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Perception of Customer-Supplier Interactions During Laboratory Analysis at the Tengandogo University Hospital Centre, Burkina Faso

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Abstract

Internal customer-supplier interactions during laboratory analysis performance often cause difficulties in collaboration. The purpose of this study was to determine the perceptions of this group of actors about the quality of their interactions during the pre- and post-analytical phases of laboratory analysis. This was a descriptive cross-sectional study of the perceptions of the laboratory and clinical staff at the Tengandogo University Hospital. The study results showed that the laboratory staff had a low perception of the quality of laboratory test requests, with a positive perception of 21.4% (06/28) for the formulation of test requests and 14.8% (04/27) for the justification of test requests. The results also indicate a low perception of reagent availability and access to tests among clinical process personnel, with a positive perception of 39.4% (37/94) of reagent availability and 36.2% (34/94) of access to tests. The results also reveal a difference in perception between laboratory staff and clinical process staff with respect to the speed with which biological samples are received and the objectivity of laboratory analysis results. Limitations in material resources, information management, and the implementation of quality assurance are thought to be at the root of these poor perceptions. In order to improve these perceptions, it is necessary to have equipment and consumables adapted to the demands and to improve information management in the laboratory.

Keywords: laboratory analysis, customer-supplier, perception, interactions, hospital

1. Introduction

The need for quality laboratory services in the health systems of sub-Saharan African countries has been widely recognised by the main national and international players over the last decade. (Ondoa P et al., 2017). Therefore, following the example of Burkina Faso, many African countries have taken initiatives to improve the quality of biomedical laboratory services. Among the actions are quality initiatives, based on management of the organization's processes. These quality approaches tend to group homogeneous entities in a transversal logic around the main results of the company (International standardisation organisation (ISO), 2015). In this way, the process approach seeks to reconfigure the internal environment of hospitals by breaking down the traditional departmental organisation (Bayad et al., 2002).

The Centre Hospitalier Universitaire de Tengandogo (CHU-T), a benchmark in patient care in Burkina Faso, is committed to a quality approach. The hospital has a process-based organisation that takes into account the ‘laboratory analysis process’, which includes biomedical analysis and Histopathology laboratory services. This process is crucial importance in patient care. In fact, studies suggest that at least 50-70% of current medical decisions are influenced by the results of laboratory tests (Beastall, 2013; Hallworth, 2011). As part of its activities, the laboratory process maintains complex interactions with clinical entities, taking into account the request for examinations, the routing of biological samples, their reception in the laboratory, the performance of laboratory analyses, and the delivery of results to customers. The request that triggers this process is made up of test reports and biological samples. The ensuing response results in the laboratory analysis results being made

available. In this customer-supplier relationship, the clinical entities constitute the laboratory's customer processes. The fact that the laboratory's customer-supplier interface involves a multitude of players with diverse profiles means that there are many requests, and requests made by internal customers are not always met. In addition, medical and technical equipment is subject to numerous breakdowns, making it difficult to access services (SO et al., 2022) In addition, the quality of the laboratory analysis request forms sent by internal clients is not always assured (Yacouba et al., 2019).

Today, it is established that the pre- and post-analytical phases of the laboratory process are the most affected by errors (Plebani, 2006 ; Plebani, 2009 ; Plebani & Panteghini, 2014). These phases are also those which involve more interactions between laboratory and clinical process personnel. The difficulties noted in the performance of laboratory analyses could be accentuated at these essential stages of the process and undermine the collaboration necessary for patient care. Indeed, the effectiveness of this interface depends on how these two groups of professionals interact and communicate with each other (Van den Broek et al., 2014). However, to our knowledge, to date, no study has been carried out to ascertain the perceptions of laboratory and clinical staff about the quality of their interactions, from the issuing of requests for analyses to the provision of laboratory results. For this reason, this study aims to understand these perceptions. The aim is to promote good collaboration between laboratory stakeholders and clinical service staff through a better understanding of their customer-supplier interface at the CHU-T.

2. Methodology

2.1 Type of Study

This was a descriptive cross-sectional study of the perceptions of laboratory staff and clinical services (internal clients) regarding the performance of laboratory tests at CHU-T.

