



Is Laboratory Medicine Alone Sufficient? Analysis of Laboratory Requests of the Third Care Family Medicine Clinic

Bestegül ÇORUH AKYOL^{1*}, Ahmet Burak GÜRPINAR²

¹Ordu University Medicine Faculty, Family Medicine Department, Ordu

²Ordu University Medicine Faculty, Medical Biochemistry Department, Ordu

*Sorumlu yazar (Corresponding author): bestegulcoruh@yahoo.com

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Abstract

Introduction: Within the scope of preventive medicine practices of the Family Medicine Specialization discipline, individuals are analyzed with a holistic point of view, and after a full systemic physical examination by taking their anamnesis, tests that are appropriate and necessary for their age, gender and clinical findings. In our study, it was aimed to evaluate the medical biochemistry test rates of a Family Medicine Clinic serving in the tertiary level and to evaluate the health services provided in terms of holistic medicine, preventive medicine and health literacy. **Material Method:** In our cross-sectional study, the 1-year test numbers requested by Ordu University Faculty of Medicine Family Medicine Clinic between 01.01.2022 and 31.12.2022 were obtained from the automation system of Ordu University Training and Research Hospital. Microsoft Excel program and MedCalc (version 20.009; Ostend, Belgium) statistical package program were used for statistical analysis of the data. The data were statistically expressed as number, frequency, percentage, arithmetic mean, and standard deviation. $P < 0.05$ was considered statistically significant. **Results:** In our study, in which it was determined that 84368 examinations were requested, 92.2% of these examinations were requested from the outpatient clinics and 0.8% from the inpatient service. Of the examinations, 65.9% (n=55623) were female and 34.1% (n=28745) were male. When we look at the distribution of the number of tests performed in our clinic according to the test groups, it was seen that biochemistry tests were the most common (70.5%), followed by hormone tests (21%). While creatinine, ALT, AST, blood urea nitrogen and fasting blood sugar are the first five most requested biochemistry tests, respectively; The top five most requested hormone tests are listed as TSH, Vitamin B12, Folate, free T4 and Ferritin, respectively. **Conclusion:** In the light of technological developments, life expectancy is increasing day by day. This situation brings with it an increase in the incidence of chronic diseases. The laboratory evaluations in the periodic health guide and the analysis conditions of our study are qualitatively similar. In addition, the fact that female individuals are more than twice as high as males in our results can be considered as a guide for health literacy awareness. Accordingly, we think that we should give more importance to public education.

Keywords: Family medicine, laboratory, preventive medicine, health education

1. Introduction

Laboratory tests are very valuable in screening for the prevention of diseases, diagnosis, follow-up processes of diseases and follow-up of treatment conditions. As in all branches, our priority in patient evaluation is our anamnesis and physical examination findings. However, with the increasing work tempo and patient density, the worry of malpractice and the insistence of patients to have some examinations with questionable information about health continue to work against the general understanding of medicine in order to bring laboratory medicine to the fore. A family physician is a physician who has received specialty training after graduating from medical school, who provides comprehensive and continuous preventive health services and primary diagnosis, treatment and rehabilitative health services for the individual, regardless of age, gender and disease. In our country, family medicine can be practiced by general practitioners after trainings deemed appropriate by the institution when necessary (Anonymous, 2023a). The doctor uses the patient's anamnesis and clinical markers to make a diagnosis within the framework of a specific plan. Within the framework of these plans, the fact that the family medicine polyclinics are mostly undifferentiated patients, regardless of the level of the health institution they serve, usually puts laboratory analyzes at the top of the planning lists. Thus, it is desired to direct clinical uncertainties. However, considering the specificity and sensitivity of the tests, a number of guidelines were needed, primarily for cost-effectiveness and orientation towards differential diagnosis. Türkiye Republic (TR) The Guide to Periodic Health Examination (PHE) and Screening Tests Recommended in Family Medicine Practice, prepared by the Ministry of Health, Public Health Institution of Turkey, is used by the physicians of the discipline independent of the level of the health institution to which they are

