levels in these 55 samples found to be 532,3 (108-1128) mg/dl.

Conclusion: It is important to take fasting blood for analysis in patients who will be monitored by CDT test. It is necessary to determine the blood sampling hours and establish a standard for patients who are monitored due to alcohol dependence. It is also important that blood samples taken into gel tubes should not be run on the HPLC. Many studies have shown that if CDT and GGT are used together, sensitivity is higher than when used individually. In our study, GGT was not found high in every patient with a level of disialotransferrin of 2.5% and above. This shows that CDT is more useful in the diagnosis and follow-up of chronic alcoholism. Another common cause of uninterpretable CDT results is bridging, possibly due to the presence of an extra component between disialotransferrin and trisialotransferrin. Changing glycosylation of plasma proteins is often associated with liver diseases such as hepatitis and cirrhosis. Although the most common reason for applying to our laboratory for this test is to show not to use of alcohol to get back the driver's license, nevertheless, the possibility of chronic liver disease should be kept in mind when reporting the results.

OP-10

The Tools for Evaluating the Performance in Hba1C Analyzer: Sigma Metric and Quality Goal Index Ratio

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Objectives: One of the most popular quality management system tools used for Six Sigma process improvement. In addition, this model can provide three features that affect patient results: low inaccuracy and deviation and the correct performance of the analytical method. Internal clinical control (IQC) and external quality assessment (EQA) programs are routinely carried out in all clinical laboratories to assist in the evaluation and continual improvement of analytical quality. The Six Sigma Model is a global quality management system that can also be applied in the determination of glycated hemoglobin (HbA1c). In recent years, this model has been supported by Quality Goal Index (QGI). In this study, we aimed to evaluate the analytical performances of Arkray HA8180V HbA1c Analyzer, based on according to internal and external quality sigma metrics and QGI.

Material and Methods: The data have been evaluated according to two internal control material (Bio-DPC and KBUDEK External Quality Program) with the calculation of Sigma levels (S=(TEa%-Bias%)/CV%) and quality target indexes (QGI=Bias/1.5*CV). Quality Goal Index, a metric that can distinguish between precision and accuracy problems, as well as techniques to deal with calibrator lot changes.

Results: The mean sigma levels for low and high-quality control materials were found to be 3.5 and 7.3 respectively. QGI were found 0.8-1.2 for both devices.

Control	Cv%	Bias	Tea	Sigma	QGI
k1	1.47	-2.40	4.83	3.52	1.09
k4	2.10	-4.72	-1.26	5.36	0.76

Conclusion: The performance of ADAMS HA8180T and HA8180V HbA1c Analyzers were found to be acceptable compared to sigma metrics. The values of the OGI between 0.8-1.2 indicate that the problems related to inaccuracy and inconsistency. But when evaluated as a whole with sigma values, the results of the devices were found reliable.

Months	SDI	BİAS	%CV	QGI	SİGMA
January	0.99	6.5	4.49	0.97	3.10
February	1.45	4.6	4.2	0.73	3.83
March	1.2	3.6	4.7	0.51	6.14
April	0.37	2	3.32	0.40	2.41
May	1.09	2.5	4.09	0.41	1.83
June	0.77	7.1	2.2	0.66	1.32
July	0.55	5.9	1.96	0.79	2.09
August	0.6	1.6	2.27	0.25	3.70
September	0.6	3	1.43	0.37	4.90
October	0.92	2.8	2.27	0.62	3.17
November	0.6	1.3	2.3	0.38	9.43
December	0.34	1.6	3.5	-0.80	2.40

POSTER PRESENTATION

PP-01

Assessment of 2019 Van Akdamar Hospital Preanalytical Errors With Sigma Metric

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Objectives: Today's laboratory approach relies on high-quality analysis, cost-effectiveness and patient satisfaction. Preanalytical errors lead to problematic analyses, delayed results and increased healthcare costs. This study aims to evaluate 1-year preanalytical error rates of Van Akdamar Hospital.