2.2 Study Framework and Population

2.2.1 Study Framework

This study was carried out at the CHU-T. The departments concerned were

- The medical biology laboratory and Histopathology laboratory services, which constituted the laboratory analysis process.
- The clinical processes (consultation, hospitalisation, and emergency management)

2.2.2 Population

The study population consisted of:

- laboratory staff (biologist, biomedical technologist, hospital hygiene technician and medical secretary) in charge of receiving biological samples, carrying out analyses and delivering results;
- clinical care staff who interact directly with laboratory staff, including prescribers (general practitioners and specialists) and hospital hygiene technicians (in charge of transporting biological samples and collecting test results).

❖ **Selection Criteria**

The study included:

- Personnel assigned to the processes concerned for at least three months;
- Consenting staff.

❖ **Sampling**

Subjects were selected using a non-probabilistic method based on an exhaustive census of clinical process staff (doctors, hospital hygiene technicians) and laboratory process staff (biologists, biomedical technologists, hospital hygiene technicians and medical secretaries).

2.3 Study Variables

The Donabedian evaluation framework (structure, process, results approach) applied to the performance of laboratory analyses was used to define the variables in this study. It takes into account the ‘structure’ which concerns laboratory resources and inputs, the laboratory process (pre- and post-analytical phase) and laboratory results (output). It does not take into account clinical results "outcomes" under the responsibility of clinical services. Furthermore, due to its technical nature and limited interaction with clinical processes, the analytical phase was not the subject of our study.

2.3.1 Variables Related to the ‘Structure’ of the Laboratory

The variables related to ‘structure’ are:

- availability of laboratory tests
- accessibility of laboratory tests
- the biological sample transmission circuit,
- environment in which biological samples are received
- framework for carrying out biological tests,
- reporting circuit of the results of biological tests.
- safety of the laboratory environment.

2.3.2 Variables Relating to the Laboratory Analysis Process

At the level of the request for analyses:

- formulation of the request for analyses (nature of the analyses);
- justification of the request (clinical indications);
- completeness of the request (completeness of forms, biological sample);
- feasibility of the tests requested;
- consideration of sampling/transportation precautions;

In terms of receiving biological samples and delivering results:

- welcome and courtesy
- speed of receipt of biological samples;
- speed with which laboratory results are made available;
- confidentiality of laboratory results;
- transparency of laboratory results.

In terms of the quality of analysis results:

- completeness of laboratory test results,
- accuracy of laboratory test results;
- objectivity of laboratory test results;
- appropriateness of the format in which the laboratory test results are presented;
- adaptability of the results in relation to the laboratory analysis request.

2.4 Data Collection Techniques and Tools

The technique used to collect the data was a staff interview. Data were collected using an interview guide. These tools were developed and validated after a pre-test which took place after the training of the investigators on the collection tool. The interview guide consisted of semi-structured questionnaires. It consisted of 28 questions grouped under five headings, including general data (process concerned, age, sex, seniority, qualifications, etc.), data on the perception of the laboratory environment, data on the perception of the demand for laboratory services, data on the perception of the performance of laboratory services, and data on the perception of the results of laboratory analyses.

2.5 Data Collection Process

Data collection was conducted between 20 February and 20 March 2024 by five experienced interviewers, each holding at least a bachelor's degree. Prior to the fieldwork, they received training on the study objectives as well as the structure and administration of the survey instrument. Throughout the data collection period, the interviewers simultaneously conducted interviews with hospital staff, working under the supervision of the principal investigator.

2.6 Data Processing and Analysis

Data from the semi-structured questionnaire were processed and analysed using Epi Info 7.2.6.0 software. Quantitative variables were described using the mean, and qualitative variables using the proportion.

Determining perception index

Five types of response were proposed: very adequate, adequate, fair, inadequate, and very inadequate. In the light of the responses, two types of perception were retained:

- positive perception, which includes ‘very adequate’ and ‘adequate’ responses;
- negative perception, corresponding to ‘fair’, ‘insufficient’ and ‘very insufficient’ responses.

