Emergency physician Practice of laboratory tests requesting at King Faisal Hospital Taif, KSA, 2020

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Abstract

Background: Studies have found that unnecessary testing at the emergency department, King Faisal Hospital, was found to be expensive, inefficient, and requires additional technical resources.

Objectives: The aim of this study was to determine the practice of laboratory tests in emergency room requested by emergency physicians at King Faisal Hospital, Taif, KSA.

Methods: A cross-sectional study was done on 340 patient files that were checked for laboratory tests requested by the emergency doctors. The checklist included items about demographic data, presence of chronic diseases, laboratory tests requested, and whether these tests were normal, was used for data collection.

Results: CBC was requested for 97.9% of patients, LFT was requested for 82.9%, Urea/creatinine test was requested for 84.1% of the participants and electrolytes testing was requested for 88.5% of them. Vitamin D testing was requested for 42% of the participants and blood sugar testing was requested for 12.1% of them. The mean number of lab. tests done for studied patients was (6.82 ± 1.86). Patients with chronic diseases and those with comorbidities had a significantly higher mean number of requested tests.

Conclusions: There was an overuse of laboratory tests at the ED which necessitates to choose the necessary analyses for each patient and to implement education and training of physicians on the ways to decrease unnecessary lab test ordering.

Key words: practice, laboratory, tests, emergency, room, Taif

Introduction

Emergency room is the busiest area in the hospital. The staff working in the emergency room have feelings of anxiety due to several factors such as caring of the patients, taking responsibility, decision-making (as laboratory tests requested) (1). The Laboratory tests are an important key to diagnosis and prevention of a lot of diseases; also it represents an essential part of health care. We have recently noticed the use of more laboratory tests in emergency room patients (2,3).

Laboratory analyses differ from other techniques in certain aspects: first, there is only a slight probability of harming the patient; second, it is not easy to find consensus approved protocols among doctors to control their use; third, the techniques are easily available and are usually inexpensive; fourth, there are few objections to their implementation, and less (or no) regulation for their provision; and finally, oftentimes technological dissemination occurs before proper evaluation (4).

The increase in the use of laboratory services is attributed to factors impacting laboratories. This includes facilitated access, the introduction of autoanalyzers, development of new tests, and availability. Other factors increasing laboratory utilization include lack of physician training in clinic management, legal aspects, and demand from patients themselves who are increasingly becoming aware of health problems, such as old patients and those with comorbidities (5).

Laboratory tests in hospitals are the most important diagnostic tools for medical decision making at the Emergency Department. They are helpful and convenient for doctors; however, they can lead to overuse of tests and overdiagnosis (6).

Frequent problems that decrease both the efficiency and quality of laboratory diagnostic testing are: inappropriate utilization, abuse, and ignorance of diagnostic tests (7). It was found that 50% of physicians operating in emergency departments were

concerned about the possibility of malpractice litigation. Thus, among providers in subspecialties that are “high risk” for litigation were those working in emergency medicine (8). In addition, a study done by Sekhar and Vyas in 2013 has found that 52% of physicians order unnecessary tests and procedures out of concern over potential malpractice litigation, but without demonstrably better results in terms of patient care (9). Other studies found that excessive testing begets more testing as one test demonstrates an abnormality necessitating a second test for justification and further investigation with potential harm and little benefit to the patient (10).

Laboratory tests are among the ED’s most important diagnostic tools for medical decision making, in addition to anamnesis and physical examination (11). A study was done in the Netherlands in 2014 to determine which laboratory tests are essential for optimal decision making at the Emergency Department of our hospital. The study found that a limited number of laboratory tests are considered indispensable for the Emergency Department such as CRP and leukocytes, urea and creatinin, sodium and potassium, and haemoglobin (6).

Epner et al (2013) noted that inappropriate test ordering can result in false positive findings resulting in diagnostic error and leading to a cascade of further unnecessary investigations with additional inconvenience and anxiety for the patients concerned (12).

An Irish study done in 2014 aimed to encourage Sensible Test Ordering Practice to reduce the requesting of selected pathology tests by 50% in the Emergency Department of a large Irish teaching hospital. The study demonstrated that the aim was achieved through quality improvement following identification and careful selection of the optimal intervention (13).