affiliated. (Anonymous, 2015) According to this guideline, in Family Medicines where patients of all ages are evaluated, physical examinations are supported by laboratory analyzes and imaging tests at appropriate intervals according to age and background. Family physicians must have specific problem-solving skills in accordance with the core competencies of our discipline. Accordingly, family physicians want to be selective in obtaining and interpreting information from the history, physical examination and laboratory analyzes of their patients according to the prevalence and incidence rates of diseases in the community, and to use this information in creating an appropriate management plan in cooperation with the patient, and laboratory investigations are required in stages. According to the 1978 Alma-Ata declaration, most of the health problems can be solved in primary care. This fact still holds true today. It is reported that this rate is almost complete with the addition of simple laboratory tests (Anonymous, 2023b). The amount of money spent in the health sector in the world is increasing in direct proportion to the development of technological opportunities. More than 4.3 billion laboratory tests are performed each year for healthcare expenditures in the United States (US), with an estimated \$65 billion spent. However, \$6.8 billion is due to unnecessary testing, medical care and procedures that do not contribute to the patient's recovery. (Freedman, 2015) It is estimated that annual health expenditures cover 2-3% in Europe and 4% in the USA. (Konger et al., 2016; Alonso-Cerezo et al., 2009) According to the health expenditure statistics of the Turkish Statistical Institute, 2021; Total health expenditure increased by 41.6% in 2021 compared to the previous year and reached 353 billion 941 million Turkish Liras (Anonymous, 2023c). In our country, individuals expect a blood test not only in applications for control purposes, but also when they apply to a physician with a complaint. In fact, most of the time, the

reason for applying to a doctor in many practices is the demand: "I want to have my blood checked." Within the scope of preventive medicine practices of the Family Medicine Specialization discipline, individuals are analyzed with a holistic point of view, and after a full systemic physical examination by taking their anamnesis, tests that are appropriate and necessary for their age, gender and clinical findings. In our study, it was aimed to evaluate the health services provided by the evaluation of the laboratory test rates of a Family Medicine Clinic serving in the tertiary level in terms of holistic medicine, preventive medicine health literacy.