Materials and Methods: This study involves 2019 data analysis of 150802 laboratory specimens which are assessed with specimen acceptance/rejection criteria. The data evaluated in the study were retrospectively obtained from hospital information system. Further analysis of data is carried out by Excel statistical program.

Results: Overall 212 of specimens reached laboratory were rejected. Total rejection rate was %0.14 which corresponds to 4.5 sigma performance. Primary rejection reasons were related to 121 insufficient volumed, 30 clotted, 28 hemolyzed and 20 contaminated samples. In details, sample rejection rates of complete blood count, biochemistry plus hormone, coagulation, HbA1c, blood-grouping, sedimentation and urine tests were %0.08 (4.7 sigma), %0.21 (4.4 sigma), %0.26 (4.3 sigma), %0.03(4.9 sigma), %0.04(4.9 sigma), %0.06(4.8 sigma) and %0.12(4.6 sigma), respectively. The vast majority of rejected samples were attributable to complete blood count, biochemistry and hormone tests (%75). Rejections were also analyzed in aspect of clinic services where sample came from. The rejection rates of newborn intensive care unit, pediatric clinic, emergency service, blood collecting unit(adult), blood collecting unit(child), gynecology and obstetrics service, internal medicine service and other clinics were %4.49 (3.2 sigma), %0.21 (4.4 sigma), %0.17 (4.5 sigma), %0,008 (5.3 sigma), %0.09 (4.7 sigma), %0.05 (4.8 sigma), %0.24 (4.4 sigma) and %0.09 (4.7 sigma), respectively.

Conclusion: Our total specimen rejection rate is at good levels in terms of 4.5 sigma performance. But the newborn intensive care unit rejection rate is at moderate levels as a 3.2 sigma performance which needs improvement applications. Owing to challenging blood draw from children, a dramatic rejection rate difference occurs between samples collected from children and adults in blood collecting unit.

PP-02

Distribution of Blood Groups in Van City Population

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Objectives: Determination of blood groups is essential in medical processes. Transfusion with wrong blood type leads to life-threatening reactions. Rh incompatibility is a condition occasionally occurring during pregnancy which gives rise to fetal morbidity and mortality. In this study, we aimed to specify distribution of blood groups in Van City population.

Material and Methods: This study comprises a 3-year blood-grouping tests data of 16338 patients admitted to Van Akdamar Hospital. Forward grouping method was used for detecting blood types of patients. The data of 2017-2019 blood-grouping tests were retrospectively acquired from hospital information system. Detailed distribution analysis of data is performed by Microsoft Excel Program.

Results: Distribution of blood groups in Van population was 40.2% A Rh-positive, 26.8% 0 Rh-positive, 13.7% B Rh-positive, 6.8% AB Rh-positive, 5.8% A Rh-negative, 3.7% 0 Rh-negative, 1.7% B Rh-negative, 0.8% AB Rh-negative and 0.3% variants. In addition, overall frequency of Rh-positive and Rh-negative types were 87.5% and 12.2%, respectively.

Conclusion: In Van City population, it is observed that A Rh-positive and 0 Rh-positive blood groups are the most prevalent ones. The findings were very similar to total of Turkey distribution.

PP-03

Comparison of 5 Monthly Quality Control During 2018-2019

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Objectives: The increasing role of laboratory medicine in clinical decision-making has led to a more careful evaluation of the effectiveness and the improvement of clinical results. Evidence-based assessment of laboratory performances is essential to ensure patients receive safe and efficient care. Quality control (QC) is an important element of the quality management system. It monitors the processes related to the analysis phase of the test and enables to detect errors. We aimed to calculate and compare total error, six sigma and RCV values for 5 months in 2018 and 2019 for glucose, albumin, AST, BUN, creatinine, sodium, potassium and total protein tests studied in our emergency biochemistry laboratory.

