



**SCHOOL OF ECONOMICS**  
**MSC ECONOMICS & BUSINESS - MARKETING**

**COVID-19 EFFECTS ON PATIENTS' SATISFACTION IN HOSPITAL PATIENTS**

*Masters' Thesis*

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Rotterdam

October 2023

## ABSTRACT

Patient satisfaction is one of the main dimensions of healthcare quality. It has a significant importance in the healthcare industry, because it promotes patient engagement, trust, loyalty, and contributes to better patient outcomes. In addition, it contributes in improving the reputation of health organizations, the quality healthcare delivery, as well as the financial stability of healthcare organizations. The measurement of patient satisfaction is based on patients' experiences and evaluations of health services, which is achieved through patient reported experience measures.

*Aim of the study:* During the COVID-19 pandemic, healthcare systems faced unprecedented challenges, which are expected to affect patient satisfaction. Aim of this study is to explore the impact of COVID pandemic on the patient satisfaction of hospital care, both overall and of the various aspects of hospital care.

*Methods:* The study design is based on the comparison of patient satisfaction between two samples of a Greek population, one including patients of the pre-COVID period and the second patients of the post-COVID period. The questionnaire used in the study is the questionnaire of the “Hospital Consumer Assessment of Healthcare Providers and Systems” survey (HCAHPS), which was adapted in the local conditions of Greece. The first sample included 348 and the second 329 patients, achieving a total number of 677 questionnaires. The data analysis included (i) descriptive statistics of the two samples, (ii) calculation of HCAHPS scores according to the instructions of the HCAHPS Organization, and (iii) hypothesis testing analyses, including  $\chi^2$ -tests, multinomial logistic regression analyses.

*Results:* The “Overall rating of the hospital” score decreased during the post-COVID period by almost 10% and the “Willingness to recommend the hospital” by 13%. In most HCAHPS a statistically significant worsening during the post-COVID period was recorded. In the non-COVID patients, no significant difference in the overall rating was noticed between the two periods. The scores in “Communication with nurses” and “Communication with doctors” present a significant worsening in post-COVID period, in both genders and in almost all age groups and educational levels. “Responsiveness”, “Pain management” and “Provision of Medicine Information” scores display a significant reduction during the post-COVID period, especially in age-group 66-85 years old, as well as in the higher educated patients. “Provision of discharge information”, “Cleanness” and “Quietness” scores showed no significant change between the two periods. Logistic regression analysis identified as most determining factor of the Overall hospital rating “Period”, “COVID-19 disease”, “Health status self-assessment”, “Provision of medicine information”, “Communication with nurses”, “Communication with doctors”, “Responsiveness” and “Provision of medicine information”. Similar analyses of the determinants of the “Willingness to recommend the hospital” defined as most affecting factors the “Period”, “COVID disease”, “Health status self-assessment”, “Communication with nurses”, “Communication with doctors” and “Provision of medicine information”.

*Conclusions:* The COVID-19 pandemic significantly affected most domains of patient satisfaction with hospital care. The effect was greater in patients suffering COVID-19 disease and in older patients. Apart from the COVID-19 disease, the overall patient experience was mainly determined by communication with nurses and doctors, responsiveness and provision of medicine information.

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## **CHAPTER 1: INTRODUCTION**

### **1.1. The background of the COVID-19 pandemic**

The COVID-19 pandemic arrived in Europe in January 2020 and very quickly it was expanded throughout the continent (WHO, 2023). The pandemic dramatically increased the number of patients affected by the disease and led to a sharp increase of the need of healthcare services. At the same time, restrictive measures were applied to limit the rapid expansion of the pandemic (WHO, 2023).

The pandemic produced unprecedented conditions in hospitals and had significant effects on their function. The provision of some health services was temporarily interrupted or limited, while several departments were underperforming (DiFazio et al., 2020, (Department of Health and Human Services, 2022). Significant effects were also reported on hospital staff as well as hospital reimbursement (Department of Health and Human Services, 2022, Canadian Institute for Health Information, 2021, California Health Care Foundation, 2021). The effects on health services had in turn impact on the adequacy and the quality of health care delivered to the population (Tuczyńska et al, 2022). All these developments formed an unprecedented situation in the health sector and set several challenges that have to be addressed by the health systems.

### **1.2. Problem statement and purpose of the study**

The effects of the COVID pandemic on the hospitals were expected to affect the provision of hospital services to patients as well as the quality of services. Several studies suggest that the pandemic has negatively affected the provision of hospital services and the access of patients to hospital care. Oseran et al (2020), comparing admission rates during the pandemic with the same period one year before, found that they reduced significantly during the pandemic, underlying a need for measures to reassure the trust of the public to health services. Lange et al (2020) examined admission rates exclusively in Emergency Departments and they also found a decline in admission rates of 32% during the pandemic. Mitura et al (2020) in a qualitative study using focus groups of critical care health professionals in UK, concluded that the pandemic has negatively affected critical care personnel and their work. Tuczyńska et al (2022) reviewing the pandemic effects on the quality of health services in various European countries concluded that the quality was negatively affected in most countries. These findings raise questions whether pandemic affected the patients' satisfaction with their hospital care. Therefore, measuring patient satisfaction attracted special interest during the last years, because of the pandemic effects on healthcare.

This study aims to investigate how the COVID-19 pandemic has affected both the satisfaction of patients with their overall hospital experience, as well as their satisfaction with specific aspects of care, including nursing care, medical care, healthcare conditions, post-discharge services etc.

### 1.3. Research Questions

In accordance with the stated problem and the objectives of the study, the theoretical framework employed in this study can be described as follows.

The pandemic increases the needs for hospital care and because of that, it limits the availability and the access of hospital services for the non-COVID patients. The high demand for hospital services and the consequent limitation of availability and access for the non-COVID patients reduces the patient satisfaction with medical care, nursing care, hospital environment, healthcare conditions, after discharge services and the overall evaluation of hospital by the patients.

Personal characteristics such as gender and age may differentiate the health needs and consequently the health services received, and therefore they may differentiate patient satisfaction with the aforementioned aspects of healthcare. Educational level may affect the patients' understanding of the magnitude and the traits of the pandemic, and because of that, the tolerance to the hospital challenges and problems. Therefore, it may act as a moderator of the main effect, influencing the strength and direction of the relationship between the pandemic and patient satisfaction.

Suffering COVID disease provides a higher priority for hospital admission and attracts more attention for hospital care in contrary to the non-COVID patients, and therefore, it may differentiate the patient satisfaction levels. The need for surgery differentiates the hospital department and the type of hospital services needed, and it may affect patient satisfaction.

Hence, the research questions that emanate from the theoretical framework and serve as focal inquiries for this study are the following.

#### ***Research questions (RQ)***

- RQ-1. Are there any effects of the COVID pandemic on the patient satisfaction levels compared to the pre-COVID ones?
- RQ-2. What are the main effects of the pandemic on patients' satisfaction with the specific aspects of hospital care, such as nursing care, medical care, hospital environment, healthcare conditions, and after discharge service ?
- RQ-3. Is there any difference in the patient satisfaction between COVID and non-COVID patients admitted to the hospital?
- RQ-4. What are the possible moderators of the effect of the COVID pandemic on patient satisfaction?

### 1.4. Moderators

According to the Andersen's model for health service utilization (Andersen 1995) and the corresponding literature (Geitona et al., 2007, ODPHP, 2017, WHO, 2017, Hajek et al., 2021), the



main determinants of healthcare utilization include (i) personal characteristics (gender, age, education, etc.), (ii) the characteristics of the health need (in this case, COVID or non-COVID condition, emergency, need for surgery, etc.), (iii) enabling factors (economic, social insurance, local availability of services etc.) and (iv) psychological factors (Andersen, 1995, Hajek et al., 2021).

In addition to studying the effect of the pandemic on patient satisfaction, the study will explore whether the aforementioned (i) personal characteristics (gender, age, educational level) and (ii) the characteristics of the health need (hospital department, COVID illness, need for surgery and health status self-assessment), affected the patient satisfaction during the pandemic, acting as moderators. These factors differentiate the health needs among patients, and consequently, they differentiate the hospital services they need and the hospital department they were admitted. Enabling and psychological factors will not be included in the study, because first, the health insurance in Greece provides hospital services to all citizens, regardless of economic or employment status, second, the equity in local availability of services is a given in this study because the study will be performed in one particular city where all healthcare consumers have the same local availability of services, and third, the research instrument that will be used (HCAHPS questionnaire) does not include questions regarding enabling or psychological factors.

Therefore, the parameters that will be tested as possible moderators of healthcare satisfaction will include:

- Patient's gender
- Patient's age
- Educational level
- Hospital department
- Need for surgery
- Suffering from COVID disease
- Health status self-assessment.

## **1.5. Academic and managerial contribution of the study**

***Academic contribution*** A crisis is an unpredictable or low-probability event that poses significant threats to organizations and businesses, potentially resulting in adverse effects (Pearson and Clair, 2008). Among the critical aspects of a crisis is the potential impact on an organization's reputation, which can lead to a loss of consumer confidence and have destructive consequences on the organization's market position (Coombs, 2007). Consequently, safeguarding organizational reputation and maintaining consumer satisfaction are vital considerations in any crisis management model (Avendano, 2020, Gonzalez-Herrero & Smith, 2010). The COVID-19 pandemic has emerged as a substantial health crisis for healthcare organizations, posing threats to their reputation, as well as the confidence and satisfaction of their patients (Pollard et al, 2020). However, hospitals, being at the forefront of addressing the health consequences of the pandemic, have become the focal point of social and state interest and priority. This unique scenario raises

questions regarding the impact of the COVID-19 crisis on patient satisfaction with hospital care. The conventional theory, which suggests that a crisis primarily leads to a reputation crisis and loss of consumer trust (Coombs, 2007, Avendano, 2020), may not entirely apply when considering the effects of a health crisis on hospitals. Various parameters, such as the provision of extensive and comprehensive information, public comprehension of the hospital's role in addressing the crisis, understanding the immense workload faced by hospitals, and even compassion towards the pressures experienced by hospital personnel, may play a protective role in maintaining hospital reputation and patient satisfaction (Schwartz et al., 2020, Irandoost et al., 2022). However, it is also possible that the operational effects of the COVID-19 pandemic on patients' treatment were so extensive that they surpassed comprehension or compassion, resulting in a reduction in patient satisfaction (Ammar et al., 2020, BMA, 2023). This study aims to contribute to the existing research on this topic by exploring the potential impact of a health crisis, specifically the COVID-19 pandemic, on consumer satisfaction with hospital care. To achieve this, a quasi-experimental approach will be employed, comparing patient satisfaction levels before and after the pandemic within two samples from the same population. The study will utilize a reliable and validated instrument to measure patients' experiences of hospital care, specifically examining various aspects of hospital care and different hospital departments. Furthermore, the study seeks to identify potential determinants of patient satisfaction that may act as moderators of the crisis's effect. By examining the relationship between the COVID-19 crisis and patient satisfaction, this study aims to enhance our understanding of the complex dynamics between health crises, hospital care, and consumer satisfaction.

***Managerial and marketing contribution.*** A crucial component of any effective crisis management model is the thorough examination of the crisis's impact on customer satisfaction. This investigation serves as a foundation for formulating appropriate marketing strategies aimed at safeguarding the organization's market position (Pearson and Clair, 2008). In this context, the present study aims to contribute to the understanding of how the COVID-19 pandemic has affected patients' satisfaction across various aspects of hospital care. By examining the specific effects of the pandemic on patient satisfaction, this study will shed light on areas of healthcare that may have experienced challenges during this crisis period. The insights gained will be instrumental in identifying areas that require improvement and formulating targeted interventions. It is well-established that healthcare quality and patient satisfaction play pivotal roles in shaping both health service demand and the overall success of a healthcare institution (Kui-Son et al., 2004; Prakash, 2010). Thus, understanding the quality of care and potential weaknesses in patient satisfaction becomes a critical component of an effective marketing strategy aimed at enhancing the position of a hospital within the healthcare market. Furthermore, this understanding will provide evidence-based support for hospital management to develop tailored strategies and initiatives to enhance patient satisfaction and build the hospital's brand reputation within the healthcare market. By leveraging these findings, hospitals and other healthcare providers can take proactive measures to improve patient satisfaction, ultimately enhancing their market competitiveness. Beyond the immediate implications for healthcare organizations, the findings of this study are expected to have broader implications. They will contribute to the collective knowledge and understanding of how similar pandemics, such as COVID-19, may impact patient satisfaction. This valuable insight will

assist hospitals and healthcare providers in making informed decisions and developing efficient strategies to effectively respond to similar crisis situations in the future. By delving into the intricate relationship between the COVID-19 pandemic, patient satisfaction, and the marketing strategies of healthcare organizations, this study seeks to make a significant contribution to both academic research and practical implications in the field. Ultimately, the results will aid in improving the overall patient experience, bolstering the reputation of healthcare institutions, and fostering better decision-making in crisis management and marketing endeavours within the healthcare sector.

## **CHAPTER 2: LITERATURE REVIEW**

The patient satisfaction approach is a specification in the health sector of the theory about customer satisfaction. Therefore, reviewing the main elements of the customer satisfaction theory is of a particular importance for this study.

### **2.1. Customer Satisfaction**

#### **2.1.1. Definition and Significance of Customer Satisfaction**

Customer satisfaction is a fundamental concept in marketing and business management, reflecting the extent to which customers' expectations are met or exceeded by products, services, or overall experiences provided by organizations (Liu et al., 2016; Oliver, 2010). It serves as a crucial indicator of a company's performance, as satisfied customers tend to exhibit higher loyalty, repurchase intentions, positive word-of-mouth, and increased profitability (Anderson et al., 1994; Fornell et al., 1996).

Customer satisfaction is defined as the customer's subjective evaluation of a product or service based on their pre-consumption expectations and the subsequent experience (Lam et al., 2013; Zeithaml et al., 2006). It represents the customer's overall judgment of the performance and value derived from a specific purchase, influenced by factors such as product quality, price, service delivery, and post-purchase support (Parasuraman et al., 1988; Spreng et al., 1995).

The customer satisfaction approach is based on the “disconfirmation theory”, which first was proposed by Oliver (1980). According to this theory, each customer has certain expectations from the service that plans to purchase. The degree that these expectations are met from the service purchased determines the level of customer disconfirmation and in turn the level of customer satisfaction. If the service meets or exceeds the customer’s expectations, that leads to a higher level of satisfaction. The gap between perceptions and expectations is called “Service Quality Gap” and provides a measure of the level of customer satisfaction (Figure 1).



Source: European Public Administration Network (2008).

**Figure 1.** The service quality gap.

It is clear that personal expectations have a crucial role in affecting customer satisfaction with services, and therefore it is important to understand how they are formed. The main key factors most commonly seen to influence expectations include (Parasuraman et al., 1991, Accounts Commission, 1999) personal needs, which customer expect the service to address, previous experience of the particular service and of other similar services, direct or indirect service communications coming from several factors such as brand name, physical appearance, reputation, etc., or other types of communication including word of mouth and social media communications, or from sources other than the service itself.

A main problem in studying customer satisfaction is that very little is known about customer expectations, because most literature focuses on customers perceptions. Recognizing this fact, the Servqual model is an instrument developed with the purpose to assess both customers' expectations and service perceptions across a range of different service characteristics, permitting a measure of service quality (Parasuraman et al., 1985, Parasuraman et al., 1991). The degree to which a service provides an experience that meets the customers' expectations is a measure of the service quality (Parasuraman et al., 1985). Servqual provides a method to analyze the gap between customer's expectations and perceptions to help businesses reorient their sales strategies, organization and communication, as well as to prioritize their actions to achieve the desired improvements.

Servqual is developed with a methodology based on the "gap analysis", and for this reason it is described as the "gap model". The model identifies four underlying gaps and a fifth final gap that may cause customers to experience poor service quality. These five gaps are the following (Parasuraman et al., 1991):

1. The “*knowledge gap*”, which described the difference between the real customers’ expectations and what the management perceives about them.
2. The “*standards gap*”, which described the difference between the management perceptions about customer needs and the service specifications and service provision procedures.
3. The “*delivery gap*”, which describes the difference between quality specifications that have defined for the service and the quality of the service actually delivered.
4. The “*communications gap*”, which describes the difference between the intentions for the service delivery and what is communicated to the customers.
5. The “*gap between customer’s perceptions and expectations*”. By analysing the four aforementioned underlying gaps, insight is given into the final fifth gap between customer’s expectations and perceptions, which provides a measure of customer satisfaction.

Customer satisfaction is a meaning much close to *service quality*. Service quality has been defined as “the measure of how an organization delivers its services compared to the expectations of its customers” (Lewis & Booms, 1983, Parasuraman et al., 1985). That definition makes clear how close are the two meanings. Service quality refers to the customer's evaluation of the performance and delivery of services by a company. It comprises dimensions that capture different aspects of quality. Many factors has been identified as capable to influence service quality. Johnston (1995) provides a list of 18 quality determinants, which may be very helpful in specifying the various aspects of service quality. However, after extensive research, these service quality determinants can be summarized in the five following:

- *Responsiveness*, which is the willingness to help customers and to provide prompt service
- *Reliability*, which describes the ability to perform the promised service reliably and accurately
- *Assurance*, which is the ability to inspire trust and confidence,
- *Empathy*, which entails delivering personalized and compassionate attention to customers and
- *Tangibles*, which refers to the appearance of facilities, equipment, personnel etc. (Parasuraman et al., 1988).

It is expected that customers who perceive high service quality experience positive service encounters, leading to increased satisfaction. However, in addition to service quality, multiple other factors contribute to customer satisfaction, including product quality, price fairness, customer support, choices, accessibility, convenience, communication, emotional satisfaction etc. (Putro & Rachmat 2019, Liu et al., 2016, Gronroos, 1984).

Product or service quality is a critical dimension of customer satisfaction, encompassing factors such as reliability, performance, features, design, and durability (Cronin et al., 2000; Zeithaml et al., 1996).

Price fairness relates to customers' perceptions of the fairness and value in the pricing of products or services, affecting customer satisfaction. It encompasses factors such as price transparency, competitive pricing, discounts, and perceived value-for-money (Zeithaml, 1988).

Customer support, including the provision of assistance, guidance, choices and problem-solving, significantly influences customer satisfaction and affects customer loyalty. (Van Noort et al., 2009).

Accessibility and convenience of services are important determinants of customer satisfaction very often. (Van Dooren et al., 2004).

Emotional satisfaction refers to customers' affective responses and emotional engagement with a product or service. Satisfied customers experience positive emotions related to their purchase and increased overall satisfaction (Oliver, 2014).

