

Evaluation of the quality of clinical laboratory services in the University Hospital of Kinshasa, Democratic Republic of the Congo

Chabo Byaene Alain^{1*} • Mabela Makengo Matendo Rostin² • Konde Nkiama Numbi Joël³ • Muhindo Mavoko Hypolite⁴ • Kayembe Nzongola-Nkasu Donatien¹ • Tanon Aristophane Koffi⁵ • Muwonga Masidi Jérémie¹ • Situakibanza Nani-Tuma Hippolyte^{4,6}

¹Department of Medical Biology, University Hospital of Kinshasa, Faculty of Medicine, University of Kinshasa. PO Box 834 Kinshasa XI, Kinshasa, Democratic Republic of the Congo (DRC).

²Department of Mathematics and Informatics, Faculty of Sciences, University of Kinshasa. PO Box 190 Kinshasa XI, Kinshasa, Democratic Republic of the Congo (DRC).

³Department of Health and Environment, Faculty of Medicine, University of Kinshasa. PO Box 834 Kinshasa XI, Kinshasa, Democratic Republic of the Congo (DRC).

⁴Department of Tropical Medicine, University Hospital of Kinshasa, Faculty of Medicine, University of Kinshasa. PO Box 834 Kinshasa XI, Kinshasa, Democratic Republic of the Congo (DRC).

⁵Department of Dermatology and Infectiology, Faculty of Medical Sciences, Félix Houphouët Boigny University. PO Box V 166 Abidjan-Cocody, Côte d'Ivoire.

⁶Department of Internal Medicine, University Hospital of Kinshasa, Faculty of Medicine, University of Kinshasa. PO Box 834 Kinshasa XI, Kinshasa, Democratic Republic of the Congo (DRC).

*Corresponding author. Email: byaene_2005@hotmail.com. Tel: +243 810 394 108.

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Abstract. The evaluation of the quality of a service is the critical assessment of the degree to which the service, or its component, provides customers' satisfaction. Monitoring customer satisfaction is an important and useful quality improvement tool for clinical laboratories and health care organizations. The purpose of this research is to evaluate the satisfaction level with laboratory services among attending physicians and to identify factors associated with satisfaction and priorities for quality improvement. A cross-sectional study was conducted at the University Hospital of Kinshasa. Data were collected through a reliable and valid interviewer-administered questionnaire and analyzed by using SPSS version 21. The correlation between associated factors and customer satisfaction was analyzed using the chi-square test and multivariate regression analysis. The Importance-Performance Analysis was the determinant of improvement priority. The overall level of customers' satisfaction toward clinical laboratory services in this study was 45.2% with a response rate of 330 (100%). Gender ($OR_{adj} = 1.75$, 95% CI 1.06, 2.91), Department ($OR_{adj} = 3.09$, 95% CI 1.50, 6.37) and academic title ($OR_{adj} = 6.85$, 95% CI 3.51, 8.81) were found to have a statistically significant association with the overall satisfaction. Results accuracy ($I = 0.944$, $P = 4.7$), laboratory turnaround time ($I = 0.932$, $P = 4.8$), and availability of all the tests requested by physicians ($I = 0.917$, $P = 4.9$) were the most important opportunities for quality improvement. The overall level of customers' satisfaction with laboratory services was low. Thus, the laboratory management must establish preventive and corrective measures to improve the results' accuracy, reduce the laboratory turnaround time, and ensure the availability of all the tests requested by physicians.

Keywords: Customers satisfaction, clinical laboratory, services' quality, continuous improvement, Democratic Republic of the Congo.

INTRODUCTION

Clients are the backbone of every business and, therefore, the opinion they have of a company and the

services it provides is very important. Quality of service can be understood as a comprehensive customer

evaluation of a particular service and the extent to which it meets their expectations and provides satisfaction (Al-Jazzazi and Sultan, 2017). An organization's main focus must be to satisfy its customers. This applies to industrial firms, retail and wholesale businesses, government bodies, service companies, nonprofit organizations, and every subgroup within an organization. In a user-based approach, quality corresponds to satisfaction: the highest quality means the best satisfaction of consumers' preferences (Yarimoglu, 2014). Hence, the evaluation of the quality of a service is the critical assessment of the degree to which the service, or its component, provides customers' satisfaction.

