

**Measurement of the degree of customer satisfaction cases:****HABIB BOURGUIBA Hospital****Jallouli fayza** <sup>1\*</sup>**Benzaala ismail** <sup>2</sup>

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**Received:** 2022-11-06**Accepted:** 2023-01-03**Published:** 2023-01-18**Abstract:**

Currently each hospital offers satisfaction surveys to its patients to observe how they evaluate the care services. Indeed, it is important for each hospital, whatever it is, to take an interest in the opinion of its patients about the care provided to them. These surveys allow hospitals to consider patient satisfaction as an indicator for judging the quality of care and services offered. In hospitals, patient satisfaction does not only correspond to the intervention or a simple consultation. On the contrary, it begins when the appointment is made, then continues when the patient arrives at the hospital and ends when he leaves. This study aims to measure the general level of patient satisfaction with all aspects of their care at Habib Bourguiba Hospital, to explain the length of stay in the hospital, as we can imagine that the longer patients stay in the care service, the greater the sources of dissatisfaction. We concluded that the most important thing for the patient is that he leaves the hospital "healed".

**Keywords:** Patient satisfaction; Quality of services; Control chart; Flat and Cross sorting, Frequency comparison test.

**JEL classification codes:** I11; O31; I15; I30; M15.

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## قياس درجة رضا الزبائن: مستشفى حبيب بورقيبة

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### الملخص:

تقدم كل مستشفى حاليًا استطلاعات رضا لمرضاهم لمراقبة كيفية تقييمهم لخدمات الرعاية، في الواقع من المهم لكل مستشفى مهما كان، أن يهتم برأي مرضاه حول الرعاية المقدمة لهم. تسمح هذه الاستطلاعات للمستشفيات بالنظر في رضا المرضى كمؤشر للحكم على جودة الرعاية والخدمات المقدمة. في المستشفيات لا يتوافق إرضاء المريض مع التدخل أو الاستشارة البسيطة فقط، على العكس من ذلك فهو يبدأ عند تحديد الموعد، ثم يستمر عند وصول المريض إلى المستشفى وينتهي عند مغادرته. تهدف هذه الدراسة إلى قياس المستوى العام لرضا المرضى عن جميع جوانب رعايتهم في مستشفى حبيب بورقيبة، لتفسير طول مدة الإقامة في المستشفى، حيث يمكننا أن نتخيل أنه كلما طال مدة بقاء المرضى في خدمة الرعاية، زادت مصادر عدم الرضا. خلصت الدراسة إلى أن أهم شيء بالنسبة للمريض هو أنه يغادر المستشفى قد "شُفي".

**الكلمات المفتاحية:** رضا المرضى؛ جودة الخدمات؛ مخطط التحكم؛ فرز مسطح ومتقاطع، اختبار مقارنة التردد.

رموز تصنيف JEL: I11؛ O31؛ I15؛ I30؛ M15.

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## Introduction

Patient satisfaction is an important subject for any commercial or non-commercial company. For the hospital sector, it is also a very interesting tool to know the opinion of patients regarding their hospitalization. Thanks to satisfaction surveys, each establishment can periodically check the level of satisfaction and understand patient expectations. However, this is quite complex within hospitals. Indeed, these have many services and for each of them the support is different. Patients can enter a service for a very short or longer stay and the medical teams are specific to each service. There is therefore no typical hospitalization because a large number of elements come into play. In addition, the personal variables of the patients can intervene since each person who is hospitalized can have a positive, negative or neutral personal hospital experience. The interest of carrying out a questionnaire in the HABIB BOURGUIBA hospital and identifying the weak points and the strong points of the hospital. The weak points to correct them and the strong points to improve them. In this article, we will introduce the hospital. We will present in detail the different specialties provided by this company and we will end with an analysis of the degree of customer satisfaction with the services presented using the Spss software.

## Literature review:

The first research on consumer satisfaction was carried out in the mid-1970s. At that time, companies were limited to responding to complaints. It was in the 1980s that companies gave importance to this concept. They realized that satisfaction had become an important variable for subsequent behaviors. This is how it has become essential for any organization. There are many definitions of satisfaction in the marketing literature. While some compare satisfaction to an emotion (Westbrook, 1980; Woodruff, Cadotte and Jenkins, 1983), others consider it a cognitive appreciation (Bloemer and Kasper, 1995; Churchill and Surprenant, 1982). For this thesis, we have decided to present the following definition to you: satisfaction can be defined as "The positive or negative impression felt by a customer regarding a purchasing and/or consumption experience. It results from a comparison between their expectations with regard to the product and its perceived performance. Derbaix and Brée (2000) define satisfaction as "a psychological state resulting from the purchasing and consumption process". (DERBAIX C, 2000, p. 505)

Satisfaction in the hospital environment, at present, patient satisfaction has become a central point for hospitals in order to take into account the patient's point of view in relation, in particular, to the evaluation of the quality of their care. . In the hospital environment, the measurement of customer satisfaction comes from two types of motivation. The "internal motivations" which come from establishments wishing to better control the quality of care and costs while taking into account the patient's point of view. The measurement of patient satisfaction will allow, in this case, establishments to improve their performance while seeking the best for the patient. This is how many hospitals set up quality control procedures in order to control the process and therefore the quality of care. Quality control, which consists of "an organizational system that makes it possible to integrate together the efforts to develop, maintain and improve quality, carried out by different groups in the company, in order to ensure that the studies, marketing, manufacturing and customer service are carried out at the lowest cost level while achieving complete customer satisfaction". (BUMAND B, 1997)