Customer satisfaction holds great importance for organizations in several aspects. Firstly, it plays a pivotal role in customer retention and fostering long-term loyalty (Santouridis and Trivellas, 2010). Satisfied customers have a higher chance to make more purchases from the same company, reducing the need for costly acquisition efforts. Positive word-of-mouth, resulting from satisfied customers sharing their positive experiences, significantly influences the purchase decisions of potential customers and contributes to customer acquisition and brand reputation enhancement (Reichheld, 2003).

Moreover, customer satisfaction can provide a competitive advantage by differentiating a company's offerings from its competitors (Panneer Selvam et al., 2010, Lam et al., 2013). Organizations that consistently exceed customer expectations can establish a strong market position, attracting a larger customer base and potentially commanding premium prices (Grubor et al., 2019, Gronroos, 1984).

Additionally, customer satisfaction serves as a valuable source of feedback for organizations to identify areas of improvement and refine their products or services (Van Dooren et al., 2004, Fornell et al., 1996). It facilitates a better understanding of customer needs, preferences, and pain points, enabling companies to enhance their offerings and maintain a customer-centric approach. By understanding and managing these factors, organizations can foster customer loyalty, drive business success, and enhance their market position. (Gye-Soo, 2016, Putro & Rachmat 2019).

### **2.1.2. Customer Satisfaction Measurement**

Measuring customer satisfaction is essential for organizations to make relevant decisions to achieve improvements and prioritize resources effectively (Farris et al., 2010).

Various methods and metrics are employed for measuring customer satisfaction, to support measures and strategies aiming to improve satisfaction and enhance strategic decision-making. Surveys and questionnaires are widely used tools that collect customer feedback through structured questions, rating scales, and open-ended responses (Farris et al., 2010). These surveys can be conducted through various channels, such as online platforms, email, phone, or in-person, and may cover different aspects of satisfaction.

In addition to surveys, metrics like the Net Promoter Score (NPS), the Customer Satisfaction Index (CSI), and customer experience metrics such as the Customer Effort Score (CES) and the Customer Emotion Score (CES) provide additional methods to measure customer satisfaction.

The Net Promoter Score (NPS) indicates customer loyalty and satisfaction by measuring how likely is the customers to recommend a company or a particular product (Reichheld, 2003). It is calculated by asking customers one single question “On a scale from 0 to 10, how likely are you to recommend this product/company to a friend or colleague?”

The Customer Satisfaction Index (CSI) combines multiple satisfaction metrics into a single index, providing a holistic view of satisfaction levels (Farris et al., 2010). It allows companies to determine the reasons for consumers’ satisfaction or dissatisfaction. Analyzing customer feedback and complaints is an important qualitative method that helps identify patterns, common issues, and areas for improvement (Van Noort et al., 2009). This understanding can help business to achieve retention of customers and loyalty increase. Moreover, it can support a wise budget re-allocation, optimize and improve products, and finally to promote sales.

Customer experience metrics, such as the Customer Effort Score (CES) assess the ease of doing business and emotional responses (Dixon et al., 2010). This metric provide additional dimensions for evaluating customer satisfaction and experiences.

Customer Effort Score (CES) is derived from a customer satisfaction survey that measures how easy is the use of a product or service by customers and how easy is the interaction with the business in customer support. It reflects the amount of effort a customer had to exert to use a product or service, find the information they needed, or get an issue resolved. Less effort indicates a higher CES score and consequently a greater customer satisfaction (Clark & Bryan, 2013).

Besides, repeat purchase behavior and loyalty metrics, including repeat purchase rates, customer retention rates, and customer churn rates, indirectly reflect customer satisfaction and loyalty (Farris et al., 2010). These metrics provide significant information into the long-term satisfaction and loyalty of customers. In conclusion, measuring customer satisfaction is vital for organizations to comprehend customer perceptions and experiences.

The use of tools like surveys, NPS, CSI, customer feedback analysis, customer experience metrics, and repeat purchase and loyalty metrics allows organizations to gain valuable insights, enhance customer satisfaction, improve customer experiences, and drive business success.

### **2.1.3. Customer Satisfaction Management and Improvement**

To improve service quality and achieve higher customer satisfaction, businesses and organizations need to develop specific strategies and take relevant initiatives (Vikas et al., 2010). In a theoretical context, the management of customer satisfaction starts from the Service Quality Gap and aims to bridge the quality gap and make service perceptions closer to customer expectations. Customer satisfaction management describes the strategies and the measures that can minimize all five gaps



according to the Servqual model (European Public Administration Network, 2008). This requires a strategy to obtain the necessary feedback about customer expectations and perceptions through continuous consultation of service users (Kim, 2010, Kotler & Keller, 2007).

To achieve customer satisfaction, it is important for businesses and organisations to develop *a research and customer consultation strategy*, which will provide feedback about customer expectations and perceptions, as well as the necessary information to map customer's journey. Such a strategy must use the appropriate methods and technics to gain insight customer satisfaction, such as surveys, satisfaction surveys, customer journey mapping, consultation, focus groups, complaints analysis etc.

Developing *a strategy to improve service quality* to achieve the desirable standards, which are expected to meet customers' expectations can has significant contribution in ensuring customer satisfaction (Liu et al., 2015, Ravichandran et al., 2010, Sureshchandar et al., 2002). Such a strategy may include:

- Defining quality standards that should be achieved by the organization in order to meet customers' expectations
- Defining quality procedures in service production
- Setting priorities and measurable objectives regarding service quality
- Making the necessary technological investments to improve quality
- Investing on employees' training
- Promoting organizational changes needed to achieve the desirable service quality etc.

Moreover, *a strategy to improve service delivery* is also of particular importance. Service delivery should take the characteristics according to the defined standards (Kotler & Keller, 2007). That may include:

- Organizational improvements that enhance service delivery
- Appropriate employee training and engagement
- Setting priorities and measurable objectives about service delivery improvements
- Build a customer focused team culture
- Taking initiatives to personalize services
- Promote customer support and provide multi-channel support options
- Offering choices, simplicity and convenience to customers etc.

Developing policies *to response to customers' remarks and complaints* have essential contribution in improving customer satisfaction . Organizations and businesses must encourage customers to give a feedback about the service quality they received, including any complaints (Juanamasta et al., 2019, Nuseir & Madanat, 2015, Barsky & Labagh 1992). Facilitating complaint submissions and promptly responding to customer feedback are essential. These actions not only enhance customer experiences but also foster customer loyalty. Additionally, post-service follow-up directly influences customer retention. Utilizing a Customer Relationship Management (CRM) system can optimize the value derived from customer interactions and facilitate personalized outreach (Bin-Nashwan & Hassan, 2017). Developing a comprehensive *communication strategy*, addressed to all internal and external audience, including service users, customers, potential

customers, staff, administration, decision makers and other stakeholders is also an integral part of the overall customer satisfaction strategy (Gonzalez-Herrero & Smith, 2010, Tibbie, 1997). Communication must provide answers to most possible customers' questions, because if a possible question is not answered, it may repel customers. The communication strategy must include communication of findings from customer surveys, service quality standards, service delivery options and procedures, customer support, the relevant information about choices, price policy, accessibility, convenience, etc. (European Public Administration Network, 2008, Nagel & Cilliers 1990).

## 2.2. Healthcare Service Quality

Focusing on health sector, service quality is a critical factor in the delivery of healthcare services as it directly influences patient experiences and perceptions. By examining the dimensions of service quality, we can understand the key factors that contribute to the overall quality of healthcare services and subsequently impact patient and consumer satisfaction. Understanding the link between health service quality and patient satisfaction is crucial for healthcare organizations aiming to improve their performance and maintain a competitive edge. In addition, the quality of health services is one of the fundamental parameters that, together with *access* and *cost effectiveness*, determine the performance of the health system and its subsystems (OECD, 2007, Arah et al, 2003).

Various definitions of quality have been given over time, showing minor differentiations. The most common definition defines healthcare quality as the extent to which health services increase the likelihood of desirable outcomes for service recipients and reduce the likelihood of undesirable outcomes, based on the existing scientific knowledge and the patient's expectations (Agency for Healthcare Research and Quality, 2020). There is a general recognition that healthcare quality incorporates several dimensions affecting the final level of achieving desirable outcomes. The most common dimensions of healthcare quality include (Kelley & Hurst, 2007):

*Effectiveness*, which is the degree of attaining desirable outcomes according to the existing scientific documentation (WHO, 2000, AHRQ, 2004). In other words, as Donabedian stressed, effectiveness is the extent to which achievable improvements in health are in fact achieved (Donabedian, 2003).

*Safety*, which describes to what degree healthcare minimizes the risk of unwanted side effects, harm or errors to service recipients.

*Patient-centeredness*, which means that the healthcare must responds to the patient's individual needs, values, expectations and preferences.

*Accessibility*, referring to how easy health services can be reached by the population. Access can be physical, economic, social or psychological, and requires the unimpeded availability of appropriate care, technology and resources, at the appropriate place and time, for the entire population.

*Equity*, which refers to the degree of no differentiation in health service delivery by geographic area, socio-economic status, demographic or social characteristics, nationality, religion, language or beliefs.

*Timeliness*, which means to be delivered without delay and at the most appropriate time to achieve optimal patient outcomes.

*Comprehensiveness*, which is the degree of coordinated provision of all necessary for the patient health services, at all levels and for all the time necessary.

*Efficiency*, which is the optimal use of available resources that ensure the maximization of the benefit from the available resources and the avoidance of unnecessary use or waste of resources.

All the above make it clear that the health service quality is closely related to all parameters that determine the performance of the health system. However, if we must identify the dimensions most closely related to the concept of “quality”, as distinct from the concepts of “accessibility” and “efficiency” then, according to the OECD (Kelley & Hurst, 2007), we should include the following (Figure 2):

- Effectiveness
- Safety and
- Patient centeredness

Healthcare System Performance					
<u>Dimensions</u>					
<u>Quality</u>				Access	Cost/ expenditure
<u>Health care needs</u>	Effectiveness	Safety	Responsiveness/ Patient centeredness	Accessibility	
Staying healthy					
Getting better					
Living with illness or disability					
Coping with end of life					

Source: Kelley E., Hurst J. (2006).

**Figure 2.** Healthcare quality in the overall healthcare system performance.

In this context, the quality of health services is one of the key parameters that determine not only the overall performance of the health system, but also its economic efficiency: The healthcare

service provision must ensure the best outcome for patient, with the optimal utilization of available resources, highlighting quality as one of the most critical factors of the health system. Besides, these dimensions serve as essential benchmarks for assessing and measuring service quality in healthcare settings.

Service quality is influenced by a range of factors, including healthcare provider-patient communication, staff competence, waiting times, physical environment etc. These factors contribute to patients' overall service experience and significantly impact their satisfaction levels.

Overall, service quality serves as a critical precursor to patient and consumer satisfaction. When healthcare organizations prioritize and deliver high-quality services across the identified dimensions, they enhance patients' experiences, build trust, and foster positive perceptions. Consequently, patient and consumer satisfaction levels are likely to increase, leading to positive outcomes such as patient loyalty, increased healthcare utilization, and positive word-of-mouth recommendations. By examining the interplay between service quality and patient satisfaction, this literature review aims to contribute to the understanding and enhancement of the patient experience in healthcare organizations.

## **2.3. Patient Satisfaction**

### **2.3.1. Definition and Significance of Patient Satisfaction**

Focusing on the health sector, patient satisfaction consists one of the main dimensions of healthcare quality (Kelley & Hurst, 2006, Goodrich & Lazenby, 2023), and therefore, it is a fundamental goal of healthcare organizations (Raftopoulos, 2005, Xesfingi & Vozikis, 2016).

Patient satisfaction refers to the degree of fulfilment or contentment experienced by patients in their healthcare encounters and the overall healthcare services they received. It encompasses patients' subjective perceptions, expectations, and evaluations of the care they receive (Williams et al., 2008, Cleary & McNeil, 1988, Pascoe, 1983;).

Patient satisfaction is a multidimensional construct that encompasses various aspects of the healthcare experience (Zaim el al., 2010, Williams et al., 2008). These aspects include:

*Technical Quality*, which refers to the clinical competence and effectiveness of healthcare services provided to patients. It includes factors such as accurate diagnosis, appropriate treatment, medical outcomes, and the overall effectiveness of healthcare interventions (Donabedian, 1988). Patients' perceptions of the technical quality of care greatly influence their satisfaction from health services.

*Interpersonal Communication* focuses on the quality of interactions between healthcare providers and patients. Effective communication involves active listening, clear explanations, empathy, and respectful behaviour. Patients' satisfaction with the communication skills of healthcare providers greatly impacts their overall satisfaction and engagement in care (Stewart 2000).

*Access to Care* refers to patients' ability to acquire timely and convenient healthcare services when needed. It involves factors such as appointment availability, waiting times, ease of scheduling, and the accessibility of healthcare facilities (Penchansky & Thomas, 1981). Patients' satisfaction with the accessibility of care significantly influences their overall satisfaction and perceptions of healthcare quality.

*Emotional Support*, which refers to the provision of empathy, compassion, and psychological reassurance to patients during their healthcare experiences. It involves healthcare providers demonstrating sensitivity, understanding, and addressing patients' emotional needs (Kaplan et al., 2009). Patients' satisfaction with the emotional support provided by healthcare providers contributes to their overall satisfaction and well-being.

*Continuity of Care*, which refers to the ongoing and coordinated healthcare experiences patients have over time. It involves consistent and seamless care across different healthcare settings and providers, facilitating better communication, knowledge of patient history, and personalized care (Haggerty et al., 2003). Patients' satisfaction with continuity of care positively influences their overall satisfaction and trust in the healthcare system.

Understanding these dimensions of patient satisfaction can guide healthcare providers in improving specific aspects of care delivery and enhancing overall patient experiences and satisfaction levels (Zaim el al., 2010). By addressing these dimensions, healthcare organizations can promote patient-centered care and improve patient outcomes.

Patient satisfaction holds significant importance in healthcare as it is related to several desirable outcomes for both patients and healthcare organizations.

*Patient Engagement and Adherence*: Satisfied patients are more likely to actively participate in their healthcare and comply with treatment plans. They are more engaged in shared decision-making processes, follow healthcare instructions, and take prescribed medications as recommended (Baker et al., 2008). This engagement and adherence lead to improved health outcomes and better management of chronic conditions.

*Trust and Patient-Provider Relationship*: Patient satisfaction is closely related to the development of trust between patients and healthcare providers. Satisfied patients tend to have higher levels of trust in their healthcare providers (Safran et al., 1998). A strong patient-provider relationship built on trust enhances communication, promotes patient-centered care, and fosters a collaborative approach to healthcare decision-making (Asan et al., 2021).

*Patient Loyalty and Retention*: Satisfied patients are more likely to remain loyal to a healthcare provider or organization. They are more inclined to continue seeking care from the same provider and recommend the healthcare facility to others (Crow et al., 2002). This loyalty and positive word-of-mouth contribute to patient retention, attracting new patients, and sustaining the financial stability of healthcare organizations.

*Quality Improvement and Performance Evaluation*: Patient satisfaction serves as an important feedback mechanism for healthcare organizations to assess the quality of care and identify areas for improvement. It helps healthcare providers evaluate their performance, identify strengths and weaknesses, and implement strategies to enhance patient experiences (Kelley & Hurst, 2006,

Goodrich & Lazenby, 2023). Patient satisfaction data can inform quality improvement initiatives, leading to better care delivery and enhanced patient outcomes.

*Reimbursement and Financial Impact:* In many healthcare systems, patient satisfaction is tied to reimbursement and financial incentives. For example, in the United States, patient satisfaction scores are incorporated into the Hospital Value-Based Purchasing (VBP) Program, which impacts reimbursement rates (Centers for Medicare and Medicaid Services, n.d.). Higher patient satisfaction scores can positively influence financial outcomes for healthcare organizations by ensuring full reimbursement and maintaining a competitive edge in the market.

Overall, patient satisfaction plays a crucial role in healthcare by promoting patient engagement, trust, loyalty, and quality improvement. It contributes to better patient outcomes, financial stability for healthcare organizations, and the overall delivery of patient-centered care.

### **2.3.2. Patient Satisfaction Measurement**

To achieve greater patient satisfaction, hospitals strive to measure satisfaction reliably and identify areas for improvement in healthcare (Parashar, 1995). Patient satisfaction measurement aims to ensure quality assurance and continuous improvement (Bleich et al., 2009).

A contemporary approach to evaluating patient satisfaction centres around gauging patients' personal experiences and assessments of healthcare services. This is accomplished through the utilization of Patient Reported Experience Measures (PREMs) and Patient Reported Outcome Measures (PROMs) (Kingsley & Patel, 2017; Haute Autorite de Sante, 2021). PROMs serve the dual purpose of helping patients gain a clearer understanding of their medical conditions, pinpoint their most critical symptoms, and communicate them more effectively, while also enabling healthcare professionals to engage in more fruitful discussions regarding patients' care challenges. By employing PROMs, healthcare providers can detect symptoms earlier, carry out more effective follow-up procedures, and propose more suitable treatment plans, ultimately resulting in improved health outcomes and enhanced quality of life for patients. PREMs, on the other hand, revolve around analyzing patients' experiences to help healthcare practitioners enhance communication, foster team responsiveness, effectively manage pain, and cater to patient preferences (Haute Autorite de Sante, 2021).

To assess whether patients' expectations have been met and to gauge their satisfaction with the healthcare services they've received, Patient Satisfaction Questionnaires are employed. Various tools and methodological instruments have been developed for this purpose (Bernardo et al., 2022). Among these tools, the "Hospital Consumer Assessment of Healthcare Providers and Systems" (HCAHPS) questionnaire is of particular significance in the United States (CMS, n.d.). It's a standardized survey designed to evaluate patients' experiences and satisfaction levels with hospital care. The questionnaire encompasses several dimensions of the patient experience, including interactions with healthcare providers, staff responsiveness, pain management, facility cleanliness, and overall hospital rating. The HCAHPS survey furnishes invaluable insights into the viewpoints

of patients, helping hospitals pinpoint specific areas for improvement and elevate the quality of care they offer. Similarly, evaluating customer satisfaction is pivotal for organizations to gauge and assess the degree of contentment among their customer base (Mazurenko et al., 2017).

