Physician's Satisfaction with Clinical Laboratory Services in Three Public Hospitals in Benghazi, Libya: A Cross-Sectional Study

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ABSTRACT

Introduction: A health assessment of laboratory quality, based on customer satisfaction, is vital for improving health services, especially for physicians who rely heavily on clinical laboratory services. Physician satisfaction affects job performance, patient care, and the quality of healthcare as a whole. Accurate diagnostic decisions depend heavily on lab results. **Methods and Materials:** A cross-sectional study design was implemented. The target population was physicians working at Al-Jalaa Hospital for Surgery and Accidents, Benghazi Children's Hospital, and Benghazi Medical Centre public hospital. Questionnaires were used to collect data from physicians in three public hospitals from May 1 to July 10, 2024. SPSS-26 was used for data analysis. Statistical analyses performed included percentage frequencies, the T-test, and ANOVA. **Results:** A study of 570 questionnaires found that most participants were middle-aged (30-40 years old), with a female demographic of 84.9% and a high proportion of bachelor's degree holders. The dermatology department had the largest percentage of participants at 26%. Most participants were physicians with less than 5 years of experience, and over half worked morning shifts. The weighted average of 2.78 (55.6%) suggests that physicians' satisfaction with clinical laboratory services is neutral, with the Children's Hospital having the highest satisfaction levels. Laboratory user guidebooks were the elements the participants were most dissatisfied with. There are statistically significant differences between the different departments, work shifts and physician satisfaction. In contrast, there are not statistically significant differences between experience, age and physician's satisfaction. **Conclusion and Recommendation:** The findings reveal that laboratory services face issues requiring attention and improvement.

Keywords: Physicians; Laboratory Services; Satisfaction; Benghazi; Health Assessment; Performance; Questionnaires; Quality; Disease Diagnosis.

1. Introduction

The medical laboratory service plays a vital role in the healthcare system, delivering crucial information for disease diagnosis, treatment direction, drug resistance assessment, disease prevention and control, and the identification of public health-related diseases through surveillance and policy formulation. An organised, efficient, and sustainable laboratory service is crucial to fulfilling these healthcare system needs [1],[3].

Physicians request laboratory tests, anticipating precise and prompt results to assist in the management of the patients they treat. The evaluation of clinical laboratory services is crucial for enhancing care quality and ensuring the adherence to quality standards. Physician satisfaction is regarded as the essential and desired consequence of the healthcare system, strongly associated with the utilisation of healthcare services [4].

Medical professionals consider many aspects of laboratory services as being crucial, including the quality and reliability of results, response time for routine tests, accessibility of pathologists, format of laboratory reports, notification of critical values, turnaround time for esoteric tests, availability of laboratory staff, the procedure services, responsiveness of laboratory management, and overall accessibility of the laboratory [5],[6].

The collaboration and synergy between physicians and clinical laboratories must be efficient to guarantee the quality of patient care. Effective collaboration between laboratories and doctors will enhance service quality for patients by addressing their needs [16]. Efficient communication across these services will probably reveal deficiencies in the precision and dependability of test outcomes, along with issues in reporting and timeliness [7].

Physician satisfaction with various clinical laboratory services is a reliable indicator of laboratory performance quality. These measurements indicate customer requirements and identify laboratory areas for improvement in patient health care quality [8].

Physician satisfaction with laboratory services is a key quality indicator in quality assurance programmes. These services are crucial for the quality and quantity of healthcare services in hospitals, and their integration is essential for quality improvement planning within these institutions [5],[9].

Test results with errors significantly impact the diagnosis, intervention, or preventive measures a physician recommends to the patient [10]. It was asserted that physicians are the primary clients of clinical laboratories, and their perspectives are crucial to highlighting areas requiring improvements [11]. Their observations and comments can assist clinical laboratories in recognising deficiencies and constraints in delivering quality service, hence demonstrating the significance of healthy physician-laboratory communication [12],[13].

Previous studies have shown that the communication and interactions between laboratory and clinical healthcare professionals influence the behaviour and treatment interventions of physicians. Improved communication between laboratory and clinical health workers can enhance the quality of patient care by fostering a positive attitude towards laboratory diagnostic services [5],[14].

 Medical laboratories are crucial departments in healthcare, performing tests and investigations to provide accurate and reliable health information to patients [15]. Laboratory data typically serve as the foundation for medical choices and potential therapy strategies evaluated by clinicians [16].

A physician satisfaction survey can help identify laboratory issues, thereby enhancing service quality. Monitoring customer satisfaction is crucial for clinical laboratories and healthcare organisations. Factors affecting satisfaction include service quality, staff professionalism, information provided for specimen collection and result retrieval, waiting times, availability of tests, cleanliness of the environment, location, and accessibility of lavatory facilities [17],[18]. The primary user of the laboratory, the test-requesting clinician, provides valuable suggestions for improving service quality. Laboratory managers can utilise physicians' perspectives to determine areas that need improvement [7],[19].