Material and Methods: In this study, comparisons were made for 8 biochemistry tests between 1 February-30 June 2018 and 1 February-30 June 2019 at the Istanbul Medeniyet University Goztepe Training and Research Hospital Emergency Biochemistry Laboratory, using IQC (internal quality control) and EQC (external quality control) data. The biochemistry auto analyzer used was Abbott Architect C8000 and it was swapped with the same device in January 2018. 2 levels of CV, normal and pathological levels, from IQ data, and bias from EQ data were taken. Total error, six sigma and RCV values were calculated for each month and for a total of five months in each test. Total error was compared with Ricos desirable criteria. Six sigma values were accepted as follows: <3 poor performance, between 3 and 6 sufficient, 6< world class performance.

Results: We couldn't meet the total error criteria for albumin, sodium, total protein. For six sigma, BUN performed poorly in both 2018 and 2019, while albumin and sodium performed poorly in 2019. The calculated RCV was similar for both years.

Conclusion: We can concentrate on different analytes if we follow the quality of our laboratory with total error or six sigma quality control methods. In fact, this shows that quality management by separate methods is not very consistent. It should be remembered that tests with a sigma value less than 4, due to the low biological variation/analytical variation rate, will change the quality tracking methods in the oncoming years, such as moving average quality control or with a change in sigma calculation method.

PP-04

Results of Test Requesting Optimization Study at University of Health Sciences Umraniye Training and Research Hospital

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Objectives: One of the most up-to-date topics of the preanalytical phase that has been tried to be managed is test optimization at the clinician requesting level. In this study, it is aimed to determine the results of optimization over numerical data in the last 6 years.

Materials and Methods: In Umraniye Training and Research Hospital, in 2018, the re-test intervals and clinical and diagnosis-based request restrictions were initiated in line with the clinical committee decisions of the Istanbul Provincial Health Directorate. The number of patients and total number of tests for the last 6 years were obtained on LBYS as of the 2nd Monday of every year and the average number of tests per patient was calculated.

Results: The rates of change obtained after the application were determined as 25.7 31.0, 28.7, 11.9, 9.4 10.0 for the emergency clinic as the average number of tests per patient, respectively, in 2015, 2106, 2017, 2018, 2019, 2020. The rate of change obtained after the application for the outpatient was determined as 11.2, 12.4, 12.4, 13.7, 11.1, 10.8 per patient, respectively, in 2015, 2106, 2017, 2018, 2019, 2020.

Conclusion: Demand optimization results are observed to create a positive change. In terms of efficient use of resources, test demand optimization is an important problem in the country and all around the world health system, and this exemplary implementation will be a guide for other health facilities.

PP-05

Biochemical and Haematological Changes in Synthetic Cannabinoids and Marijuana Consumers; A Retrospective Evaluation

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Objectives: In this study, we aimed to investigate the effects of synthetic cannabinoids and marijuana use on biochemical and hematological parameters.

Material and Methods: 104 patients aged 18-65 years were evaluated retrospectively between July 2017-2019. Alanine aminotransferase(ALT), Aspartate aminotransferase(AST), Urea, Creatinine, Sodium(Na), Potassium(K), Thyroid Stimulating Hormone(TSH), Free thyroxine 3(fT3), Free thyroxine 4(fT4), and hemogram parameters levels in blood samples were analyzed along with spot urine toxic substance levels.In addition, neutrophil lymphocyte ratio(NLR), platelet eosinophil ratio(PER) and platelet lymphocyte ratio(PLR) were calculated. Participants were divided into three groups based on the level of cannabinoid metabolites found in spot urine samples: Those testing negative for any toxic substances were included Group 1 (Control group). Group 2 comprised of those with urine bonsai metabolite levels >20ng/ml, and Group 3 included those with >50ng/ml marijuana metabolites. The used cutoff values were determined by Substance Use and Mental Health Services (SAMHSA) for immune methods1. Mean and standard deviations of the blood parameters measured within each group were calculated. One-way analysis of variance and Post-hoc Tukey test were used to compare the three groups with normally distributed parameters. Kruskal Wallis Analysis and Mann Whitney U test were performed for non- normally distributed parameters. The relationship between the parameters was determined by the Spearman correlation test and the Pearson correlation test. $p<0.05$ was considered significant.