The significance of patient satisfaction measurement lies in its ability to drive quality improvement initiatives. By systematically collecting and analysing patient feedback, healthcare organizations can identify specific areas for improvement, monitor changes over time, and track the impact of interventions. It enables healthcare providers to align their services with patient expectations, enhance patient-centred care, and ultimately improve patient outcomes and satisfaction (Mazurenko et al., 2017, Farris et al., 2010). Moreover, patient satisfaction measurement contributes to accountability and transparency in healthcare. Public reporting of patient satisfaction data allows patients, payers, policymakers, and regulators to assess and compare healthcare providers' performance. It promotes transparency, encourages competition, and empowers patients to make informed decisions about their healthcare choices.

Overall, patient satisfaction measurement plays a pivotal role in promoting patient-centred care, improving healthcare quality, and enhancing patient experiences. It provides a valuable feedback loop for healthcare organizations to continually assess and enhance their services, ultimately leading to better patient outcomes and increased patient satisfaction.

## **2.4. Patient Satisfaction and COVID-19 Pandemic**

Patient satisfaction during the COVID-19 pandemic has garnered significant attention in the literature as healthcare systems worldwide faced unprecedented challenges. The pandemic imposed measures that significantly impact patient satisfaction in hospitals. These challenges include limited visitation policies, increased infection control measures, communication barriers, and changes in service delivery (Hariri-Ardebili 2020; Alzahrani et al., 2021, Mitura, 2020, Oseran et al., 2020). Numerous studies have explored the impact of the pandemic on patient satisfaction in different health care settings or in specific aspects of healthcare, such as the satisfaction with Emergency Departments (Leszczynski et al., 2022), the satisfaction of patients who needed surgery (Bin-Traiki et al., 2020), the impact of the applied preventive measures on satisfaction (Gomez-Carmona et al., 2022), the satisfaction with telemedicine and virtual clinics (Alwabibili et al., 2021, Teng et al., 2021, Monaghesh & Hajizadeh, 2020, Bokolo, 2020, Golinelli et al., 2020), the quality of care specifically in COVID patients (Lopez-Picazo et al., 2021 ) etc. and attempted to identify some key factors influencing the satisfaction levels. Understanding the specific factors influencing patient satisfaction during the pandemic is crucial for developing effective management strategies.

The literature on patient satisfaction during the COVID-19 pandemic has highlighted several common themes. Firstly, studies have emphasized the negative impact of restricted visitation policies and limited social support on patient satisfaction (Ammar et al., 2020, Maher et al., 2021). Patients experienced increased feelings of isolation and reduced emotional support, leading to decreased satisfaction with their healthcare experiences (Papagiannis et al., 2020). Secondly, changes in service delivery, such as the rapid adoption of telehealth and virtual consultations, have

had mixed effects on patient satisfaction (Monaghesh & Hajizadeh, 2020, Bokolo, 2020, Golinelli et al., 2020). The use of telehealth and remote care services has witnessed a significant surge during the pandemic. These technologies enable hospitals to provide timely medical advice, monitor patients remotely, and address their concerns without requiring physical visits (Wu et al., 2023, Monaghesh & Hajizadeh, 2020, Kichloo et al., 2020, Keesara et al 2020). Several studies found that telehealth and virtual support of patients can enhance convenience, accessibility, and the overall patient satisfaction (Monaghesh & Hajizadeh, 2020, Alwabili et al., 2021, Kozak et al., 2021). However, while some patients appreciated the convenience and accessibility of telehealth, others expressed concerns about the quality of care and the lack of in-person interactions (Monaghesh & Hajizadeh, 2020).

Several studies stressed the role of communication during the pandemic. Effective communication between healthcare providers and patients has been crucial for providing accurate information, managing patient expectations, and alleviating anxiety (Al-Jabr et al., 2020, Gupta et al., 2018). Al-Jabr et al (2020) reviewing the studies exploring the role of communication in addressing the COVID pandemic, highlighted the significance of the particular aspects of communication. It is known that timely and transparent communication regarding safety protocols, visitation policies, treatment procedures, and appointment scheduling can help alleviate patient concerns (Al-Jabr et al., 2020, Gupta et al., 2018). The use of technology, such as telemedicine and virtual consultations, has also emerged as a valuable tool for maintaining communication with patients while minimizing physical contact (Martinez et al., 2020, Burgener, 2017). However, language barriers have posed some obstacles to effective communication, potentially impacting patient satisfaction (Martinez et al., 2020).

Training and engagement of healthcare staff came in first priority during the pandemic, because it was understood that it could significantly contribute to positive patient experience and satisfaction (Hu & Wang, 2022, Latsou et al., 2022). Many hospitals invested in training programs that equip healthcare providers with the necessary skills to deliver quality care in challenging situations (Al-Jabr et al., 2020, BMA, 2023, Canadian Institute for Health Information, 2022). Several studies show that appropriate employee training during the pandemic improve the quality of care and increase patient satisfaction (Odusanya et al., 2022, Cash et al., 2021, Delamarre et al., 2022).

Ensuring high-quality care and implementing stringent safety measures seem to be paramount to patient satisfaction during the pandemic. Most hospitals prioritized infection control protocols, including adequate personal protective equipment, proper sanitization practices, and adherence to guidelines from health authorities, to ensure the quality of care, patient trust and patient satisfaction (Canadian Institute for Health Information, 2022).

*Studies show that measuring patients' experiences* during the pandemic allows hospitals to capture patient feedback, identify areas for improvement, and assess the effectiveness of interventions to improve patient satisfaction (Bordas-Martinez et al., 2022, Christensen et al., 2022, Hartl et al., 2021, Millstein & Kindt, 2020, Bin-Traiki et al., 2020).

These findings can help hospitals to adopt appropriate strategies to manage and improve patient satisfaction in the context of COVID-19.



Despite the growing body of literature on patient satisfaction during the COVID-19 pandemic, there are still gaps that our study seeks to fill. The literature reviewed above shows that most studies focused on specific types of health services (e.g. emergency departments, surgical patients, preventive measures, telemedicine, or specific hospital departments (Alwabili et al., 2021, Teng et al., 2021, Bin-Traiki et al., 2020)), limiting the generalizability of findings. The literature on the pandemic effects on the patient satisfaction from their overall hospital experience is limited. Besides, there is a need to explore the specific factors that influence patient satisfaction in the context of the pandemic. These factors may include demographic and social characteristics, health status-related characteristics of the patients, differences among the various hospital departments, or healthcare-related parameters affecting patient satisfaction such as nursing care, medical care, hospital conditions etc. Such information could help healthcare providers and policymakers in developing strategies to optimize patient experiences, enhance satisfaction levels, and improve overall healthcare delivery in the face of future crises.

## **2.5. Study hypotheses**

In this thesis, we rely on a strong theoretical foundation that emphasizes the complex nature of people's healthcare experiences both during and after the COVID-19 pandemic. The hypotheses tested are derived from a comprehensive theoretical understanding of the intricate dynamics shaping healthcare experiences, particularly during and after the COVID-19 pandemic. The anticipation of a negative impact on overall patient satisfaction and specific aspects of hospital care arises from the recognition of how external factors, like pandemics, can disrupt the continuum of healthcare services (Baker & Greiner, 2021). This disruption is further underscored by the observed strain experienced by different hospital departments during the pandemic, potentially influencing patient satisfaction. Moreover, extensive literature reveals the influence of various factors on patient experiences and their perceptions of healthcare, and this forms the basis for our study hypotheses. Gender, as highlighted in numerous studies, plays a pivotal role in healthcare dynamics, affecting healthcare-seeking behaviors, expectations, and responses to medical care (Elliott et al. 2012). Consequently, gender differences may contribute to divergent levels of patient satisfaction amid the pandemic. Likewise, the susceptibility of older patients to severe illness and mortality during the COVID-19 crisis underscores their distinct healthcare experiences, making them a vital consideration in our hypotheses (Elliott et al. 2012). Furthermore, education level's impact on patients' access to information, healthcare literacy, and expectations necessitates inclusion in our hypotheses, especially given the disruptions in care during a pandemic (Ahmad et al. 2022). Meanwhile, individuals who contracted COVID-19 faced unique challenges, such as isolation, severe symptoms, or complications, which undoubtedly had repercussions on their overall perception of healthcare quality. Varying strain on different hospital departments during the pandemic, such as internal medicine departments handling COVID-19 cases, and the impact on patient satisfaction is another significant dimension to the study. Lastly, surgical and non-surgical patients had distinct experiences due to postponed or canceled surgeries, and patients with pre-existing health conditions or those who perceived their health as poor prior to the pandemic

were disproportionately affected (Maher et al. 2015). In the light of these various factors, the study hypotheses aim to investigate how the pandemic has affected patients' satisfaction, considering these critical variables. Therefore, the study hypotheses are as follows:

- HA-1. There is a significant negative change in the overall HCAHPS patient satisfaction score during the COVID pandemic compared to the pre-COVID period.
- HA-2. There is a significant negative change in the patient satisfaction score in each aspect of hospital care during the COVID pandemic compared to the pre-COVID period.
- HA-3. There is a significant negative change in the HCAHPS patient satisfaction score during the COVID pandemic in each hospital department compared to the pre-COVID period.
- HA-4a. The relationship between the patient satisfaction during pre-COVID and post-COVID period is moderated by gender, such as that the effect of the pandemic on patient satisfaction is greater for men.
- HA-4b. The relationship between the patient satisfaction during pre-COVID and post-COVID period is moderated by age, such that the effect of the pandemic on patient satisfaction is greater for older patients.
- HA-4c. The relationship between the patient satisfaction during pre-COVID and post-COVID period is moderated by education level, such that the effect of the pandemic on patient satisfaction is greater for patients of higher education.
- HA-4d. The relationship between the patient satisfaction during pre-COVID and post-COVID period is moderated by the presence of the COVID disease, such that the effect of the pandemic on patient satisfaction is greater for COVID patients.
- HA-4e. The relationship between the patient satisfaction during pre-COVID and post-COVID period is moderated by hospital department, such that the effect of the pandemic on patient satisfaction is greater for patients admitted to internal medicine departments.
- HA-4f. The relationship between the patient satisfaction during pre-COVID and post-COVID period is moderated by patient's need for surgery, such that the effect of the pandemic on patient satisfaction is greater for non-surgical patients.
- HA-4g. The relationship between the patient satisfaction during pre-COVID and post-COVID period is moderated by health status self-assessment of patients, such that the effect of the pandemic on patient satisfaction is greater for patients with worse health status self-assessment.

## **2.6. Conceptual Model**

The conceptual model employed in this study serves as an expansion to the theoretical framework that guides the investigation of the impact of the COVID-19 pandemic on patient satisfaction in hospital patients. By utilizing this conceptual model, we aim to provide a structured and systematic approach for examining the complex relationships between the pandemic and patient satisfaction. It helps us organize and structure our understanding of the factors and mechanisms that may influence patient satisfaction during

the COVID-19 crisis. Additionally, the conceptual model aids in generating research questions, formulating hypotheses, and identifying the relevant variables and their interrelationships. By using the conceptual model as a foundation, we can effectively explore and analyse the impact of the pandemic on patient satisfaction using the HCAHPS questionnaire and scoring as a quantitative assessment tool. Using this instrument, the study aims to evaluate the effects of the pandemic on the patient satisfaction from the various aspects of hospital care, namely, the satisfaction with: Overall evaluation of the hospital, Nursing care, Medical care, Hospital environment, Healthcare conditions, After discharge service.

Also, the study aims to explore whether the personal characteristics (gender, age, educational level) and the characteristics of the health need (COVID illness, hospital department, ~~and~~ need for surgery, and health status self-assessment), affected the patient satisfaction during the pandemic.

*The dependent variables* of the study are the satisfaction with the various aforementioned aspects of hospital care, which are expected to be affected.

*The moderators of the effect* are on the one hand the demographic characteristics of patients and on the other hand the health-related characteristics of patients, including hospital department, suffering from COVID disease, need for surgery and health status self-assessment.

The selection of the possible moderators for this study was based on several considerations arising from Andersen's model for health service utilization (Andersen, 1995, Hajek et al., 2021). Firstly, patient's gender was chosen as a variable because previous research has indicated potential differences in healthcare experiences and satisfaction based on gender (Geitona et al., 2007, ODPHP, 2017). It is important to explore whether gender plays a role in shaping patient satisfaction with hospital care during the COVID-19 pandemic.

Secondly, patient's age was included as a variable due to its potential influence on healthcare expectations, communication preferences, and health outcomes (WHO, 2017, Hajek et al., 2021). Different age groups may have distinct needs and perspectives, which can impact their satisfaction with hospital care.

Educational level was considered as an independent variable because it can influence health literacy, comprehension of healthcare information, and patient engagement in decision-making (Andersen, 1995, WHO, 2017). Variations in educational backgrounds might lead to differences in patient satisfaction levels.

The inclusion of COVID disease as a possible moderator of the effect is vital in examining the specific impact of the pandemic on patient satisfaction. Suffering a patient from COVID disease may change healthcare protocols, infection control measures, and disruptions in regular healthcare services, which could affect patient satisfaction (Canadian Institute for Health Information, 2023).

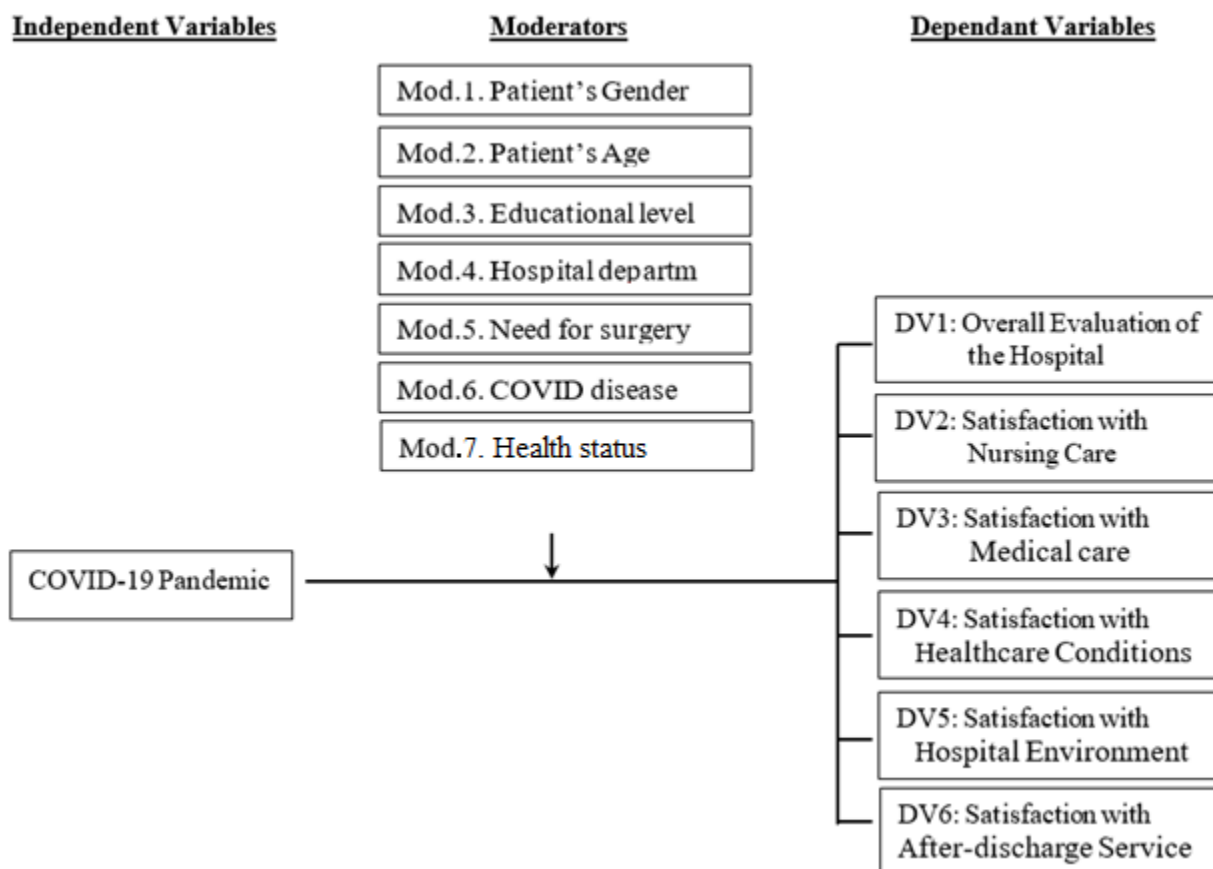
Need for surgery was chosen as a variable since patients requiring surgical interventions might have different expectations, concerns, and experiences compared to those receiving non-surgical

treatments. It is crucial to explore the potential influence of this factor on patient satisfaction (Bin-Traiki et al., 2020).

Lastly, the hospital department variable was considered to capture potential differences in patient experiences and satisfaction across different medical specialties or units. Variations in care processes, resources, and expertise among hospital departments might contribute to variations in patient satisfaction. These variables were selected based on their relevance to the research topic and their potential to provide insights into the impact of the COVID-19 pandemic on patient satisfaction with hospital care.

The combination and cross-check of dependent and independent variables will provide information about the parameters affecting the various aspects of patient satisfaction and the possible effects observed in the hospital operations during the pandemic. The independent variables may play a role of moderator of the effect.

Figure 3 summarizes the conceptual model of the effect of COVID pandemic on patient satisfaction with hospital services and the possible moderators of the effect which were included in the study. This approach permits the identification of possible weaknesses and can provide some evidence to support the planning of a strategy for improvements and higher patient satisfaction.



**Figure 3.** Conceptual model of the effect of COVID pandemic on patient satisfaction with hospital services.

## **CHAPTER 3: RESEARCH METHODOLOGY**

### **3.1. Research design**

The study was performed through a survey of patient satisfaction, in a sample of hospital patients, in Greece, using an appropriate questionnaire.

The logical base of the study is to compare the patient satisfaction between two samples of the same population, receiving services from the same hospital departments: one sample including patients of the pre-COVID period and the second including patients in the post-COVID period. Conducting the survey in the same population, in the same hospital departments and using the same questionnaire ensures the comparability of data among the two periods. This method adopts a quasi-experimental approach, similar to a “natural experiment” (Craig et al., 2017). A “natural experiment” is an observational study which can be performed with the aim to assess the outcomes and impacts of an intentional or unintentional intervention to a population (Petticrew et al, 2005). Usually, it is a situation which has not been designed by researchers themselves, but can be investigated to help answer a research question. In a natural experiment, there is not the ability to assign participants to “intervention group” and “control group”, but only to select the two groups that have or have not received the natural intervention.