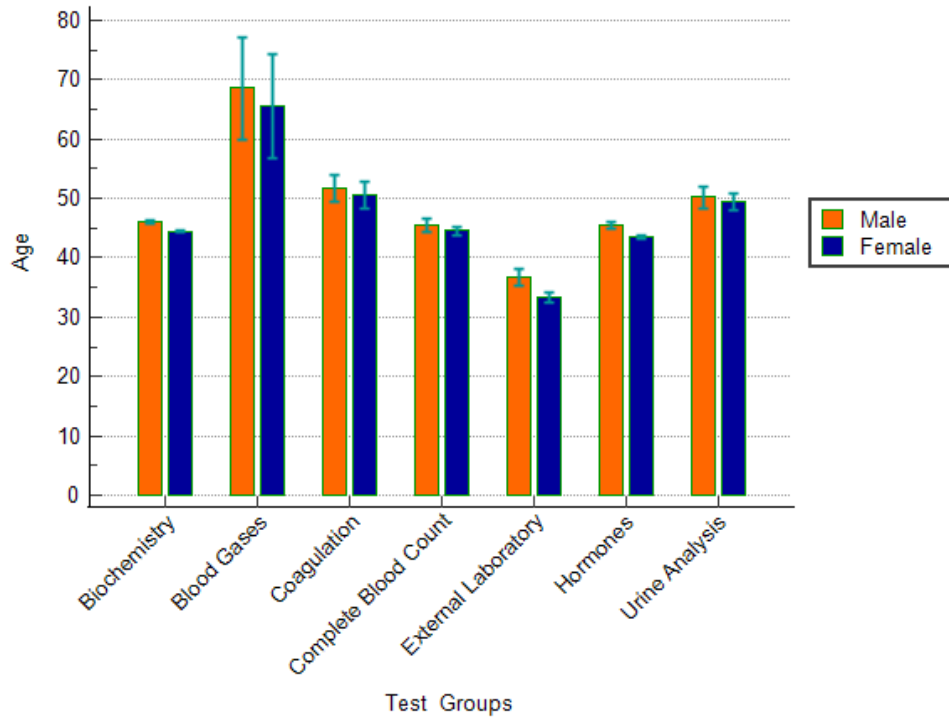
2. Materials and Methods

In our cross-sectional study, the 1-year test numbers requested by Ordu University Faculty of Medicine Family Medicine Clinic between 01.01.2022 and 31.12.2022 were obtained from the automation system of Ordu University Training and Research Hospital. Microsoft Excel program and Medical Calculator (MedCalc) (version 20.009; Ostend, Belgium) statistical package program were used for statistical analysis of the data. The data were statistically expressed as number, frequency, percentage, arithmetic mean, and standard deviation. For comparisons, two main groups were formed according to the reasons for application. (Illness and PHE) For laboratory analysis, the tests were categorized into seven groups as biochemistry, hormone, hemogram, urine tests, blood gases, coagulation and external laboratory tests. The chi-square test was used to compare the relationship of the groups with other factors. $P < 0.05$ was

considered statistically significant. Ethics committee approval for this study Ordu University Received from the Clinical Research Ethics Committee of the University Clinical Research Ethics Committee (Ethics committee date and no: 28.04.2023, 112).

3. Results

In our study, in which it was determined that 84368 examinations were requested from 3362 people in total, 92.2% of these examinations were requested from outpatient clinics and 0.8% from inpatient services. Of the examinations, 65.9% ($n=55623$) were female and 34.1% ($n=28745$) were male. While the highest number of examinations were requested in the winter with 28.8% ($n= 24289$), the least number of examinations were requested in the summer season with 20.1% ($n=16934$). When the age and gender of the patients in the test groups were evaluated, it was seen that as the age of the patients increased, the most requested examination was blood gases and coagulation, while external laboratory tests were requested the least. The distribution of test groups by age is shown in Graph 1. When we look at the distribution of the number of tests studied in our clinic according to the test groups, biochemistry tests (70.5%) were requested the most, followed by hormone tests (21%), followed by hemogram (4.4%). Mostly creatinine was requested from biochemistry tests, and Thyroid Stimulating Hormone (TSH) was the most requested from hormone tests. The data of the top ten most requested biochemistry and hormone examination groups are shown in Table 1.



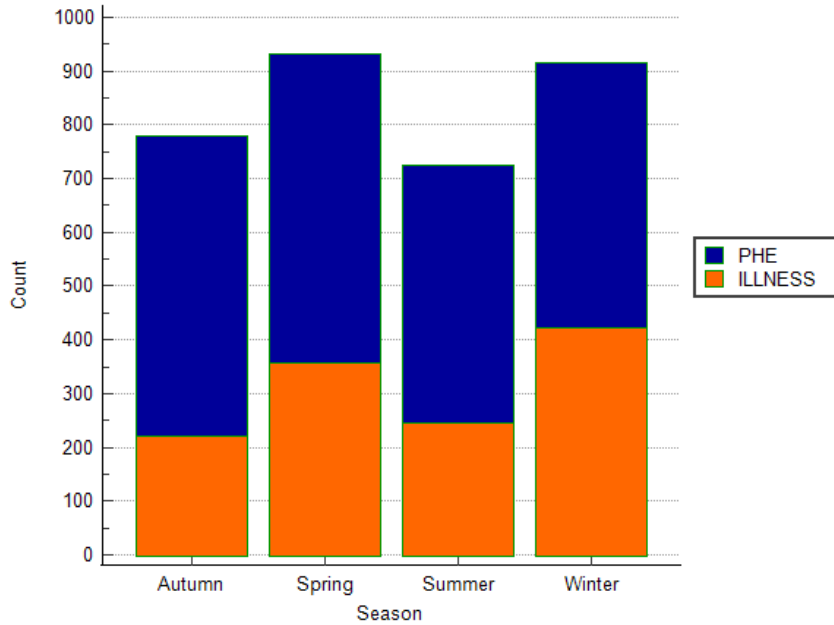
Graphic 1. The distribution of test groups by age

Table 1. The data of the top ten most requested biochemistry and hormone examination groups

