

## Assessment of Customer Satisfaction with the Clinical Laboratory Services Provided in King Abdullah Medical City, Makkah

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### ABSTRACT

**Background:** Patients and physicians are considered primary customers of laboratory services. Therefore, assessing customer satisfaction with laboratory services is an essential indicator in improving the quality of laboratory services. **Objectives:** This study measures the level of satisfaction of physicians and patients who avail of the clinical laboratory and phlebotomy services, respectively, at the outpatient department (OPD) in King Abdullah Medical City (KAMC), to evaluate the possible issues and carry out corrective actions. **Methods:** A cross-sectional survey to evaluate the level of satisfaction using a modified patient and physician questionnaires, the patients were randomly selected and interviewed in phlebotomy areas at the outpatient and chemotherapy clinics. A paper-based questionnaires were distributed to all physicians all available physicians in KAMC who were regularly requiring laboratory investigations. The collected data were coded, entered, and checked for outliers or missing data and analyzed using the SPSS statistical package version 21. **Results:** A total of 435 patients were interviewed and their mean satisfaction was  $4.51 \pm 0.32$  out of 5. Respondents were satisfied with the Availability of laboratory tests. However, they were dissatisfied with Explanation of the phlebotomy cautions by the phlebotomist (75.4%). Twenty eight percent of physicians (132) participated, their mean satisfaction rate was  $3.6 \pm 0.7$  out of 5. The greatest satisfaction rate was related to critical results notification and the communication with laboratory personnel. Physicians were most dissatisfied with both specimen delivery process and incorrect test results. **Conclusion:** Both customers were satisfied with the laboratory service provided for them. Factors as "Explanation of the phlebotomy process by phlebotomist" and "specimen collection and delivery process" received lowest satisfaction score for patients and physicians respectively. Therefore, improving them is required to meet the needs of the customers and gain their satisfaction regarding the service.

**Keywords:** Laboratory, Customer, satisfactions, services.

### INTRODUCTION

The clinical laboratory services of a healthcare facility play an essential role in making appropriate medical decisions for patient's health [1]. The concept in improving the quality of laboratory services considering the customer's perspective on the services provided to them has become more prevalent in the later decades [2]. Therefore, assessing customer satisfaction with laboratory services is an essential indicator in improving the quality of laboratory services. The Joint Commission on Accreditation of Healthcare Organizations and the College of American Pathologists (CAPs) give accreditation to clinical laboratory programs. The CAPs require the healthcare facility to measure customer satisfaction with the laboratory services every two years [3,4]. The healthcare system in Saudi Arabia has greatly improved. However, the customers' perspective regarding the healthcare services in general still remains unclear, and only a few studies have been conducted to measure the level of customer satisfaction [5]. In 2009, a study was done to measure the overall satisfaction of Arab patients about the services provided by primary health care centers in the city of Makkah during Hajj season [6]. Previously, in 1993, a similar study was conducted

in the city of Riyadh measuring the patients' level of satisfaction in general [7]. In 2015, a study was conducted in Maternity and Children Hospital in Makkah focusing on the physician's satisfaction with the laboratory services [1]. The lack of research aimed at measuring the customer's satisfaction with the laboratory services in Saudi Arabia inspired us to establish this study. Our study aimed to evaluate the level of satisfaction of physicians and patients who avail of the clinical laboratory and phlebotomy services, respectively, at the outpatient department (OPD) in King Abdullah Medical City (KAMC) and to address the possible issues to carry out corrective actions.

### METHODS

A cross-sectional survey was conducted in King Abdullah Medical City (KAMC), Makkah, Saudi Arabia from June 1 to June 30, 2015 measuring the level of satisfaction of customers who availed of the hospital's clinical laboratory services. Specifically, we performed customer satisfaction surveys to evaluate the level of satisfaction of physicians and outpatients who availed of the clinical laboratory and phlebotomy

services, respectively, at the KAMC. The study was approved by the KAMC Institutional Review Board.