### **3.2. The HCAHPS questionnaire**

The questionnaire which was used in this study, is the questionnaire of the “Hospital Consumer Assessment of Healthcare Providers and Systems” survey (HCAHPS). The HCAHPS is a standardized survey developed by the Centers for Medicare and Medicaid Services (CMS) in the United States (Centers for Medicare and Medicaid Services, 2021). It measures various aspects of patients' hospital experiences, including communication with doctors and nurses, responsiveness of hospital staff, pain management, cleanliness, and quietness of the hospital environment, discharge information, and overall hospital rating. It serves as a widely accepted and publicly reported measure of patient satisfaction and quality of care in hospitals.

The HCAHPS questionnaire was applied in this study, after a configuration to the local conditions of Greece and of Greek hospitals.

The particular questionnaire was chosen because it is validated and it has high reliability and the findings of the study will be comparable to the corresponding findings of other studies performed with the same questionnaire. Besides, the questionnaire has been used in the same hospital during the pre-COVID period, providing the capability for longitudinal comparisons within the same population. In addition, there are certain results of the same questionnaire in the scientific literature, permitting a comparative evaluation of the study findings.

In contrary, if a new questionnaire was developed, it would have the disadvantage of unknown reliability, and it would not provide the capability for longitudinal comparisons in the same population, neither comparisons with the findings of other similar studies.

The HCAHPS questionnaire evaluates the hospital services based on the personal experience of each patient (Centers for Medicare & Medicaid Services, n.d.). It includes twenty-two main questions and seven auxiliary questions about the patient. The 22 main questions are referred to the following:

Nursing care:	4 questions
Care of doctors:	3 questions
Hospital environment:	2 questions
Healthcare conditions:	8 questions
After discharge service:	3 questions
Overall evaluation of hospital:	2 questions
<hr/>	
TOTAL	22 questions

In each question, the patients are requested to provide a response about the frequency of receiving a particular health service, classified in four categories, “always”, “usually”, “sometimes” and “never”.

The auxiliary questions concern patient’s language, ethnicity, educational level, and a self-assessment of patient’s health status. In addition, information about gender, age and hospital department are included. The auxiliary questions regarding educational level, ethnicity and language spoken were configured to the conditions of Greece. Appendix I includes the HCAHPS questionnaire with the configurations.

Considering all above elements, the use of the HCAHPS questionnaire provides several advantages. Firstly, it provides a standardized and comparable measure of patient experience across different hospital units, enabling patients to make informed choices when selecting a healthcare provider. Secondly, it promotes patient-centered care by emphasizing the importance of effective communication, responsiveness, and other aspects of care that impact patient satisfaction. Lastly, it encourages hospitals to continuously improve their quality of care based on patient feedback, leading to enhanced patient experiences and better overall healthcare outcomes.

### 3.3. Ethical considerations

Ethical considerations play a crucial role in conducting research on patient satisfaction. When studying patient satisfaction, researchers must uphold ethical principles to ensure the protection of participants' rights, confidentiality, and privacy (Beauchamp & Childress, 2019). In this study, the following ethical considerations have been taken into account:

*Permissions:* Permissions and ethical approval ensure the compliance with ethical guidelines and safeguards the privacy and confidentiality of patient information (Masterson Creber et al., 2018).

They demonstrate respect for the institution and its policies regarding data use (Godwin et al., 2020).

*Informed Consent:* Obtaining consent from patients to analyze and study their questionnaire responses demonstrates respect for autonomy and protects their privacy (Godwin et al., 2020). It is important to emphasize that participation is voluntary, and participants have the right to withdraw their consent at any time (National Institutes of Health, n.d.). In the present study, informed consent was given by each individual patient who accepted to participate in the survey.

*Anonymity:* All questionnaires have been designed and administered in a way that does not require participants to disclose their personal information. The use of unique identifiers rather than personal data ensures anonymity during data analysis and reporting (Masterson Creber et al., 2018). In addition, anonymity reduces the risk of unintended disclosure and potential harm to participants (Godwin et al., 2020).

*Confidentiality:* Patients have a right to privacy, and maintaining confidentiality helps preserve their trust and confidence in the research process (Masterson Creber et al., 2018). Researchers have an ethical obligation to respect the privacy and confidentiality of participants. Respecting confidentiality is a fundamental principle of research ethics, ensuring that participants' information is not disclosed without their consent and preventing potential harm or unintended consequences (World Medical Association, 2013). It demonstrates a commitment to upholding ethical standards and protecting the rights and well-being of participants. Healthcare-related studies often involve sensitive information, including medical history, treatment experiences, and personal opinions. Breaches in confidentiality can lead to unintended disclosure of participants' identities or sensitive data, potentially exposing them to social, professional, or legal risks (Masterson Creber et al., 2018).

To get permission, a written request was submitted to the administration of the research hospital, accompanied by the research protocol. The request was evaluated by the Scientific and Ethical Committee of the Hospital, which, with its opinion of the 6th/08-05-2023 (issue 9th) meeting, approved the provision and use of the data. The opinion of the Scientific and Ethical Committee was submitted to the competent Regional Health Authority, which issued the 24352 decision approving the provision and the use of data according to the research protocol.

By upholding the above ethical principles, it was attempted to maintain the integrity of research, protect the rights and well-being of participants, and contribute to the overall advancement of patient satisfaction research.

## **3.4. Data collection**

### **3.3.1. Sample size**

The adapted HCAHPS questionnaire has been used in the same hospital during the pre-COVID period (before 2019). That provides the ability to take two different samples of patients, one before

2019 and the second during the current period of the research. The first sample is a random sample of the questionnaires submitted before the COVID pandemic. The second sample included patients who were admitted to the hospital during the COVID pandemic and it is described as “post-COVID sample”, meaning that it includes patients after the eruption of the pandemic. Finally, the first sample included 348 patients and the second 329 patients, achieving a total number of 677 questionnaires.

### **3.3.2. Sample collection**

The two datasets of the pre-COVID and post-COVID periods were derived from two random samples of the same population (the population of the particular city), which attended the same hospital during the pre-COVID and post-COVID periods, providing a solid basis for the comparability of data. However, to improve comparability of the two datasets, the two samples were selected through a stratified sampling method, aiming to achieve a matching between subgroups of the two samples, as follows.

First, the post-COVID sample was selected, which included all questionnaires submitted by patients during the post-COVID period, specifically during 2022-2023. This sample included 329 patients, who were classified by gender, age and hospital department. Then the pre-COVID sample of questionnaires was selected among the available pre-COVID questionnaires of the years 2017-2018. This sample was selected by subgroup by department, gender and age, taking the same fraction of patients of each subgroup in each sample (Stuart, 2010, Greifer & Stuart 2022, Delcoigne et al., 2018). In each subgroup, the sample members were selected at a regular interval basis. Through this method, a matching between the subgroups of the two samples was achieved, and finally the two samples had insignificant differences in their demographic characteristics.

## **3.5. Data analysis**

The overall data analysis included (i) descriptive statistics of the two samples, (ii) calculation of HCAHPS scores, and (iii) hypothesis testing analyses.

### **3.5.1. Descriptive statistics**

The descriptive statistics included (a) the demographic and social characteristics of the two samples (gender, age group, education, nationality and language) and (b) the demographic and social characteristics by hospital department, COVID-19 disease, need for surgery and patients' health status.

### **3.5.2. Calculation of HCAHPS scores**

The 22 basic questions of the HCAHPS questionnaire can be combined in groups, to provide information about the several aspects of healthcare. The HCAHPS Organization suggests to combine the 22 questions to calculate ten different measures: Six (6) composite measures, each



comprised of two to three questions, which describe six different aspects of healthcare; two (2) individual item scores referring to specific hospital conditions, and two (2) global item scores, which provide an overall evaluation of the hospital (HCAHPS Organization, 2013, CMS, 2011, CMS, 2017). These ten HCAHPS measures are the following:

### **Composite Measures**

1. Communication with Nurses (based on questions Q1, Q2 and Q3)
2. Communication with Doctors (based on questions Q5, Q6 and Q7)
3. Responsiveness of Hospital Staff (based on questions Q4 and Q11)
4. Pain Management (based on questions Q13 and Q14)
5. Communication about Medicine (based on questions Q16 and Q17)
6. Discharge Information (based on questions Q19 and Q20)

### **Individual Items**

1. Cleanliness of Hospital Environment (Q8)
2. Quietness of Hospital Environment (Q9)

### **Global Items**

1. Overall Hospital Rating (Q21)
2. Recommend the Hospital (Q22)

Considering that the 21 of the 22 HCAHPS questions (excluding Q21) have categorical scale answers, the elaboration of patient responses in each measure is as categorical variables. The responses in Q21 “Overall Hospital Rating” although are provided at a numerical basis, is advised by the HCAHPS guidelines to be evaluated also as a categorical variable, by summarizing responses in groups. This approach ensures clarity in distinguishing exactly how many patients rate the hospital highly and how many not. Although an average rating score could be calculated, it would not provide information about the specific count and distribution of patients according to their hospital rating. The elaboration of patient responses (including the hospital rating), as categorical variables is applied in almost all HCAHPS surveys (HCAHPS Organization, 2023, NRC Health, 2023, Goldstein et al., 2010, Harmon et al., 2005, Islam & Muhamad, 2021, Mackenzie, 2022, Maher et al., 2015, Mazurenko et al., 2017, Tiperneni et al., 2022, Lopez-Picazo et al., 2021).

The HCAHPS Organization suggests to elaborate the patient responses in each measure classified in three categories, called “boxes” (HCAHPS Organization, 2013, HCAHPS Organization, 2023, CMS, 2011, CMS, 2017). This method offers the advantage of providing a precise breakdown, distinguishing the number of patients who are unequivocally very satisfied (Top Box) from those who are definitely unsatisfied (Bottom Box). The three categories (boxes) are described below.

### **The “Top-Box” category includes the most positive responses to the questions, which are:**

- “Always” for the first five HCAHPS composites measures and the two individual items,
- “Yes” for Discharge Information
- “9” or “10” for Hospital Rating, and
- “Definitely” for Recommend the Hospital

The **“Middle-Box”** category includes the **“in-between”** responses, namely:

- “Usually” for the five HCAHPS composites measures and the two individual items,
- “7” or “8” for Hospital Rating, and
- “Probably Yes” for Recommend the Hospital.
- “Middle-Box” category does not exist for Discharge Information.

The **“Bottom-Box”** category includes the **least positive responses**, namely:

- “Sometimes” or “Never” for the five composites measures and the two individual items,
- “No” for Discharge Information,
- “0” through “6” for Hospital Rating, and
- “Definitely No” or “Probably No” for Recommend the Hospital.

The classification of the response categories in all ten measures is specified below.

<b>HCAHPS Indicator</b>	<b>Top Box</b>	<b>Middle Box</b>	<b>Bottom Box</b>
Communication with Nurses	“Always”	“Usually”	“Sometimes”, “Never”
Communication with Doctors	“Always”	“Usually”	“Sometimes”, “Never”
Responsiveness of Hospital Staff	“Always”	“Usually”	“Sometimes”, “Never”
Pain Management	“Always”	“Usually”	“Sometimes”, “Never”
Communication about Medicine	“Always”	“Usually”	“Sometimes”, “Never”
Discharge Information	“Yes”	-	“No”
Cleanliness of Hospital Environment	“Always”	“Usually”	“Sometimes”, “Never”
Quietness of Hospital Environment	“Always”	“Usually”	“Sometimes”, “Never”
Overall Hospital Rating	9, 10	7, 8	0, 1, 2, 3, 4, 5, 6
Willingness to Recommend Hospital	“Definitely yes”	“Probably yes”	“Definitely no”, “Probably no”

**Score calculation.** The HCAHPS Organization suggests the patient satisfaction scores to be calculated as percentages of respondents who answered that they received each particular service line (a) at the “Top Box” frequency and (b) at the “Bottom Box” frequency (HCAHPS Organization, 2013, HCAHPS Organization, 2023, CMS, 2011, CMS, 2017, Goldstein et al., 2010, Harmon et al., 2005, Lopez-Picazo et al., 2021, Mackenzie, 2022, Mazurenko et al., 2017, Tiperneni et al., 2022).

For the two individual items (Q8 and Q9) the “Top Box” score is:

- (1) *“Top Box” Score = Number of responses “Always”/Total number of responded to the particular question patients*
- (2) *“Bottom Box” Score = Number of responses “Sometimes” or “Never”/ Total number of responded to the particular question patients*

The scores for the six composite indexes are calculated by combining the responses to the questions included in each index. First, the proportion of answers for each question of the index is calculated. Then, the average proportion of the respective index questions is computed to derive

the score of the index:

$$(3) \text{ Composite "Top Box" Score} = \Sigma_n (\text{"Top Box" Score}_n)/n$$

$$(4) \text{ Composite "Bottom Box" Score} = \Sigma_n (\text{"Bottom Box" Score}_n)/n$$

This method provides the advantage to have at the same time the scores both at an individual item level and composite index level (HCAHPS Organization, 2013, HCAHPS Organization, 2023, CMS, 2011, CMS, 2017, Harmon et al., 2005).

The scores of the two global items (Q21 and Q22) are calculated as follows:

$$(5) \text{ "Top Box" Overall Hospital Rating Score} = \text{Number of ratings 9 or 10} / \text{Total number of responded to Q21 patients}$$

$$(6) \text{ "Bottom Box" Overall Hospital Rating Score} = \text{Number of ratings 1 to 6} / \text{Total number of responded to Q21 patients}$$

$$(7) \text{ "Top Box" of Willingness to Recommend Hospital Score} = \text{Number of responses "Definitely yes"} / \text{Total number of responded to Q22 patients.}$$

$$(8) \text{ "Bottom Box" of Willingness to Recommend Hospital Score} = \text{Number of responses "Definitely no" or "Probably no"} / \text{Total number of responded to Q22 patients.}$$

The data analysis in this study included the calculation of HCAHPS scores:

- (i) by period (pre- and post-COVID)
- (ii) by demographic characteristics (gender, age, educational level, and nationality)
- (iii) by health condition of patients (hospital department, COVID or non-COVID disease, need for surgery, and patients' assessment of their health status).

### 3.5.3. Hypothesis testing

Hypothesis testing included two statistical analyses:

- (i) Testing the significance of the score differences between the two periods
- (ii) Regression analyses.

**Testing the significance of the score differences.** The fact that the HCAHPS scores are in essence simple frequencies permits the use of chi-square as an appropriate test to evaluate the differences between them. Thus, the research hypothesis was tested by using the chi-square test to evaluate the significance of the score differences between the two samples, before and during COVID-19 pandemic. The chi-square test was also used in comparing the patient satisfaction scores by gender, age, educational level, COVID or non-COVID disease, need for surgery and hospital department.

**Regression analysis.** The hypothesis regarding the possible moderators of the satisfaction score was tested by using multinomial logistic regression analyses for the two global items "Overall Hospital Rating score" and "Willingness to Recommend the Hospital", which were considered as dependent variables. Each regression analysis evaluates the role of the possible moderators on the score of the respective dependent variable. The effect of the pre- or post-COVID period is evaluated by introducing "period" as an independent variable in the analysis. In the regression

analysis, both “Overall Hospital Rating” and “Willingness to Recommend the Hospital” were treated as categorical variables.

The possible moderators were divided in three groups, Three different regression models were tested:

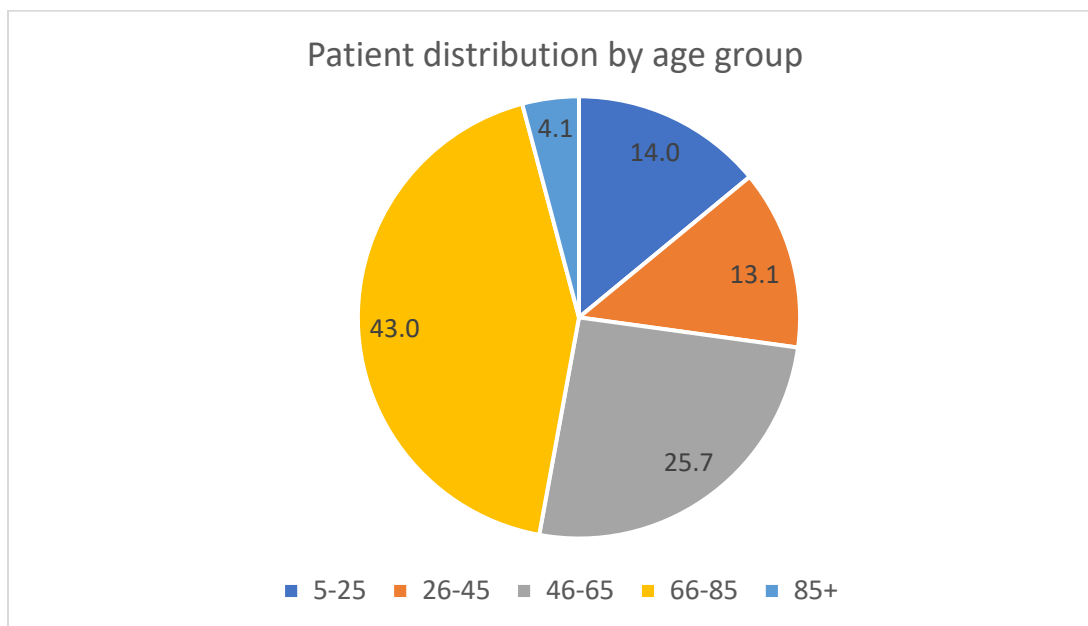
a) The first group included as independent variables the demographic characteristics of respondents, which were the categorical variables: gender, age group, education, nationality, language and period (pre or post COVID). The dependent variables were the two global items, namely (i) the Overall Hospital Rating and (ii) the Willingness to Recommend the Hospital. This model can be called “demographic model” and it aims to explore whether the aforementioned variables act as moderators of the satisfaction level.

b) The second group included as independent variables those related to the health condition of patients: hospital department they were admitted, COVID-19 disease, need for surgery, and health status self-assessment, all four treated as categorical variables. The dependent variables were the two global items. This model can be called “health status model” and aims to explore whether the aforementioned health conditions act as moderators of the patient satisfaction.

c) The third model included as independent variables the various aspects of healthcare received by patients, which may affect the overall rating scores: nurse care, medical care, responsiveness, cleanliness, quietness, drug instructions, and discharge instructions. The dependent variables were again the same two global items. This model can be called “healthcare model” and aims to explore whether the healthcare conditions act as moderators of patient satisfaction.

The statistical analyses were performed with MS Excel and SPSS v.26.