Clinical laboratories are required to evaluate physicians' satisfaction with their services to enhance quality. However, there is a shortage of national statistics or data concerning physicians' satisfaction in Libya. This study aims to assess physicians' satisfaction with clinical laboratory services in three public hospitals located in Benghazi, Libya.

1.1. Study Objectives

The objectives of this study are as follows:

(1). To assess the six dimensions of physicians' satisfaction with clinical laboratory services, which are turnaround time (TAT), laboratory information system, laboratory users' guidebook, quality of test results, communication, and process of collecting and delivering samples. (2). To survey the highest and lowest levels of physician satisfaction with hospital clinical laboratory services in Benghazi City. (3). To identify the related factors (social demographic)

associated with satisfaction or dissatisfaction with clinical laboratory services. (4). To determine the factors affecting physician satisfaction across various departments and to assess which department or hospital reported the highest level of satisfaction. (5). To analyse the impact of laboratory turnaround times on physician satisfaction, as well as explore any correlations between service quality and overall patient care outcomes. This comprehensive approach aims to provide insights that can lead to improvements in laboratory services and enhance collaboration between physicians and laboratory staff.

2. Materials and Methods

2.1. Study Design: A quantitative methodology was conducted to address the investigation inquiry. This investigation takes the form of a cross-sectional study method.

2.2. The research setting: The research data in this study is drawn from three main sources: Benghazi Medical Hospital, Al Jalaa Hospital, and Children's Hospital in Benghazi City. A random sample of hospitals was recruited from 7 public hospitals in Benghazi city to minimize bias.

2.3. Target population: All doctors working in the selected hospitals represent the target population to achieve the study objective. There were no specific exceptions for selecting the physicians. All doctors who hold a qualification that qualifies them to work as doctors were selected to examine, diagnose and treat patients in the selected institution. The numbers of physicians were about 570 physicians, which Response rate was %85 as it represented in Table 1.

Table 1. Questionnaires distributed and analyzed

Item	Number	Percentage
Total distributed questionnaires	570	—
Number of responses received	521	—
Invalid questionnaires for analysis	32	—
Valid questionnaires for analysis	489	**85%**

2.4. Data collection tool: The study was conducted in the form of a survey, with data being gathered via questionnaire that was adapted from a previous study [20]. It was a self-administered, close-ended question, and the type of questionnaire was the 5-point Likert scale for agreement, which, as in Table 2.

Table 2. Likert scale levels and relative weight

Degree of Approval	Likert Scale	Weighted Average Range	Percentage Range	Level Description
Strongly Agree	5	5.00 – 4.21	100% – 84%	Very High
Agree	4	4.20 – 3.41	84% – 68%	High
Neutral	3	3.40 – 2.61	68% – 52%	Middle
Disagree	2	2.60 – 1.81	52% – 36%	Low
Strongly Disagree	1	1.80 – 1.00	36% – 20%	Very Low

In addition, the questionnaire was divided under three headings: Special part of the demographic data on respondents (personal data) (Age, gender, experience, department, qualification, shift "the specific period of time during which the doctor works", satisfaction with the laboratory services provided in general). While the second

part: was allocated to measuring the degree of doctors' satisfaction with the clinical laboratory services at Benghazi Medical Hospital, Al-Jalaa Hospital, and the Children's Hospital in Benghazi, through 33 phrases formulated in a positive manner, divided as follows:

- Response time scale (TAT) consists of (4 paragraphs).

- The element of the laboratory information system, consisting of (4 paragraphs).

- The element of the laboratory users' guide, which consists of (5 paragraphs).

- The axis of the quality of test results, consisting of (5 paragraphs).

- The communication element consists of (8 paragraphs).

- The element of the sample collection and delivery process consists of (4 paragraphs).

Reliability of the questionnaire was calculated using Cronbach's alpha which was %94. It is clear from Table 3 that the elements obtained acceptable stability coefficients, which indicates that the questionnaire is characterized by stability to a very acceptable degree.

Table 3. Reliability Statistics of questionnaire

Dimensions	Number of Items	Stability Coefficient	Cronbach's Alpha
Response time (ATA)	4	0.675	0.821
Laboratory information system	4	0.666	0.816
Laboratory users' guidebook	5	0.752	0.884
Quality of test results	5	0.653	0.808
Communication	8	0.794	0.891
Process of collecting and delivering samples	4	0.812	0.901
Total scale	30	0.901	0.949

Duration of Data Collection: The collection of data is done approximately in two weeks.

2.5 Statistical analysis: It was performed using SPSS software (version 26).

Statistical analysis: Cronbach's alpha coefficient was used to find the stability values of the study tool, and the weighted average, standard deviation, and relative weight were used to identify at the level of physicians' satisfaction with clinical laboratory services at Benghazi Medical Hospital, Al-Jalaa Hospital, and Benghazi Children's Hospital. In addition, mean, standard deviation, percentage. The "T" test was used in the case of one sample, the "T" test in the case of two independent samples, and the analysis of variance (ANOVA) test.