This study involved all available physicians in KAMC who were regularly requiring laboratory investigations to be performed, were on duty during the study period, and agreed to participate in the study. On the other hand, physicians did not regularly require laboratory services (such as radiologists and histopathologists) were excluded from the study.

A total of 425 patients above the age of 18 years whose blood samples were collected were randomly selected from phlebotomy areas in the outpatient and chemotherapy clinics. Verbal consent was obtained after the study objectives were explained to each participant. Modified patient and physician questionnaires were used for data collection. These questionnaires were developed after referring to a validated published survey tool from the CAP Q-Probes program<sup>[4]</sup>. The patient's questionnaire was translated to Arabic, and some questions were added and rephrased.

The adaptation was done after the three consultants from KAMC have validated and piloted the questionnaires. A 5-point Likert scale was used for both questionnaires to prevent the clustering of the respondents' scores near the average.

The paper-based questionnaires were distributed to all physicians and then collected the following day. The questionnaires contained the following categories: laboratory information system, guidebook, specimen collection and delivery process, turnaround time for test results, quality of test results, responsiveness, attitude and communication of laboratory personnel, the laboratory's cooperativeness in performing research tests, and overall satisfaction.

A patient satisfaction survey was carried out through face-to-face interviews using paper questionnaires. The patient questionnaires have four main categories, which included patient's demographics, condition of the phlebotomy room, phlebotomy process, and overall service satisfaction. One investigator was assigned to each area to distribute the questionnaires. The collected data were coded, entered, and checked for outliers or missing data and analyzed using the SPSS statistical package version 21.

The differences between the respondents from the OPD and chemotherapy unit were compared using the Mann-Whitney test. Using a 5-point Likert scale, the results were rated as excellent (1-point), good (2-point), average (3-point), fair (4-point), and poor (5-point). For descriptive statistics, percentages were used for categorical variables and the mean (+standard deviation [SD]), median, and interquartile ranges for the numeric data according to the type of distribution.

Poor, fair, and average responses were considered as dissatisfied, whereas good and excellent responses were considered as satisfied. The percentage of satisfaction or dissatisfaction was calculated by dividing the number of satisfied or dissatisfied responses by the total number of responses.

The overall rate of satisfaction based on Likert scale score was calculated as follows:  $(\text{No. of poor rating} \times 5) + (\text{No. of good rating} \times 4) + (\text{No. of average rating} \times 3) + (\text{No. of good rating} \times 2) + (\text{No. of excellent rating} \times 1)$  divided by the total number of ratings (1-5) for the specific laboratory service. On the other hand, the percentages of poor, fair, average, good, and excellent rating were calculated by dividing the number of poor, fair, average, good, and excellent rating by the total number of ratings (1-5) for a specific laboratory service.

## RESULTS

### Sociodemographic character of physicians:

Among the 467 physicians, 132 of them responded to our questionnaire, with a response rate of 28.3%. The majority of our samples were male physicians (87.9%) (n=116). We observed a higher response rate from the specialists (57.6%) (n=76), followed by the consultants (31.1%) (n=41) and residents 9.8% (n=13). These specialists (57.6%; n=76) have been working in the hospital for less than 3 years. Table 1 shows the characteristics of the participants.

### Degree of physician's satisfaction with the clinical laboratory services:

As shown in Table 2, the physician satisfaction survey categories that received the highest percentage of "Excellent" rating were the critical results notification (33.3%; n=44), followed by the communication with laboratory personnel (26.5%; n=35). By contrast, the percentage of "Poor" rating was equally high for both specimen delivery process and incorrect test results items (13.6%; n=18). The satisfaction with laboratory communication category had the highest mean score (3.92±0.8 out of 5), whereas the specimen collection and delivery process category had the lowest mean score (3.39±0.9 out of 5).

The mean overall satisfaction score was 3.6±0.7 out of 5. The age, gender, job title, specialty, work duration, and work in an accredited hospital and tertiary care hospital were analyzed using a univariate ordinal regression model. Results showed that none of these factors are significantly influencing the degree of physician satisfaction (Table 3).