**Figure 4.** Patient distribution by age group.

Table 2 shows the social characteristics of the two samples, namely education, nationality, residency and language. The distribution of patients education displays some significant differences between the two samples, showing higher percentages of patients with higher education in the post-COVID sample ( $\chi^2=20.78$ ,  $p<0.01$ ).

Regarding nationality, residency and language spoken, about 89% of all patients were Greeks, permanent citizens of Greece and with Greek as native language. Although in the post-COVID sample the percentage of Greeks is higher than the pre-COVID one, the differences are not statistically significant ( $\chi^2=0.34$ ). Figure 5 presents the distribution of patients by educational level in the two samples.

**Table 2.** Social characteristics of the two samples.

	No of patients			(%)		
	Pre-COVID	Post-COVID	Total	Pre-COVID	Post-COVID	Total
<b>Education</b>						
6 years	93	50	143	26,7%	15,2%	21,1%
9 years	51	37	88	14,7%	11,2%	13,0%
12 years	106	112	218	30,5%	34,0%	32,2%
University	69	101	170	19,8%	30,7%	25,1%
NA	29	29	58	8,3%	8,8%	8,6%
<b>Nationality</b>						
Greek	289	309	598	83,0%	93,9%	88,3%
Other	11	9	20	3,2%	2,7%	3,0%
NA	48	11	59	13,8%	3,3%	8,7%
<b>Residency</b>						
Greece	296	307	603	85,1%	93,3%	89,1%
Other	14	8	22	4,0%	2,4%	3,2%
NA	38	14	52	10,9%	4,3%	7,7%
<b>Language</b>						
Greek	297	308	605	85,3%	93,6%	89,4%
Other	15	7	22	4,3%	2,1%	3,2%
NA	36	14	50	10,3%	4,3%	7,4%
<b>Total</b>	<b>348</b>	<b>329</b>	<b>677</b>	<b>100,0%</b>	<b>100,0%</b>	<b>100,0%</b>

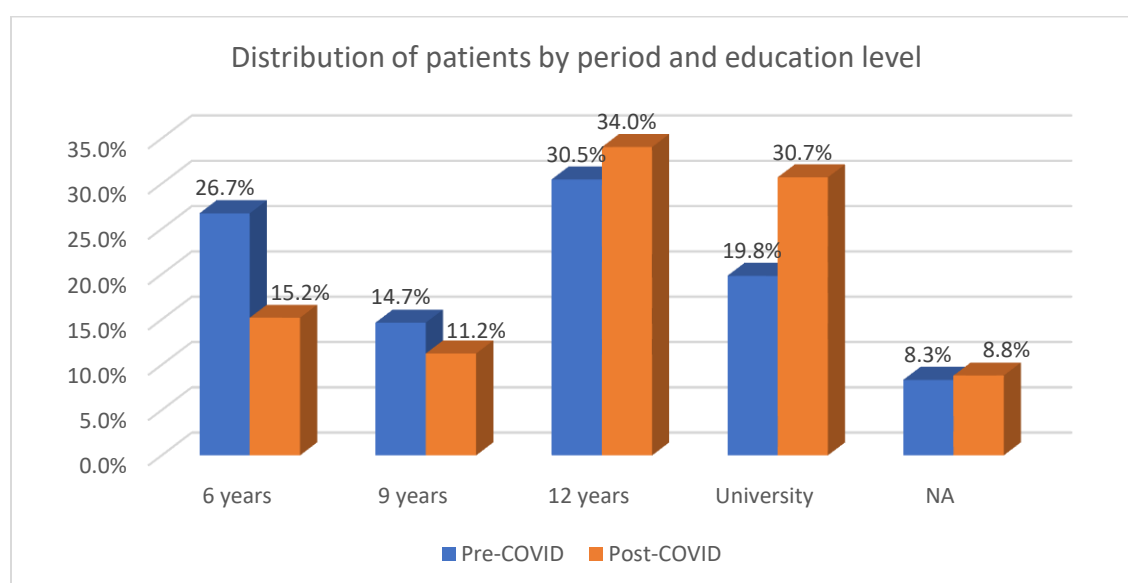
**Figure 5.** Distribution of patients by period and education level.

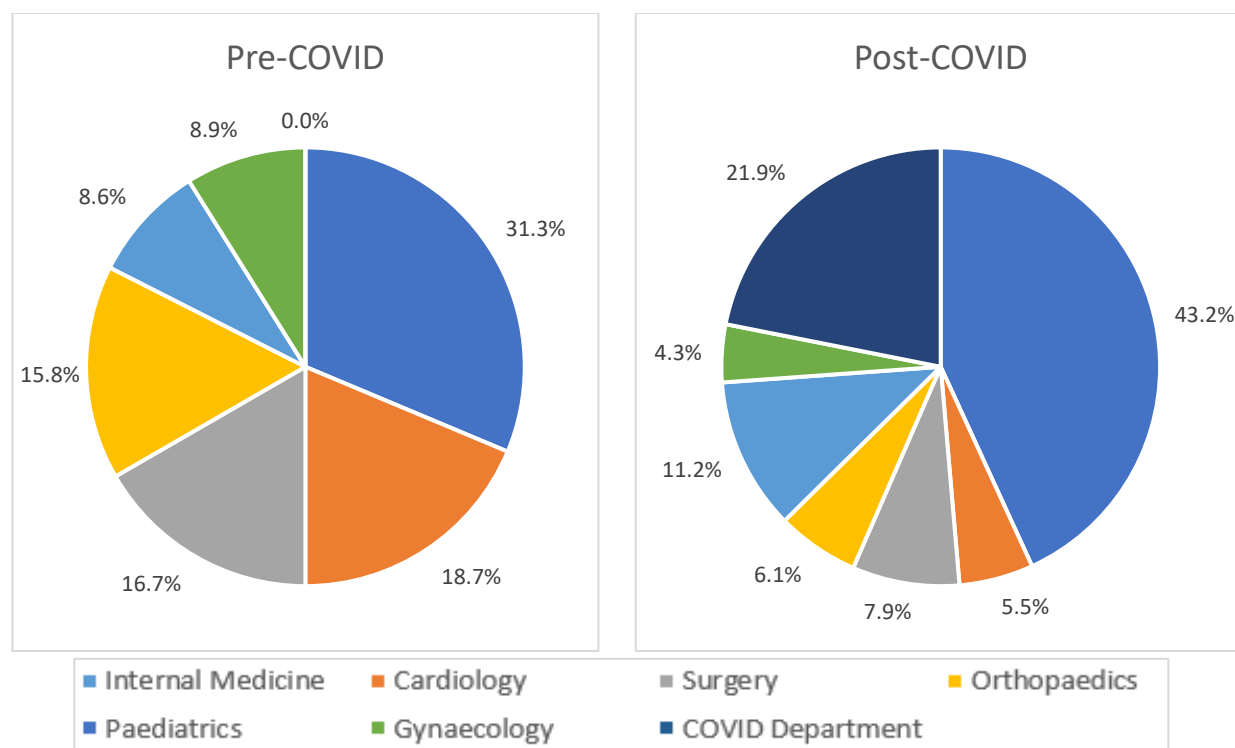
Table 3 presents the distribution of patients by hospital department, need for surgery, suffering for COVID-19 disease, and health status self-assessment. In the post-COVID sample, there are significantly lower percentages of patients in the Cardiology, Surgery, Orthopaedics and Gynaecology Departments ( $\chi^2=52,99$ ,  $p<0,001$ ), while 10,6% have been admitted in the specific COVID department which was developed during the COVID pandemic. Figure 6 presents the distribution of the two samples by hospital department. The different distribution of patients by department in the two samples requires to calculate the HCAHPS scores separately by hospital department.

**Table 3.** Distribution of patients by hospital department, need for surgery, suffering from COVID-19 disease, and health status self-assessment.

	No of patients			(%)		
	Pre-COVID	Post-COVID	Total	Pre-COVID	Post-COVID	Total
<b><i>Hospital department(*)</i></b>						
Internal Medicine	109	142	251	31,3%	43,2%	37,1%
Cardiology	65	18	83	18,7%	5,5%	12,3%
Surgery	58	26	84	16,7%	7,9%	12,4%
Orthopaedics	55	20	75	15,8%	6,1%	11,1%
Paediatrics	30	37	67	8,6%	11,2%	9,9%
Gynaecology	31	14	45	8,9%	4,3%	6,6%
COVID Department	0	72	72	0,0%	21,9%	10,6%
Total	348	329	677	100,0%	100,0%	100,0%
<b><i>Surgery need (**)</i></b>						
No	235	283	518	67,5%	86,0%	76,5%
Yes	113	46	159	32,5%	14,0%	23,5%
Total	348	329	677	100,0%	100,0%	100,0%
<b><i>COVID-19 disease</i></b>						
No	348	257	605	100,0%	78,1%	89,4%
Yes	0	72	72	-	100,0%	100,0%
Total	348	329	677	100,0%	100,0%	100,0%
<b><i>Health status self-assessment (***)</i></b>						
Excellent	67	48	115	19,3%	14,6%	17,0%
Very good	76	72	148	21,8%	21,9%	21,9%
Good	92	114	206	26,4%	34,7%	30,4%
Fair	67	68	135	19,3%	20,7%	19,9%
Poor	15	9	24	4,3%	2,7%	3,5%
NA	31	18	49	8,9%	5,5%	7,2%
Total	348	329	677	100,0%	100,0%	100,0%

(\*)  $p<0,001$     (\*\*)  $p<0,01$     (\*\*\*) not significant





**Figure 6.** Distribution of patients by hospital department.

Regarding the need for surgery, the percentage of patients who did not need surgery was significantly higher in the post-COVID sample ( $\chi^2=32,17$ ,  $p<0,01$ ).

No significant differences are observed in the distribution of the two samples by health status self-assessment ( $\chi^2=6,24$ ).

## 4.2. HCAHPS scores

### 4.2.1. Overall scores in the two samples

Table 4 summarizes the calculated overall top-box and bottom-box scores of the ten HCAHPS indexes in the two samples, and provides the  $\chi^2$  values of the statistical significance of the observed differences between the two samples. The table evaluates if the percentages of satisfied and unsatisfied patients changed after the eruption of the pandemic. Considering that HCAHPS scores are frequencies of patients, the chi-square test was used to test their differences.

The top-box score of the “Overall rating of the hospital” decreased by almost 10% while the bottom-box score raised from 2,3% to 6,1% ( $p<0,05$ ). The top-box score of the “Willingness to recommend the hospital” decreased by 13%, in contrary to the bottom-box score which increased from 0,9 to 4,2% ( $p<0,01$ ). The higher top-box scores are found in “Communication with nurses”, “Discharge information” and “Cleanness”. However, in all indices but “Discharge information”, the top-box HCAHPS score is calculated lower in the post-COVID period. The difference found

to be highly significant in most measures, excluding “Cleanness” and “Quietness”. The highest worsening of the top-box scores is noticed in “Communication with doctors” (17,6%) and “Pain control” (17,3%).

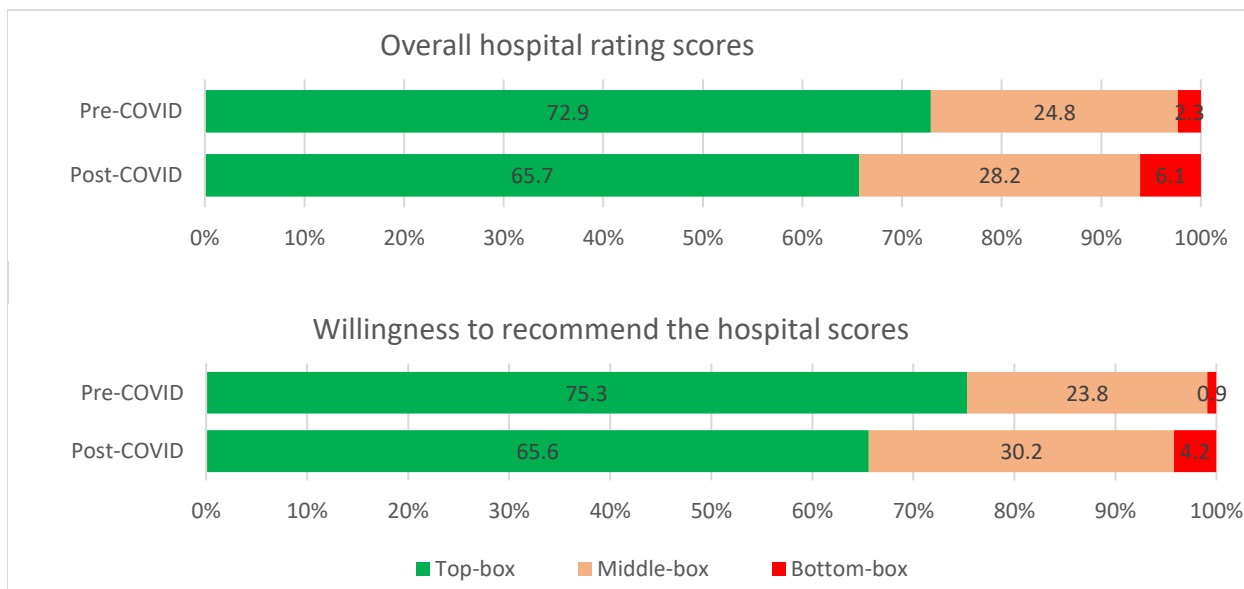
Regarding the bottom-box scores, the less favourable values are shown in “Medicine information”, “Discharge information” and “Quietness”. In four indicators, “Communication with nurses”, “Communication with doctors”, “Overall hospital rating” and “Willingness to recommend the hospital” the bottom-box score was significantly worsened in the post-COVID sample. The bottom-box score of “Communication with doctors” recorded a sharp increase by 269%, reaching 10,7%, while the respective score of “Pain management” increased by 53,1%, reaching 9,8%.

**Table 4.** Top-box and bottom-box HCAHPS scores of the HCAHPS indexes in the two samples.

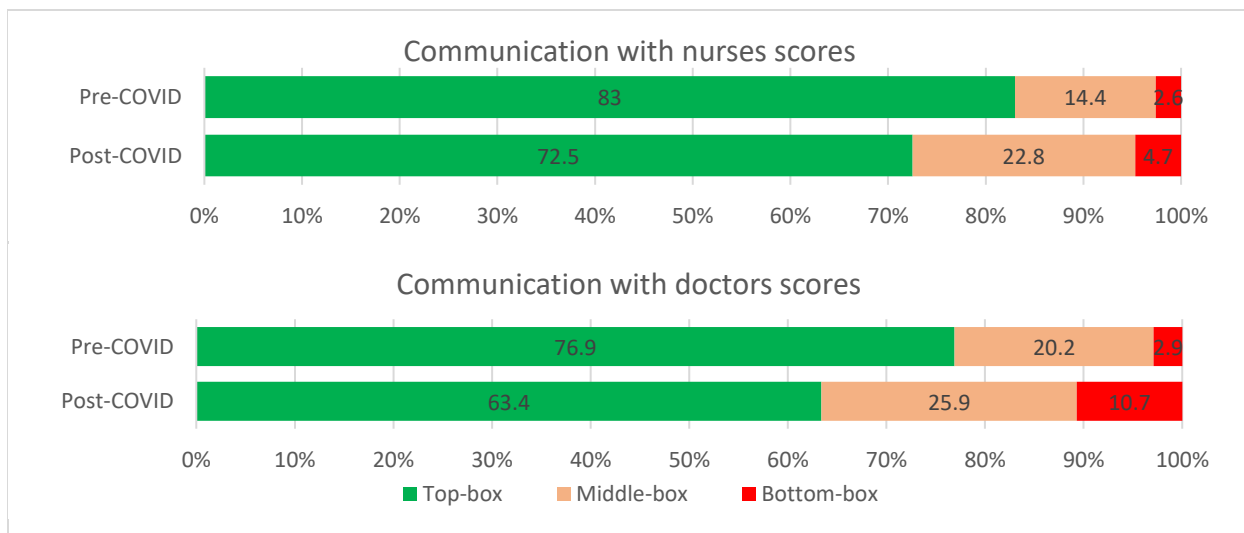
HCAHPS index	Pre-COVID		Post-COVID		$\chi^2$ value
	Top-box score	Bottom-box score	Top-box score	Bottom-box score	
Overall hospital rating	72,9	2,3	65,7	6,1	7,84 (***)
Willingness to recommend the hospital	75,3	0,9	65,6	4,2	11,97 (**)
Communication with nurses	83,0	2,6	72,5	4,7	32,72 (*)
Communication with doctors	76,9	2,9	63,4	10,7	65,83 (*)
Responsiveness	78,9	9,5	70,8	5,6	28,57 (*)
Cleanness	80,3	5,8	75,5	5,0	3,91 (****)
Quietness	56,7	11,6	51,6	13,4	1,78 (****)
Pain management	74,6	6,4	61,7	9,8	17,15 (*)
Medicine information	63,6	16,8	54,2	18,3	8,60 (***)
Discharge information	84,7	15,3	85,5	14,5	0,05 (****)

(\*) p<0,001 (\*\*) p<0,01 (\*\*\*) p<0,05 (\*\*\*\*) not significant

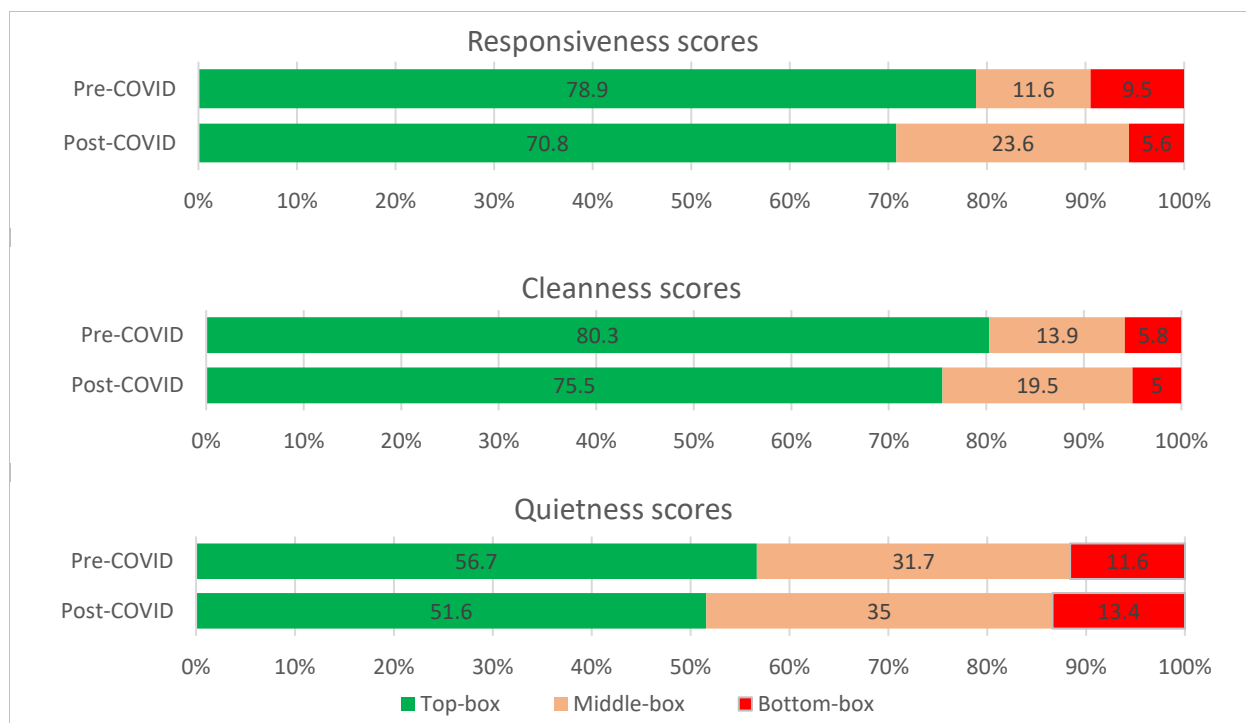
Figures 7-10, combines the Top-box, Middle-box and Bottom-box scores in the ten measures over the two periods. In almost all indices, a reduction of the Top-box score is noticed and inversely, an increase in the middle-box and bottom-box scores is observed.