Customer satisfaction is defined by Oliver (1997) as the consumer's fulfillment response. It is a judgment/assessment that a product or service feature, or the product or service itself, provides a pleasurable level of consumption-related fulfillment. In other words, it is the overall level of contentment with a service/product experience. Satisfaction with an offer is the result of the subjective comparison of the expectations of the consumer to the perceived performance of the offer. If the performance meets or exceeds expectations, then the customer is satisfied; if the performance is below expectations, then the customer is dissatisfied (Oliver, 1997). Dissatisfied customers may discourage others from trying the products or services of that company. Negative word-of-mouth by a dissatisfied customer of products or services of a company has the most damaging effect on the image of that company. Chen and Wang (2009) indicated that satisfied customers are more likely to repurchase, lower their price sensitivity, engage in positive word-of-mouth, recommendation and become loyal customers (Chen and Wang, 2009).

Medical laboratories have a range of customers including physicians, patients, public health agencies, and the community. A central figure in the client list is the physician or health care provider. The initial service request originates with this person, and the laboratory staff generally identifies the ordering physician as the primary client (World Health Organization, 2011). Today, assessing customer satisfaction with laboratory services is considered an important component of the laboratory quality assurance program and is required for accreditation by the College of American Pathologists (CAP) and the Joint Commission on Accreditation for Health care Organization (Aubid *et al.*, 2014). Thus, to evaluate the quality of laboratory services, this study investigated the satisfaction level with laboratory services among attending physicians. This assessment was aimed at determining the factors associated with customers' satisfaction and opportunities for laboratory quality improvement.

METHODS

Setting and study design

A cross-sectional study design was conducted at the

University Hospital of Kinshasa (UHK) from January to March 2020. The UHK is a 565-bed tertiary care teaching hospital. The department of laboratory medicine of the UHK runs two clinical laboratories. One is the laboratory of Microbiology. The other, called the laboratory of Clinical biology and which is concerned by the present study is the main central laboratory, with 5 divisions: phlebotomy and sampling; cytohematology and hemostasis; immunology; biochemistry; immunohematology and transfusion. Physicians were surveyed because they are directly involved in the process of ordering laboratory tests and reviewing subsequent results in the physician's home setting.

Inclusion and exclusion criteria

This study involved all available physicians (all Heads of concerned Departments, Professors, senior residents, and junior residents): who has worked at the medical institution for more than half a year; who were regularly requiring laboratory investigations to be performed; and who was on duty during the study period and agreed to participate in the study.

On the other hand, some physicians were not included in the study. These are physicians: who have not worked at the medical institution for more than half a year; who did not regularly require laboratory services (such as radiologists and histopathologists); and who was not on duty during the study period or did not agree to participate in the study. In addition, physicians in training (interns' students) were not included in this study.

Ethical considerations

Before implementing the study, ethical clearance was obtained from the ethical review committee of the Public Health School, University of Kinshasa. Informed consent was obtained from each respondent, and confidentiality was maintained throughout the study.

Data collection

The questionnaire contained the following information categories: sociodemographic characteristics of participants, reliability of test results, responsiveness of services, laboratory personnel's willingness to help, and overall satisfaction (Chabo Byaene *et al.*, 2021). The questionnaire was developed using a 7-point Likert scale to prevent respondents' scores from clustering near the average.

The satisfaction was measured on 7 point scale from 0 to 6 indicating the lowest and highest levels of satisfaction. 0, strongly disagree; 1, disagree; 2, slightly disagree; 3, average; 4, slightly agree; 5, agree; and 6,

strongly agree. The respondents could respond by 'not applicable' where appropriate. The respondents were informed of the purpose of the study and assured of confidentiality and their right to withdraw from the study.

Verbal consent was obtained after the study objectives were explained to each participant.