Several researchers have demonstrated a linear relationship between satisfaction and loyalty, that is to say that satisfaction could be associated with greater consumer loyalty (Bitner, 1990; Fornell et al. 1996; Host and Knie- Andersen, 2004; Taylor and Baker, 1994). Others claim that the relationship between satisfaction and loyalty is not linear. Oliva et al. (1992) noticed that satisfaction reaches a certain threshold when loyalty increases rapidly. (BOSS, 1993, pp. 5-6)

In the hospital setting, determinants specific to this field can be added in relation to those of Parasuraman, Zeithaml and Berry, previously stated. Many components specific to the perceived quality of service, in a hospital environment, come into play:

**Tangibility:** although the hospital service is intangible, there are tangible elements such as the appearance of the hospital, the medical equipment, etc.

**Attention:** the willingness of staff to give each patient special and individualized attention, while being courteous and pleasant.

**Availability:** in all circumstances and within acceptable deadlines, the hospital and the staff give themselves the means to meet the needs and requests of the patient.

**Insurance:** patients must feel confident and secure throughout the service.

**Communication:** throughout their stay, the patient must receive information concerning their state of health and the services offered to them.

**Reliability:** in all circumstances, the patient must be able to benefit from the services that have been promised to him.

**Exteriority:** the hospital allows patients to maintain contact with the outside world and supports them in the aftermath of their hospitalization.

From these seven dimensions, it will be easier to assess the perceived quality of the service.

Finally, we can conclude that the perceived quality of the service has an impact on patient satisfaction and will or will not lead the patient to return to the hospital for subsequent care (fidelity). (BIELEN, 2001)

## General presentation of the HABIB BOURGUIBA hospital

### Emergencies and additional examinations

Due to the constant pressure on the outpatient departments, more than 55% of patients manage to go through the emergency department and thus circumvent the obligation to accept appointments that are often far apart due to the restriction of outpatient consultations to morning sessions only. The congestion observed could be reduced by improving reception and orientation services. With the same concern, sufficient examination rooms should be allocated and at least two beds reserved in each of the hospital departments for the admission of patients referred by the emergency department. In addition, the medical assistance and rescue unit managed to satisfy 62% of the requests for intervention during the period from 2003 to 2006, despite the dilapidated state of the ambulances and the inadequacy of their number. This unit is not connected to other hospital services by special communication lines likely to ensure the effectiveness of its interventions. (Achour, accessed September 22, 2018, p. 8)

### Surgical activity

Surgical activity is encountering difficulties which have resulted in the non-implementation of weekly surgical intervention programs and the extension of waiting periods and lengths of hospitalization for patients, in addition to the resulting increase in costs. At the origin of such a situation, mention should be made in particular of the limitation of surgical activity to morning sessions, the delay in starting operations, the non-scheduling of some of them beforehand, the absence of a post-operative resuscitation unit and the obsolescence of many medical equipment, some of which remain out of use for a long time due to frequent technical breakdowns. (Care network, accessed September 22, 2018)

### Pre-survey

The pre-surveys that we carried out are semi-structured interviews. The interview takes place on the basis of an interview guide, which the interviewer will address specific topics in relation

to the theme and then go deeper into them. The principles and attitude of the interviewer are identical to non-directive interviews. These semi-structured interviews were subject to content analysis. The pre-survey took place with 26 patients, some of the people accompanying them also spoke during the interviews. The patients were interviewed after their intervention and before returning home.

### Hypotheses

Following the results obtained mainly during the pre-survey, we will develop research hypotheses that will be tested using the results of the satisfaction survey. We will give the link of each hypothesis with the objective of the article, its justification, as well as the statistical test that will be used to verify the hypothesis.

**a- Hypothesis 1:** The majority of patients are generally satisfied with day hospitalization.

**Link with the objective:** The study of the satisfaction of day hospital patients is our objective, this hypothesis will allow us to evaluate it as a whole.

**Justification:** During the pre-survey, the patients showed a high level of satisfaction, i.e. 23 interviewees out of 26.

**Key words:** The majority means that a proportion statistically higher than 50% will declare themselves satisfied by the hospitalization service.

**Statistical tests:** Comparison at a frequency (50%).

**b- Hypothesis 2:** A majority of patients are satisfied with the information received by

- The doctors
- The nursing staff

**Link to the objective:** In addition to overall patient satisfaction, it is important to discover the sources of satisfaction and dissatisfaction. Since patients go through different stages during day hospitalization, some aspects of care may be assessed differently.

**Rationale:** Some patients received a lot of information and others very little. The information varies from person to person. Indeed, we were able to observe that 15 out of 26 patients had received explanations about the course of the intervention from the doctors, while the others had received nothing. In addition to this, only 11 out of 26 patients obtained information about the course of the day from the nursing staff.

**Keywords:** The majority means that a proportion statistically greater than 50% will declare themselves satisfied with the information received by the various stakeholders.

### Methodology for data collection

#### a- Modes of administration

This satisfaction questionnaire will be sent after the intervention by the nursing staff to the patients who will complete it individually. Then, they will be asked to deposit the questionnaires in a ballot box placed in the hallway of the day hospital service to guarantee their anonymity.

#### b- Presentation of statistical tests

To test our different hypotheses, we had the statistical test of frequency comparison. Before verifying these hypotheses, it seems interesting to us to develop these statistical tests to facilitate understanding when verifying the hypotheses.