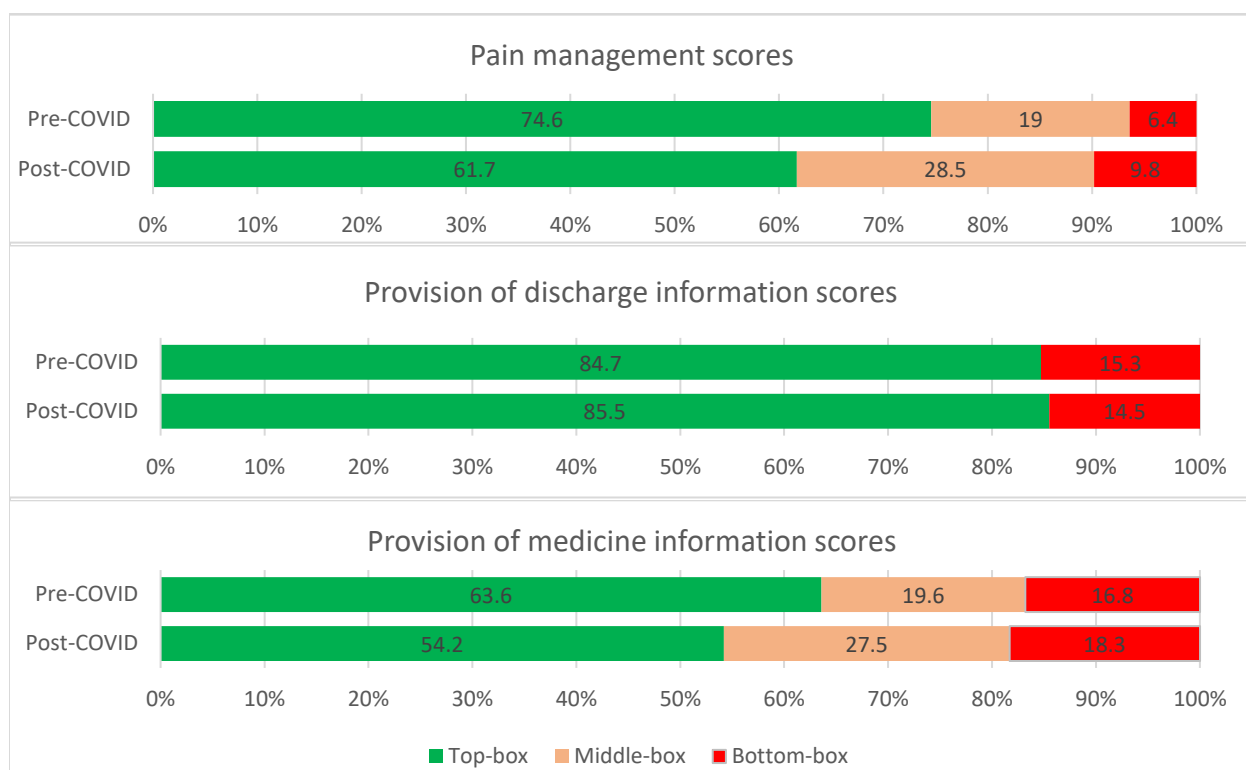
**Figure 7.** Change in the Top-box, Middle-box and Bottom-box scores between the two periods in (i) Overall hospital rating and (ii) Willingness to recommend the hospital.



**Figure 8.** Change in the Top-box, Middle-box and Bottom-box scores between the two periods in (i) Communication with nurses and (ii) Communication with doctors and (iii) Responsiveness.



**Figure 9.** Change in the Top-box, Middle-box and Bottom-box scores between the two periods in (i) Responsiveness, (ii) Cleanness and (iii) Quietness.



**Figure 10.** Change in the Top-box, Middle-box and Bottom-box scores between the two periods in (i) Pain management, (ii) Provision of discharge information and (iii) Provision of medicine information.

#### 4.2.2. HCAHPS scores by subgroup

Table 5 presents the top-box scores of the “Overall hospital rating” and the “Willingness to recommend the hospital, by gender, age group, education level and nationality, over the two periods. The respective bottom-box score are shown in Table A1 of Appendix II.

The “Overall rating of the hospital” recorded a reduction which was found significant in total, in females, in patients of age 66-85 years old, and in patients of 9 years of education. Significant increase is presented only patients 5-25 years old. The bottom-box score in “Overall hospital rating” (Table A1) significantly increased in males, in patients over 65 years old and in patients of 6-9 years of education.

The top-box score of the measure “Willingness to recommend the hospital” reduced significantly in males, in patients 46-85 years old, and in patients with higher education. A significant increase was shown only in patients 5-25 years old, where the overall hospital rating increased. The bottom-box score increased from 0,9 to 4,2% in total, and this increase was significant in males, and in patients of age 46-85 years old.

Regarding the “Overall hospital rating score”, no significant differences between hospital departments were observed in the pre-COVID period. However, in the post-COVID period, the overall rating score was significantly lower in the specific COVID department ( $p < 0.001$ ), almost half of the average score of all other departments. No significant difference between the two periods was observed in any of the other departments. Also, no significant difference in the overall rating was noticed between the two periods in the non-COVID patients. The overall rating score reduced significantly in the groups of patients who assess their health status as “Excellent”, “Good” or “Poor”, but it increased in the group of patients who assess their health status as “Very good”.

Regarding the “Willingness to recommend the hospital” score, significant worsening is observed in the Internal Medicine department, and a non-significant in the Orthopaedics department. In contrary, significant increase of the score was recorded in the Cardiology and Gynaecology departments, and a non-significant in Surgery and Paediatrics departments. Patients who did not need surgery seem to have a worse hospital experience during the post-COVID period, with a lower overall rating and significantly lower score in “Willingness to recommend the hospital”. Similarly, the score in the group of patients suffering COVID disease was much lower compared to that of that of the non-COVID patients. According to health status self-assessment, the trends are similar to those observed in the overall rating score; the score reduced in all groups of patients, except those who assess their health status as “Very good”.

**Table 5.** Top-box scores of “Overall hospital rating” and “Willingness to recommend the hospital, by demographic, social and health condition characteristics.

	Overall hospital rating score			Willingness to recommend the hospital		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>						
Male	70,7	66,7	0,7	76,1	66,3	(***) 4,1
Female	75,5	64,7	(***) 4,4	74,4	64,9	3,3
Total	72,9	65,7	(***) 4,1	75,3	65,6	(**) 7,4
<b>Age group</b>						
5-25	61,2	82,6	(***) 5,3	54,2	82,9	(**) 8,3
26-45	75,6	55,8	3,8	75,0	59,1	2,5
46-65	72,4	74,4	0,1	82,8	65,4	(***) 6,6
66-85	76,5	58,2	(*) 11,1	78,4	61,6	(**) 9,6
85+	70,6	63,6	0,1	76,5	85,7	0,3
<b>Education</b>						
6 years	74,2	66,0	1,1	80,6	71,4	1,6
9 years	80,4	54,1	(**) 7,0	74,5	58,1	2,4
12 years	64,8	75,9	3,2	67,3	68,2	0,0
University	81,2	71,3	2,1	82,4	67,0	(***) 4,9
<b>Nationality</b>						
Greek	71,9	66,0	2,4	74,9	64,3	(**) 7,7
Other	45,5	77,8	2,2	40,0	100,0	(**) 7,9
<b>Hospital department</b>						
Internal Medicine	75,2	71,1	0,7	81,5	64,7	(**) 9,3
Cardiology	63,1	82,4	2,3	62,5	94,1	(***) 6,3
Surgery	75,4	76,0	0,0	82,5	88,0	0,4
Orthopaedics	67,3	75,0	0,4	80,0	63,2	2,2
Paediatrics	83,3	78,4	0,3	72,4	80,0	0,5
Gynaecology	80,6	71,4	0,5	64,5	92,9	(***) 4,0
COVID Department		37,5			37,1	
<b>Surgery need</b>						
Yes	73,4	74,6	0,0	77,6	81,0	0,3
No	72,5	65,5	2,6	74,1	63,8	(3) 5,4
<b>COVID-19 disease</b>						
Yes	-	37,5		-	37,1	
No	72,9	73,7	0,0	75,3	72,7	0,5
<b>Health status self-assessment</b>						
Excellent	88,1	70,8	(***) 5,4	88,1	66,7	(**) 7,8
Very good	69,7	87,5	(**) 6,9	75,0	87,5	3,8
Good	69,6	53,5	(***) 5,5	76,1	43,0	(*) 22,9
Fair	65,7	66,2	0,0	76,1	67,6	1,2
Poor	66,7	44,4	1,1	80,0	22,2	(**) 7,7

(\*) p<0.001    (\*\*) p<0.01    (\*\*\*) p<0.05

Table 6 compares the top-box scores of the “Communication with nurses” and “Communication with doctors” measures of the two samples, by gender, age group, education level, nationality, hospital department, need for surgery, COVID-19 disease and health status self-assessment. The bottom-box scores of the two measures are presented in Table A2 of Appendix II.

The score in both indices present no significant difference between genders, age groups and education level. Also, both scores present a significant worsening in post-COVID period, in both genders and in almost all age groups and educational levels.

The bottom-box scores of both indices recorded a significant worsening, which was greater in males and in older patients. Specifically, the bottom-box score of “Communication with nurses” increased in total from 2,6% to 4,7%, reaching 6,3% in males, 12,1% in patients of age greater than 85 years old, and 9% in patients of age 46-65 years old. The bottom-box score of “Communication with doctors” recorded a greater increase, from 2,9% to 10,7% in total, reaching 14,5% in males, 17,2% in patients 66-85 years old and 26,9% in patients of age over 85 years old.

Regarding nationality, noticeable differences are shown in both measures, but due to the small number of patients with other than Greek nationality (table 2), they are not found significant. However, a reverse trend is observed between patients of different nationality over time. The scores given by the Greek patients is significantly worsened in the post-COVID period, while the score given by patients of other nationality displayed a significant improvement in “Communication with doctors” and a non-significant in “Communication with nurses”.

The “Communication with nurses” score recorded a reduction in the Internal Medicine, Surgery and Paediatrics departments. At the same time, the bottom-box score increased from 2,8% to 7,6% in the Internal Medicine department, and from 1,2% to 5,1% in the Cardiology department. The worsening was more visible in the non-COVID and non- surgical patients, as well as in patients who assessed their health status as “Good”, “Fair” or “Poor”. In addition, in the same categories of patients, the bottom-box score showed a rise.

The “Communication with doctors” score displayed different trends between departments, showing an improvement in Internal Medicine and Cardiology departments, and worsening in Orthopaedics and Paediatrics. The score also worsened in patients with a lower health status self-assessment (“Good” or “Fair”). However, the bottom-box score (table A1) recorded a notable increase in the non-COVID patients and in patients with a higher health status self-assessment, reaching 13,9% in those with a “Very good” self-assessment and 20,8% in patients with an “Excellent” health status self-assessment.

**Table 6.** Top-box scores of “Communication with nurses” and “Communication with doctors” by demographic, social and health condition characteristics, over the two periods.

	Communication with nurses			Communication with doctors		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>						
Male	82,9	69,2	(*) 27,9	76,2	65,2	(*) 15,5
Female	83,1	76,2	(**) 7,1	77,7	61,4	(*) 29,9
Total	83,0	72,5	(*) 32,5	76,9	63,4	(*) 44,0
<b>Age group</b>						
5-25	80,3	76,1	0,7	86,8	77,5	(***) 4,2
26-45	88,1	82,5	1,7	82,2	72,3	3,7
46-65	87,7	68,1	(*) 28,9	71,1	73,0	0,2
66-85	80,8	69,8	(*) 14,2	75,3	50,6	(*) 56,9
85+	72,5	87,9	2,4	78,4	60,9	2,8
<b>Education</b>						
6 years	82,4	78,0	1,2	73,5	61,3	(**) 6,8
9 years	78,4	84,7	1,6	77,1	49,5	(*) 21,7
12 years	80,5	72,9	(***) 5,3	78,9	71,3	(***) 4,9
University	87,9	67,0	(*) 28,9	73,6	64,7	(***) 4,4
<b>Nationality</b>						
Greek	82,4	72,1	(*) 26,6	76,4	62,5	(*) 40,0
Other	72,7	77,8	0,2	63,6	92,6	(**) 7,0
<b>Hospital department</b>						
Internal Medicine	70,3	61,0	(**) 8,9	57,5	66,5	(***) 4,8
Cardiology	84,1	92,6	2,5	71,8	80,9	1,2
Surgery	92,9	83,2	(***) 5,6	87,1	86,7	0,0
Orthopaedics	87,9	85,0	0,3	91,4	81,7	4,1
Paediatrics	87,8	72,1	(**) 7,4	91,1	73,0	(**) 10,7
Gynaecology	93,5	92,9	0,0	97,8	100,0	0,9
COVID Department		79,0	-		25,0	-
<b>Surgery need</b>						
Yes	91,1	86,1	3,5	91,1	88,2	1,2
No	77,3	71,3	(***) 6,4	67,0	59,4	(**) 8,6
<b>COVID-19 disease</b>						
Yes	-	79,0		-	25,0	
No	83,0	70,7	(*) 38,7	76,9	73,5	2,8
<b>Health status self-assessment</b>						
Excellent	87,6	93,1	2,8	75,6	65,3	(***) 4,4
Very good	82,5	84,3	0,3	79,4	73,6	2,1
Good	78,6	58,2	(*) 29,0	74,6	54,1	(*) 27,7
Fair	85,1	69,1	(*) 14,6	78,6	58,3	(*) 19,3
Poor	75,6	48,1	(***) 5,6	55,6	66,7	0,9

(\*) p&lt;0.001    (\*\*) p&lt;0.01    (\*\*\*) p&lt;0.05



Table 7 summarizes the top-box scores of the indices “Responsiveness” and “Cleanness” and “Quietness” of the two samples, by demographic, social and health condition characteristics. The bottom-box scores of the three indices are presented in Table A3 of Appendix II.

The score of “Responsiveness” shows a significant reduction during the post-COVID period in the total, especially in females, in age-groups 5-25 years and 66-85 years old, as well as in the higher educated patients. However, it displays an improvement in patients with 9 years of education. The improvement of the score in patients with other than Greek nationality is not found significant.

“Responsiveness” recorded a worsening in Internal Medicine department, but improvement in Cardiology and Surgery departments. Correspondingly, the bottom-box score was increased in Internal Medicine department and improved in all other departments. No change in score was observed in surgical and non-surgical patients. However, in both periods, the score was significantly lower in patients who needed surgery. Also, no difference in the score is observed between COVID and non-COVID patients. According to health status self-assessment, decrease of the score was observed in the patients who assess their health status as “Good” or “Fair”.

Regarding Cleanness, the top-box score shows no significant changes between the two periods in the most demographic sub-groups, except a worsening in patients of age over 85 years old and an improvement in patients with 9 years of education and of nationality other than Greek.

The score of Cleanness presented a reduction in some hospital departments, which was not found statistically significant. However, the bottom-box score recorded a notable increase in the Surgery department. No changes were observed in the score of patients who needed or not surgery. The score was found higher in the COVID patients compared to the non-COVID. According to health status self-assessment, reduction of the score was observed in the patients who assess their health status as “Good” or “Fair”, in which also the bottom-box score recorded an increase.

Top-box score in Quietness does not display significant differences between the two periods by demographic or social characteristics of the patients. In almost all departments but Paediatrics an improvement was observed. In the specific COVID department the score in Quietness is much lower than all other departments except Paediatrics. In the Paediatrics department, in addition to the reduction of the top-box score, a notable increase of the bottom-box score was also recorded (Table A3). No significant changes in the bottom-box score were observed in all other groups of patients.

**Table 7.** Top-box scores of the indices “Responsiveness” and “Cleanness” and “Quietness” by demographic, social and health condition characteristics.