The percentages of positive perceptions have been divided into four perception indices:

- Very positive perception index: positive perception ≥ 75%;
- Moderately positive perception index: positive perception < 75 % and ≥ 50 %;
- Low perception index: positive perception < 50 % and ≥ 25 %;
- Very low perception index: positive perception < 25 %.

2.7 Ethical Considerations

The study of internal customer (staff) perceptions in CHU-T was part of the implementation of the hospital's quality policy, which provides for the measurement of staff perceptions of the level of quality of the hospital's services. The protocol was approved by the hospital's Director General, and free consent was obtained from study participants.

3. Results

3.1 Type of Respondents and Average Age

The average age of the respondents was 39.4 years, with extremes ranging from 25 to 59 years. There were 28 laboratory staffs (22.9%) and 94 internal customers (77.1%).

3.2 Distribution of Respondents by Qualification

Table 1. The distribution of respondents by qualification

Qualification	Number	Percentage
General practitioner	16	13.1
Specialist doctors	38	31.1
Biologist/pathologist	08	06.6
Biomedical technologist	15	12.3
Hospital hygiene technician	43	35,3
Medical secretary	2	01.6
Total	122	100

Medical staff (general practitioners, specialist doctors, biologists and pathologists) were the majority represented at 50.8%.

3.3 Perception of the Quality of the Laboratory's 'Structure'

Table 2. Perception of laboratory staff and clinical processes on the quality of the laboratory 'structure

Quality of the laboratory's structure	Clinical process staff		Laboratory staff	
	Positive perception (%)	Perception index	Positive Perception (%)	Perception index
Availability of reagents for analysis	37/94 (39.4)	Low	02/28 (07.1)	Very low
Access to analyses	34/94 (36.2)	Low	03/25 (12)	Very low
Transmission circuit for biological samples	48/92 (52.2)	Moderately positive	11/27 (40.7)	Low
Biological sample reception frame	50/94 (53,2)	Moderately positive	17/27 (63)	Moderately positive
Framework for carrying out biological tests	50/83 (60.2)	Moderately positive	17/27 (63)	Moderately positive
Reporting circuit of analysis results reporting circuit	35/92 (38.0)	Low	10/27 (37)	Low
Safety of premises	42/93 (45.2)	Low	11/28 (39.3)	Low

Perception indices among clinical process staff were low regarding the availability of reagents, access to laboratory tests, the test result reporting system, and the security of laboratory premises. Among laboratory staff, perception indices were particularly low for the availability of reagents, test accessibility, and premises security. Both groups also rated the biological sample transmission circuit, test result reporting process, and laboratory security poorly.

3.4 Perception of the Quality of Demand for Laboratory Analyses

Table 3. Perception of laboratory Staff of the quality of requests for Laboratory analyses

Quality of the analysis request	Positive Perception (%)	Perception index
Formulation of request for laboratory analyses (nature of analyses)	06/28 (21.4)	Very low
Justification for the request (details)	04/27 (14.8)	Very low
Completeness of application (completion of forms, biological sample)	02/27 (7.4)	Very low
Feasibility of the tests requested	05/26 (19.2)	Very low
Consideration of sampling/transportation precautions	04/28 (14.3)	Very low

Laboratory staff's perception indexes were very low for all the variables relating to the quality of the request for analyses.

3.5 Perception of Receipt of Biological Samples and Delivery of Laboratory Test Results

Table 4. Perception of laboratory staff and clinical processes regarding the quality of the reception of biological samples and the delivery of test results

Quality of sample reception and delivery of analysis results	Clinical process staff		Laboratory staff	
	Positive perception (%)	Perception index	Positive Perception (%)	Perception index
Welcome and courtesy	63/91 (69.2)	Moderately positive	21/28 (75)	Very positive
Speedy receipt of samples	30/92 (32.6)	Low	23/26 (88.5)	Very positive
Rapid delivery of test results	24/95 (25.3)	Low	07/27 (25.9)	Low
Confidentiality of analysis results	66/93 (71)	Moderately positive	16/28 (57.1)	Moderately positive
Transparent reporting of test results	56/89 (62.9)	Moderately positive	15/27 (55.6)	Moderately positive

The perception indices for clinical process personnel were low for the speed with which samples were received and the speed with which test results were made available. For laboratory staff, perception indices were low for the speed with which test results were made available. The ratings were very positive for courtesy and speed of receipt of samples.