2.6 Pilot Study: A pilot study was conducted with four respondents, two with an academic background and the other with laboratory field background. The pilot's study tested the questionnaire's content validity. The pilot study evaluated the clarity and comprehensibility of the consent forms within the research protocols, as well as the effectiveness of various participant outreach methods used in the recruitment strategies. These assessments were conducted to ensure that the procedures were clear, feasible, and would facilitate successful participant enrollment in the main study.

2.7 Ethical Considerations: Ethical approval was obtained from the authorities affiliated with the administration of each hospital in which the questionnaire was distributed. An official letter of permission was delivered from the College of Public Health to the administration of (Al-Jalaa Hospital/Benghazi Medical Center/Children's Hospital). The hospital administration was informed of the general objective and importance of the study. Data was collected by distributing a questionnaire to all doctors present during work hours, without exception. For data collection, the purpose of the study was explained, and written consent was obtained from study participants before administering the questions.

3. Results

3.1. Demographic variables for the study of study population

Figure 1 shows the distribution of participants in this study according to the selected hospitals. 32.7% of doctors work at Benghazi Medical Center, 30.1% at Al-Jalaa Hospital for Surgery and Accidents, and 37.2% work at Benghazi Children's Hospital. Approximately, the percentage of participants is not significantly different. This distribution shows a good representation of the three hospitals, which enhances the comprehensiveness of the study and ensures diversity in the sample.
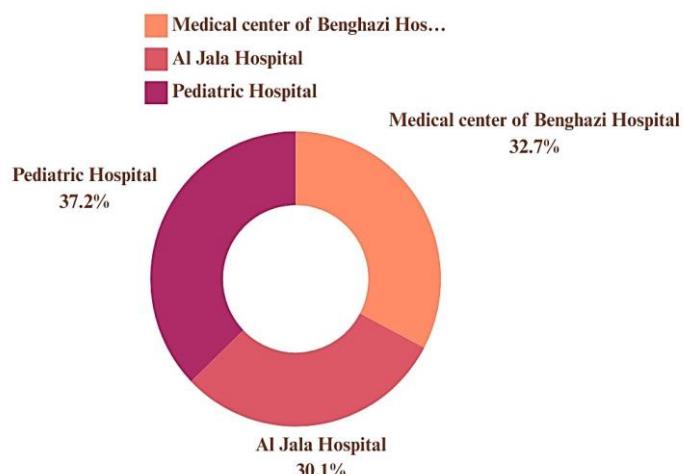

Figure 1. The distribution of participants according to the selected hospitals
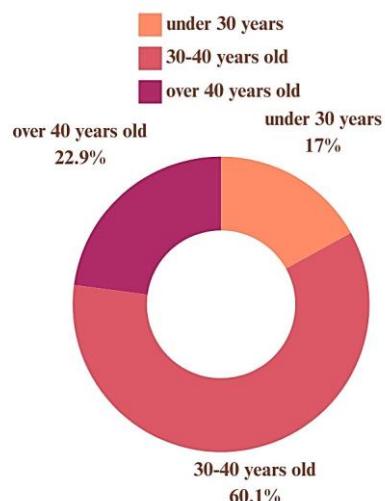
Figure 2. Age distribution of study participants

According to Figure 2, almost two-thirds of the participants belong to the age group of those older than 30 to 40 years, represented by 60.1% of the study population, while the group younger than 30 years constitutes 17.0%, and the group older than 40 years constitutes 22.9%. This indicates that most of the study population was middle-aged.

It is apparent from Figure 3 that the majority of those who participated in this study were female (84.9%), while the percentage of males was only 15.1%. This large difference reflects the dominance of females in the health sector within the populations under study.
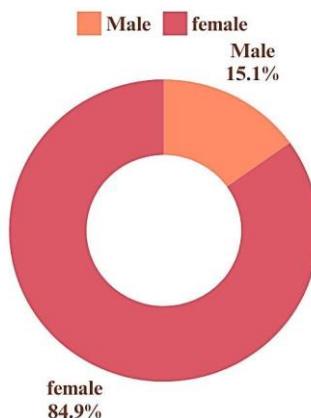
Figure 3. Gender
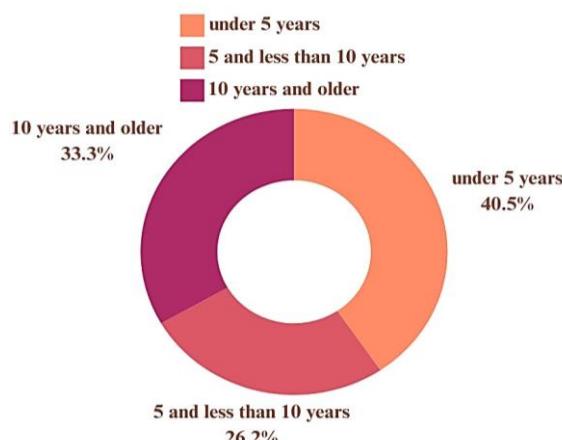
Figure 4. Years of Experience
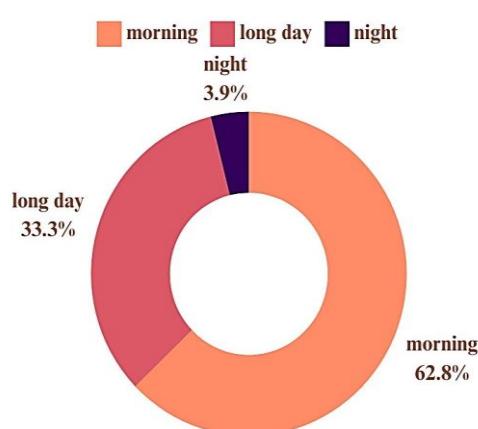
Figure 5. Work shift