	Responsiveness			Cleanness			Quietness		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>									
Male	73,2	70,3	3,0	76,6	75,0	0,1	49,4	47,9	0,1
Female	86,0	71,4	(*) 18,3	84,5	76,0	3,5	65,0	55,6	2,9
Total	78,9	70,8	(*) 16,1	80,3	75,5	2,3	56,7	51,6	1,8
<b>Age group</b>									
5-25	91,5	81,9	(***) 4,9	83,7	79,5	0,3	53,2	34,8	3,2
26-45	66,0	92,9	1,3	73,3	88,6	3,4	59,1	55,8	0,1
46-65	77,0	75,6	1,5	78,8	75,3	0,3	44,4	53,0	1,2
66-85	80,3	69,4	(***) 5,6	80,5	71,7	3,1	63,0	54,0	2,4
85+	72,0	72,7	0,2	94,1	54,5	(***) 6,2	64,7	63,6	0,0
<b>Education</b>									
6 years	80,8	87,5	3,2	84,8	93,8	2,4	54,4	48,9	0,4
9 years	67,4	92,9	(**) 10,4	82,4	97,3	(***) 4,8	63,3	41,2	(***) 3,9
12 years	81,0	62,9	(*) 12,0	73,6	69,4	0,5	52,0	51,4	0,0
University	82,5	73,3	(**) 7,7	82,6	71,4	2,8	64,7	60,4	0,3
<b>Nationality</b>									
Greek	78,4	73,8	(***) 5,1	80,1	74,9	2,3	57,3	52,0	1,7
Other	76,6	100,0	2,8	54,5	100,0	(***) 5,5	60,0	55,6	0,0
<b>Hospital department</b>									
Internal									
Medicine	76,2	59,8	(**) 8,9	72,5	63,3	2,9	50,5	60,3	3,2
Cardiology	67,3	92,9	1,8	81,3	82,4	0,0	50,0	76,5	3,8
Surgery	87,2	100,0	2,9	76,8	69,2	0,5	68,5	87,0	2,9
Orthopaedics	78,4	78,3	1,1	87,3	100,0	2,7	49,1	47,4	0,0
Paediatrics	87,9	89,2	2,6	90,0	74,3	2,7	78,6	21,6	(*) 20,8
Gynaecology	100,0	96,4	1,7	90,3	92,9	0,1	64,5	71,4	0,2
COVID Department		86,9			90,3			29,0	
<b>Surgery need</b>									
Yes	85,3	84,7	0,03	83,8	84,7	0,03	60,1	69,6	1,54
No	75,6	75,7	0,51	77,8	75,4	0,38	54,3	49,0	1,25
<b>COVID-19 disease</b>									
Yes	-	86,9		-	71,2		-	57,8	
No	78,9	66,1	26,9	80,3	90,3	6,7	56,7	29,0	0,1
<b>Health status self-assessment</b>									
Excellent	57,5	52,1	0,7	91,0	87,5	0,4	64,2	54,2	1,2
Very good	44,7	50,0	0,8	78,9	80,6	0,1	55,3	54,2	0,0
Good	55,4	43,0	(**) 6,3	78,3	64,9	(***) 4,4	48,9	48,2	0,0
Fair	56,0	45,6	2,9	76,1	70,6	0,5	53,7	48,5	0,4
Poor	53,3	55,6	0,0	60,0	88,9	2,3	46,7	55,6	0,2

(\*) p&lt;0.001 (\*\*) p&lt;0.01 (\*\*\*) p&lt;0.05

Table 8 displays the top-box scores of the indices “Pain management”, “Provision of medicine information” and “Provision of discharge information”. The bottom-box scores of the same measures are presented in Table A4 of Appendix II.

The score of “Pain management” recorded a significant reduction, which was more visible in males, patients of age 66-85 years old, patients with 12 or more year of education and of Greek nationality. The bottom-box score displayed an increase in total from 6,4 to 9,8%, which however was not found significant, except in patients of age 66-85 years old.

During the pre-COVID-19 period, the score of “Pain management” did not vary significantly among hospital departments. In contrary, during the post-COVID period significant differences are observed between departments. In the departments of Internal Medicine, Orthopaedics and Paediatrics a worsening of the top-box score was recorded, while in the Cardiology department a notable increase was observed. The score decreased in both patient groups who need or not surgery, as well as in the non-COVID patients. The bottom-box score worsened in the Paediatrics department and in the non-COVID patients. The score does not differ between the two periods in patients who assess their health status as “Excellent” or “Very good”, but it worsened in those patients who assess their health as “Good” or “Fair”.

The top-box score in “Provision of medicine information” significantly reduced in total, in males, in patients of age greater than 65 years old, in patients with lower education and patients of Greek nationality. The reduction in the other education groups was not found significant. Also, the score reduced in the Paediatrics department, but it showed an increase in Cardiology department. Patients of the specific COVID department gave much lower score compared to all other patients. The bottom-box score (Table A4) shows no significant change between the two periods, except in patients of age over 85 years old.

The score of “Provision of discharge information” remained in high levels in both periods. The score does not present significant change in total or by gender, but it shows a worsening in patients of age 66-85 years old, and in less educated patients. In contrary, an improvement is recorded in patients of age 5-25 years old and in older patients of age over 86 years old. The score recorded an increase in Cardiology and Paediatrics departments, however it reduced in the Internal Medicine department. No significant differences are observed according to surgery needs or COVID disease. An improvement was recorded in patients who assess their health status as “Very good” or “Poor”. The bottom-box score did not present changes in total or by gender. It shows a rise in patients of age 66-85 years old and in the less educated patients.

**Table 8.** Top-box scores of “Pain management”, “Provision of medicine information” and “Provision of discharge information” by demographic, social and health condition characteristics.

	Pain management			Medicine information			Discharge information		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>									
Male	73,8	57,2	(*) 15,2	59,9	49,7	(***) 4,6	83,2	88,3	2,5
Female	75,4	66,9	3,5	67,9	59,5	2,7	86,5	82,5	1,6
Total	74,6	61,7	(*) 17,1	63,6	54,2	(**) 7,2	84,7	85,5	0,1
<b>Age group</b>									
5-25	63,5	52,3	1,7	69,8	68,7	0,0	82,4	94,9	(***) 5,7
26-45	85,1	79,5	0,6	71,1	68,4	0,1	75,3	82,0	1,0
46-65	70,3	66,8	0,5	52,6	53,0	0,0	86,2	91,2	1,4
66-85	77,3	58,6	(*) 14,0	64,8	48,2	(**) 10,5	88,6	78,8	(**) 7,6
85+	70,8	50,0	2,0	79,2	42,9	(***) 5,6	77,8	100,0	(***) 4,5
<b>Education</b>									
6 years	75,4	64,2	2,2	60,1	39,0	(**) 7,6	87,9	76,8	(***) 4,8
9 years	73,3	74,2	0,0	62,6	52,6	1,1	93,1	86,9	1,3
12 years	72,7	59,4	(***) 5,6	69,5	59,5	2,7	82,1	83,9	0,2
University	77,4	63,3	(***) 4,8	63,5	63,2	0,0	83,4	91,5	(***) 4,0
<b>Nationality</b>									
Greek	75,7	60,3	(*) 21,5	64,3	54,9	(**) 6,7	85,8	85,2	0,1
Other	60,0	92,9	(***) 4,6	55,6	-	-	85,0	100,0	2,0
<b>Hospital department</b>									
Internal									
Medicine	70,1	58,0	(***) 4,4	63,6	60,0	0,7	90,4	81,1	(***) 4,7
Cardiology	68,1	93,8	(***) 4,6	44,7	80,0	(**) 8,1	81,9	96,7	3,4
Surgery	77,2	67,6	0,6	72,4	50,0	2,9	76,5	81,9	0,7
Orthopaedics	80,6	60,5	(***) 6,3	63,3	66,5	0,1	80,6	82,6	0,0
Paediatrics	88,2	47,8	(*) 15,5	91,7	60,1	(**) 7,6	84,1	95,7	(***) 4,6
Gynaecology	77,3	78,6	0,0	72,5	70,0	0,0	85,3	83,3	0,1
COVID Department		62,7			34,0			86,8	
<b>Surgery need</b>									
Yes	78,6	68,4	3,82	69,1	63,5	0,65	80,3	83,1	0,30
No	71,5	62,3	5,10	60,4	54,8	1,74	87,4	88,6	0,13
<b>COVID-19 disease</b>									
Yes	-	62,7		-	34,0		-	86,8	
No	74,6	61,4	(*) 15,34	63,6	62,4	0,09	84,7	85,1	0,00
<b>Health status self-assessment</b>									
Excellent	66,4	61,5	0,6	54,5	24,0	( <sup>1</sup> ) 21,4	72,4	62,5	2,5
Very good	53,3	53,5	0,0	41,4	39,6	0,1	54,6	75,7	(*) 14,4
Good	54,9	28,1	(*) 30,5	37,0	23,7	(**) 8,6	62,0	64,5	0,3
Fair	65,7	32,4	(*) 30,0	43,3	31,6	(***) 3,9	64,9	67,6	0,2
Poor	20,0	33,3	1,1	20,0	50,0	(***) 4,7	36,7	77,8	(**) 7,6

(\*) p&lt;0.001 (\*\*) p&lt;0.01 (\*\*\*) p&lt;0.05

### 4.3. Regression analysis results

Table 9 displays the results of the multinomial logistic regression analyses, where dependent variable was either the “Overall hospital rating score” or the “Willingness to recommend the hospital score and independent variables were the categorical ones “period” (pre/post COVID), “gender”, “age group”, “education”, “nationality” and “language”. Both dependent variables were introduced in the model as categorical.

**Table 9.** Results of the multinomial logistic regression analysis of the demographic variables.

	Overall hospital rating score (*)				Willingness to recommend the hospital (**)			
	Sig.	Exp(B)	95% CI of Exp(B)		Sig.	Exp(B)	95% CI of Exp(B)	
<b>Gender</b>								
Period	<0.05	0.60	0.37	0.97	<0.01	0.48	0.29	0.80
Gender	0.71	0.92	0.58	1.45	0.80	0.94	0.59	1.50
Period*Male	0.42	0.83	0.53	1.30	<0.01	0.48	0.29	0.78
Period*Female	<0.05	0.60	0.37	0.97	<0.01	0.48	0.29	0.80
<b>Age group</b>								
Age group 5-45	0.09	0.62	0.35	1.07	0.23	0.70	0.39	1.25
Age group 46-65	<0.05	0.49	0.27	0.87	0.69	0.89	0.50	1.57
Age group 66+		1.00				1.00		
Period*Age group 5-45	0.72	1.08	0.58	2.01	0.87	0.95	0.49	1.81
Period*Age group 46-65	0.77	1.11	0.56	2.18	<0.01	0.30	0.14	0.65
Period*Age group 66+	<0.01	0.45	0.28	0.73	<0.001	0.39	0.23	0.60
<b>Education</b>								
Education up to 9 years	0.13	1.59	0.87	2.93	0.92	1.03	0.55	1.93
Education 12 years	0.45	0.79	0.43	1.45	0.85	0.95	0.53	1.69
Education 12+ years		1.00				1.00		
Period*Education up to 9 y	<0.05	0.48	0.27	0.86	<0.01	0.37	0.20	0.71
Period*Education 12 years	0.07	1.71	0.95	3.09	0.44	0.79	0.44	1.43
Period*Education 12+ years	0.14	0.57	0.28	1.21	<0.05	0.39	0.18	0.85
<b>Nationality</b>								
Nationality Greek	0.47	1.80	0.37	8.83	-	-	-	-
Nationality other		1.00			-	-	-	-
Period*Greek	0.12	0.76	0.54	01.08	-	-	-	-
Period* Other	0.15	4.20	0.59	30.09	-	-	-	-
<b>Language</b>								
Greek	0.81	1.22	0.23	6.40	-	-	-	-
Other		1.00			-	-	-	-
Period*Greek	0.12	0.76	0.54	1.08	-	-	-	-
Period*Other	0.43	2.19	0.32	15.04	-	-	-	-

(\*) Reference value: “Top-box score 9,10”

(\*\*) Reference value: “Definitely yes”

Regarding the “Overall hospital rating score”, the regression analysis provided statistically significant results only for “Age group 46-65 years” ( $p < 0,05$ ). In addition, an interaction between “Period” and “Age group 66+” is detected, indicating that the overall hospital rating during the post-Covid period worsened in the older patients. “Gender”, “Education”, “Nationality” and “Language” were not found to affect the overall hospital rating. However, an interaction between “Period” and “Education” is noticed in patients with up to 9 years of education.

In the case of the “Willingness to recommend the hospital”, the regression analyses showed statistically significant dependence only from “Period” ( $p < 0,01$ ). All other parameters were not found to affect the “Willingness to recommend the hospital score”. However, interaction with “period” is observed in gender, age group and education.

Table 10 summarizes the results of the logistic regression analyses of the health-related variables, in which dependent variable was either the “Overall hospital rating score” or the “Willingness to

**Table 10.** Results of the multinomial logistic regression analysis of the health-related variables.

	Overall hospital rating score (*)				Willingness to recommend the hospital (**)				
	Sig.	Exp(B)	95% CI for Exp(B)		Sig.	Exp(B)	95% CI for Exp(B)		
COVID disease									
COVID disease	<0.001	4.68	2.69	8.13	<0.001	4.51	2.51	8.11	
No COVID		1.00				1.00			
Period*COVID	0.82	1.04	0.72	1.50	<0.05	0.67	0.46	0.98	
Hosp. Department									
Internal Med. departms	0.10	1.71	0.90	3.23	<0.01	2.69	1.33	5.44	
Surgical departmtnets		1.00				1.00			
Period*Internal Med. Departms	<0.05	0.63	0.42	0.94	<0.001	0.44	0.29	0.67	
Period*Surgical Deprtms	0.87	1.06	0.53	2.12	0.71	0.86	0.39	1.90	
Need for surgery									
Need for surgery	0.14	0.58	0.28	1.19	0.08	0.52	0.24	1.09	
No need for surgery		1.00				1.00			
Period*Need for surgery	0.60	1.24	0.56	2.74	0.58	0.79	0.34	1.84	
Period*No need for surgery	<0.05	0.64	0.44	0.94	<0.001	0.46	0.31	0.69	
Health status									
Poor or fair	<0.01	2.41	1.26	4.62	<0.01	2.75	1.37	5.53	
Good	<0.001	3.66	2.04	6.58	<0.001	6.35	3.38	11.94	
Very good / excellent		1.00				1.00			
Period* Poor or fair	0.69	0.88	0.46	1.68	0.07	0.52	0.25	1.07	
Period* Good	<0.05	0.50	0.28	0.90	<0.001	0.26	0.14	0.48	
Period* Very good or excellent	0.62	1.17	0.64	2.14	0.70	1.14	0.59	2.210	

(\*) Reference value: “Top-box score 9,10”

(\*\*) Reference value: “Definitely yes”

recommend the hospital score”, while as possible moderators (i.e. independent variables of the regression model) were taken “COVID disease”, “Hospital department”, “Need for surgery”, and “Health status self-assessment”.

Regarding the “Overall hospital rating”, a significant dependence from “COVID disease” ( $p < 0,001$ ) and “Health status self-assessment” ( $p < 0,001$ ) was found. “Hospital department” and “Need for surgery” were not found to affect the hospital rating score. Interaction between health status self-assessment and period is detected only in patients with good health status.

In the case of the “Willingness to recommend the hospital”, the results show also a dependence from “COVID disease” ( $p < 0,001$ ) and “Health status self-assessment” ( $p < 0,001$ ). An interaction between “period” and “Health status self-assessment” is found in patients who assess their health status as “very good or excellent”. Besides, the results show a dependence from “Hospital Department” ( $p < 0,05$ ).

Table 11 displays the results of the regression analyses of the healthcare-related variables, in which independent variables were the categorical “Communication with nurses”, “Communication with doctors”, “Responsiveness”, “Cleanness”, “Quietness”, “Provision of medicine information” and “Provision of discharge information”.

Regarding the “Overall hospital rating”, the variables found to affect the “Overall hospital rating” at a statistical level were “Communication with nurses” ( $p < 0,001$ ), “Communication with doctors” ( $p < 0,001$ ), “Responsiveness” ( $p < 0,05$ ), “Quietness” ( $p < 0,01$ ) and “Provision of medicine information” ( $p < 0,001$ ). In all these variables no interaction with “Period” was observed. “Cleanness” and “Provision of discharge information” were not found to affect hospital rating. However, in these two variables interaction with “Period” was observed, indicating a statistically significant worsening in the scores during the post-COVID period.

In the “Willingness to recommend the hospital” score, the variables which were found to affect the score were “Communication with nurses” ( $p < 0,001$ ), “Communication with doctors” ( $p < 0,001$ ), “Quietness” ( $p < 0,01$ ) and “Provision of medicine information” ( $p < 0,01$ ). Interactions with “Period” indicate a reduction in the top-box scores during the post-COVID period. “Cleanness” and “Provision of discharge information” were not found to affect the “Willingness to recommend the hospital”. However, in both these variables, an interaction with “Period” indicates a worsening of the top-box scores during the post-COVID period.

**Table 11.** Results of the multinomial logistic regression analysis of the healthcare model”.

	Overall hospital rating score (*)				Willingness to recommend the hospital (**)			
	Sig.	Exp(B)	95% CI for Exp(B)		Sig.	Exp(B)	95% CI for Exp(B)	
			Lower	Upper			Lower	Upper
Communication with nurses	<0.001	3.39	2.08	5.52	<0.001	3.44	2.07	5.70
Period*Communication with nurses <sup>(1)</sup>	0.95	0.98	0.51	1.90	0.09	0.56	0.28	1.10
Period*Communication with nurses <sup>(2)</sup>	0.48	0.86	0.57	1.30	<0.05	0.58	0.37	0.89
Communication with doctors	<0.001	4.53	2.77	7.41	<0.001	5.25	3.15	8.74
Period*Communication with doctors(1)	0.62	0.87	0.51	1.50	<0.01	0.39	0.22	0.69
Period*Communication with doctors(2)	0.88	0.96	0.60	1.54	0.34	0.79	0.48	1.29
Responsiveness	<0.05	2.14	1.05	4.37	0.48	1.28	0.64	2.53
Period*Responsiveness(1)	0.14	0.75	0.51	1.10	<0.001	0.46	0.31	0.70
Period*Responsiveness <sup>(2)</sup>	<0.05	0.36	0.13	0.99	<0.01	0.18	0.06	0.51
Cleaness	0.42	1.24	0.73	2.10	0.05	1.70	0.99	2.91
Period*Cleaness <sup>(1)</sup>	<0.05	2.27	1.17	4.42	0.71	1.13	0.58	2.22
Period*Cleaness <sup>(2)</sup>	<0.001	0.49	0.33	0.73	<0.001	0.35	0.22	0.54
Quietness	<0.01	1.93	1.21	3.08	<0.01	1.98	1.23	3.20
Period*Quietness <sup>(1)</sup>	0.53	1.16	0.73	1.83	<0.05	0.56	0.35	0.91
Period*Quietness <sup>(2)</sup>	<0.01	0.43	0.25	0.73	<0.01	0.40	0.23	0.69
Provision of medicine information	<0.001	4.15	2.14	8.03	<0.01	2.45	1.31	4.59
Period*Medicine information <sup>(1)</sup>	0.30	0.75	0.44	1.28	<0.001	0.33	0.19	0.59
Period*Medicine information <sup>(2)</sup>	0.08	0.50	0.23	1.10	<0.001	0.25	0.11	0.54
Provision of discharge information	0.92	1.05	0.45	2.45	0.92	1.05	0.45	2.45
Period*Discharge information <sup>(1)</sup>	<0.05	5.67	1.22	26.33	0.68	1.35	0.33	5.49
Period*Discharge information <sup>(2)</sup>	0.10	0.72	0.49	1.06	<0.01	0.51	0.34	0.76

(\*) Reference value: “Top-box score 9,10”

(\*\*) Reference value: “Definitely yes”

<sup>(1)</sup> Bottom-box or middle-box values.<sup>(2)</sup> Top-box values.



