

# Evaluation of Prescriber Satisfaction in a University Testing Laboratory of Bacteriology

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## Abstract

**Background and Objectives:** Given the growing concern focused on the continuous improvement of the quality of care, safety and customer satisfaction, the Ibn Sina University Hospital (CHIS) has started an ambitious program for institutionalization of quality management at the establishments under the CHIS, in general, and the ISO certification 9001v2008 of its biomedical analysis laboratories, in particular. Furthermore, it is recognized that satisfaction of patients and prescribers is an evaluation of quality care, and an indicator of weaknesses in the services. The purpose of this study was to measure the prescriber's satisfaction for the services provided by a university testing laboratory of bacteriology in order to identify the axes of improvement and meet their expectations.

**Methods:** One of the goals of this study was to measure the overall and specific satisfaction of prescribers towards the services provided by Ibn Sina University testing laboratory of bacteriology (Rabat), to analyze the links with their characteristics, and to strengthen collaboration between the laboratory and prescribers services in order to identify the axes of improvement and meet their expectations. The starting point of this work was obtaining satisfaction scores by item. For this purpose, dimension and a final overall score were calculated. A validated questionnaire including 14 items, built according to the literature, was transferred to all clinical services asking for analyses. Then descriptive analyses were carried out to optimize the instrument that measures the aspects of the quality to prioritize the needs of prescribers.

**Findings:** The participation rate was 76%, and the questionnaire allowed us to assess 4 underlying dimensions of satisfaction. Satisfaction scores were 50±26% for the transmission of information about the service activity; 43±26% for communication and relational exchange, and 42±27% for the quality and timeliness of reporting results. Identification of priorities and relevance of corrective actions on the basis of calculating a quality improvement score index showed that the quality aspects deserve priorities for actions to be undertaken to fully meet the benchmarks set out. Our study is one of the rare and pioneer researches in Morocco and at the CHIS since few studies are interested in prioritizing the expectations of prescribers in Morocco through the design of a simple and useful tool in practice of evaluation of quality improvement scores using the physicians satisfaction as an index to study the most important aspects to improve our services in line with the CHIS clinicians.

**Conclusions:** It is possible to transpose our results with those of foreign works because of the similarities and differences between the health systems on one condition to adapt them to the Moroccan context. However, some aspects should be considered by our health professionals to ensure the required quality.

**Keywords:** Care quality, Bacteriology, Survey, Prescribers' satisfaction.

## Background and Objectives

The growing interest given to the health care quality over the last 25 years has led to the implication of the majority of health institutions to continuous quality improvements.

Also patients and prescribers express increasing claims regarding the accessibility to health care and new technology, while requiring safety guarantees [1]. For medical bacteriology laboratories, the quality required by clinicians includes the pre-analytic, analytic and post-analytic phases. Although the clinical laboratory is equipped, the requirements for quality control, quality assurance, documentation, and competency training of staff have made more difficult their implementation in the bacteriology laboratory, where multiple staff including physicians, nurses

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and technical personnel may be needed to perform patient testing [2]. Prescribers call into question the decisions of the bacteriology laboratory, and change them if they are not satisfied. In brief, they behave like customers.

Thereby, the effort was initiated aiming to meet not only the technical standards of service, but also to satisfy the various expectations and needs of customers. We no longer speak of technical quality only, rather we are also going to deal with perceived quality. The health care quality viewpoints measure of a hospitalization should certainly take into account viewpoints of patients receiving care, as well as that of actors in health care delivery [1, 3, 4]. Verbal or written expression of prescriber's satisfaction is a judgment that covers all aspects of care, particularly the interpersonal dimension. Some prescribers are grateful even when the quality of care was not optimal. Conversely, there are prescribers since the conditions of the services of medical bacteriology laboratories as well as the provided care were the best, however, they still complain [5, 6].

This satisfaction is a subjective value that reflects the personal preferences and expectations of prescribers and patients. Their individual perceptions necessarily a subjective reality which they lived, may be different from the objective reality, of the medical biology's act experience, and do not reflect those of the laboratory staff and managers [7, 8]. The satisfaction of both clients can be considered as an indicator of care quality [9, 10]. It is correlated with adherence to therapy, continuity of care, and improvement in health status as perceived. The prescribers' satisfaction measurement is usually done using a questionnaire that explores its multiple dimensions. Each survey has a different questionnaire, which allows tackling each issue in its context [10, 11].