**Table 1.** Sociodemographic characteristics of physicians (n=132) who participated in the study

Characteristics	Frequency	Percent
<b>Participant Gender (N= 132)</b>		
Male	116	87.9
Female	16	12.1
<b>Age (N=122)</b>		
30 and below	9	6.8
More than 30-40	60	45.5
More than 40-50	44	33.3
More than 50	12	9.1
Missing	7	5.3
<b>Job Title (N=130)</b>		
Resident	13	9.8
Assistant Consultant	76	57.6
Consultant	41	31.1
Missing	2	1.5
<b>Duration of work at KAMC (N= 132)</b>		
>3 years	56	42.4
< 3 years	76	57.6

**Table 2.** Distribution of physicians rating of laboratory service categories and mean score for each service category

		Excellent	Good	Average	Fair	Poor
<b>1</b>	<b>Laboratory information system:</b>					
a.	Laboratory test order system is convenient	26	72	23	4	7
		-19.70%	-54.50%	-17.40%	-3%	-5.30%
b.	Laboratory test search system is convenient	21	67	26	11	6
		-15.90%	-50.80%	-19.70%	-8.30%	-4.50%
c.	Reporting system of results is appropriate	31	58	31	9	3
		-23.50%	-43.90%	-23.50%	-6.80%	-2.30%
Mean ± SD		3.75±0.83				
<b>2</b>	<b>Laboratory users' lab test guide:</b>					
a.	Lab test guide is always available	22	39	41	9	16
		-16.70%	-29.50%	-31.10%	-6.80%	-12.10%
b.	Lab test guide is useful	26	41	37	7	12
		-19.70%	-31.10%	-28%	-5.30%	-9.10%
Mean ± SD		3.45±1.14				
<b>3</b>	<b>Specimen collection and delivery process:</b>					
a.	Satisfaction with specimen collection process for inpatients is convenient	20	52	26	7	10
		-15.20%	-39.40%	-19.70%	-5.30%	-7.60%
b.	Specimen delivery process is convenient	16	54	24	8	18
		-12.10%	-40.90%	-18.20%	-6.10%	-13.60%
c.	There is difficulty in specimen collection	11	41	38	10	9
		-8.30%	-31.10%	-28.80%	-7.60%	-6.80%
Mean ± SD		3.39±0.97				
<b>4</b>	<b>Critical results notification:</b>					
A	Notified in timely manner	44	52	17	9	8
		-33.30%	-39.40%	-12.90%	-6.80%	-6.10%
Mean ± SD		3.88±1.13				
<b>5</b>	<b>Turnaround time for test results:</b>					
a.	Turnaround time for inpatient test results	20	56	32	5	9
		-15.20%	-42.40%	-24.20%	-3.80%	-6.80%

		Excellent	Good	Average	Fair	Poor
b.	Turnaround time for STAT test results	22 -16.70%	61 -46.20%	25 -18.90%	6 -4.50%	9 -6.80%
Mean ± SD		3.65±1.00				
<b>6</b>	<b>Quality of test results</b>					
a.	Reliability of test results	33 -25.00%	66 -50%	24 -18.20%	4 -3%	4 -3%
b.	Missing test results	9 -6.80%	35 -26.50%	33 -25.00%	15 -11.40%	12 -9.10%
c.	Incorrect test results	12 -9.10%	31 -23.50%	34 -25.80%	9 -6.80%	18 (13.6%)
d.	Corrected report	28 -21.20%	55 -41.70%	26 -19.70%	9 -6.80%	3 -2.30%
Mean ± SD		3.43±0.87				
<b>7</b>	<b>Laboratory Communication:</b>					
a.	Responsiveness of laboratory personnel	32 -24.20%	65 -49.20%	21 -15.90%	5 -3.80%	7 -5.30%
b.	Courtesy of laboratory personnel	33 -25.00%	64 -48.50%	20 -15.20%	9 -6.80%	4 -3.00%
c.	Communication with laboratory personnel	35 -26.50%	60 -45.50%	22 -16.70%	8 -6.10%	6 -4.50%
d.	Laboratory is cooperative for research tests	30 -22.70%	54 -40.90%	17 -12.90%	5 -3.80%	5 -3.80%
Mean ± SD		3.93±0.85				
<b>8</b>	<b>Satisfaction with service:</b>					
a.	Overall satisfaction with laboratory services	25 -18.90%	60 -45.50%	34 -25.80%	7 -5.30%	5 -3.80%
Mean ± SD		3.63±0.70				