Data management and statistical analyses

To ensure the quality of data entry, a dual entry system was used during the data entry stage, which comprised each questionnaire being independently entered by two investigators. The collected data were coded, entered, and checked for outliers or missing data and stored in a database using Excel version 2007. All data were analyzed by using SPSS 21.0 (SPSS Inc., Chicago, IL, USA). Using a 7-point Likert scale, the results were rated as follows: 0, strongly disagree; 16.6, disagree; 33.3, slightly disagree; 50, average; 66.6, slightly agree; 83.3, agree; and 100, strongly agree. Strongly disagree, disagree, and slightly disagree responses were considered as dissatisfied, whereas slightly agree, agree, and strongly agree responses were considered as satisfied.

Descriptive as well as analytical analyses were employed to determine customers' level of satisfaction and associated factors. Mean \pm Standard Deviation (SD) and frequency percent were used to present descriptive statistics. The percentage of satisfaction or dissatisfaction was calculated by dividing the number of satisfied or dissatisfied responses by the total number of responses. The correlation between associated factors and customer satisfaction was analyzed using the chi-square test and regression analysis. The chi-square test of independence was used to test the statistical independence or association between customers' sociodemographic characteristics and overall satisfaction. In univariate and multivariate analysis, the odds ratio and confidence intervals were calculated to quantify the strength of the association.

To identify the quality improvement priorities, an importance-performance analysis (IPA) was performed. Through this approach, high priority is assigned to elements that clients are unsatisfied with (low performance) but viewed as highly important. Multiple regression analysis was used to forge a functional relationship for the performance (P) and overall satisfaction of each quality characteristic. The regression coefficient from this relationship is the estimate of importance (I) for each quality characteristic. A *P*-value < 0.05 was considered statistically significant.

RESULTS

The physicians' satisfaction scores and the percentage

distributions for each item are shown in Table 1.

The overall mean satisfaction score was 48.5 (range, 22.3 to 74.7) out of 100. Among all questionnaire items, questions concerning laboratory personnel's willingness to help had means of >55, while items concerning the reliability of tests' results had means <50. The customer satisfaction score was variable: courtesy of laboratory doctors received the highest score (60.3%), whereas the accuracy of laboratory tests' results received the lowest score (43.4%).

The customers' sociodemographic characteristics are shown in Table 2. There were 330 total respondents; 197 (59.7%) were male and 133 (40.3%) were female; 64(19.4%) were from Internal Medicine, 60(18.2%) from pediatric, 50 (15.2%) from surgery, 46 (13.9%) from gynecology and 110 (33.3%) from specialties' department.

Female physicians (51.8%) were more satisfied than male physicians (40.6%) ($p = 0.044$).

Specialties' department had a significantly higher mean score than that of other groups ($p = 0.008$), whereas the Internal Medicine department and Pediatric department had significantly lower mean scores than the other physician groups ($p=0.001$ and 0.008 respectively).

The sociodemographic factors associated with overall customer satisfaction are shown in Table 3.

The gender, age, department, and academic title were analyzed using a univariate and multivariate linear regression model. Gender, Department and academic title were found to have a statistically significant association with the overall satisfaction of physicians toward clinical laboratory services. The likelihood of physicians' satisfaction on clinical laboratory services was 1.75 times more likely in female physicians as compared with male physicians (Adjusted OR = 1.75, 95% CI 1.06, 2.91). On the other hand, doctors from the specialties' department were more likely to be satisfied with the laboratory services compared to those from the pediatric department (Adjusted OR = 3.09, 95% CI 1.50, 6.37). Similarly, junior doctors and senior doctors were more likely to be satisfied with the laboratory services compared to Professors (Adjusted OR = 6.85, 95% CI 3.51, 8.81 and Adjusted OR = 3.92, 95% CI 1.64, 6.92, respectively).

The Importance Performance Analysis results are shown in Table 4.

Accuracy of tests' results (TR1), laboratory turnaround time (TR2), and availability of the tests requested by physicians (TR4) are the three quality indicators with the lowest performance (47.1, 48.0 and 48.7 respectively) but viewed as highly important for customers (0.944, 0.932 and 0.928, respectively).

DISCUSSION

This study investigated the satisfaction level with

Table 1. Physicians' satisfaction scores and percentage distributions.