This study is part of the national strategy of continuously improving care quality and the different health services of a university hospital centre. Indeed, like other countries and in the field of health, Morocco was involved in a quality approach towards the end of 2006 through a partnership between the Ministry of Health and the World Health Organization (WHO) [12, 13]. They aim to mobilize the whole staff in an effort to achieve total quality. This underlines the willingness and the major concern of Ibn Sina University Hospital (CHIS), which started in November 2007, an ambitious program for the institutionalization of quality management at the establishments under the CHIS, in general, and the ISO certification 9001v2008 of its biomedical analysis laboratories in particular [12, 13]. First of all, this certification demands the compliance with regulatory requirements, namely the Moroccan GBEA, a quality referential, the application of which meets the regulatory requirement related to Guide to the Correct Execution of Biomedical Analysis [12]. The program of quality management was proposed

to CHIS Medico-Technical Services and Departments of Rabat, on the one hand, and by an institution circular of the Quality Management Program (Circular No. 34/07) and a circular requiring managerial compliance to GBEA requirements, on the other [13, 14].

In this context, an optimization of the quality policy and lasting performance of our bacteriology laboratory (CHIS) that integrates regulatory aspects and features of continuous quality improvement, has been introduced, which led initially to the development of a repository of requirements specific quality laboratory bacteriology. Thus one of the objectives of this study was to measure overall and specific satisfaction of physicians prescribing health services in CHU Ibn Sina Rabat towards the services provision in the bacteriology laboratory. Also aspects of quality that need improvement were explored and options to report prescriber quality index information are discussed by analyzing the relationship with their characteristics to strengthen collaboration between the laboratory services and prescribers, and therefore, to carry out corrective actions of priority areas for more performance in the quality of these services.

## Methods

### Presentation of the studied medical bacteriology laboratory of Ibn Sina Hospital

The study targeted a university laboratory of bacteriology that serves 10 university hospitals under the Ibn Sina Hospital of Rabat (CHIS) that joined a quality management program of the Moroccan Ministry of Health. This laboratory receives requests and biological samples from care hospitals and hospitalization institutions such as Ibn Sina Hospital (ISH), Children's Hospital of Rabat (CHR), Laboratories and Outpatient Clinics (LOC), ERRAZI Hospital of Sale (EHS), Rabat Hospital of Specialties (RHS), Souissi Maternity Hospital (SMH), EL Ayachi Hospital in Sale (AHS), Moulay Youssef Hospital of Rabat (MYH), National Institute of Oncology (NIO), and National Center for Reproductive Health (NCRH) [14]. For the medical staff, it is composed of a manager who is a professor of higher education, 4 biologist physicians, 1 assistant professor, and 4 internal residents. The para-medical staff consists of 5 engineers, 10 technicians, a head nurse, and 2 service agents. The laboratory has two automats, and provides analytical activities involving: medical bacteriology, bacterial serology, and the control of the hospital environment and food hygiene.

In 2009, the laboratory was committed to a quality approach that aimed for ISO 9001 certification in short-term and long-term accreditation. In 2011, quality cell service of bacteriology has developed a self-report diagnosis about the application of Moroccan GBEA.

**Table 1** Top ten for quality improvement scores with corresponding importance scores and experience scores

Quality aspects	Score of (-) experience	Average score	Improvement score	Dimensions <sup>a</sup>
a. The quality of expression of results	1,46	3,27	4,76	D3
b. information on the range of tests carried out in the laboratory	1,43	2,70	3,86	D1
c. The availability of technician all the day	1,18	2,64	3,11	D2
d. Ulterior transmission of printed and signed results	1,25	2,45	3,06	D3
e. Exchange with the biologist to comment on the results	1,11	2,59	2,87	D2
f. The analyses lists availability made in the laboratory	1,01	2,25	2,28	D1
g. Prescriber information on the presence of non-conformities	1,07	2,07	2,23	D4
h. Claims management by laboratory upon detection of anomalies on the results	1,05	2,08	2,19	D4
i. Information for prescribers on medical indications and appropriate choice of methods available	1,08	1,93	2,08	D1
j. The availability of technician at night and on weekends	1,16	1,80	2,08	D4
k. Transmission delay of results	1,02	1,90	1,95	D3
l. The treatment of urgent requests for analysis	0,99	1,84	1,82	D3
m. Transmission of results via telematic means	0,92	1,61	1,49	D3
n. Quality of telephone reception by the technician	0,78	1,65	1,28	D2