**Table 3.** Correlation between physician overall satisfaction and different personal characters.

Factors	Average for Physician Overall Satisfaction		
	Regression Coefficient	(95% C.I)	P-Value
Age	0.347	(-0.255-0.951)	0.255
Gender	-0.294	(-1.626-1.036)	0.665
Job title	0.153	(-0.480-0.787)	0.635
Specialty	-0.034	(-0.135-0.657)	0.497
Working duration at KAMC	0.713	(-0.261-1.689)	0.149
Working in accredited Hospital	0.831	(-0.428-2.091)	0.198
Working in a Tertiary Care hospital	0.639	(-1.245-1.117)	0.915

### Sociodemographic characteristics of patients

A total number of 435 patients were interviewed: 251 (57.7%) of them were in the outpatient phlebotomy room and 184 (42.3%) were in the chemotherapy phlebotomy room. Results revealed that 198 (45.5%) of the total participants were males and 237 (54.5%) were females. Patient demographics are shown in Table 4.

Patients (n=435) were most satisfied with the attitude of the phlebotomist (98.6%), availability of laboratory tests (98.6%), and the cleanliness (97.7%). In contrast, patients were dissatisfied with how the phlebotomist explained the precautions of phlebotomy (76.3%) and the phlebotomy process (54.0%). The

mean overall satisfaction score was 4.52 out of 5. The means and SDs of each questionnaire category are shown in Table 5.

The patient satisfaction ratings were calculated for all the service categories according to the laboratory location. Results indicate that respondents were satisfied with the service and health care provided for them in general. The respondents from both the chemotherapy and outpatient laboratory group have a similar mean overall satisfaction score. The relationship between cleanliness (0.025) and waiting time for phlebotomy service (0.007) was statistically significant ( $P < 0.05$ ) (Table 6). A univariate logistic regression model was used to analyze the age,

gender, education, and occupation in relation to patients' level of satisfaction. Results indicate that the values of age (0.026), gender (0.01), and education (0.08) showed a statistical significance ( $P$

$< 0.05$ ). Moreover, the results of the multivariate (adjusted) logistic regression analysis revealed that only age and gender reached a statistical significance (Table 7).

**Table 4.** Sociodemographic characteristics of patients participated in the study

Characteristics	Frequency	Percent %
<b>Participant Gender (N= 435)</b>		
Male	198	45.50%
Female	237	54.50%
<b>Age (N=435)</b>		
30 and below	77	17.70%
More than 30-40	65	14.90%
More than 40-50	83	19.10%
More than 50	104	23.90%
Above 60	106	24.40%
<b>Marital status (N=435)</b>		
Single	61	14.00%
Married	328	75.40%
Divorced	15	3.40%
Widowed	31	7.10%
<b>Educational Level (N=435)</b>		
Alliterate	95	21.80%
read and write	30	6.90%
Primary	58	13.30%
Middle	44	10.10%
Secondary	71	16.30%
Higher	137	31.50%
<b>Occupation (N= 435)</b>		
Governmental	112	25.70%
Nongovernmental	46	10.60%
Unemployed	211	48.50%
Student	14	3.20%
Retired	52	12.00%
<b>Laboratory location (N=435)</b>		
Outpatient Laboratory	251	57.70%
Chemotherapy Laboratory	184	42.30%