In the Kingdom of Saudi Arabia (KSA), A retrospective study was done in 2016 to investigate the major causes of pre-analytical errors that led to sample rejection at the clinical biochemistry department in the laboratory of Hera’a General Hospital, Makkah city. This study also detected an overall specimen rejection rate of 23.72% from the emergency department (ED), which might be related to workload and pressured environment in the ED (14).

As the unnecessary testing is expensive, inefficient, and requires additional technical resources (15), the aim of this study was to assess the practice of laboratory tests in the emergency room requested by emergency physicians at King Faisal Hospital, Taif, KSA, 2019.

Methodology

Study design and time frame: This study was a cross-sectional study done from August to October 2019.
Study setting: This study was done at King Faisal Hospital, Taif, Saudi Arabia.

Sampling methodology: A simple random sampling methodology was used to choose the first patient file, where a randomly selected number between one, two or three was used. For example: if the number one was picked, the first file became the first one selected, and then a sample interval of 5 was used to systematically select files that would be included in the study.

Files of patients of both sexes, including those over the age of 18 who visited the emergency room with any complaints were included. The files of patients under the age of 18 and in critical conditions were excluded. After the exclusion criteria, 340 files were the study sample.

Study instrument: Data was collected through a predesigned checklist, where all laboratory tests requested by the emergency doctor were reviewed and recorded.

The variables included in the checklist were demographic data, questions related to chronic diseases, the analyses that were requested, whether the tests were normal or abnormal, and whether the expected diagnosis was reached or not and what was the expected diagnosis.

A pilot testing was done among 10 patient files. The experience of the questionnaire ensured that inconsistent questions were corrected and modified before managing to collect actual data.

Ethical considerations: Ethical approval for the study was obtained from the Research Ethics Committee of Academic Affairs and Training in Taif Health. Approval and permission were obtained from King Faisal Hospital in Taif. The confidentiality of the data was stressed and it was not used for anything except the study.

Statistical analysis: Data was analyzed using (SPSS) version 23. Qualitative data was expressed as numbers and percentages, and Chi- squared test ($\chi 2$) was used to test the relationship between variables. Quantitative data was expressed as mean and standard deviation (Mean ± SD), where Mann-Whitney and Kruskal Wallis Tests were applied to test the relationship between variables. A p-value of <0.05 was considered as statistically significant.

Results

(Table 1) shows that 65% of the studied sample were males, 35% had an age ranging from 18-30 years, and 81.1% were of Saudi nationality. Of the participants, 25.9% had chronic diseases, and 9.4% had multiple diseases comorbidities.

(Figure 1) shows that according to the diseases the participants had, 12.6% of patients had HTN, 12.4% had DM and 5.6% had CVD.

As for the lab. tests requested for the participants, CBC was requested for 97.9% of patients, where 19.4% of the requested tests were normal, LFT was requested for 82.9% where 65% of the requested tests were normal Urea/creatinine test was requested for 84.1% of the participants , where 52.6% of the test results were normal, and electrolytes testing was requested for 88.5% of the participants and for 43.2% of them the test was normal (Figure 2).

Vitamin D testing was requested for 42% of the participants, where 1.8% of the test results were normal, and blood sugar testing was requested for 12.1% of the participants and for 0.6 % of them the test was normal (Figure 3).

(Figure 4) shows that the possible diagnosis of the participants was CVD for 7.1%, renal colic for 5.9% of them. On the other hand, 45% of the participants were not diagnosed.

(Table 2) shows that the mean number of lab tests done for all patients was (6.82 ± 1.86). There was a highly significant relationship between the number of tests requested and the presence of chronic disease, comorbidities, where patients with chronic diseases and those with comorbidities had a higher mean number of requested tests (p=< 0.05). On the other hand, a non-significant relationship was found between the number of tests requested and whether these tests led to the accurate diagnoses (p=> 0.05).