Item Code	Questionnaire Item	Mean \pm SD	Agree with n (%)	Average n (%)	Disagree n (%)
Reliability of Tests' Results (TR)					
TR1	Laboratory tests results are accurate	47.1 \pm 25.5	143(43.4)	9(2.7)	178(53.9)
TR2	Laboratory tests turnaround time is not long	48.0 \pm 25.7	149(45.2)	7(2.1)	174(52.7)
TR3	Erroneous test results are not common	48.7 \pm 25.8	152(46.1)	7(2.1)	171(51.8)
TR4	Requested tests are always available	48.7 \pm 25.8	152(46.1)	7(2.1)	171(51.8)
TR5	Laboratory tests' normal reference ranges are fit for use	49.2 \pm 25.9	154(46.7)	7(2.1)	169(51.2)
Responsiveness of services (RS)					
CC1	Laboratory doctors answer efficiently most of our enquires	52.1 \pm 25.6	176(53.3)	2(0.6)	152(46.1)
CC2	Laboratory technologists answer efficiently most of our enquires	53.9 \pm 24.8	186(56.4)	0(0.0)	144(43.6)
CC3	Communication with laboratory personnel is smooth	54.0 \pm 25.8	187(56.7)	0(0.0)	143(43.3)
CC4	Abnormal results notification is adequate	53.9 \pm 24.7	185(56.1)	0(0.0)	145(43.9)
CC5	Laboratory's notification of the changes in services is adequate	54.2 \pm 24.8	187(56.7)	0(0.0)	143(43.3)
Laboratory Personnel (LP)'s willingness to help					
LP1	Laboratory doctors are courteous	56.3 \pm 24.3	199(60.3)	2(0.6)	129(39.1)
LP2	Laboratory technologists are courteous	55.0 \pm 23.0	193(58.5)	0(0.0)	137(41.5)
LP3	Laboratory personnel has a positive attitude toward our research projects	57.2 \pm 24.4	197(59.7)	2(0.6)	131(39.7)
LP4	Laboratory's employees are willing to help customers	56.4 \pm 24.5	191(57.9)	0(0.0)	139(42.1)
Overall satisfaction with laboratory services		48.5\pm26.2	149 (45.2)	0 (0.0)	181(54.8)

laboratory services among attending physicians to identify factors associated with satisfaction and priorities for quality improvement. Assessing customer satisfaction with laboratory services is considered an important component of the laboratory quality assurance program (Aubid *et al.*, 2014). The clinical laboratory staff generally identifies the ordering physician as the primary customer (World Health Organization, 2011).

This study revealed that the overall customer satisfaction score was 45.2%. This customer satisfaction score was lesser than a study conducted by Teklemariam *et al.* in which the overall percentage of satisfied clinical services providers by the laboratory services was 80.0% (Teklemariam *et al.*, 2013). This difference in the overall customer satisfaction rating might be due to the difference in customer primary need's satisfaction in the two studies. Most service offerings consist of a "core service" (the primary need or main reason for choosing a service), and the "peripheral service" (the little things, or bonuses that support and complement the primary need) (Normann, 2008). The core service of every hospital-based clinical laboratory is providing laboratory test results to its various customers (Kiechle and Main, 2002). Table 1 shows that the lowest satisfaction scores, all related to poor quality of tests' results, which included accuracy of tests' results (43.4%), test turnaround time (45.2%), and availability of requested tests (46.1%). In

Teklemariam's study, clinicians were satisfied with the quality/reliability of laboratory test results (79.6%), reporting of complete test results (76.0%), and getting urgent results on time (86.0%) (Teklemariam *et al.*, 2013).

Physician satisfaction can be achieved only if the laboratory's core service offering can meet the expectations of the customer; peripheral offerings thus essentially assist the firm in providing added attractions to the core service. This differentiation of core service and peripheral service within a range of services is critical for the effective management of clinical laboratories and customer satisfaction.