Results: Neutrophils, NLR and PER were higher, while lymphocyte percentage and eosinophil percentage were lower in Group 2 than Group 1 ($p<0.05$). The neutrophil count and NLR values of Group 3 were higher whereas lymphocyte percentage and lymphocyte count were lower compared to Group 1 ($p<0.05$). The eosinophil count and eosinophil percentage were lower,and PER was higher in Group 2 compared to Group 3 ($p<0.05$). The use of bonsai positively correlated with neutrophil percentage, neutrophil count, and PER,and negatively correlated with Lymphocyte percentage, monocyte percentage, eosinophil percentage, red blood cell count and NLR ($p<0.05$). Marijuana use positively correlated with neutrophil percentage,NLR and PLR, and negatively correlated with lymphocyte percentage, monocyte percentage and lymphocyte count ($p<0.05$).

Conclusion: The findings of our study showed that bonsai consuming decreased lymphocyte percentage, eosinophil percentage and eosinophil count while increasing neutrophil percentage, NLR and PER. We also found that marijuana consumption increased neutrophil percentage and NLR, and reduced lymphocyte and Lymphocyte percentage values. Contradicting results are reported across different studies.Therefore, we believe that further research is needed to fully elucidate the effects of cannabinoid use on blood parameters.

PP-06

Analysis of the Relationship Between Blood Gas and Serum Bicarbonate Values

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Objectives: The aim of this study is to investigate the compatibility of bicarbonate (HCO_3-) levels measured by blood gas meter in serum autoanalyser.

Material and Methods: In the study, serum bicarbonate and blood gas bicarbonate levels of 186 patients were evaluated retrospectively in the last one year period (September 2018-2019). Serum HCO_3- levels were analyzed with Olympus AU5800 autoanalyser and blood HCO_3- level with Radiometer ABL800. Serum bicarbonate results were divided into three groups as 0-60, 61-120 and >120 minutes according to the time elapsed between sampling and delivery time.

Results: The mean difference between the two methods [blood HCO_3- serum HCO_3-]; for 0-60, 61-120 and 120 minutes were; 0.13±7.6, 0.92±7.6; 1.6±5.4 mmol/L, respectively. According to the literature, the maximum

allowable error obtained from intra-individual coefficients of variability was reported as 0.46 mmol/L. In this study, the mean difference between the two methods examined between 0-60 minutes was less than 0.46 mmol/L; The difference between the other two groups was greater than 0.46 mmol/L. In addition, % Bias, Total CV% and total analytical error (TAH) of levels serum bicarbonate were found as 8.52, 10.27 and 25.47 respectively.

Conclusion: If the serum HCO_3- level was measured in the time of 0-60 min, we think that the two methods can be considered as alternatives. However, for samples that are waiting longer, evaluation of them as an alternative may cause errors. We also believe that the TAH value of the laboratory should be taken into consideration when evaluating serum bicarbonate level results, even if it is run under optimum conditions.

PP-07

Quality Control Application Based on Patient Results of the Serum Creatinine: Exponentially Weighted Moving Averge

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Objectives: Serum creatinine test is one of the most important parameters used in routine in renal dysfunction. With "exponentially weighted moving average" (EWMA) in patients' data, we can observe how much it has changed compared to the previous one. Since excessive fluctuations have been eliminated, any deviation from any reason can be regarded as false height or low results. We aimed to follow serum creatinine results with the EWMA method in different biochemistry analyzer models from the same manufacturer.