<sup>a</sup> D1: Transmission of information about the provided services; D2: Communication and relational exchange; D3: Quality and quickness of transmitted documents; D4: Claims processing

**Table 1** Top ten for quality improvement scores with corresponding averages importance scores and negative experience scores. (D1: Transmission of information about the provided services; D2: Communication and relational exchange; D3: Quality and quickness of transmitted documents; D4: Claims processing).

### Study setting and target population

This study was performed in the CHIS bacteriology laboratory, which receives approximately 12398 annual requests, and was approved by the hospital laboratory's Investigational Review Board [14]. Whereas, the medical staff at the CHIS of Rabat includes approximately 3000 attending physicians (residents and nurse practitioners). These staff members all have input into the prescribing decisions made at our laboratory.

During 3 months, a satisfaction survey was launched to all these prescribers addressing requests for bacterial analysis in the laboratory. The survey questions relate to the chosen themes that enable us to assess whether the bacteriology services do or not meet their expectations and needs. In this perspective, a laboratory committee, named COLAB, was created for the development and validation of the questionnaire shown in Figure 1.

### Questionnaire development and data collection

As a result of preliminary investigations (claims analysis,

communication between service bacteriology and clinical services based on the feedback, and specific comments from each of the target caregivers such as physician, nurse,...) A small number of simple and essential criteria for the assessment of potential sources of dissatisfaction were selected by the COLAB and reported on the grid (Figure 1).

The questionnaire included 14 items that corresponded to 4 dimensions or evaluation criteria for the activity of bacteriology laboratory in the context of overall satisfaction, access and availability, trust in the biologist skill, and the interpersonal relationships. The proposed answers followed a scale from 0 to 5 (0: none, 1: very dissatisfied, 2: dissatisfied, 3: neutral, 4: satisfied, and 5: very satisfied) (Figure 1). Evaluation grids sent to top executives and department heads of all clinical service prescribers with recommendations for a collective assessment.

Data collection began three months after a letter sent to all clinical services. It was conducted in collaboration with the studied services where a person was in charge

Assessment criteria or issues	A	B	C	D	E	F	Comments
<b>Dimension 1: Communication and relational exchange</b>							
1- Quality of telephone reception by the technician 2- The technician availability along the day 3- The availability of technician at night and on weekends							
<b>Dimension 2: Transmission of information about the provided services</b>							
4- The analyses lists availability made in the laboratory 5- The range of tests carried out in the laboratory 6- Information for prescribers on medical indications and appropriate choice of methods available							
<b>Dimension 3: Quality and quickness of transmitted documents</b>							
7- The delay for response the results 8- The treatment of urgent requests for analysis 9- Transmission of results via telematic means 10- Ulterior transmission of printed and signed results 11- Results expression (clarity, accuracy, unequivocal)							
<b>Dimension 4: Claims processing</b>							
12- Exchange with the biologist to comment on the results 13- claims management by laboratory upon detection of anomalies on the results 14- Prescriber information on the presence of non-conformities							

**Figure 1** Questionnaire addressed to prescribers CHIS. A: none, B: very dissatisfied, C: dissatisfied, D: neutral, E: satisfied, F: very satisfied.

of spreading the questionnaires and their collection once completed or if there is a need to get on to the physicians again. However, for other centers (with a small staff of clinician prescribers), the questionnaires were sent by mail and returned the same way. Protection of anonymity was guaranteed as follows: after the return of the questionnaires, they were all numbered without preferential order with a unique number. The procedure for collection and processing of data is described in Figure 2.

### Data analysis

#### Quality improvement scores

A note from 0 to 5 was assigned to each response. For each of the five dimensions of the questionnaire, a score

was calculated by summing the scores for each informed item and belonging to this dimension. Finally, an overall score was calculated by summing the scores of all items completed. Each score was then converted into a score ranging from 0 to 100, which is interpreted as a percentage of the maximum satisfaction possible.