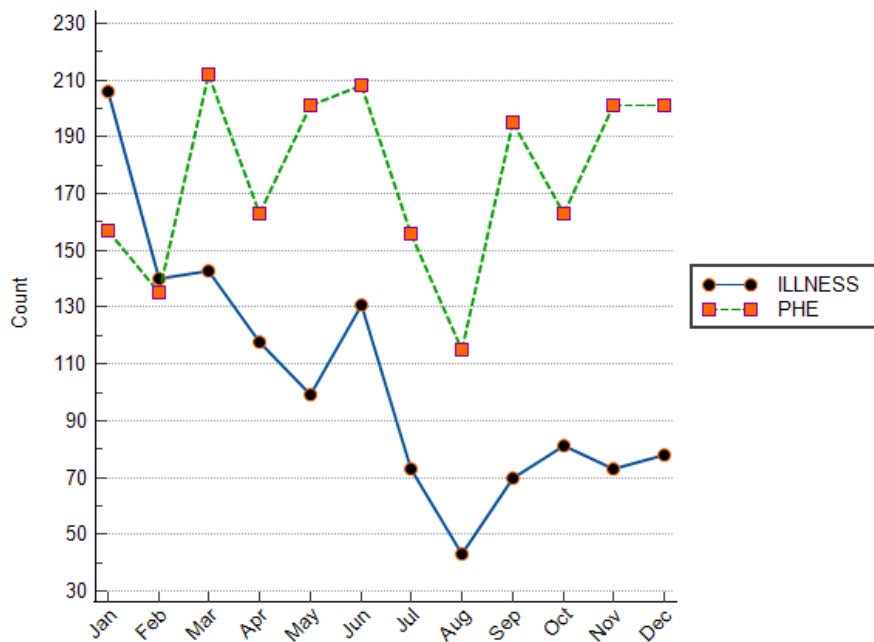
Biochemistry Tests	n	Hormone Tests	n
Creatinine	2.892	Tiroid Stimulate Hormone	2.527
Alanine Aminotransferase (ALT)	2.832	Vitamine B12	2.410
Aspartat Transferase (AST)	2.826	Folate	2.352
Blood Ürea Nitrogen (BUN)	2.823	Free T4	2.317
Glucose	2.811	Ferritin	2.287
Sodium (Na)	2.779	İnsülin	1.594
Potasium (K)	2.778	Homa Index Insulin Resistance	1.018
C-Reactive Protein (CRP)	2.615	25-Hydroxy Vitamin D	908
Iron	2.610	Free T3	523
Iron binding Capacity	2.609	Troponin I	163

While 62.7% (n=2107) of the examinations in the family medicine clinic were requested for periodic health examination (PHE), 37.3% (n=1255) applied for a disease. In both groups, women applied more than men, but no statistical significance could be found between the reason for admission according to gender (p=0.25). A statistically significant difference was found between

the reason for the application according to the seasons (p<0.0001). As seen in Graph 2, the highest number of applications for PHE was in the spring months, while the number of diseases did not increase relatively in the winter months. Both patient and PHE evaluation rates were declining during the summer months. The lowest rate was detected in August.



Graphic 2. Analysis of illness and PHE applications by season



Graphic 3. Analysis of disease and PHE applications by months

4. Discussion

In our clinic, outpatient follow-up, chronic disease follow-up, vaccination polyclinic, home health services and evaluations of our patients who apply after their complaints are made. Inpatient follow-ups are also carried out in our Palliative Care Service. The American Institute of

Medicine has summarized the 21st century health policy as preventive, effective, patient-oriented, equitable, efficient and timely service. (Anonymous, 2001) This definition almost defines the discipline of Family Medicine. According to the principles of preventive medicine, which is one of the indispensable facts of our