3.6 Perception of the Quality of Laboratory Test Results

Table 5. Perceptions of laboratory staff and clinical processes on the quality of laboratory test results

Quality of analysis results	Clinical process staff		Laboratory staff	
	Positive Perception (%)	Perception index	Positive Perception (%)	Perception index
Completeness of results	41/85 (48.2)	Low	06/25 (24)	Low
Accuracy of results	39/73 (53.4)	Moderately positive	19/28 (67.8)	Moderately positive
Objectivity of results	33/74 (44.6)	Low	21/27 (77.8)	Very positive
Appropriate format for presenting results	55/87 (63.2)	Moderately positive	19/28 (67.9)	Moderately positive
Matching results to demand	46/83 (55.4)	Moderately positive	14/25 (56)	Moderately positive

The perception indices of the clinical process staff were low for the completeness and objectivity of the test results. Perception indices for laboratory staff were also low for the completeness of analyses, but very positive for the objectivity of test results.

4. Discussion

This study provided information on the perceptions of laboratory and clinical staff regarding the "structure", process, and results of laboratory analyses. It highlighted some observations that are:

- low perception of the quality of test requests from clinical departments;
- low perception by laboratory staff and clinical processes of the timeliness and completeness of test results;
- differences in perception between laboratory staff and clinical process staff regarding the speed with which biological samples are received and the objectivity of biological test results.

4.1 Low Perception of the Quality of Test Requests From Clinical Departments

The biological examination request form is an essential tool for performing laboratory analyses. It is a medical prescription for diagnostic purposes, containing information about the prescriber, the patient, and the sample (Yacouba et al., 2019). In this study, laboratory staff had a very low perception of the quality of these analysis request forms. Their positive perception was 21.4% (06/28) for the formulation of the request for laboratory tests, 14.8% (04/27) for the justification of the request, 7.4% (02/27) for the completion of the test request forms, and 19.2% (05/26) for the feasibility of the tests requested. Numerous irregularities making it difficult to carry out and interpret the results of biological examinations related to the analysis forms (Yacouba et al., 2019; Djobo et al., 2022). These shortcomings are likely to alter the perceptions of laboratory staff regarding the quality of these information tools. This situation results in non-compliance, with the rejection of biological specimens, causing delays in therapeutic treatment and an additional workload for the biologist and all those involved in the performance, treatment, and interpretation of the results of this sampling (Djobo et al., 2022).

The poor quality of the examination reports also affects the collaboration between the parties involved. In fact, the absence of certain additional information in the reports limits communication between biologists and clinicians in the event of a need for additional information on the patient or the transmission of critical results that require immediate attention (Yacouba et al., 2019; Nutt et al., 2008). In addition, rejections of biological specimens generate a certain frustration on the part of clinical service staff.

4.2 Low Perception by Laboratory Staff and Clinical Processes of the Timeliness and Completeness of Test Results

Automation of laboratory processes has significantly improved the throughput of analyses while reducing turnaround times (Jeffrey et al. 2008). However, the results of our study showed that laboratory and clinical process staff had a low perception of the speed with which test results were made available, with positive perceptions of 25.9% (07/27) and 25.3% (24/95), respectively. The speed with which test results are made available is a performance criterion for laboratory services. However, in countries with limited resources, such as Burkina Faso, laboratory equipment and qualified personnel are in short supply (Sagna et al., 2021; Carter, 2017). In addition, laboratory equipment is not sufficiently efficient and reagents are often out of stock. The implementation of quality approaches hardly provides solutions to these concerns (So et al., 2019). Furthermore, the conditions under which test results are delivered are not optimal. In fact, at the CHU-T, results of test are not printed directly from the computer. They are entered by an operator before being delivered to the customer. As a result of the growing number of analyses requested, the time taken to enter the results is becoming increasingly long, leading to delays in making the analyses available. Generally speaking, the lack of suitable open-source laboratory information management software is particularly worrying in countries with limited resources (Turner et al., 2021). This shortcoming severely limits the scope for interoperability between laboratory equipment and hospital information systems, and could lengthen the time taken to deliver results.