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From the data in Figure 4, just under half of the doctors who participated in this study had experience less than 5 years of 40.5%. They are followed by those with 5 to less than 10 years of experience, at 26.2%, and finally those with 10 years of experience or more, at 33.3%. This distribution shows variation in the level of experience among doctors.

From Figure 5 above we can see that the high percentage of physicians work at morning shift. Following by the day shift which was 33.3%.the small percentage was for the night shift.
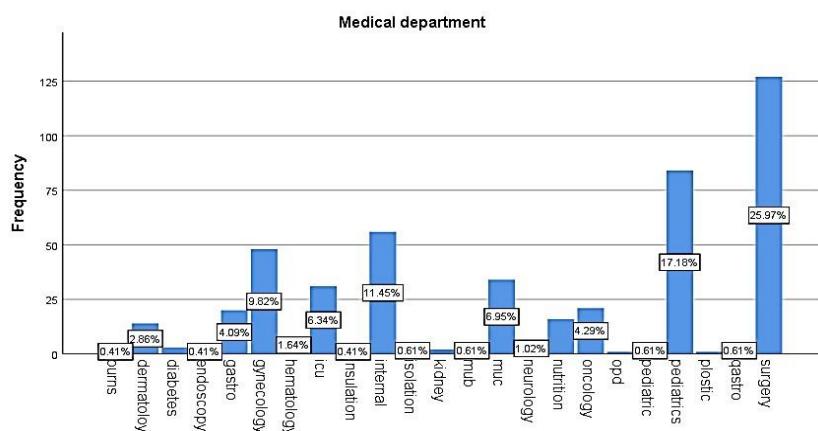
Figure 6. Departments

Figure 6 shows the different departments in which the participants work. for the department variable, the Department of Surgery has the largest percentage of doctors at 26.0%, followed by the Department of Pediatrics at 17.2%. The rest of the departments are distributed in smaller percentages, such as dermatology (2.9%), gastroenterology (4.1%), and obstetrics and gynecology (9.8%). This distribution reflects the focus on some vital departments.

3.2. Presentation and analysis of the study topics

Table 4. The whole elements of satisfaction

Elements of the satisfaction	Mean	Standard deviation	Percentage	Priority level	Rank
Response time (ATA)	2.91	0.83	58.2%	Neutral	1
Laboratory information system	2.79	0.83	55.8%	Neutral	2
Users' guidebook	2.61	1.06	52.2%	Neutral	4
Quality of test results	2.97	0.73	59.4%	Neutral	3
Communication	2.73	0.77	54.6%	Neutral	5
Process of collecting and delivering samples	2.78	0.60	56.4%	Neutral	6

Overall, through the data available in Table 4, the general level of the various elements related to satisfaction with clinical laboratory services from the point of view of the physicians is examined. The table shows the mean, standard deviation, percentage, and ranking of each element based on these values.

The quality of test results element received mean (2.97), with a standard deviation (0.73) and a percentage (59.4%), and the priority level is neutral and arranged in first place from other elements of satisfaction, which indicates that

doctors have relative satisfaction with the quality of results, but it still requires improvements to bring quality exactly in line with their expectations and further enhance their satisfaction.

The satisfaction about response time element (ATA) had the mean (2.91), with a standard deviation (0.83), and percentage (58.2%), and the degree of importance is neutral, and came in second place, which indicates that there is reasonable satisfaction with this element, but it needs to be improved. Further improvement to increase the overall level of satisfaction among doctors.

The Laboratory Users Guide had mean of 2.58, a standard deviation of 0.80, and a percentage of 51.6%. The degree of importance is not agreeing, and it came in sixth place, which means that this element needs major improvement. Emphasis should be placed on providing a clearer and more comprehensive guide to be useful to doctors and increase their satisfaction.

Table 5. Laboratory information system level

Rank	Priority Level	Percentage	SD	Mean	Item Description	No.
1	Neutral	59.2%	1.15	2.96	The response time is sufficient for routine frequentist testing	3
2	Neutral	58.6%	1.17	2.93	The response time (TAT) is sufficient for routine shelter testing	2
3	Neutral	57.6%	1.14	2.88	How satisfied are you with the timely provision of urgent/express services?	1
4	Neutral	57.4%	1.22	2.87	Response time is sufficient for emergency tests	4
–	Neutral (General level)	58.2%	0.83	2.91	General level of response time element (ATA)	–

It is clear from Table 5 that the means for the response time element (ATA) items ranged between (2.87-2.96) with standard deviations that ranged between (1.14-1.22). The item No. (3), which states, "The response time is sufficient for routine tests for those who are patient," came in first place, as it was of moderate importance, with mean of (2.96), a standard deviation of (1.15), and percentage (59.2%). This indicates that physicians consider the turnaround time for routine testing of patients acceptable, reflecting relative satisfaction with this aspect.