#### The frequency comparison test

We are in the presence of a sample greater than 30 ( $n \geq 30$ ). Indeed, let  $p$  be the proportion of the population and  $p_0$  a particular hypothetical value of the proportion.

In the context of hypothesis testing, we can have different possible forms for the population proportion:

- $H_0: p \geq p_0 / H_1: p < p_0$
- $H_0: p \leq p_0 / H_1: p > p_0$
- $H_0: p = p_0 / H_1: p \neq p_0$

In the first two cases, we find ourselves in the presence of unilateral tests while for the 3rd case, it is a bilateral test. Since the size of our sample is greater than 30, we can say that the frequency of the sample follows a normal law, whose mean  $p = p_0$  and the standard deviation is:

**a- Decision rule**

In our case, we are in the presence of a test with rejection on the right of the hypothesis  $H_0$ , since  $H_1: p > p_0$ . We consider a risk  $\alpha$  of 5%, i.e. a confidence threshold of 95% for the verification of our hypothesis.

Thanks to this significance level  $\alpha$ , we are able to determine the critical region in the form  $f > b$  since we are testing  $p > p_0$ . The value of  $b$  will be calculated as follows:

$$\begin{aligned} \text{Prob (H1 accepted / H0 true)} \\ = \text{Prob (f > b / p=p0)} \end{aligned}$$

Then, in the table of the reduced centered normal law, we will define the value of  $t_\alpha$  such that:

$$\text{Prob (T > } t_\alpha) = \alpha$$

The test rule is as follows:

Then: If  $f > b \Rightarrow$  we will reject  $H_0$

If  $f < b \Rightarrow$  we will accept  $H_0$

We are going to put this statistical test into practice to have our  $b$  value and thus we can accept or invalidate the hypotheses.

We have: HABIB BOURGUIBA  $n=100$

$$b = 0.5 + 1.645 * 0.0041 = 0.5041$$

If  $f > 0.5041 \Rightarrow$  we reject  $H_0$

If  $f < 0.5041 \Rightarrow$  we accept  $H_0$

**b- Verification of hypotheses**

In order to analyze the frequencies, during a positive affirmation, we formed two groups:

- "Agree respondents": these are all patients who responded "totally agree" and "agree" to the statements;

- The "other respondents": these are all those who "neither agree nor disagree", "disagree" or "totally disagree" with the various statements.

In the negative statement frame, we also split the respondents into two groups:

- "Respondents who disagree": these are all patients who answered "disagree" or "totally disagree" with the statements;

- The "other respondents": These are all those who "totally agree" and "agree" and "neither agree nor disagree" with the various statements.

In each table below, we find the different frequencies noted on the two sites in relation to the degree of agreement of the patients vis-à-vis the statements. Thanks to these precisions, we can begin the verification of our hypotheses.

**c- Hypothesis n°1:** The majority of patients are generally satisfied with their day hospitalization.

In order to test this first hypothesis, we asked respondents to indicate their agreement with the following statement: "Overall I am satisfied with my stay".

To affirm or refute this hypothesis, we used a one-frequency comparison test. In the following table, we can take note of the frequencies.

**Table N°1**  
**Frequencies of responses obtained to question n° 1**

Question asked n°1	Respondents agree		Other respondents	
Overall, I am satisfied with my stay.	100	1	0	0

Source: One-Frequency Comparison Test Result

We can already observe that the majority of patients (100%). Is satisfied with her stay in the day hospital. We can therefore accept H1 since:

$$-f = 1 \text{ and } f_0 = 0.5041$$

Since the observed frequency is greater than  $f_0$  values, we can conclude that the majority of patients agree with the statement.

**d- Hypothesis n°2:** A majority of patients are satisfied with the information received by

-2a: Doctors

-2b: The nursing staff

• Hypothesis 2a

Initially, we were interested in the information received from doctors. To be able to test this hypothesis, we asked the respondents several questions relating to the information they had received. We used a frequency comparison test.

**Table N°2**  
**Frequencies of responses obtained to question n° 2**

Question asked n° 2	Respondents agree		Other respondents	
The doctor takes the time to explain how the operation will take place.	96	0.931	4	0.069

**Source:** One-Frequency Comparison Test Result

We can already observe that the majority of patients agree that the doctor takes the time to explain how the operation will take place. For the sake of precaution, we will compare our frequencies with the values  $f_0$ :

$$-f = 0.931 \text{ and } f_0 = 0.5041$$

Since the observed frequency is greater than  $f_0$  values, we can conclude that the majority of patients agree with the statement. We will now focus on the second statement which is negative. In this case, we take into account respondents who disagree.

**Table N°3**  
**Frequencies of responses obtained to question n° 3**

Question asked n° 3	Respondents agree		Other respondents	
The doctor does not take the time to give information on the precautions to be taken and the instructions for home care.	94	0.897	6	0.103

**Source:** One-Frequency Comparison Test Result

We can observe that a majority of people disagree with this statement. To confirm this trend, we will refer to  $f_0$  values.

$$-f = 0.897 \text{ and } f_0 = 0.5041$$

Since the observed frequency is greater than  $f_0$  values, we can conclude that the majority of patients do not agree with the fact that the doctor does not take the time to give information on the precautions to be taken and the instructions for treatment. Home Care. We will now analyze the frequencies observed for the last statement relating to the information received by the doctor.