For companies to successfully reach their precise customer, they need to divide a market into similar and identifiable segments through market segmentation. The main reason companies divide markets into identifiable groups is so that the marketing team can create a custom marketing mix for the specific group. Companies will not survive if the marketing strategy is dependent upon targeting an entire mass market. Using segmentation, marketers can identify groups that require extra attention and those that churn quickly, along with customers with the highest potential value. It can also help with creating targeted strategies that capture customers' attention and create positive, high-value experiences with brands (Bodea and Ferguson, 2014). Table 2 shows the

Table 2. Sociodemographic characteristics and customers satisfaction.

Variable	Dissatisfied n (%)	Satisfied n (%)	Total n (%)	χ^2	df	P-value
Gender				4.072	1	0.044
Male (M)	117(64.6)	80(53.7)	197(59.7)			
Female (F)	64(35.4)	69(46.3)	133(40.3)			
Age (year)				0.313	4	0.989
18-27	14(7.7)	12(8.1)	26(7.9)			0.998
28-37	43(23.8)	33(22.1)	76(23.0)			0.991
38-47	56(30.9)	46(30.9)	102(30.9)			0.998
48-57	40(22.1)	32(21.5)	72(21.8)			0.997
≥ 58	28(15.5)	26(17.4)	54(16.4)			0.997
Department				19.448	4	0.001
Internal Medicine	43(23.8)	21(14.1)	64(19.4)			0.001
Pediatrics	41(22.7)	19(12.8)	60(18.2)			0.008
Surgery	28(15.5)	22(14.8)	50(15.2)			0.387
Gynecology	26(14.4)	20(13.4)	46(13.9)			0.386
Specialties	43(23.8)	67(45.0)	110(33.3)			0.008
Academic Title				6.360	4	0.174
Junior Doctor	48(26.5)	53(35.6)	101(30.6)			0.996
Senior Doctor	44(24.3)	43(28.9)	87(26.4)			0.730
Specialist	41(22.7)	25(16.8)	66(20.0)			0.730
Senior Lecturer	26(14.4)	15(10.1)	41(12.4)			0.761
Professor	22(12.2)	13(8.7)	35(10.6)			0.822

segmentation of customers. Depending on the overall customer satisfaction score, our research has revealed that there are two categories of customers: dissatisfied and satisfied customers. This result can be explained as follows: dissatisfied customers expected higher levels of services related to the accuracy of tests' results, test turnaround time, and availability of requested tests than they received, indicating that the laboratory should improve the quality of services offered to this category of customers. Regarding sociodemographic factors, results suggest that the dissatisfied segment includes essentially male physicians, the Internal medicine department, and the pediatric department. This study did not provide reasons for this, but it does indicate to the laboratory that more research is needed to identify the reasons for such an outcome. Laboratory managers must spend time on these customers. It is a fact that to become more profitable, managers need to be able to differentiate their customers to more effectively satisfy the needs of the different segments (Bodea and Ferguson, 2014).

Gender, academic title, and department were found to have a statistically significant association with the overall satisfaction of physicians toward clinical laboratory services (Table 3). Hence, the most dissatisfied clients were male physicians, professors, and physicians from the internal medicine department and pediatric department. But, there was no similar significant

association in other similar studies consulted. Assessment of Customer Satisfaction with the Clinical Laboratory Services Provided in King Abdullah Medical City, Makkah, revealed no significant difference in the level of physician satisfaction related to age, gender, job title, specialty, etc (Daliah *et al.*, 2018). The national survey aiming to assess the satisfaction level of physicians with laboratory services at public hospitals in Ethiopia found that none of the socio-demographic characteristics (gender, age, marital status, educational status, and experience) of the physicians had a statistically significant association with overall satisfaction (Hailu *et al.*, 2020). It is rare to find a business that has not to deal with unhappy or angry customers. Sometimes that unhappiness is justified; sometimes it is not (Aylen *et al.*, 2012). Laboratory managers have to identify unsatisfied clients and try to improve on their service delivery standard as a part of their roles to give more service users satisfied care.

When conducting a customer satisfaction survey, there are two fundamentals characteristics that every logistics organization needs to know: the quality of its service (a performance rating) and what is most important to its customers (an importance rating). Importance-Performance Analysis is widely recognized as a useful tool for the management of service quality. The importance-performance analysis is an approach to

Table 3. Sociodemographic factors associated with overall customer satisfaction: univariate and multivariate analyses.