In last place came item No. (4), which states, "The response time is sufficient for emergency tests," as it obtained the lowest mean (2.87), with a standard deviation of (1.22), and a percentage (57.4%). This indicates that physicians were not sufficiently satisfied with the turnaround time for emergency tests, indicating a need to improve performance in this area.

Table 6. Laboratory information system level element

Rank	Priority Level	Percentage	SD	Mean	Item Description	No.
1	Neutral	60.6%	1.19	3.03	The laboratory test ordering system is convenient	5
2	Neutral	54.8%	1.16	2.74	The laboratory test search system is convenient	6
3	Neutral	54.8%	1.20	2.74	The results reporting system is appropriate	7
4	Neutral	53.0%	1.18	2.65	The laboratory is collaborative to conduct research tests	8
–	Neutral (General level)	55.8%	0.83	2.79	The general level of the laboratory information system	–

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Table 6 shows that the means for the items in the laboratory information system element ranged between (2.65-3.03) with standard deviations that ranged between (1.16-1.20). Item No. (5), which states, "The laboratory test request system is appropriate," came in first place, as it was of moderate importance, with a mean of (3.03), a standard deviation of (1.19), and a percentage (60.6%). This indicates that doctors consider the laboratory test ordering system acceptable, reflecting relative satisfaction with this aspect.

In last place came item No. (8), which states, "The laboratory is cooperative to conduct research tests," as it obtained the lowest arithmetic mean (2.65), with a standard deviation of (1.18), and a relative weight of (53.0%). This indicates that doctors are not sufficiently satisfied with laboratory cooperation in conducting research tests, indicating a need to strengthen cooperation in this area.

Table 7. Laboratory Users Guide level elements

Rank	Priority Level	Percentage	SD	Mean	Item Description	No.
1	Neutral	55.0%	1.16	2.75	The guide is useful	9
2	Neutral	52.6%	1.10	2.63	The guide explains the specialty of laboratory doctors	13
3	Disagree	50.8%	1.09	2.54	The guide details appropriate guidelines for test preparation	11
4	Disagree	50.6%	1.08	2.53	The guide details sample collection procedures	12
5	Disagree	49.6%	1.07	2.48	The guide is well updated	10
–	Disagree (General level)	51.6%	0.80	2.58	The general level of the Laboratory Users' Guide	–

Table 7 presents the means for the paragraphs of the laboratory users' guide ranged between (2.48-2.75) with standard deviations that ranged between (1.07-1.16). Item No. (9), which states "The evidence is useful," came in first place, as it was of moderate importance, with an arithmetic mean of (2.75), a standard deviation of (1.16), and percentage (55.0%). This indicates that doctors find the user guide relatively useful, which reflects limited satisfaction with this tool, followed in second place by item No. (13) which states, "The guide explains the specialty of laboratory doctors," with a mean (2.63) and standard deviation (1.10), and percentage (52.6%).

Table 8. The level of quality of test results

Rank	Priority Level	Percentage	SD	Average	Item Description	No.
1	Neutral	62.4%	1.18	3.12	Reliability of special test results	15
2	Neutral	61.8%	1.22	3.09	There is a loss of test results	16
3	Neutral	60.8%	1.22	3.04	Reliability of general test results	14
4	Neutral	56.2%	1.26	2.81	All types of basic tests are available	17
5	Neutral	55.8%	1.23	2.79	There are incorrect test results	18
–	Neutral (General level)	59.4%	0.73	2.97	General level of quality of test results	–

From the data in Table 8, it is apparent that the arithmetic means for the test results quality axis items ranged between (2.79-3.12) with standard deviations that ranged from (1.18-1.26). Paragraph No. (15), which stipulate "the reliability of special test results," came in first place, as it was of moderate importance, with mean of (3.12), a standard deviation of (1.18), and a percentage of (62.4%). This indicates that doctors consider the results of special

tests to have an acceptable level of reliability, followed in second place by paragraph No. (163) which states, "There is a loss in the test results," with a mean (3.09), standard deviation (1.22), and percentage (61.8%). This finding reflects a concern about missing some test results, which may affect the reliability of the diagnostic process. Item No. (18), which states, "There are incorrect test results," came in last place, as it obtained the lowest mean (2.79), with a standard deviation of (1.23), and percentage of (55.8%). This indicates that there are some incorrect results, which reflect the need to improve the accuracy of the tests provided. In general, the overall weighted average of the test results quality item, which reached (2.97), with a standard deviation of (0.73) and a percentage of (59.4%), indicates that the level of general satisfaction with the quality of test results falls within the neutral range. This demonstrates a relative alignment in physicians' perspectives regarding this aspect and suggests significant potential for enhancing the quality of test results.