**Table N°4**  
**Frequencies of answers obtained to question n° 4**

Question asked n° 4	Respondents agree		Other respondents	
The doctor answers all questions.	98	0.966	2	0.034

**Source:** One-Frequency Comparison Test Result

Thanks to the frequencies observed for this statement, we can already observe that the majority of patients agree. We can support this observation by comparing the frequencies with the  $f_0$  values.

$-f = 0.966$  and  $f_0 = 0.5041$

Since the observed frequency is greater than  $f_0$  values, we can conclude that the majority of patients agree that the doctor answers all the questions.

• **Assumption 2b:**

In the rest of the questionnaire, we were interested in the information received by the patients from the nursing staff, i.e. the nurses of the surgical day hospital. To be able to test this hypothesis, we asked the respondents several questions relating to the information they had received. We used a one-frequency comparison test.

**Table N°5**

**Frequencies of responses obtained to question n° 5**

Question asked n° 5	Respondents agree		Other respondents	
The nurses do not take the time to explain the course of the day.	89	0.810	11	0.190

**Source:** One-Frequency Comparison Test Result

We can observe, on the basis of these simple frequencies, that a majority of patients do not agree that the nursing staff does not take the time to explain the course of the day.

To confirm this trend, we will refer to the  $f_0$  values:

$-f = 0.810$  and  $f_0 = 0.5041$

Since the observed frequency is greater than  $f_0$  values.

We can conclude that the majority of patients disagree with this statement. On the other hand, since the patients do not agree with this statement, we can assume, on the contrary, that the care staff took the time to explain to the patients the course of the day.

Subsequently, a second statement was proposed to the patients in relation to the theme of the information received.

**Table N°6**

**Frequencies of responses obtained to question n° 6**

Question asked n° 6	Respondents agree		Other respondents	
The nurses come by regularly to see if everything is going well.	94	0.897	6	0.103

**Source:** One-Frequency Comparison Test Result

Thanks to the above data, we can observe that 89.7% of respondents agree that nurses come regularly to see if everything is going well. Based on these simple frequencies, we can say that the majority of respondents agree. However, we will use a frequency comparison test to support our claims.

We compared the observed frequencies with the  $f_0$  values:

$-f = 0.897$  and  $f_0 = 0.5041$

We can say that the majority of patients agree with this statement.

## Presentation of the questionnaire

### Objective

The satisfaction survey is a powerful tool to measure customer satisfaction to better meet their expectations, and to know their needs, and the means to retain them.

### Structure of the questionnaire

The completed questionnaire has 26 questions covering 100 patients and is written in French.

**Table N°7**  
**Coding of scale questions measuring the level of satisfaction**

Degree of satisfaction	Coded
Not concerned	0
Very unsatisfied	1
Not satisfied	2
Moderately Satisfied	3
Satisfied	4
Very satisfied	5

Source: (European Scientific Journal, November 2015 edition vol.11)

### Spss Software Definition

SPSS software is an instrument particularly suited to the implementation of statistical data analysis techniques. It promotes data management in a user-friendly graphical environment combining descriptive menus and dialog boxes. In addition, this environment offers a command language that allows you to write programs to optimize production tasks. It allows efficient data processing and analysis on large databases. It offers several possibilities for organizing and summarizing statistical information. (BAKO Dramane, 2022, pp. 3-23)

#### 1-Breakdown of patients surveyed

- **Distribution of customers:** In our questionnaire, we used a question to identify the customer who completed the questionnaire. This client can be the patient, the relatives of the patients as it is possible that the questionnaire is completed by the patient in the presence of his relatives.

**Table N°8**  
**Breakdown of customers**

Who completes the questionnaire ?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Patient	39	39.0	39.0	39.0
	Relatives	25	25.0	25.0	64.0
	patient with	36	36.0	36.0	100.0
	Total	100	100.0	100.0	

Source: SPSS software output results

In 39% of cases the patient completed the questionnaire alone. In 26% of cases one of the patient's relatives completed the questionnaire and 36% of cases the questionnaire was completed by the patient in the presence of these relatives.

- **Breakdown of customer stay durations**

**Table N°9**  
**Breakdown of customers by length of stay**

How long are you at the clinic ?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A day or less	32	32.0	32.0	32.0
	Between one and 10 days	60	60.0	60.0	92.0
	More than 10 days	8	8.0	8.0	100.0
	Total	100	100.0	100.0	

Source: SPSS software output results

We can conclude that the duration is less than 24 hours for 32% of patients, which is between 1 and 10 days for 60% of patients and that it exceeds 10 days in 8% of cases.

## 2- Univariate analysis

Univariate analysis makes it possible to describe and synthesize the results of the study examining the variables on a case-by-case basis.

### • Flat sorting

A flat sort in Modalisa corresponds to an array of statistical frequencies. This tool makes it possible to know the distribution of individuals having answered each of the modalities of a question single, multiple or ordered response. It is possible to display these frequencies in the form of a table or in the form of a graph. (MODALISA, 2022, pp. 3-7)

### • Welcome at the reception

**Table N°10**  
**Flat sorting reception at reception**

		<b>Welcome at the reception</b>			
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Moderately Satisfied	4	4.0	4.0	4.0
	Satisfied	31	31.0	31.0	35.0
	Very satisfied	65	65.0	65.0	100.0
	Total	100	100.0	100.0	

**Source:** SPSS software output results

65% of customers are very satisfied while 31% said they were satisfied and 4% were moderately satisfied, but they think the hospital can provide a better reception.