Variables	Crude OR* (95% CI**)	P-value	Adjusted OR (95% CI)	P-value
Gender				
Female	1.58 (1.01-2.46)	0.044	1.75 (1.06-2.91)	0.029
Male	1		1	
Age (years)				
18-27	1		1	
28-37	1.12 (0.37-2.19)	0.809	1.18 (0.44-3.12)	0.742
38-47	1.04 (0.40-2.27)	0.923	1.21 (0.96-3.37)	0.058
48-57	1.07 (0.38-2.30)	0.881	1.57 (0.51-6.97)	0.122
≥ 58	1.08 (0.42-2.77)	0.867	2.13 (0.03-7.93)	0.111
Department				
Specialties	3.19 (1.67-6.10)	<0.001	3.09 (1.50-6.37)	0.002
Gynecology	1.61 (0.75-3.46)	0.223	1.42 (0.63-3.20)	0.397
Surgery	1.58 (0.72-3.44)	0.255	1.67 (0.70-3.96)	0.245
Internal Medicine	0.95 (0.45-2.02)	0.892	0.79 (0.35-1.78)	0.575
Pediatrics	1		1	
Academic Title				
Junior Doctor	4.87 (2.85-9.11)	<0.001	6.85 (3.51-8.81)	<0.001
Senior Doctor	3.65 (1.74-7.70)	0.020	3.92 (1.64-6.92)	0.008
Specialist	1.03 (0.44-2.41)	0.942	0.92 (0.33-2.53)	0.864
Senior Lecturer	0.98 (0.38-2.79)	0.960	0.44 (0.16-1.25)	0.124
Professor	1		1	

*OR: Odd Ratio **CI: Confidence Interval

Table 4. Importance Performance Analysis

Item Code	Performance (P)	Importance (I)
TR1	47.1	0.944
TR2	48.0	0.932
TR3	48.7	0.917
TR4	48.7	0.928
TR5	49.2	0.910
CC1	52.1	0.617
CC2	53.9	0.560
CC3	54.0	0.601
CC4	53.9	0.583
CC5	54.2	0.604
LP1	56.3	0.466
LP2	55.0	0.521
LP3	57.2	0.488
LP4	56.4	0.505

prioritizing which aspects of performance should be subject to improvement (Harding, 1998). The observation from Table 4 reveals that the accuracy of tests' results is the most important quality indicator to respondents, but

its performance level is the lowest. This suggests that improvement efforts should be concentrated here. The laboratory director has to make strategies to improve the accuracy of all the tests' results. Also, the availability of

tests and laboratory turnaround time were the two other priorities for improvement. Thus, laboratory managers have to focus attention and resources on these attributes to contribute to improving customer satisfaction. Both the ISO15189 and ISO/IEC17025 standards encourage an investigative process to search continuously for causes behind processes that deviate from procedures or are not satisfactory to customers so that proper corrective and preventive action can be initiated (Addis *et al.*, 2013). In the present study, preventive and corrective measures must be established to improve the results' accuracy, reduce the laboratory turnaround time, and ensure the availability of all the tests requested by physicians.

CONCLUSIONS

The overall patients' satisfaction towards clinical laboratory services was low. Gender, academic title, and department were found to have a statistically significant association with the overall satisfaction of physicians toward clinical laboratory services. The most dissatisfied clients were male physicians, professors, and physicians from the internal medicine and pediatric department respectively. Laboratory managers have to consider dealing with these unhappy customers as a part of their roles. Accuracy of tests' results, availability of requested tests, and laboratory turnaround time were the three priorities for quality improvement. Therefore, the laboratory management must establish preventive and corrective measures to improve these three aspects.

Limitations and Contributions of the Study

This study involved only attending physicians who are the first category of laboratory customers and, therefore, research on patients' level of satisfaction is necessary. However, this survey is the first of its kind in the Democratic Republic of the Congo and provides credible evidence that might be used to improve the quality of laboratory service and enhance physicians' satisfaction. The findings of this study might serve as baseline data for any intervention designed to improve the quality of laboratory service in the country.

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Conflict of interest

The authors declare that they have no conflict of interest.

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