discipline, the previous examinations of the individuals followed up are checked through the system, and examinations whose control time has come are requested. The results of our study are in favor of preventive health services. Apart from the fact that this situation is a requirement of discipline, it may be due to the fact that citizens with health complaints do not know how to receive a health service in this direction through our polyclinics in this institution due to the fact that we are a third-level health institution. In a hospital in Thailand, it had been found that the five most common tests were Complete Blood Count (CBC), creatinine, serum urea nitrogen, glucose, and urinalysis. (Charuruks et al., 2004) Another hospital which is in Zimbabwe the five most common tests were urea, creatinine, sodium, potassium, and glucose. (Makuwaza et al., 2009) The list was lined up like as platelet count, CBC, creatinine, a combined test (sodium, potassium, chloride, carbon dioxide, and urea), and glucose in South Africa. (Pretorius, 2007) The most frequently requested tests in Northern Ireland are frequently listed as electrolytes, liver enzymes, thyroid function tests, and lipid profile. (Hung et al., 2021) In our study, the primary tests were creatinine in biochemical parameters, as well as the tests requested for kidney function tests and liver function tests. Hemogram was the third most frequently requested group in our clinic. The similarity of biochemical parameters may be due to high prevalence diseases such as Hypertension and Diabetes Mellitus. We think that the differences stem from the possible differences in the health policies of the countries. Schumacher et al. (2020) analyzed the examinations requested in primary care in Switzerland over a 9-year period and determined that the most requested examination was the complete blood count. The difference here with our study may be due to the difference in the duration of the cross-sectional periods in which the studies were conducted. In our

study, while both disease and PHE applications increased in winter, our rates decreased in summer months. Although there is no information on this subject in accessible sources, our clinic is a city that makes its living from agriculture and hazelnuts. For hazelnuts, August is the month known as the season. We think that this is the reason why the rates change seasonally. In a study conducted with 1768 physicians in primary care, diagnostic tests were requested for 31.4% of the interviewed patients, and in 14.7% of these tests, diagnostic tests were requested, and 8.3% of the results were uncertain in interpretation. (Hickner et al., 2014) World Health Organisation (WHO) published the third edition of the Model List of Essential In Vitro Diagnostics in 2021. WHO EDL is to ensure the availability of tests for universal health coverage and health emergencies and to promote healthier populations. Laboratory medicine is an essential element of the health-care system and is integral to many clinical decisions. The stage of economic development of the countries may affect the options in health system design. However, in all health systems it is likely that diagnosis could be improved by enhancing access to care and appropriate expertise, ensuring the competency of providers and primary care teams, making available high-quality diagnostic testing services (e.g. radiology/laboratory). (Graber et al., 2014) In addition, in order to prevent defensive medicine practices, which have become a serious problem in our country, the health awareness of individuals should be ensured in the most accurate way possible, and the necessity of physicians to request costly examinations should be avoided. In accordance with our discipline, although we did not detect this example in our own study, there are many similar findings in the sources that can be reached in the literature. Due to all the reasons we tried to explain above, especially the laboratory, examination medicine has become an unavoidable situation in our

country. These and similar situations have brought along many rational implementation measures. One of them is the rational use of laboratories. According to the results of our study, even if the number of examinations is high, the number of applicants and the fact that the majority of the examinations were requested in accordance with the guidelines within the scope of PHE shows that we pay attention to the rational use of laboratories. This is an indication that the values that seem quantitatively high are qualitatively cost-effective compared to other possibilities.

5. Conclusions

With technological developments, life expectancy is increasing day by day. This situation brings with it an increase in the incidence of chronic diseases. T.R. Ministry of Health Türkiye Public Health Institution Family. The analysis conditions of our study are qualitatively similar to the laboratory evaluations in the periodic health guide prepared by the Department of Education and Development of Medicine. In addition, the fact that female individuals are more than twice as high as males in our results can be considered as a guide for health literacy awareness. Accordingly, we think that we should give more importance to public education.

Declaration of Author Contributions

The authors declare that they have contributed equally to the article. All authors declare that they have seen/read and approved the final version of the article ready for publication. This study was presented as an oral presentation at the 1st International Eastern Black Sea Family Medicine Congress. Ordu, Türkiye.

Declaration of Conflicts of Interest

All authors declare that there is no conflict of interest related to this article.

Ethical Committee Approval

Ethics committee approval for this study Ordu University Received from the Clinical Research Ethics Committee of the University Clinical Research Ethics

Committee (Ethics committee date and no: 28.04.2023, 112).

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