### • Administrative reception

**Table N°11**  
**Flat sorting administrative reception**

		<b>Administrative reception</b>			
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	NC	4	4.0	4.0	4.0
	Not satisfied	1	1.0	1.0	5.0
	Moderately Satisfied	4	4.0	4.0	9.0
	Satisfied	28	28.0	28.0	37.0
	Very satisfied	63	63.0	63.0	100.0
	Total	100	100.0	100.0	

**Source:** SPSS software output results

1% of customers are dissatisfied with the administrative reception, 63% declared that they are very satisfied, 28% are satisfied, while another 4% declared that they are moderately satisfied. The hospital must make an additional effort at this level by improving reception techniques.

### • Quality of care

**Table N°12**  
**Flat sorting Quality of care**

		<b>Quality of care</b>			
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	NC	2	2.0	2.0	2.0
	Not satisfied	1	1.0	1.0	3.0
	Moderately Satisfied	3	3.0	3.0	6.0

Satisfied	22	22.0	22.0	28
Very satisfied	72	72.0	72.0	100.0
Total	100	100.0	100.0	

Source: SPSS software output results

Through this table, 72% of clients are very satisfied with the quality of care and 22% are satisfied. This result shows an acceptable degree of satisfaction, but the hospital must make more effort to improve the quality of care through continuous training.

### 3- Bivariate analysis

#### • Cross sorting

Cross sorting consists of building a table crossing these two variables : a line corresponds to a modality of the first variable and a column corresponds to a modality of the second variable. The values in the table correspond to the count of the number of individuals having these two characteristics. (JAKOBOWICZ, 2019)

**Table N°13**  
**Cross-sorting quality of care and overall assessment of the hospital**

		overall assessment of the hospital				Total
		NC	NC	NC	NC	
Quality of care	NC	0	0	2	0	2
	Not satisfied	0	1	0	0	1
	Moderately Satisfied	0	1	2	0	3
	Satisfied	1	1	16	4	22
	Very satisfied	0	1	18	53	72
<b>Total</b>		1	4	38	57	100

Source: SPSS software output results

We have noticed that most of the customers surveyed by 72% are very satisfied with the quality of care and service.

#### • Chi-square test

The chi-square is a statistic that makes it possible to compare the numbers (frequencies) observed in a sample with the theoretical frequencies resulting from the statistical hypotheses. In this module, we are interested in four situations in which the statistic is applicable to carry out a hypothesis test. (Louis Houde, 2022, pp. 3-18)

**Table N°14**  
**Sorting of chi two quality of care**

	Chi-Square Test		
	Value	df	Asymp.Sig. (2-sided)
<b>Pearson Chi-Square</b>	60,320 <sup>a</sup>	12	.000
<b>Likelihood Ratio</b>	41,632	12	.000
<b>Linear-by-Linear Association</b>	16,691		.000
<b>N of Valid Cases</b>	100		

Source: SPSS software output results

This table shows the existence of dependence between these two variables. This shows that the quality of care is a factor influencing overall client satisfaction.

4- One-way ANOVAs

The analysis of variance (ANOVA) covers a set of testing and estimation techniques intended to assess the effect of one or more qualitative variables on a quantitative variable and, in the simple case, amounts to comparing several averages of Gaussian samples. : we generalize the classic test of equality of two means to the test of equality of p means ( $p \geq 2$ ). (Godichon-Baggioni, 2022, pp. 1-12)

**Table N°15**  
**The average scores of the different bounded variables by the different customers**

		Descriptives							
		N	Mean	Std Deviation	Std Error	95% confidence interval for Mean		Min	Max
						Lower Bound	Upper Bound		
Quality of care	Patient	39	4,7949	,40907	,06550	4,6623	4,9275	4,00	5,00
	Proches	25	4,4000	1,08012	,21602	3,9541	4,8459	,00	5,00
	Patient with	36	4,5000	1,05560	,17593	4,1428	4,8572	,00	5,00
	Total	100	4,5900	,87727	,08773	4,4159	4,7641	,00	5,00
Welcome at the reception	Patient	39	4,7692	,42683	,06835	4,6309	4,9076	4,00	5,00
	Proches	25	4,4000	,64550	,12910	4,1336	4,6664	3,00	5,00
	Patient with	36	4,5833	,60356	,10059	4,3791	4,7875	3,00	5,00
	Total	100	4,6100	,56667	,05667	4,4976	4,7224	3,00	5,00
Administrative reception	Patient	39	4,5897	,93803	,15020	4,2857	4,8938	,00	5,00
	Proches	25	4,1200	1,33292	,26658	3,5698	4,6702	,00	5,00
	Patient with	36	4,4167	1,05221	,17537	4,0607	4,7727	,00	5,00
	Total	100	4,4100	1,09263	,10926	4,1932	4,6268	,00	5,00
Reception at the service level	Patient	39	4,7692	,42683	,06835	4,6309	4,9076	4,00	5,00
	Proches	25	4,6400	,48990	,09798	4,4378	4,8422	4,00	5,00
	Patient whit	36	4,6944	,46718	,07786	4,5364	4,8525	4,00	5,00
	Total	100	4,7100	,45605	,04560	4,6195	4,8005	4,00	5,00
Welcome to other services	Patient	39	3,3590	2,19434	,35138	2,6477	4,0703	,00	5,00
	Proches	25	3,3600	2,01825	,40365	2,5269	4,1931	,00	5,00
	Patient with	36	3,0833	2,12972	,35495	2,3627	3,8039	,00	5,00
	Total	100	3,2600	2,11115	,21112	2,8411	3,6789	,00	5,00