To identify the aspects of quality of the services provided by our laboratory, which are particularly eligible for improvement, we conducted descriptive analyses. First, the proportions of the respondents reporting negative experiences on the different items were assessed. Second, to prioritize the needs of prescribers, we calculated the average importance scores on all items. These two types of scores were then combined in to a so called "quality improvement score", using the formula: proportion negative experience \* importance score. The higher the score, the



**Table 2** Satisfaction assessment of prescribers with bacteriology laboratory services - CHIS, Year 2013.

Health care establishments of CHIS	D1	D2	D3	D4	Satisfaction index by establishments of CHIS
INO	55 ± 20	39 ± 25	38 ± 30	44 ± 20	44 ± 22
HSR	51 ± 29	29 ± 23	26 ± 20	28 ± 25	32 ± 23
HEY	57 ± 26	56 ± 26	51 ± 28	48 ± 21	57 ± 22
HER	41 ± 30	38 ± 29	44 ± 29	35 ± 31	40 ± 28
MATERNITE.S	51 ± 24	46 ± 26	40 ± 26	47 ± 25	48 ± 25
HIS	44 ± 27	49 ± 26	50 ± 26	47 ± 29	51 ± 26
Satisfaction index	50 ± 26	43 ± 26	42 ± 27	41 ± 25	

% For all

establishments of CHIS

**(D1: Transmission of information about the provided services; D2: Communication and relational exchange; D3: Quality and quickness of transmitted documents; D4: Claims processing).**

**Table 2** Satisfaction assessment of prescribers with bacteriology laboratory services - CHIS, Year 2013. (D1: Transmission of information about the provided services; D2: Communication and relational exchange; D3: Quality and quickness of transmitted documents; D4: Claims processing).

more reason there is for improvement [15, 16].

## Results

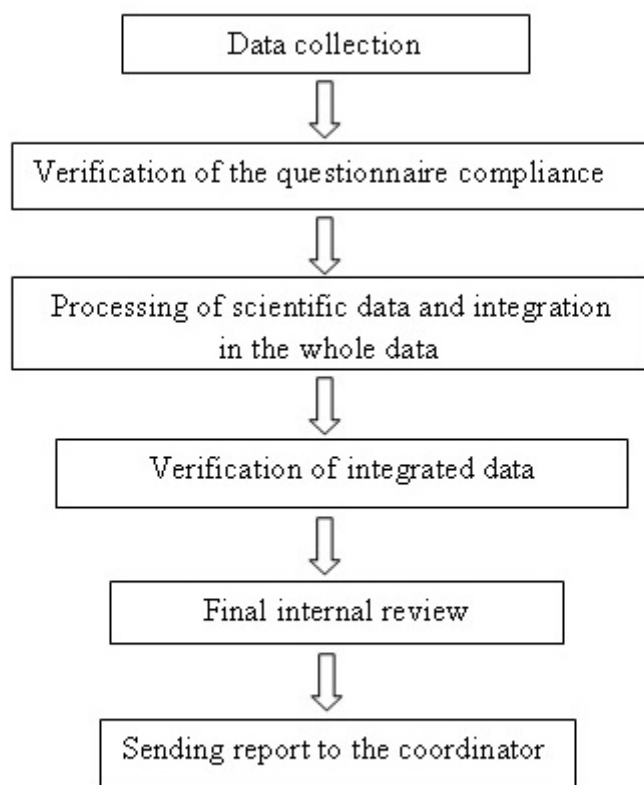
The satisfaction survey was launched to all prescribers addressing requests for analysis in the laboratory bacteriology- CHIS. To analyze the results in a structured way, the 14 questions were divided into four themes or dimensions chosen to allow us to assess whether the provided services in the studied laboratory do or not meet expectations.

These dimensions are: Transmission of information about the provided services (D1), Communication and relational exchange (D2), Quality and quickness of transmitted documents (D3), and Claims processing (D4). A total of 380 prescribers (76%) responded and completed the questionnaire, completely, and 1887 responses were received and recorded. Among all these obtained responses, 24% prescribers expressed positive responses, and 56% revealed negative responses while 20% recorded neutral responses. Figure 3 shows question by question the distribution of positive and negative responses for all of the performed services by the bacteriology laboratory- CHIS for the last semester of 2013.