**Table 5:** Patients satisfactions percentage and the mean scores with Clinical Laboratory Service

	<b>Patients N= 435</b>		
<b>Questionnaire item:</b>	<b>Satisfied</b>	<b>Average</b>	<b>Dissatisfied</b>
<b>1. Environment of phlebotomy room:</b>			
a. Accessibility of phlebotomy room	408 (93.8%)	19 (4.4%)	8 (1.8%)
b. Chairs are comfortable* (not applicable n= 42 out of 435)	379 (87.1%)	11 (2.5%)	3 (0.7%)
c. Cleanness	425 (97.7%)	6 (1.4%)	4 (0.9%)
d. Waiting time for phlebotomy	367 (84.4%)	46 (10.6%)	22 (5.1%)
<b>Mean ±SD</b>	4.7±0.43		
<b>2. Phlebotomy process by phlebotomist:</b>			
a. Availability of the phlebotomist	419 (96.3%)	9 (2.1%)	7 (1.6%)
b. Phlebotomist explained the phlebotomy process	187 (43.0%)	13 (3.0%)	235 (54.0%)
c. Phlebotomist explained cautions of the phlebotomy	101 (23.2%)	2 (0.5%)	332 (76.3%)
d. Ability of phlebotomist to answer questions* (not applicable n= 210 out of 435)	216 (49.7%)	4 (0.9%)	5 (1.1%)
e. Attitude of phlebotomist	429 (98.6%)	2 (0.5%)	4 (0.9%)
f. Number of needle stick attempts	419 (96.3%)	11 (2.5%)	5 (1.1%)
g. Confidentiality measure	392 (90.1%)	19 (4.4%)	24 (5.5%)
h. Availability of lab tests	429 (98.6%)	2 (0.5%)	4 (0.9%)
<b>Mean±SD</b>	4.27±0.5		
<b>3. Overall phlebotomy service satisfaction</b>	432 (99.3%)	3 (0.7%)	0 (0.0%)
<b>Mean±SD</b>	4.52±0.32		

**Table 6.** Comparison between outpatient and chemotherapy laboratory satisfaction scores

Questionnaire item:	Outpatient Laboratory Satisfaction score		Chemotherapy Laboratory Satisfaction score		P value
	n	%	n	%	
<b>Environment of phlebotomy room:</b>					
Accessibility of phlebotomy room	241	96.0	167	90.8	0.255
Chairs are comfortable	223	88.8	156	84.8	0.382
Cleanness	244	97.2	181	98.4	0.025
Waiting time for phlebotomy	219	87.3	148	80.4	0.007
Mean±SD	4.75±36		4.65±0.51		0.058
<b>Phlebotomy process by phlebotomist:</b>					
Availability of the phlebotomist	242	96.4	177	96.2	0.204
Phlebotomist explained the phlebotomy process	114	45.4	73	39.	0.111
Phlebotomist explained cautions of the phlebotomy	59	23.5	42	22.8	0.722
Ability of phlebotomist to answer questions	145	57.8	71	38.6	0.192
Attitude of phlebotomist	248	98.8	181	98.4	0.315
Number of needle stick attempts	246	98.0	173	94.0	0.140
Confidentiality measure	236	94.0	156	84.8	0.095
Availability of lab tests	247	98.4	182	98.9	0.149
Mean±SD	4.25±0.45		4.32±0.51		0.290
<b>Overall phlebotomy service satisfaction</b>	250	99.6	182	98.3	0.451
Mean±SD	4.51±0.33		4.56±0.31		0.451

**Table 7.** Association of Patients Overall Satisfaction with Personal Characteristic

Factor	Univariate Ordinal Regression			Multivariate Ordinal Regression (Adjusted)		
	Regression Coefficient	(95% CI)	P-Value	Regression Coefficient	(95% CI)	P-Value
Age	0.227	(0.024 – 0.431)	0.026	0.239	(0.015-0.492)	0.036
Gender	0.75	(0.167 – 1.333)	0.01	0.778	(0.151-1.406)	0.015
Educational Level	-0.143	(-0.3 – 0.021)	0.08	-0.013	(-0.202-0.176)	0.892
Occupation	-0.037	(-0.253-0.180)	0.739			

## DISCUSSION

Physicians and patients are considered the primary recipients of clinical laboratory services. Therefore, measuring their satisfaction will highlight the issues that need to be addressed to improve the quality of laboratory services.