Table 9. Communication level

Rank	Priority Level	Percentage	SD	Mean	Item Description	No.
1	Neutral	61.8%	1.23	3.09	Laboratory staff are available	19
2	Neutral	58.2%	1.30	2.91	The laboratory immediately notifies critical results (critical value notification)	25
3	Neutral	56.2%	1.24	2.81	Communication is smooth	20
4	Neutral	56.2%	1.25	2.81	Staff understand test requirements for my clinic	23
5	Neutral	52.8%	1.16	2.64	Employees are good at solving any existing problems	26
6	Disagree	51.6%	1.12	2.58	Does the laboratory notify immediately?	24
7	Disagree	50.2%	1.20	2.51	Laboratory staff efficiently respond to most phone inquiries	22
8	Disagree	49.0%	1.18	2.45	Laboratories usually answer phone calls immediately	21
–	Neutral	54.6%	0.77	2.73	General communication level (overall score)	–

It is apparent from this Table 9 that means for the items on the level of communication element ranged between (2.45-3.09) with standard deviations that ranged between (1.12-1.30). item No. (19), which states, "The laboratory staff is available," came in first place, as it was of moderate importance, with mean of (3.09), a standard deviation of (1.23), and a percentage of (61.8%). This indicates that doctors consider the availability of laboratory staff to be sufficient to some extent, followed in second place by item No. (25) which states "Does the laboratory immediately notify warning results (critical value notification)", with a mean (2.91) and standard deviation (1.30) and percentage (58. 2%). This result reflects that doctors believe that the laboratory responds appropriately to notification of critical values. Item No. (21), which states, "Laboratories usually answer phone calls immediately," came in last place, with a mean (2.45), standard deviation (1.18), and percentage (49.0%). This result indicates that laboratories do not respond very quickly to phone calls. In general, the general meaning of the communication element, which reached (2.73), with a standard deviation of (0.77) and a percentage of (54.6%), indicates that the level of general satisfaction with communication falls within the neutral range. This reflects a relative convergence in doctors' views on this element and indicates that there is much room for improvement in the quality of communication between doctors and the laboratory.

Table 10. The level of the process of collecting and delivering samples

Rank	Priority Level	Percentage	SD	Average	Item Description	No.
1	Neutral	56.8%	1.20	2.84	Inpatient specimen collection is convenient	28
2	Neutral	56.4%	1.19	2.82	Sample collection for hospitalized patients is convenient	27
3	Neutral	54.8%	1.16	2.74	Collecting samples for several tests is convenient	29
4	Neutral	54.6%	1.15	2.73	Convenient sample delivery process	30
–	Neutral (Overall)	55.6%	0.94	2.78	Overall process of collecting and delivering samples	–

From this data we can see that, means for the items on the sample collection and delivery process level element ranged between (2.73-2.84) with standard deviations ranging from (1.15-1.20). Item No. (28), which states, "Collecting samples for inpatients is appropriate," came in first place, as it was of moderate importance, with an arithmetic mean of (2.84), a standard deviation of (1.20), and a percentage of (56.8%). This indicates that doctors consider the inpatient sample collection process to be somewhat appropriate, followed in second place by item No. (27) which states, "Sample collection for hospitalized patients is appropriate," with a mean (2.82), standard deviation (1.19), and percentage (56.4%). This result reflects that doctors believe that the process of collecting samples for hospitalized patients is considered moderately appropriate, and in last place came item No. (30) which states "The process of delivering samples is appropriate," as obtained mean (2.73) with a standard deviation (1.15) and a percentage (54.6%). This indicates that the sample delivery process is considered moderately convenient.

In general, the overall mean for the sample collection and delivery process element, which reached (2.78) with a standard deviation of (0.94) and a percentage of (55.6%), indicates that the level of general satisfaction with the sample collection and delivery process falls within the neutral range. This reflects a relative convergence in the views of doctors on this axis and indicates that there is room for improvement in the quality of sample collection and delivery processes.

3.3. Statistical inference

Table 11. The case of one sample (One Sample T Test). The first main question: which states: "Is there a level of physician satisfaction with clinical laboratory services at Benghazi Medical Hospital, Al-Jalaa Hospital, and Children's Hospital in Benghazi?"

Item Description	Number (N)	Weighted Average	Standard Deviation	Hypothetical Mean	Degrees of Freedom (df)	T-value	Statistical Significance
Level of physician satisfaction with clinical laboratory services	489	2.78	0.60	3	489	-7.79	0.000

The level of physician satisfaction with clinical laboratory services consider within the normal range but tends to the negative side slightly, and the negative (T) value and statistical significance (0.000) indicates that the difference

between the mean and the hypothesized mean not only exists, but is also statistically significant, which means Doctors are significantly dissatisfied with clinical laboratory services, while the value of the standard deviation (0.60) reflects moderate variation in doctors' opinions, which indicates that there are slight differences in the level of satisfaction among doctors. Therefore, it can be said that doctors are not completely satisfied with the clinical laboratory services in the three hospitals in Benghazi.