Table 1: Distribution of the studied patients according to their demographic characters and the presence of chronic diseases and comorbidities (No.=340)

Variable	No. (%)
Gender	
- Male	221 (65)
- Female	119 (35)
Age	
- 18-30	119 (35)
- 31-40	70 (20.6)
- 41-50	48 (14.1)
- above 50	103 (30.3)
Nationality	
- Saudi	278 (81.1)
- Non-Saudi	62 (18.2)
Chronic diseases	
- Absent	252 (74.1)
- Present	88 (25.9)
Comorbidity	
- Absent	252 (74.1)
- One chronic disease	56 (16.5)
- Multiple diseases	32 (9.4)

Figure 1: Distribution of the studied patients according to diseases they had

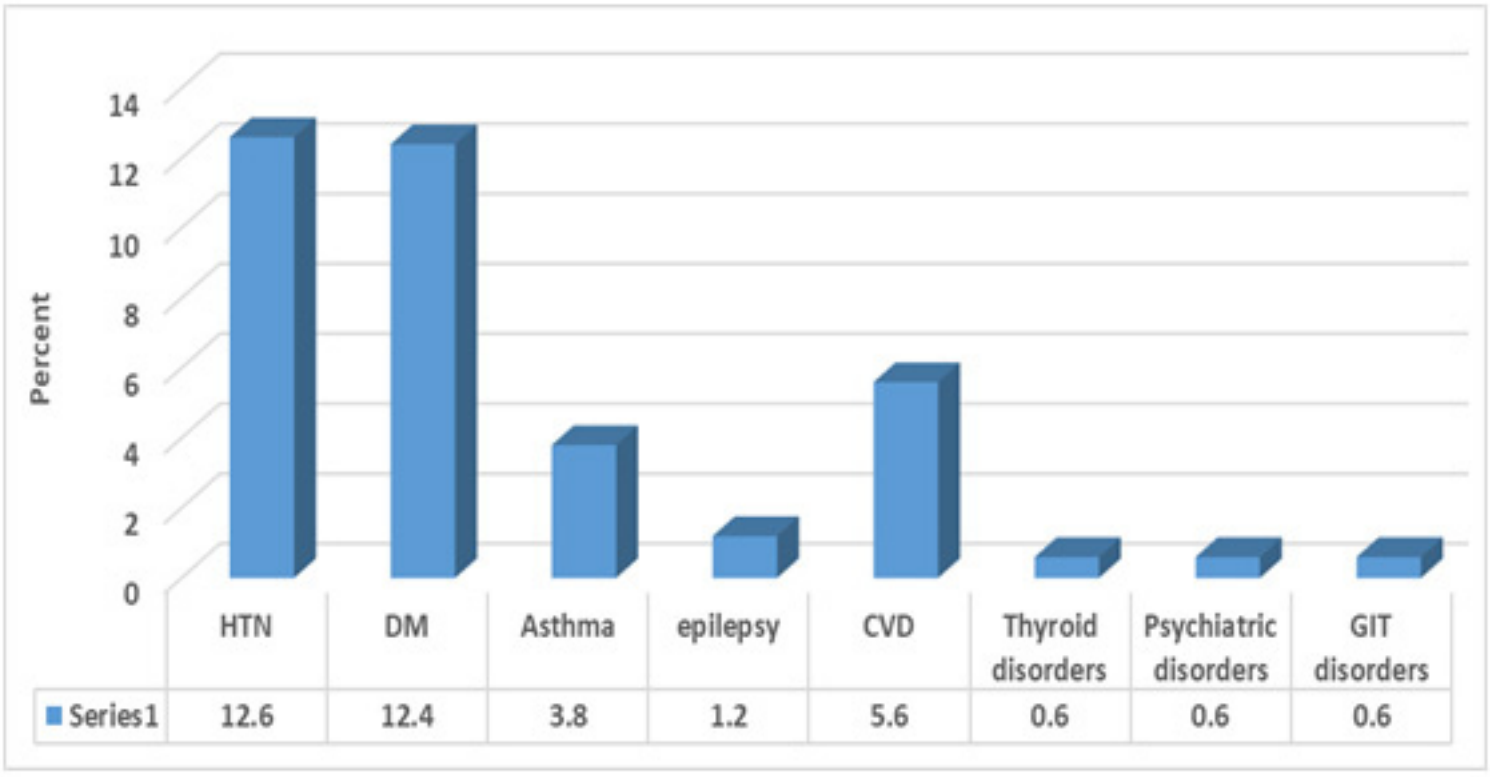
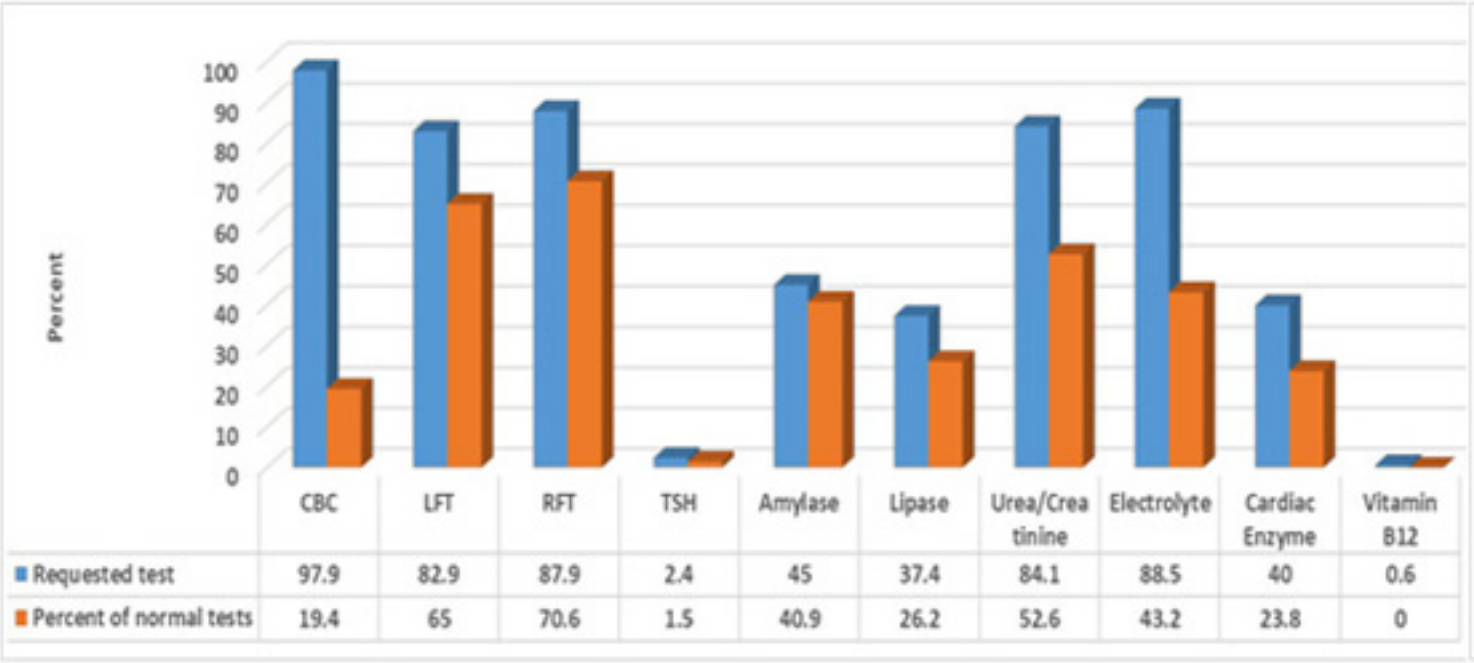
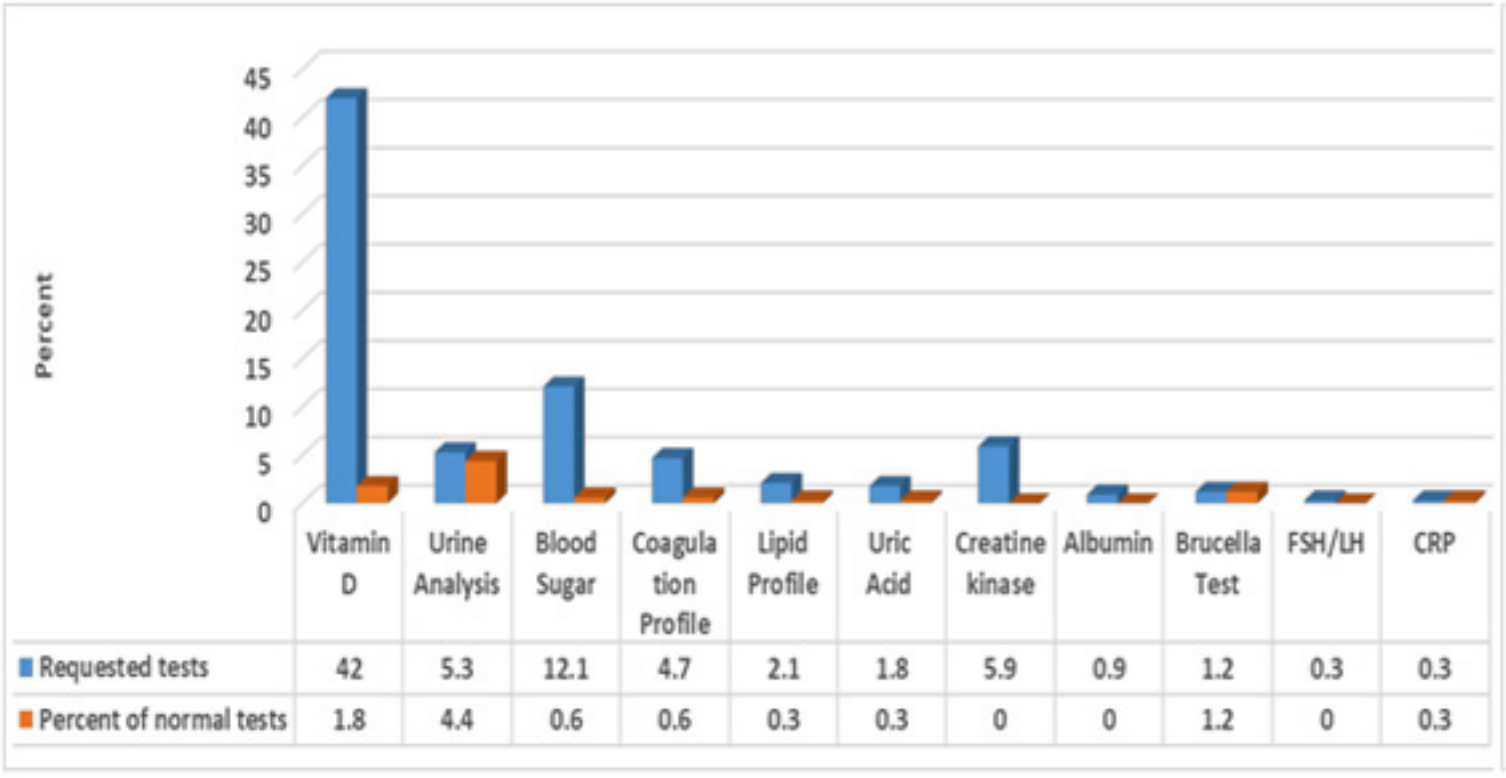