Source: SPSS software output results

**Table N°16**  
**The comparison test between the means of the different given variables  
by different customers**

		Anova					
		Sum of Squares	df	Mean Square	F	Sig.	
Quality of care	Between Groups	2,831	2	1,416	1,872	,159	
	Within Groups	73,359	97	,756			
	Total	76,190	99				
	Between Groups	2,117	2	1,058	3,460	,035	

<b>Welcome at the reception</b>	Within Groups	29,673	97	,306		
	Total	31,790	99			
<b>Administrative reception</b>	Between Groups	3,364	2	1,682	1,421	,246
	Within Groups	114,826	97	1,184		
<b>Reception at the service level</b>	Total	118,190	99			
	Between Groups	,268	2	,134	,640	,530
<b>Welcome to other services</b>	Within Groups	20,322	97	,210		
	Total	20,590	99			
	Between Groups	1,756	2	,878	,194	,824
	Within Groups	439,484	97	4,531		
	Total	441,240	99			

**Source:** SPSS software output results

For example, the average score for quality of care is 4.79 by patients, while it does not exceed 4.4 by relatives of patients. The comparison test between the means indicates that  $p\text{-value} = 0.159 > 5\%$ . This means that the null hypothesis of equality of mean scores is accepted.

### Calculation of satisfaction indicators

The following table presents the average scores of the different variables as well as the overall customer satisfaction indicator.

**Table N°17**  
**The average scores of the different variables**

		Average score per question	Average score per theme	Overall satisfaction indicator
<b>Reception at the hospital</b>	Welcome at the reception	4.6100	4.2475	
	Administrative reception	4.4100		
	Reception at the medical service level	4.7100		
	Welcome to other services	3.2600		
<b>Cares</b>	Explanation provided by the doctor	4.3500	4.5300	
	Relationship with caregivers	4.6500		
	Quality of care	4.5900		
<b>The relationship with the staff</b>	Relationship with doctors	4.3200	4.1200	
	Relationship with caregivers	4.3500		
	Relationship with other stakeholders	4.2400		
	Respect for your privacy	4.5700		
<b>Meals</b>	Food quality	3.9200	3.995	
	Presentations of dishes	4.0700		
<b>The rooms</b>	Room comfort	4.4600	4.400	3.9617
	Room maintenance	4.3400		

Schedules	meal schedule	3.8700	4.0850
	Treatment program schedule	4.3000	
Schedules	Schedule of doctor's visits	3.8600	3.7050
	Exit schedule	3.5500	
The annoyance of noise	Bothered by noise/day	1.7900	1.7300
	Disturbed by noise/night	1.6700	
Additional services	Provision of the telephone	3.8800	4.1150
	Provision of television	4.3500	

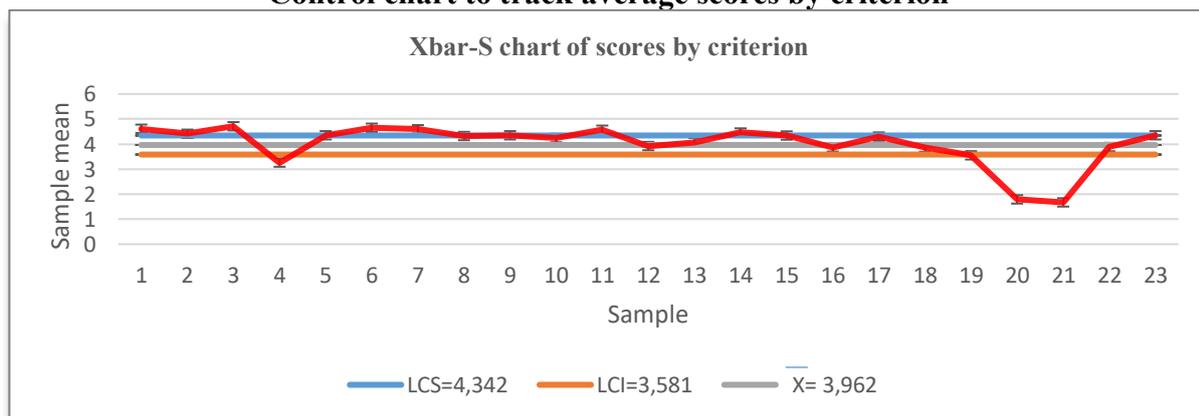
Source: SPSS software output results

We can see from this table that the average satisfaction score is equal to 3.9617. For example, the average score for the quality of care criteria is 4.53, while that for the noise criteria does not exceed 1.73. This shows that the degree of satisfaction varies considerably from one topic to another.