To classify these responses in terms of needs detected by our prescribers and identify priorities and relevance of quality improvement actions to be undertaken, it proved

very useful to present the 10 aspects that are most eligible for improvement of the services in laboratory according to prescribers. Table 1 shows the mean scores and the importance scores of the prescribers who reported negative experiences or responses with laboratory services. The aspects such as “result’s expression quality (clarity, accuracy, and unequivocal)”, and “the information about the range of tests carried out in the laboratory” seem to be aspects that need to be improved more, followed by the aspect “availability of technician along the day”.

The three quality aspects constituting the dimension 2 “transmission of information concerning laboratory activity” recorded the highest improved quality scores. Thus, as our priority must improve the two following aspects “information on the range of tests carried out in the laboratory” and “the availability of lists of tests performed by the laboratory” to meet the expectations of prescribers. Regarding the dimension “quality and quickness of transmitted documents”, which includes five aspects, obtained quality improvement scores indicated that “the quality of expression the results”, “ulterior transmission of printed and signed results” and “the delay for response to the results” deserve, respectively, a high priority to be given, and can have a significant impact. In addition, quality improvement scores obtained with the dimension “communication and relational exchange” showed that the priority is to improve “The technician availability along the day” and “exchange

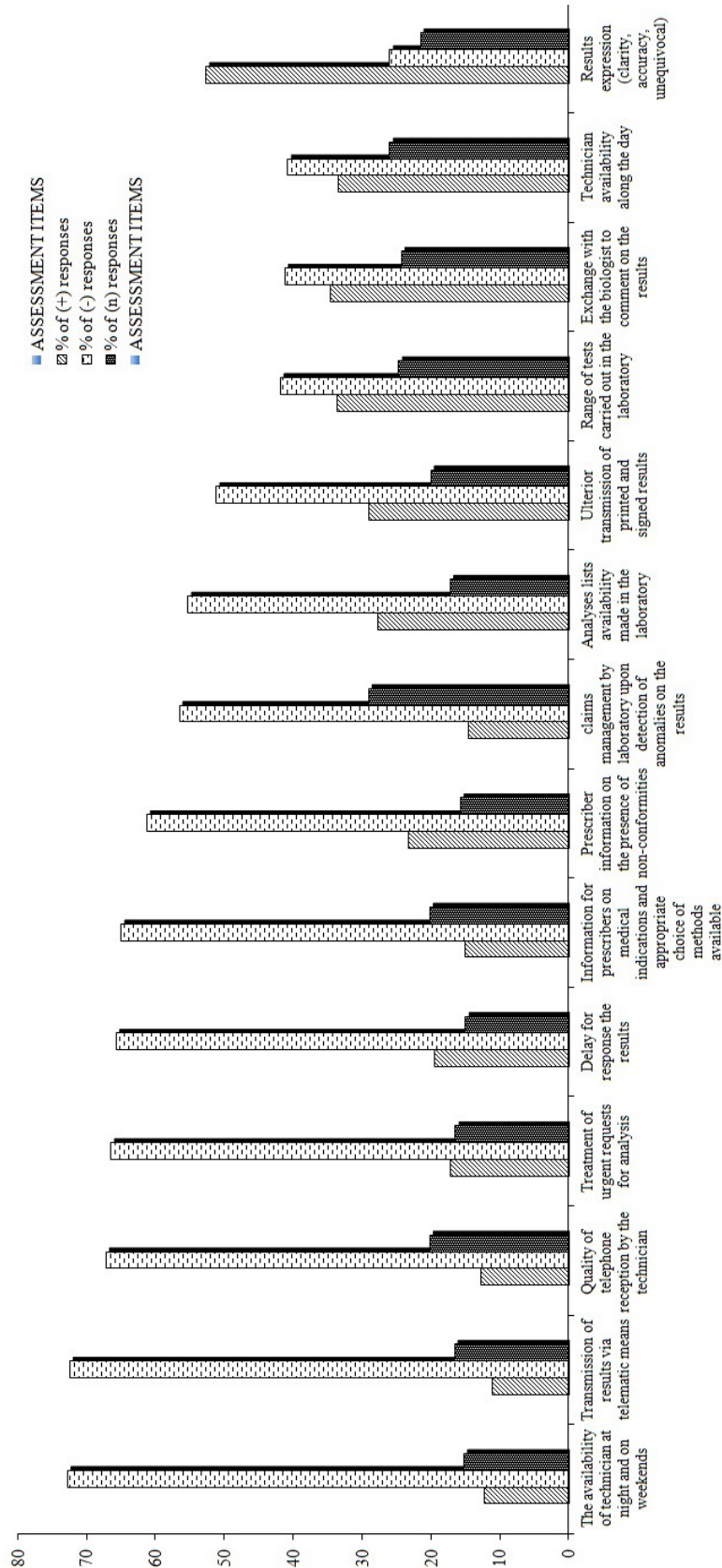


**Figure 2** Distribution of (+), (-) and (n) responses on the whole assessment criteria sent to prescribers CHIS. \* (-) responses are "not satisfied", "very dissatisfied" or "dissatisfied" for different items assessed / (+) responses are "satisfied" and "very satisfied" / (n) responses are "neutral".

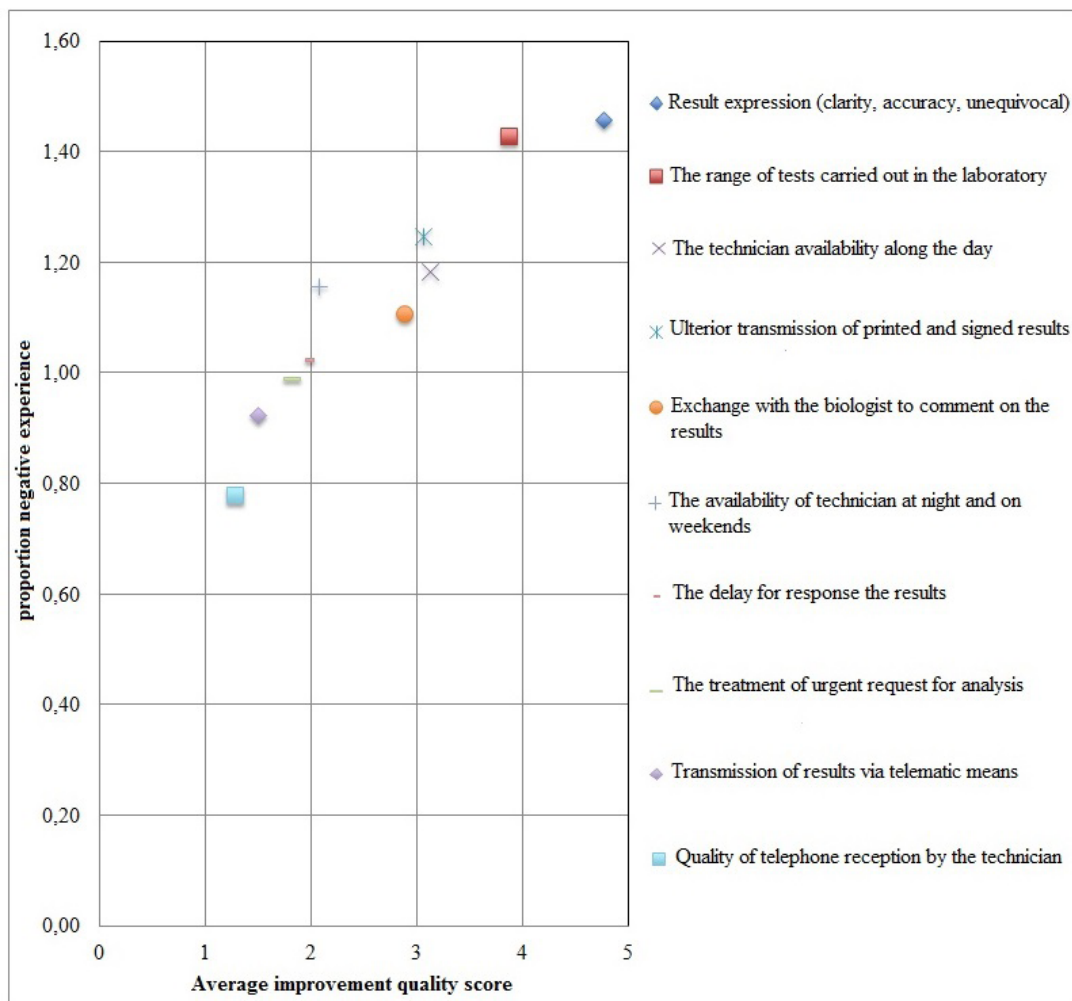
with the biologist to comment on the results".