Figure 2. Distribution of the studied patients according to the laboratory tests requested for them and the percent of normal results for every test



	CBC	LFT	RFT	TSH	Amylase	Lipase	Urea/Creatinine	Electrolyte	Cardiac Enzyme	Vitamin B12
Requested test	97.9	82.9	87.9	2.4	45	37.4	84.1	88.5	40	0.6
Percent of normal tests	19.4	65	70.6	1.5	40.9	26.2	52.6	43.2	23.8	0

Figure 3. Distribution of the studied patients according to the laboratory tests requested for them and the percent of normal results for every test….(continued)



	Vitamin D	Urine Analysis	Blood Sugar	Coagulation Profile	Lipid Profile	Uric Acid	Creatine kinase	Albumin	Brucella Test	FSH/LH	CRP
Requested tests	42	5.3	12.1	4.7	2.1	1.8	5.9	0.9	1.2	0.3	0.3
Percent of normal tests	1.8	4.4	0.6	0.6	0.3	0.3	0	0	1.2	0	0.3

Figure 4. Distribution of the studied patients according to the possible diagnosis

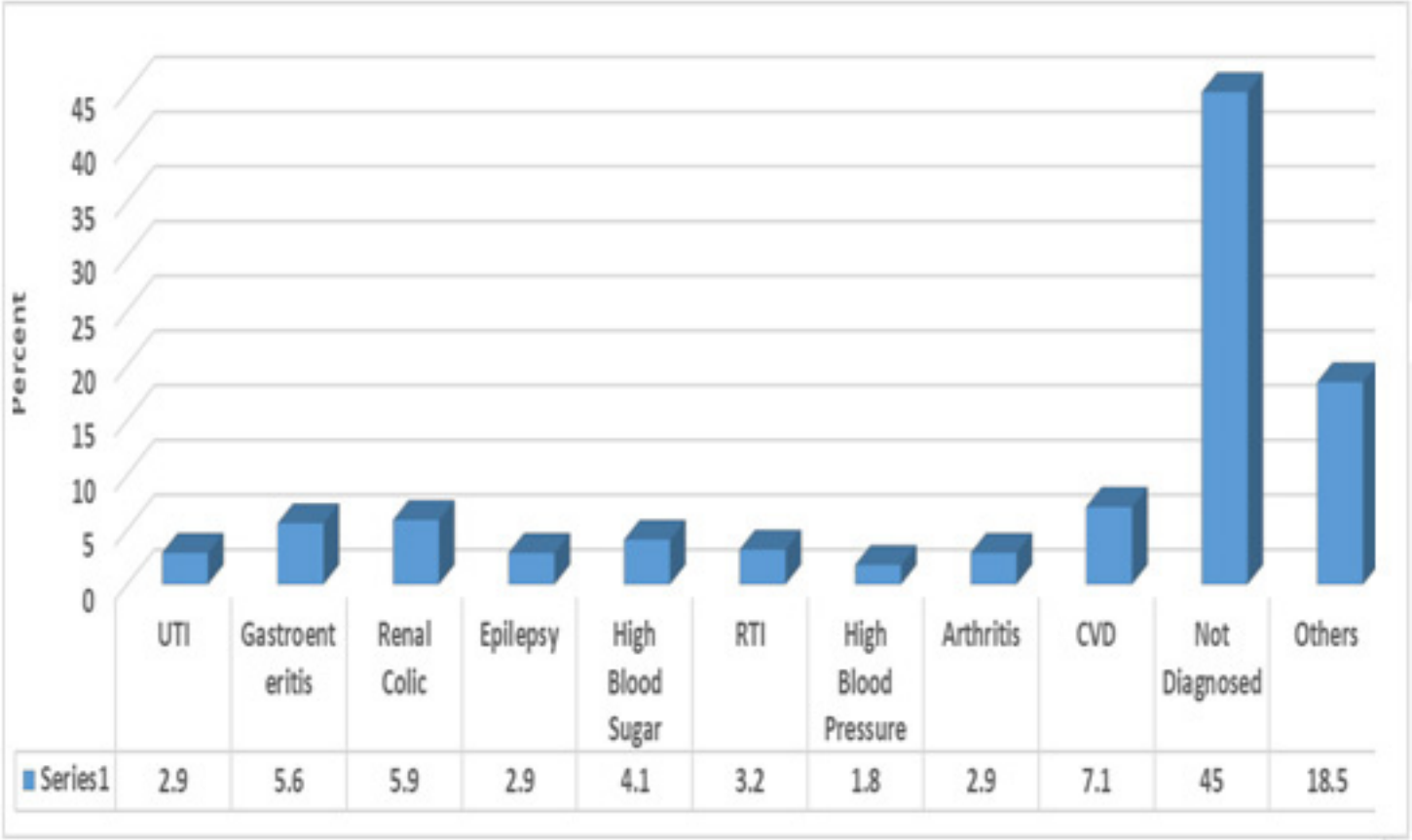


Table 2. Relationship between the number of tests requested and the presence of chronic disease, comorbidities and whether the patient was diagnosed

Variable	(Number of tests requested) Mean ± SD	Test	p-value
Chronic diseases - Absent - Present	633 ±1.62 8.8 ±1.2	8.03*	< 0.001
Comorbidity - Absent - One disease - Multiple diseases	6.33 ±1.62 7.65 ±1.62 9.15± 1.76	72.77**	< 0.001
Diagnoses - Diagnosed - Not diagnosed	6.86 ±1.78 6.77 ± 1.95	0.2*	0.84
Mean number of lab tests done for all patients	6.82 ± 1.86		

N.B.:
* Mann-Whitney U
**Kruskal Wallis Test

Discussion

The emergency laboratory is important in the management and diagnosis of the diseases of patients admitted to the emergency department. Characterized by high priority in processing and analysis, optimal and adequate use and request for laboratory tests contribute significantly to the overall quality and efficiency of laboratory services (16,17). Overuse of the laboratory tests is a noticeable event in many laboratories, especially in the ED. This may be due to doctors trying to provide the patient admitted to the ED with high-quality care, doctors are unwittingly subject to excessive demand for laboratory tests as well as a lack of awareness of the costs of laboratory testing (18).