CAP Q-Probes studies were conducted to evaluate the level of physician satisfaction with the clinical laboratory services provided by multiple institutions in 2009 and 2016. The mean overall satisfaction scores were 4.1 (range, 3.6-4.6) and 4.1 (range 3.6-4.5) <sup>[5,9]</sup>.

The mean overall satisfaction score in our study was 3.65 out of 5, which was lower than the score in the CAP Q-Probes studies but within their range and relatively higher than the score in a study in 2015 conducted in the Maternity and Children Hospital in Makkah. The mean overall satisfaction score ranged between 2.3 and 3.4 out of 5<sup>[11]</sup>. The highest satisfaction rate in similar studies was related to the quality/reliability of test results and staff courtesy (89.9%) <sup>[5]</sup>, quality of results (51.9%) <sup>[9]</sup> and courtesy of laboratory personnel?? <sup>[11]</sup>.

In our study, however, the factors with the highest satisfaction rate were critical results notifications (33.3%) and communication of laboratory personnel (26.5%). The mean score of the critical results notifications was 3.8 out of 5, which is higher than 2.57 <sup>[11]</sup> and lower than 4.3 <sup>[9]</sup>. Moreover, the least satisfaction rate in similar studies was related to test turnaround time (TAT) <sup>[5]</sup>, esoteric test TAT <sup>[9]</sup>, and laboratory essential instructions and guides <sup>[11]</sup>.

In our study, however, the factors with the least satisfaction rate were specimen collection and delivery process and quality of results (incorrect test results). Overall, the level of physician satisfaction related to age, gender, job title, specialty, working duration within the KAMC, and working in accredited hospitals or tertiary hospitals has no significant difference. In this study, the patients' mean overall satisfaction score was 4.5 out of 5, which is higher than the mean overall satisfaction score of 3.05 to 4.12 out of 5 <sup>[10]</sup> but lower than the mean satisfaction score of 70.5 (range 55.9-78.8) in the satisfaction survey performed in 2014 to outpatients who used phlebotomy services at a tertiary care unit <sup>[11]</sup>.

The highest satisfaction rate in our study was related to attitude of the phlebotomist, availability of laboratory tests, and the cleanliness. However, in other similar studies, the cleanliness of the facility, maintenance of privacy and confidentiality, cost of the laboratory service <sup>[10]</sup>, the phlebotomist's technique, and reliability of

the test results had the highest satisfaction score <sup>[11]</sup>. The explanation of phlebotomy process and precautions received the lowest scores in our study, whereas the costs of the laboratory tests received the lowest score <sup>[11]</sup>.

The respondents from the chemotherapy and outpatient laboratory units have a similar mean overall satisfaction score. Cleanliness (0.025) and waiting time for phlebotomy services (0.007) showed a statistical significance ( $P < 0.05$ ) in relation to laboratory areas. In a similar study, the accessibility of the phlebotomy room (0.034) and explanation of the precautions (0.047) also showed a statistical significance <sup>[11]</sup>.

Age, gender, and education with  $P$  values of 0.026, 0.01, and 0.08, respectively, were the only factors that showed a statistical significance ( $P < 0.05$ ).

This study was aimed to assess the clinical laboratory services in tertiary hospitals with the aim of meeting the CAP requirements and achieving quality laboratory services in the hospital.

## LIMITATION OF THE STUDY

This study does not reflect the nurses' or laboratory staff's level of satisfaction. Physicians were less cooperative which hindered us from completing the questionnaire in a reasonable time. The study was performed in only one city in Saudi Arabia and may not represent the situation in the country as a whole.

## CONCLUSION

This study showed that both the patients and physicians were satisfied with the laboratory service provided to them in general. However, factors such as "explanation of the phlebotomy process" and "specimen collection and delivery process" received the lowest satisfaction score. Therefore, improving them is required to meet the needs of the customers and for them to be satisfied with the service.

## CONFLICT OF INTEREST

The authors declare no conflict of interests.

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