Material and Methods: One month of accumulated data for outpatient and inpatients (≥18 years) was obtained from the laboratory information system. Those with serum creatinine ≥2 mg/dL were excluded. In the same health facility, results of the devices in the central laboratory (AU 5800-I and AU 5800-II), satellite outpatient clinic (AU 2700), and emergency laboratory (AU 680) were used (n=29.022). Lambda value was taken as 0.05. Statistical analysis was performed separately by gender (Microsoft Excel).

Results: When upper and lower EWMA control levels were defined as mean±2 SD, in female patient results of AU 5800-II model in the center; first bias detections were shown as starting at 144th, passing the upper control at 160th; so, bias is detected at the 16th creatinine result after bias introduction. Second bias detections were shown as starting at 1199th, passing the upper control at 1225th; so, bias is detected at the 26th creatinine result after bias introduction. When the February 2020 external quality control assessment is examined; while a deviation (at border) from the target was observed in one of the devices in the center (AU 5800-II), there was no inappropriate values in internal quality control process for creatinine. No incompatibility was found in the satellite outpatient clinic and emergency laboratory.

Conclusion: Possible intra-day deviations in analytical performance cannot be monitored, internal and external quality control applications are "late warning" in showing bias; it may be inadequate in taking corrective-preventive steps. In this study, there was a difference in patients' profile between the central laboratory and satellite outpatient clinic; samples from nephrology, dialysis, and intensive care were also admitted to the central laboratory, these units were not occupied in the satellite outpatient clinic. So, using the same truncation limits, comparison between the laboratories (and devices) can not be available if the patient profiles differ. In-house methods, laboratory specialists may take advantage of this quality control application.

PP-08

Lower Serum Glucose Results Obtained With Clot Activator Gel Compared to Naf-Edta Plasma Samples in Outpatients

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Objectives: This study aimed to compare the serum Glucose obtained by BD SST I gel and BD NaF-EDTA vacuum tubes in the hospital outpatient samples complying with routine laboratory sample handling.

Material and Methods: During one month, we collected 102 outpatients' samples in total and measured Glucose daily. We processed both tubes according to our routine laboratory procedure. After about 30 minutes of incubation at ambient temperature, we centrifuged samples at 2000 g for 10 minutes, with cooling to about 20 to 25 °C. We determined Glucose on the Roche Cobas 6000 platform with the Hexokinase method. Glucose results for both samples did not show normal distribution (Shapiro Wilk $p<0.001$), and therefore we used the Wilcoxon paired test for comparison of two glucose groups. We performed Statistical analysis using MedCalc software (ver. 19.1.7; 2020).

Results: Our laboratory's nine months' intermediate CV for Glucose is about 1.3% and the repeatability CV is <0.8%. The mean Glucose peer bias in the external quality scheme (EQAS, BioRad) for the last nine months across four different levels was -0.6%. Median and interquartile Glucose results (mg/dl) for both tubes (n=102) were as follows: SSTI Serum: 102.6 (95.5–121.8) and NaF-EDTA Plasma: 105.8 (97.7–124.4). The difference between groups was statistically significant ($p<0.001$, $\alpha 2$). Hodge-Lehmann Median difference was -2.05 (95% CI: -2.45 to -1.7). We obtained the following regression analysis equation: NaF-EDTA Glucose (Regressed Glucose)=1.4564+1.0057 *SSTI Glucose; (R^2=0.9980). Median and interquartile Regressed Glucose results were: 104.6 (97.5–123.9). NaF-EDTA and Regressed Glucose results were not statistically different ($p=0.9647$) with Hodge-Lehmann Median difference 0.000 (95% CI -0.35 to 0.4).

Conclusion: Most of the currently defined glucose cut-offs were determined using NaF as a Glucose stabilizer. Routine medical laboratories should use either NaF tubes or use standard gel tubes glucose results corrected for Glucose consumption until sample centrifugation.