The aim was to rationalize applications, reduce inappropriate testing and costs, as well as improve patient care. In this study, a comprehensive cross-sectional study of the requested lab tests by doctors in the ED at King Faisal Hospital in Taif city was done for 340 patients. All laboratory tests requested by doctors for these patients were reviewed, with a total of 2,052 laboratory tests for 340 patients.

In our study the frequencies the laboratory tests are requested for the studied patients, is similar to the most commonly used test requests as they are often requested together. As CBC was requested for 97.9% of patients, LFT was requested for 82.9%, electrolytes testing was requested for 88.5%, Urea/creatinine test was requested for 84.1%. These frequencies are in line with previous studies, where laboratory tests which are considered indispensable for the Emergency Department are: CRP, and leukocytes, urea and creatinin, sodium and potassium, and haemoglobin (6). It also agrees with a study conducted at the Zagreb University Hospital Center, where the most common tests were full blood count, urea nitrogen in the blood, creatinine, electrolytes and C-reactive protein, which are ordered together in 76% of patients (16). These studies demonstrated that doctors involved with the ED report that clinical chemical laboratory tests are among the most relevant tools for the purposes of diagnosis, following patient history and physical examination (11).

In the present study the frequency of requesting laboratory tests and the percentage of normal tests shows that there is a non-selective use of laboratory tests for patients admitted to the emergency department. As 65% of LFT tests were normal, 52.6% of Urea/creatinine tests were normal and 43.2% of electrolyte tests were normal.

This result goes along with a study done in Pakistan, where 62.2% of blood tests requested at the emergency department of a tertiary care hospital were found to be inappropriate, and only 3.8% influenced the diagnosis (19). Another study observed that more than half of abnormal results from laboratory tests ordered by physicians could be false-positive (2,20).

In the present work, the least requested test was the CRP and all tests were normal. This result = goes along with the American Academy of Allergy, Asthma & Immunology and the American Society of Clinical Pathology guidelines. The guidelines stated that incorrect tests that preferred substitutes include the CRP as it is more sensitive and specific for inflammatory conditions than erythrocyte sedimentation rate (ESR) (21).

The present study showed that patients with chronic diseases and those with comorbidities had a higher mean number of requested tests, and a non-significant relationship was found between the number of tests requested and whether the patient was diagnosed. This result agrees with previous study that showed that only a limited number of laboratory tests are essential for early medical decision making at the Emergency Department (6). And it is in line with a previous study done in Pakistan where 62.2% of investigations done on studied patients seen in the ER with one of the diagnoses covered by the Guidelines were inappropriate for the initial assessment of the patient. In this study, only 3% of the requested tests influenced patient care in the ER and 4% influenced the decision of admission (19).

The cause for inappropriate investigations could be the ER physicians themselves. A previous study found that 92% of ER doctors request imaging and laboratory tests for reassurance (22), and as a defensive medicine as 50% of physicians operating in emergency departments were concerned about the possibility of malpractice litigation (8). In addition, other studies found that 30% of ER physicians order unnecessary tests for reassurance and obtaining Information, and to avoid missing a low-probability diagnosis (8,23).

A study was done in KSA in 2014 to identify unnecessary laboratory tests ordered at King Faisal Specialist Hospital and Research Center, Jeddah, Saudi Arabia on one million laboratory tests done in 2012. This overutilization of lab tests in Saudi hospitals is shown by a previous study which found that more than 11% of requested tests were repeated, overutilized and unnecessary and could be removed. The three tests of CBC, Renal Profile and Blood Glucose accounted for 35% of all hospital inpatient lab tests (24).

The required inappropriate and non-selective tests can lead to a deterioration in the quality of care provided due to delays in diagnosis and false positive misleading results. In addition, they incur increased costs and burden on the laboratory (20).

Limitations

A limitation of the present study is the small sample size. That is why future studies with a larger sample is recommended

Conclusion

In the present study CBC was requested for 97.9% of patients, LFT was requested for 82.9% (65% of tests were normal), electrolytes testing was requested for 88.5% (43.2% of tests were normal), and Urea/creatinine test was requested for 84.1% (.52.6% of tests were normal). Patients with chronic diseases and those with comorbidities had a higher mean number of requested tests, and a non-significant relationship was found between the number of tests requested and whether the patient was diagnosed. There was an overuse of laboratory tests at the ED which necessitates choosing the necessary analyses for each patient and to implement orientation, education and training of physicians on the ways to decrease unnecessary lab test ordering and the costs of the ordered tests.

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