Figure 4 graphically displays improvements potential on a selected of items questionnaire by comparing the prescribers' negative experiences on the y-axis to the importance they attach to different aspects of the quality of x-axis. Aspects in the upper right quadrant correspond to the services that clinicians consider most important, and for which, they were less satisfied, whence the absolute priority is to improve them by implementing corrective actions. The aspects appearing in the upper left quadrant are considered less important but also less satisfactory for the reporting prescribers. So these aspects need to be improved without priority while maintaining the required monitoring work to prevent regression of the scores given by respondents. So, it is easy to determine improvement initiatives and rank them in prioritized order according to the importance of the prescribers' judgments and on the basis of negative responses they reported. It concerns the quality of expression the results, the range of tests carried out in the laboratory, the speed in transmission of printed and signed results, and the availability of the technician during the day.

A prescribers' satisfaction index is calculated with regard to all dimensions studied. Thus, as shown in Table 2, this index is used to evaluate all laboratory services studied. All in all, the percentage of overall satisfaction of the HSR, HER, INO and Maternity Souissi is low, indicating that the prescribers' dissatisfaction varies, respectively, by 32%, 40%, 44% and 48%. The other hospital complex where the percentage of satisfaction is greater than 50, is generally considered satisfied with the performance of our laboratory. This table shows the estimated percentage of prescribers' satisfaction for our bacteriology laboratory in its entirety. For example, this percentage appears low for the dimensions relative to the quality and quickness of transmitted documents (42%) and processing claims (41%). From all the results obtained for quality improvement scores and percentage of overall satisfaction, we must direct our corrective actions overwhelmingly at the HSR, HER, INO and Maternity Souissi for improving the identified quality priority areas as follows: "the quality of results, expression", "information on the range of tests carried out in the laboratory", "availability of technicians during the day," "ulterior transmission of printed



**Figure 3** Distribution of (+), (-) and (n) responses on the whole assessment criteria sent to prescribers CHIS. \* (-) responses are "not satisfied", "very dissatisfied" or "dissatisfied" for different items assessed / (+) responses are "satisfied" and "very satisfied" / (n) responses are "neutral".



**Figure 4** Quadrant figure presenting the importance of quality improvement potential scores recorded by prescribers. "Rule of thumb for importance score: all aspects with an importance score of 3.00 and higher are considered important; Rule of thumb for experience score: all aspects with proportion negative of 1 and higher are considered as negative experiences".

and signed results" and "exchange with the biologist to comment on the results".

## Discussion

The satisfaction evaluation of prescribers is an essential tool in the assessment of any quality process [17, 18]. One can view the factors influencing the studied quality items as two broad types: those that one can control and those that one cannot. Institutional factors are those that are not under the control of service providers in our laboratory. However, institution factors are those that are not under the control of service providers in the laboratory. Such factors as staffing levels, governance, case mix, or geography as it impacts transport time; are the most likely but not specific etiologic factors that have negative impacts on the quality of services provided by a medical bacteriology laboratory [19, 20, 21]. However, process factors are under the con-

trol of the laboratory, and should be considered to make urgent initiative to improve quality [22, 23].

We achieved an orthogonal analysis to determine which aspects of the quality of services in the studied laboratory bacteriology- CHIS need to be improved. Also the restitution of prescribers' satisfaction by dimension was performed. The scores of the four dimensions "Transmission of information concerning laboratory activity"; "communication and relational exchange"; "quality and quickness of transmitted documents" and "the processing of claims" are all less than or equal to 50% limit between satisfaction and dissatisfaction. Hennequin-Le Meur *et al.* (2003) [24] recorded higher satisfaction percentages that vary by items from 69% (delay waiting for the laboratory results) to 80% (presentation of results) with a percentage of 71% for information on the laboratory tests and the conditions for their realization. Steindel & Howanitz (2001) [25] reported a striking result of the physician satisfaction sur-



vey, which is the perception by 61% of emergency department physicians versus 47% overall that test turnaround time extends the length of stay always, usually, or often in this department. Cue and Inglis (1978) [26] found that the most common reasons for test delays were linked to collecting and transporting specimens, queuing the tests on an emergency basis, and communicating the results to physicians. These responses are remarkably similar to the results we have observed in this and past study on risk analysis and management of non-conformities of biological samples in our laboratory [12].