**The control chart for the comparison between the average scores**

They make it possible to carry out an appropriate adjustment of the manufacturing process and to know its machine capability. This tool is presented as a graph whose points represent the monitoring over time of a characteristic of the process whose central value (often the mean) is represented by a horizontal line as well as the lower (LCL) and upper (UCL) limits (UCL: Upper Control Limit, LCL: Lower Control Limit). These two values are the limits within which the process is under control. The values of the controlled characteristic must be within these limits, otherwise these values are 'out of control' and must be examined. ( Wikipedia licensed under CC-BY-SA 3.0, 2022)

**Figure N° 1**  
Control chart to track average scores by criterion



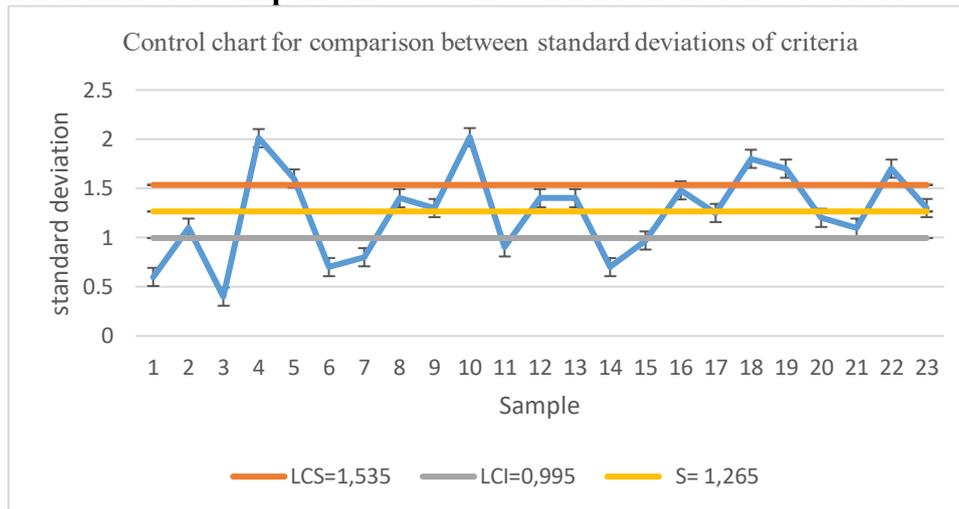
Source: results from MATLAB software output

Note that there are five criteria outside the lower limits of the map. It is necessary to correct the problems that prevent having an average overall score greater than 3.962. For criterion no. 4, the hospital must make an extra effort at this level by having a good knowledge of human behavior. As well as criterion n°10, it is necessary to improve the quality of reception. On the other hand, for criterion n°19, the waiting time for the doctor's visit must be minimized. Finally,

for criteria 20 and 21, signs should be installed to ask people passing through and staff not to speak out loud.

**Control chart for comparison between standard deviations of the criteria**

**Figure N° 2**  
**Control chart for comparison between standard deviations of criteria**



**Source:** results from MATLAB software output

This map aims to compare between the standard deviations of the answers for the different questions. A comparison between the standard deviations of the responses shows that the null hypothesis of equality of the standard deviations of the responses is rejected, since several points on the dispersion map are out of control limits.

**Corrective actions to reduce the effect of noise**

To be competitive and gain the trust of customers, one must implement corrective and improvement actions to correct the problems of having an average overall score greater than 3.962. It is for this reason that we propose to raise the awareness of staff as well as patients and their relatives by posting a sheet containing certain instructions to be followed in order to reduce noise.

**Table N°18**  
**Mean scores and standard deviations of customer responses**

Client number	Medium	standard deviation	Client number	Medium	standard deviation
1	3,53	1,88	51	3,8	1,6
2	4,57	0,98	52	3,73	1,73
3	3,61	1,49	53	4,19	1,49
4	3,73	1,8	54	3,65	1,16
5	3,5	1,74	55	3,34	1,44
6	3,69	1,51	56	2,7	1,9
7	4,11	1,306	57	4,15	1,61
8	4,3	1,37	58	2,46	2,15
9	3,84	1,55	59	4,26	1,11
10	4,07	1,46	60	4,19	1,62

11	4,11	1,47	61	3	1,54
12	3,57	2,06	62	3,61	1,26
13	3	2,15	63	4,03	1,5
14	3,61	2,04	64	3,65	1,09
15	3,5	1,88	65	3,88	1,94
16	4,11	1,39	66	3,46	0,9
17	3,96	1,56	67	2,96	1,37
18	3,96	0,91	68	4,23	1,63
19	4,38	1,16	69	4,3	1,25
20	3,3	2,2	70	4,19	1,49
21	4,42	1,39	71	4,23	1,63
22	4,34	1,12	72	3,88	1,77
23	3,15	2,16	73	4,38	1,47
24	4,46	2,24	74	3,73	2,01
25	2,42	1,74	75	4,19	1,13
26	3,61	1,55	76	4,19	1,2
27	3,3	1,25	77	3,42	1,17
28	4,15	1,34	78	4,03	1,58
29	4,11	1,1	79	4,26	1,37
30	4,15	1,46	80	3,19	1,6
31	3,19	2,28	81	2,73	2,3
32	4,46	1,33	82	3,38	1,55
33	4,42	1,39	83	2,96	1,75
34	4,5	1,2	84	4,3	1,46
35	3,23	1,82	85	4,5	1,17
36	4,03	0,87	86	3,53	2
37	4,03	1,67	87	4,23	0,76
38	3,8	0,85	88	3,61	1,55
39	4,42	1,49	89	3,88	1,79
40	3,69	1,45	90	4,23	1,63
41	3,88	1,41	91	4,38	1,38
42	4,19	1,96	92	4,5	1,2
43	3,57	1,29	93	4,34	1,38
44	3,34	1,39	94	4	1,46
45	3,03	1,83	95	3,65	1,19
46	3,46	1,28	96	3,8	1,54
47	3,73	1,88	97	3,92	1,46
48	3,88	1,26	98	4,15	1,34
49	4,34	1,7	99	3,84	1,68
50	2,5	1,7	100	4,19	1,29