In our study, laboratory and clinical process staff had a low perception of the completeness of test results, with positive perceptions of 24% (06/25) and 48.2% (41/85) respectively. Today, with the wide range of tests available as a result of diagnostic and therapeutic advances, it is becoming difficult for a laboratory to have all the tests that can be performed. In everyday practice, some tests are not available. Similarly, entering test results entails the risk of omissions and errors that lead to incomplete test results.

4.3 Differences in Perception Between Laboratory Staff and Clinical Process Staff Regarding the Speed With Which Biological Samples Are Received and the Objectivity of Biological Test Results

The positive perception of the laboratory staff at 88.5% (23/26) regarding the speed of receipt of biological analysis samples corresponded to a very positive perception index. For clinical process personnel, the positive perception of 32.6% (30/92) was low and corresponded to a low perception index. CHU-T has a dedicated

laboratory room for receiving biological samples. In addition to emergency situations, biological samples taken in the morning from the hospital inpatient units tend to arrive in this room at the end of the morning. This period coincides with the end of the morning shift and the changeover of the care teams. Under these conditions, the waiting time for samples to be received would be longer. This situation could lead to poor perception of the speed with which biological samples are received by the laboratory's internal customers. On the other hand, laboratory staff who try to receive pending biological samples quickly could have a positive perception of the speed with which biological samples are received. Since care is personalised at the CHU-T, each patient has a planned period for taking and sending his or her samples to the laboratory. Therefore, it would be desirable for samples to be delivered to the laboratory as they are taken to avoid queues at reception.

Laboratory staff had a very positive perception index corresponding to a positive perception of 77.8% (21/27) of the objectivity of the analysis results. This perception index was rather low for internal customers, with a positive perception of 44.6% (33/74). To ensure the accuracy of laboratory test results, good laboratory practice recommends a number of mechanisms involving the choice of biomedical equipment and the provision of quality laboratory reagents. These systems ensure that a laboratory selects the equipment that meets its needs and maintains it in a condition that produces reliable test results (Ikranbegiin et al., 2019). They are supplemented with quality assurance measures based on laboratory risk control and good interactions between stakeholders (Koh et al., 2022; Armstrong et al., 2011). In the context of the CHU-T, the acquisition of laboratory equipment and reagents is hampered by cumbersome public procurement procedures. These problems limit the ability of users to choose the right equipment and obtain laboratory reagents of adequate quality and quantity. In addition, malfunctions limit the successful implementation of the quality assurance measures (calibration, calibration adjustment).

5. Conclusion

The interface between the laboratory process and clinical services encounters numerous dysfunctions so that requests for laboratory analyses are not always satisfied. This study on the perceptions of the customer-supplier relationship during the performance of laboratory analyses made it possible to know the perceptions of laboratory staff and clinical services on the quality of their interactions during the pre- and post-analytical phases of the performance of laboratory analyses. It revealed that laboratory staff had a poor perception of the quality of laboratory test request forms. It also revealed a poor perception among laboratory staff and clinical processes regarding the availability of reagents, accessibility of tests, completeness of tests and the speed with which test results. Numerous shortcomings related to the quality of the writing of test bulletin writing, availability of quality laboratory equipment and reagents, and effective application of laboratory quality assurance measures lead to malfunctions in the laboratory testing process-which are the cause of a poor perception by stakeholders at the laboratory-clinical services interface. In order to improve the perceptions of laboratory staff and clinical processes regarding the performance of laboratory tests, it would be advisable to simplify the procedures for acquiring laboratory equipment and consumables, improve the quality of writing on test request forms, and make the computerised management of laboratory data more efficient.

Authors contribution

This study was designed by SO and BGS**.** Material preparation and data were collected by GA, KK, and SA. Data analysis was performed by SO, NF, GA, TA, SG and ZN. The first draft of the manuscript was written by SO, NF, GA, TH, GS and, ZN. This study was supervised by DKM**.** All coauthors reviewed the manuscript and provided input. All authors read and approved the final manuscript.

Conflict of Interest

The Authors declares that there is no conflict of interest.

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