In the present study, the dimensions of “quality and quickness of transmitted documents”, “transmission of information concerning laboratory activity”, “communication and relational exchange”, and “the claims processing” include 8 priority items to improve namely expression of results, quality, the range of tests carried out in the laboratory, the analyses lists, availability made in the laboratory, technician availability throughout the day, ulterior transmission of printed and signed results, exchange with the biologist to comment on the results, the delay for response to the results, and the laboratory treatment of urgent requests.

To meet the prescribers expectations, to the corrective actions that should be implemented and planned are:

- A manual and a reminder are developed by a working group to guide prescribers and samplers in achieving different bacteriological samples to perform analyses under optimal conditions. These documents will be distributed to guide care services and be made available on the intranet of the CHIS [12]. Some of these problems were resolved in short term with these paper documents made by the bacteriology laboratory –CHIS, and the database is currently under implementation with informatics (software selection by a working group’s after quality steering committee) via intranet that can be changed in real time.

- Installation of the pneumatic tube, frontal automation, automatic verification of results and optimization of access to computer systems (SIL, intranet) for fast access to the results, lists of analyzes, sheets declarations of non-compliance.

- In many situations, it is much faster to perform both routine laboratory tests and immediate tests instead of patient bedside care with an electronic tracking system [27, 28]. This investment is discussed with management to validation.

- For a better exchange and communication between, prescribers’, clinicians and biologists, a call center could be set up with regular information meetings between the biologists and clinicians.

- The notification in the SIL of non-conformities upon receipt will meet a concern for efficiency, and allows for computer tracking of the event in the patient file and link

the non-compliance to prescribing services.

- The creation and development of a new report sheet on the results consistent with the prescribers.

It is to be noted that investment in a single institutional strategy for improving quality of services delivered by the studied LBM must be oriented, and needs to happen quickly towards equipment (urine cytology systems, systems for *Mycobacterium tuberculosis* culture, ...), staffing (Secretary for results transmission, technician to strengthen the retirement, ...), and physical facilities (telephones, video conferencing to facilitate communication, ...). These resources will not only have an impact in terms of financial refunding but also an increase in prescriber’s and patient’s satisfaction. We plan to make the graph to understand the evolution of LBM-CHIS services over several years in terms of controlling of the customer processes and satisfaction. This tool should enable long-term to support the quality process in place implementation. The continuous improvement of LBM services must translate the graph by an increase from one year to another in order to reach 100% satisfaction and 0 defects (cases of HIS, HEY, and Maternity Souissi). Conversely, a reduction should involve a thorough analysis to identify the causes of the decline. Finally, customer satisfaction cannot pass only through a process control; and therefore, it is necessary to further develop the interface with the clinical services. This study allowed us to design a tool, simple and usable in practice, for evaluating the satisfaction of prescribers on the services in the studied LBM.

## Conclusions

In this study, we designed, simple and usable a tool for evaluating the satisfaction of prescribers on the services provided in the studied LBM. We documented a lot of common themes that have persisted at least for decades. There is a complex relationship between the services provided in LBM and the clinical services given in CHIS. A mutual frustration may exist between the laboratory staff’s and the prescriber’s services. So, we took care of the most important aspects to improve our services in agreement with the prescribers. Our studies indicate that simple and universal solutions do not exist, and effective solutions take time. All parties shall meet within the framework of a formal study of continuous improvement of quality, to find the causes and systems responsible for delays and failures that are specific to individual situations involving prescribers in an ultimate objective of developing a customer quality index. Staff must replace their time to deal internally with their frustrations with the attitude to work together (biologists, and clinicians) to find and implement satisfactory solutions. Monitoring and treatment of new problems have to be made; otherwise the continuous improvement process will deteriorate rapidly. Health care benefits still facing too many

complex changes that influence the axes of Laboratory and Clinical Department, which make conflicts persevere while they can be resolved.

#### Authors' Contributions

The authors contributed equally to this work.

#### Competing Interests

The authors declare no competing interests.

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