Table 12. Doctors' satisfaction with clinical laboratory services and hospital variables

Hospital	Number (N)	Average	SD	Degree of Freedom (df)	F-Value	Statistical Significance
BMC	160	2.69	0.52	488	7.815	0.000
Children's Hospital	147	2.71	0.68	488	7.815*	0.000*
Al-Jalaa Hospital	182	2.92	0.57	488	7.815*	0.000*

Table 12 indicates that average of the study sample's responses for the Benghazi Medical Center was (2.69) with a standard deviation of (0.52), and for Al-Jalaa Hospital for Surgery and Accidents the average was (2.71) with a standard deviation of (0.68), and for the Children's Hospital the average was (2.92) with a standard deviation of (0.57).Through the value of (F) to test the differences between the means, it was found to be equal to (7.815), which is much higher than the critical value at the level of significance (0.05). The value of statistical significance (0.000) indicates that the differences between the averages are highly statistically significant, which means that there are real differences between doctors' satisfaction with clinical laboratory services in the three hospitals.

It can be concluding that doctors at the Children's Hospital showed the highest level of satisfaction with clinical laboratory services compared to doctors at Benghazi Medical Center and Al-Jalaa Surgical and Trauma Hospital. That is, the presence of highly statistically significant differences between the means indicates that the hospital variable significantly affects the level of doctors' satisfaction with clinical laboratory services.

Table 13. Doctors' satisfaction with clinical laboratory services and the variable of age

Age Group	Number (N)	Average	SD	Degrees of Freedom (df)	F-Value	Statistical Significance (p-value)
Less than 30	83	2.74	0.58	488	**2.774**	0.063
From 30 to 40	294	2.83	0.63	488	**2.774**	0.063
More than 40	112	2.68	0.50	488	**2.774**	0.063

Table 13 shows, average of the study sample's responses about doctors' satisfaction with clinical laboratory services according to the age variable was (2.74) with a standard deviation of (0.58) for the age group under 30 years, and (2.83) with a standard deviation of (0.63) for the age group of 30-40 years, and (2.68) with a standard deviation of (0.50) for the age group over 40 years.

The value of (F) for the test of differences between the means, which amounted to (2.774), indicates that there are no highly statistically significant differences, as it is less than the critical value at the level of significance (0.05). The statistical significance value (0.063) indicates that there are no statistically significant differences between the averages of doctors' satisfaction with clinical laboratory services according to the age variable.

From these results, it can be concluded that age does not significantly affect the level of physician satisfaction with clinical laboratory services in the three hospitals studied.

Table 14. Doctors' satisfaction with clinical laboratory services and the variable experience

Experience Group	Number (N)	Average	SD	Degrees of Freedom (df)	F-Value	Statistical Significance (p-value)
Less than 5 years	83	2.78	0.58	488	**0.545**	0.580
From 5 to less than 10 years	294	2.83	0.63	488	**0.545**	0.580
10 years and above	112	2.75	0.50	488	**0.545**	0.580

Table 14 provides that the average of doctors' satisfaction with clinical laboratory services according to the experience variable for doctors with less than 5 years of experience averaged (2.78) with a standard deviation of (0.60), and doctors with experience from 5 to less than 10 years had an average of (2.83) with a standard deviation of (0.59), While the average for doctors with 10 years of experience or more was (2.75) with a standard deviation of (0.59), and through the (F) value to test the differences between the means, which amounted to (0.545), and the statistical significance value (0.580), which exceeds the usual significance level (0.05), It can be said that there are no statistically significant differences between the levels of doctors' satisfaction with clinical laboratory services based on the experience variable. This means that the duration of experience does not significantly affect the level of doctors' satisfaction with clinical laboratory services in the hospitals studied.

Table 15. Doctors' satisfaction with clinical laboratory services and the department variable

Department	No.	Mean	SD	Degrees of Freedom (df)	F-value	Statistical Significance (p-value)
Burns	2	2.66	0.85	488	**1.895**	**0.009**
Dermatology	14	2.89	0.57	488	1.895	0.009
Diabetes	3	2.53	0.06	488	1.895	0.009
Endoscopy	2	2.58	0.02	488	1.895	0.009
Gastro (1st entry)	20	2.79	0.67	488	1.895	0.009
Gynaecology	48	2.73	0.45	488	1.895	0.009
Hematology	8	2.86	0.79	488	1.895	0.009
ICU	31	2.69	0.72	488	1.895	0.009
Insulation	2	3.30	0.00	488	1.895	0.009
Internal	56	2.86	0.59	488	1.895	0.009
Isolation	3	2.94	0.39	488	1.895	0.009
Kidney	2	4.07	0.00	488	1.895	0.009
Medical Unit B	3	3.24	0.15	488	1.895	0.009
Medical Unit C	34	2.99	0.43	488	1.895	0.009
Neurology	5	2.73	0.56	488	1.895	0.009
Nutrition	16	2.76	0.57	488	1.895	0.009
Oncology	21	2.50	0.40	488	1.895	0.009
OPD	1	3.77	0.00	488	1.895	0.009
Paediatric	3	2.33	0.31	488	1.895	0.009
Pediatrics	84	2.91	0.63	488	1.895	0.009
Plastic	1	1.80	0.00	488	1.895	0.009
Gastro (duplicate entry)	3	2.98	0.78	488	1.895	0.009
Surgery	127	2.68	0.63	488	1.895	0.009

From the data of Table 15 can be interpreted that Through the value of (F) for the test of differences between the means, which amounted to (1.895) and the value of statistical significance (0.009), which indicates a level of significance less than 0.05, it can be said that there are statistically significant differences between the levels of doctors' satisfaction with clinical laboratory services based on the variable Section.