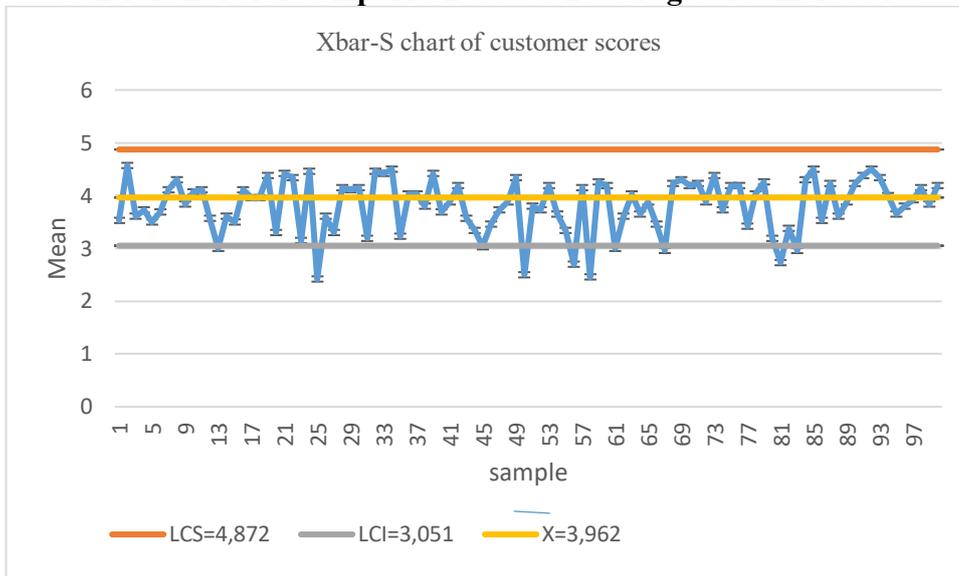
Source: SPSS software output results

This table shows the average customer scores and the standard deviations. For the average scores delimit between 2.4 and 5. This means that all of these customers are satisfied with the services.

**Control chart for comparison between average customer scores**

There are 7 customers with average scores below the average, indicating that they are significantly less satisfied than the others.

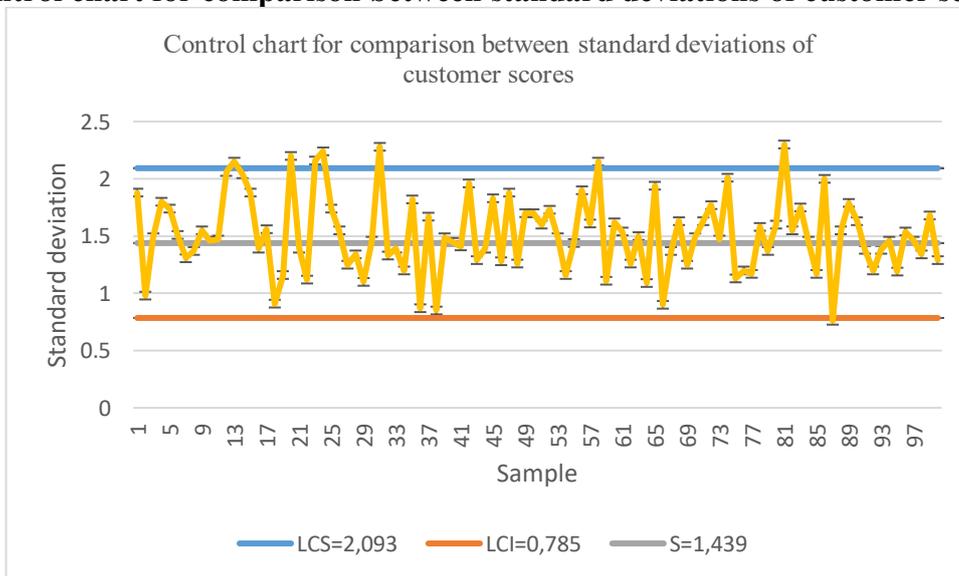
**Figure N° 3**  
**Control chart for comparison between average customer scores**



**Source:** results from MATLAB software output

**Control chart for comparison between standard deviations of customer scores**

**Figure N° 4**  
**Control chart for comparison between standard deviations of customer scores**



**Source:** results from MATLAB software output

The responses of individuals number 13, 20, 23, 31, 58 and 81 are the most scattered, the standard deviations are not statistically. Unlike the responses of individuals number 2, 19, 39, 40 and 88 are less dispersed, indicating greater homogeneity in the responses to the different questions.

## Conclusion

The objective was to measure the overall level of patient satisfaction at HABIB BOURGUIBA Hospital. We also looked at patient satisfaction with all aspects of their care. Faced with these very good results, we have tried to explain the significant satisfaction of patients in hospitals. First of all, one of the explanations that we could give is the length of stay in the hospital. Indeed, being present for one day can reduce the risk of dissatisfaction compared to hospitalizations of longer duration. We can imagine that the longer patients stay in a care service, the more the sources of dissatisfaction can develop. However, during a longer hospital stay, if something goes wrong, it is easier to fix it since there is more contact with patients.

Then we wanted to highlight the fact that patients develop their expectations in relation to the intervention rather than the day itself. The most important thing for a patient is that he leaves the day hospital "cured". We encourage care teams and physicians to continue their work method, always keeping patient satisfaction and quality of care in mind. This can generate on the one hand the loyalty of the patients for the hospital and on the other hand the motivation of the nursing staff.

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