Thus, these results indicate that the department variable significantly affects the level of doctors' satisfaction with clinical laboratory services, which means that doctors' satisfaction differs significantly between different departments.

4. Discussions

As was pointed out in the introduction to this paper, physicians constitute the principal consumer of the hospital laboratory, and their assessment of the services rendered is vital for enhancing service quality.

Regarding the average satisfaction rate for doctors in the target public hospitals, it was about 55.6%. Similar results were reported in a national survey of Ethiopia using the same questionnaire and in public hospitals, where overall physician satisfaction was 55% [21]. A Korean study of lab services found similar outcomes, with 58.1% of doctors saying they were satisfied with them [20].

In addition, this result is in line with a study done in Northwest Ethiopia (51.1%) [19]. This finding does not align with past studies conducted in Makkah, Saudi Arabia, where physician satisfaction was higher at 65%, and in Nekemte, Ethiopia, where it was 65.8%; additionally, 72.8% of clinicians reported satisfaction in Northeast Ethiopia. This discrepancy could be attributed to the fact this study was carried out at three large public hospitals, rather than the one referral hospital used in the Nekemte, Ethiopia, and Saudi Arabia investigations [11],[23],[22].

The most striking result to emerge from the data is that the laboratory user guidebook was the lowest-rated element, with a score of 2.58. This result is in excellent agreement with other studies in which the majority of doctors had unmet expectations with the handbook's accessibility or readability [24],[25],[26]. An updated manual, including the different test types, ordering procedures, sample types, and anticipated turnaround times, is required by standards to get better results from diagnostics and others [27],[28].

Another important finding was that physicians who work the night shift showed a higher level of satisfaction with clinical laboratory services compared to physicians who work the morning and day shifts. The shift variable significantly influences physicians' satisfaction with laboratory services.

It seems possible that this is the result since the workload on the night shift is usually less than other shifts in Libyan hospitals in general. In contrast to some reports in the literature, which indicated that more experienced physicians were highly satisfied [29], there was no association between the experience of the participants and the level of doctors' satisfaction with clinical laboratory services in the selected hospitals in this study.

The study evidence on the departmental variable significantly influenced doctors' satisfaction with laboratory services, which means that physician satisfaction varies significantly between different departments. This finding agrees with Jones et al.'s 2009 findings, which showed different satisfaction levels with different departments among the 4329 physicians served by the 138 participating laboratories in the United States [30]. The present

findings also seem to be consistent with other research, which found the emergency patient department had the highest level of satisfaction among healthcare practitioners with laboratory services, whereas the inpatient department had the lowest level of satisfaction [11]. However, the participants were different in this study, in which a total of 314 healthcare providers participated in the survey; the majority were nurses (63.7%).

5. Conclusions

Half of the study participants reported satisfaction with laboratory services in target hospitals. Despite the large number of participants in the study and the response rate, missing the opinions of physicians in private hospitals is a major limitation in this study. Moreover, the children's hospital showed the highest level of satisfaction compared to other hospitals investigated. It was shown that hospital departments and shift time have an impact on the level of satisfaction; consequently, improving services should focus on organisational, administrative, and technical factors more than on personal factors. Qualitative techniques are the most suitable methodology for conducting relevant research and offering recommendations to pertinent stakeholders.

6. Future Recommendations

1. Improving the communication channels between the physicians and the clinical laboratory staff.

2. Introducing guidebooks for all steps starting from the sample collection up to the interpretation of the results.

3. Updating the laboratory information systems to ensure the provision of accurate and rapid information, as well as providing necessary training for physicians.

4. Applying the quality control and assurance standards, in parallel to clinical departments as well as clinical laboratories.

5. More studies are required to monitor the impact of proposed improvements and changes and identify new areas that need to be introduced for improvement of the clinical laboratories' performance.

6. Implementing these suggested recommendations, including improving the quality of results, enhancing communication, and providing a laboratory users' guide, could significantly improve physician satisfaction.

7. Limitations

The lack of open-ended questions in the data collection tools may have restricted participants' ability to express their opinions on laboratory services. Some participants hesitated due to fear of punishment or professional consequences, potentially affecting the truthfulness of their answers.

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Consent for Publication

The authors declare that they consented to the publication of this study.

Authors' contributions

All the authors took part in literature review, analysis, and manuscript writing equally.

Ethical Approval

Ethical approval was obtained from the authorities affiliated with the administration of each hospital in which the questionnaire was distributed. An official letter of permission was delivered from the College of Public Health to the administration of (Al-Jalaa Hospital/Benghazi Medical Center/Children's Hospital).

Informed Consent

Written informed consent was obtained from study participants before administering the questions.

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