## CHAPTER 5: EVALUATION AND DISCUSSION OF RESULTS

During the last three decades, there is growing tendency in the health sector to assess patients' satisfaction with the healthcare they receive. This tendency is based on the acceptance that patient satisfaction is a fundamental aspect of healthcare quality (Kelley & Hurst, 2006, Goodrich & Lazenby, 2023). Among the various methods that have been developed towards that, the HCAHPS survey consist the most broadly used in USA and other countries (Bernardo et al., 2022). The HCAHPS survey was developed as a means to monitor patient satisfaction with the purpose to guide, stimulate and monitor efforts for quality improvement in hospitals and other health services, especially those efforts aiming to improve patients' experience of hospital care (Browne et al., 2010; Karp & Schneider, 2011).

In USA, the results of the HCAHPS survey are publicly reported to help consumers choose among various healthcare providers or plans (Kolstad & Chernew, 2009, Farley et al., 2002). Besides, the HCAHPS results have been used by the Medicare and Medicaid programmes in USA as a part of various “pay-for-performance” programs, aiming to incorporate into the reimbursement system elements about patient satisfaction collected through the HCAHPS survey (CMS-Data, n.d.). Another use of HCAHPS survey in the reimbursement system is to evaluate Accountable Care Organizations participating in the Medicare Shared Savings Program (Anhang Price et al., 2015, Harmon et al., 2005). These developments underline the growing importance of HCAHPS survey in the healthcare marketing, as it directly affects the reputation of the healthcare organization in the health market, the consumer satisfaction with services that consumers receive from healthcare organizations, the loyalty of customers and the attraction of new customers, the cost of healthcare services, the reimbursement and the revenue of the organization and the capability of the organization to expand its activities.

There is much evidence that the use of the HCAHPS survey and the aforementioned incentives are closely associated with improved patients' experience with hospitals and the higher degree of patient satisfaction (Elliott et al., 2010, Aston, 2012; Bush, 2012; Merlino & Raman, 2013; Perna, 2013; Wachter, 2012, Anhang Price et al., 2014). Moreover, two systematic reviews of 2008 and 2021 (Valderas et al., 2008, Navarro et al., 2021) found that ratings of patient experience with care may influence the clinical and quality outcomes of care, although this relationship was inconsistent. Other recent studies have also have similar findings in a Paediatric Department (Henstenburg et al., 2022), in cancer patients (Kaye et al., 2017), in patients with acute myocardial infarction (Glickman et al., 2010), in gynaecologic oncology (Dottino et al., 2019), and in orthopaedic surgery (Mercier et al., 2022). All these studies suggest that the HCAHPS survey in not only a means to assess but also to improve patient experience with hospital care.

In the COVID-19 era, Satpathy et al (2022) reviewed the various patient satisfaction scales and their applicability to COVID-19 patients and came to the conclusion that assessing patient satisfaction can result in better quality of health services and health status of patients.

Using HCAHPS questionnaire as an instrument, the aim of this study was to explore the possible effects of the COVID pandemic on the patient satisfaction levels in comparison to the pre-COVID ones, and to identify the possible effects on the various aspects of hospital care. In addition, the

research questions included the investigation of possible differences in patient satisfaction among hospital departments and between COVID and non-COVID patients, as well as the identification of moderators of the possible effect.

## **5.1. Evaluating the effects of the COVID-19 pandemic on patient satisfaction**

### **5.1.1. The overall rating scores**

Regarding the first research question, the study results show a significant negative impact of the COVID pandemic on the overall patient satisfaction, which was demonstrated with a reduction in the top-box score of the overall hospital rating from 72,9% to 65,7% ( $p < 0,05$ ) and an increase of the respective bottom-box score from 2,3 to 6,1% ( $p < 0,05$ ). Also, it was demonstrated through a reduction of the top-box score of the “Willingness to recommend the hospital” from 75,3% to 65,6% ( $p < 0,01$ ) and an increase from 0,9% to 4,2% ( $p < 0,01$ ) of the respective bottom-box score.

Several studies have found that the COVID-19 pandemic has negatively impact the patient satisfaction during at least the first phase of the pandemic. National data in USA indicate that the pandemic set HCAHPS scores back almost a decade, as the average overall rating score in 2022 (71.1%) was at a level not seen since 2014 (HCAHPS 2023, NRC Health 2023). In an nation-wide HCAHPS study in USA, it was found the overall number of patients who would definitely recommend a hospital to others decreased by 4.5 percent during the pandemic, mirroring a nationwide decline in patients’ perceptions of care in various healthcare settings (Gleeson 2021). Mackenzie (2022) exploring the change of HCAHPS scores in some hospitals between 2019 and 2020-21, calculated a decrease by 1,54% in the overall hospital rating and 1,41% in the willingness to recommend the hospital. Maher et al (2021) found that most medical specialties faced a decrease in their patient's likelihood to recommend medical practices in the first few months of the pandemic, although the magnitude of this decrease was varying among medical specialties. In a study in Spain, Lopez-Picazo et al (2021) found that the overall satisfaction rating of patients was higher before the COVID pandemic, and they concluded that the COVID-19 pandemic massively deteriorated the healthcare quality as perceived by patients, both in COVID and in non-COVID ones. In another study, Leszczynski et al (2022) found an increase in problems reported by patients in an Emergency Medical Service and a correlation of patient satisfaction level with the waiting time for the Emergency Service and in the Emergency Department. Hartl et al (2021) pointed out that patient satisfaction with treatment in an liver care unit at a Vienna General Hospital decreased significantly during the COVID pandemic, and this reduction was accompanied by hospitalization of sicker patients with advanced chronic liver disease, and increased liver-related mortality. Deriba et al. (2020) found that the level of patient satisfaction was very low during the COVID-19 pandemic. Cilović-Lagarija et al (2022) concluded that the rate of satisfaction with health care services in the Bosnia-Herzegovina was lower during the COVID-19 pandemic compared to 2011 and 2017. All these findings converge to the conclusion that the COVID-19 pandemic negatively affected patient satisfaction.

According to the findings of this study, the overall rating of the hospital does not differ significantly between genders. Considering together the top-box and the bottom-box scores, the overall rating is found lower in patients over 65 years old, probably because of the greater severity

of diseases in these patients. It is possible that the statistical significance of the change in this age group is due to the greater number of patients of that age, considering that that age group represents 43% of all patients (Table 1). Although the individual scores in this age group are not always the lower, they are constantly found significantly decreased compared to the pre-COVID period.

Chen et al (2020) noticed also that patient satisfaction was associated with age but not with gender or ethnicity. Jensen et al (2005) concluded that among demographic characteristics, health status, age and race consistently had a statistically significant effect on satisfaction scores. Zupančič & Rogelj (2022) found statistically significant differences in patient satisfaction among age groups. Elliott et al (2010) investigated the gender differences in patient satisfaction, as well as the age differences (Elliott et al., 2022), concluding that patients of the age of 75+ tend to report worse care experiences than those 55–74. The biggest differences involve communication with doctors and nurses, medication, and discharge information. Maher et al (2015) found an association of demographic factors to patient satisfaction of both pain management and overall satisfaction.

McFarland et al., (2015, 2016) analysed the demographic and social factors affecting satisfaction scores in a nation-wide study in USA and they found that non-English speaking as primary language, most strongly predicted unfavourable HCAHPS scores, whereas education and white ethnicity most strongly predicted favourable HCAHPS scores. Goldstein et al. (2010) further investigated the racial / ethnic differences in HCAHPS scores in USA.

In our study, changes in satisfaction levels show different trends in patients of Greek nationality and those of other than Greek nationality. The overall rating and the willingness to recommend the hospital reduced in Greeks however increased in other than Greek patients, exceeding the score of the former. This is probably due to insurance problems that non Greek patients faced before COVID-19, a condition that changed dramatically during the pandemic, when all patients were equally and free-of-charge treated, without any insurance restrictions. As it has been highlighted, insurance is a factor significantly affecting patient satisfaction (Markowitz et al, 2022).

Differences in the overall satisfaction scores between hospital departments is frequent phenomenon, due to large differences in patient characteristics, types of treatment interventions, etc. (Gavurova et al, 2021). The results of the present study indicate indeed a variation in the overall satisfaction scores among hospital departments. However, what is notable is that in the specific COVID department which was developed in the hospital after the pandemic, the overall hospital rating score was significantly lower compared to all other departments. Similar differentiation is also observed in the score of the willingness to recommend the hospital. These two converging elements indicate that patient experience with hospital was much lower than that of all other departments. Lower levels of patient satisfaction in COVID patients were also observed in some other studies, such as Lopez-Picazo et al, 2021, and Cilović-Lagarija et al, 2022. It has been stated that low satisfaction in COVID patients may be related to the anxiety and the inadequate information of these patients about their condition and the perspectives of their treatment (Vindegaard & Benros, 2020, Handley et al, 2021.)

Another department which recorded low and declining satisfaction scores was the Internal Medicine Department. It should be noted that, according to the hospital administration, this department accepted much of the pressure of the COVID pandemic, because, disease before the

development of the specific COVID department in the hospital, it cured patients either suffering or suspected for COVID.

The patients who needed surgery gave higher overall rating scores, which in addition improved after the pandemic. However, the findings seem inconsistent, since surgery patients, despite the higher top-box scores, had at the same time also higher bottom-box scores. Patients who did not need surgery seem that they had a worse hospital experience, expressed with lower rating and worsening of the scores after the pandemic.

### **5.1.2. Pandemic impact on the various domains of patients' satisfaction**

According to our results, the impact of the pandemic on the various domains of patient satisfaction seems to be more visible in communication with nurses and doctors, responsiveness, pain management and provision of medicine information. No significant effect was recorded in cleanness, quietness and provision of discharge information.

The problems with communication with nurses and physicians has been noted in several studies. In the USA, before the pandemic, 73% of patients surveyed with HCAHPS said they were very satisfied with the communication with their healthcare providers. During the pandemic, that figure reduced to 60%, while the number of patients who were not satisfied at all almost tripled. (Relias Media 2021). Mackenzie (2022) recorded a decrease by 1,76% in communication with nurses and 1,74% in communication with physicians. Lopez-Picazo et al in Spain (2021) found lower score in nursing services and discharge information during the COVID pandemic than before it. Parizad et al (2021) suggested that the patients' satisfaction with nursing care during the pandemic was mostly at a moderate level. Zupančič & Rogelj (2022) performing a quantitative assessment of patient satisfaction in the COVID-19 epidemic in comparison to the epidemic-free period, found that the lower scores were about the possibility of filing complaints and praises, being informed about the course of healthcare, and about the presentation of health professionals at the first contact. These findings refer to communication with personnel and responsiveness of the hospital. Ahmad et al (2022) in Liverpool underlined the need for improvements in those care domains related to worries and fears of the patients due to the pandemic, and they stressed the importance to address them through improving communication and consultation. Tiperneni et al (2022) demonstrated that having constant communication with doctors augments hospital and patient satisfaction. The significance of communication on the overall patient satisfaction has also been stressed in other studies (Islam & Muhamad 2021). The Agency for Healthcare Research and Quality (AHRQ) of USA identifies communication as a priority area, highlighting the instrumental role of hospital staff in facilitating (AHRQ 2018).

There is not much available information in the literature about the pandemic effects on other domains of patient satisfaction. According to published data of HCAHPS organization in USA, the average national top-box score decreased in all domains of satisfaction (HCAHPS, 2023). Mackenzie (2022) recorded a reduction in patient satisfaction score with responsiveness by 5,5%, with provision of information about medication 4,8%, and with cleanness by 3,9%, as well as smaller reductions in the other domains of satisfaction. Ahmad et al (2022) stressed a need for improvements in providing consultation about medications and their side-effects.

El-Tallawy et al (2023) reviewing the importance of pain management after the COVID-19 pandemic, stress that the management of chronic pain has become an important health issue, because a significant proportion of patients with COVID-19 experienced long-term and persistent pain symptoms. However, after the COVID pandemic this measure recorded a reduction in USA (HCAHPS, 2023). Maher et al (2021) noticed that the already poor score in pain medicine prior the pandemic did not change statistically after the pandemic.

Regarding the provision of discharge information, Baker & Greiner (2021) underline that the primary goal of the discharge instructions is to provide self-management strategies for preventing complications and disease transmission.

All above findings converge to the conclusion that the COVID-19 pandemic has measurable negative effects in almost all domains of patient satisfaction, which are reflected on the reduction of the respective HCAHPS scores.

## **5.2. Main determinants of the overall patient satisfaction**

One of the research questions of the study, was the identification of the determinants of patient satisfaction. Regression analyses showed that the main variables determining the overall hospital rating were “Period”, “COVID-19 disease”, “Health status self-assessment”, “Communication with nurses”, “Communication with doctors”, “Responsiveness”, “Quietness” and “Provision of medicine information”.

There is some evidence in the literature about the aspects of patient experience most affecting the overall hospital rating. HCAHPS organization exploring the correlation of overall hospital rating with the various domains of patient satisfaction, pointed out that Communication with nurses is the most significant hospital factor correlated with hospital rating, with a Pearson’s r coefficient of 0,64, followed by Communication with doctors ( $r=0,53$ ), Responsiveness ( $r=0,51$ ) and Provision of medicine information (HCAHPS, 2022). Kemp et al (2015) found that the overall hospital experience was strongest correlated with the "communication with nurses", while hospital cleanliness, quietness, and discharge information showed poor correlation. Watts et al (2021) suggested that the most important individual domain contributor to the overall rating of a facility was nursing communication. Riopel et al (2022) also suggested that communication with nurses is most correlated with the overall hospital experience rating, followed by hospital administrative processes. Belasen & Belasen (2018), reviewing the impact of doctor’s-patient communication on healthcare quality, suggested that doctor’s-patient communication is correlated with better and more accurate care as well as with more satisfied patients.

The results of all these studies, although differ in some points, converge to the conclusion that communication with nurses seem to be the most critical determinant of the overall patient experience with hospital care. In our study, Communication with nurses found to be one of the most important variables affecting the hospital rating.

A notable result is the significance of the “Provision of medicine information”, which is revealed to be a crucial determinant of the overall hospital rating of patients. One possible explanation could be that the Provision of medicine information gained a special importance because of the COVID pandemic, due to the increased anxiety of patients about the protection of their lives. To investigate that hypothesis, we performed two additional regression analyses, the first including only the patients of the pre-COVID period, and the second including all the non-COVID patients of both periods, to examine the significance of medicine information without the effect of the COVID pandemic. However, in both cases, the analysis showed that the variable “Provision of medicine information” remains equally crucial for them. The results are in alignment with the fact that the top-box score of “Provision of medicine information” is the lowest of almost all other hospital parameters, while the bottom-box score is the highest, in both period, achieving 16,8% in the pre-COVID and 18,3% in the post-COVID period. These findings reveal that the patients expect constantly more or better information and instructions about the medication they receive, and this is a lasting weakness of the particular hospital service quality. Moreover, the need for better information seems to be so crucial that affects the overall rating of the hospital more than any other parameter.

It should be mentioned that not only the medicine information but also the discharge information is a domain with very low scores. In addition, at least one model of the regression analysis also indicated discharge information as a significant variable affecting the overall rating score.

Apart from the increased problem with medicine information, the rest of our regression findings are in alignment with the literature findings regarding the importance of Communication with nurses, Health status self-assessment, adding the parameter “COVID disease” in the crucial determinants of the overall patient experience.

### **5.3. Limitations of the study**

This study has several limitations, which are related to the study design, the sample collection, the type of data and the possible bias.

The study design uses a quasi-experimental approach, by comparing two samples of different patients, before and after the eruption of the COVID pandemic. The study design does not permit to compare the level of satisfaction of each individual patient before and after the pandemic. The comparison is between two groups of different patients.

The method of the study is similar to a “natural experiment”. Natural experiments have not been designed by researchers themselves, and therefore, there is not an ability to assign participants to “intervention group” and “control group”, and because of that, the comparability of the two samples is not guaranteed. Although we applied methods to increase the sample comparability, such as a to select patients from the same population receiving healthcare from the same hospital departments, and after matching by sub-groups according to their demographic characteristics, it is not known whether the patients of the post-COVID period have the same characteristics.

The study design does not allow identifying the specific mechanisms and the conditions under which the patients feel or not satisfied. The analysis of the satisfaction determinants is based on

correlations between various parameters, which are considered that affect patients' experience. However, there are no questions about "what exactly made you to feel or not satisfied".

An additional limitation is due to the study population, which limits the possibility for a generalization of the study conclusions.

Fourth, the nature of the study does not permit to control for possible bias or other possible predictive variables of the overall patient satisfaction. As in other similar studies, a possible impact of other unexplored social or healthcare-related variables on patient satisfaction cannot be excluded. In the context of the pandemic, psychological factors, possible anxiety or insecurity of patients, the fear of the unknown COVID-19 etc. may have significant effects on the personal experiences and feelings of patients during their hospital stay.

Lastly, for all above reasons, it should be highlighted that the study findings are not directly comparable to those from other studies, because of different designs or methods used, different populations and different services. The exploration of the findings of other studies is performed with the purpose to detect similarities and trends.

## CHAPTER 6: CONCLUSIONS

The study results indicate a statistically significant negative effect of the COVID-19 pandemic on the patients' satisfaction with hospital care. The worsening of patient satisfaction is reflected both with a reduction of top-box scores and an increase of the bottom-box scores of the "Overall rating of the hospital" and the "Willingness to recommend the hospital". Moreover, the results show that the decrease of patient satisfaction is visible not only in the overall scores but also in the most specific domains of patient satisfaction, namely "Communication with nurses", "Communication with doctors", "Responsiveness", "Pain management" and "Provision of medicine information". The greater worsening of the top-box scores was recorded in "Communication with doctors", "Pain management", and "Provision of medicine information".

"Quietness" and "Provision of medicine information" were the domains with the lowest scores in both periods.

The results about the satisfaction scores by sub-groups of patients provide some interesting elements. First, regarding gender differences, the trends are similar in almost all indices, without significant differences between genders. Regarding age groups, a clear worsening was observed in the age group 66-85 years old, both in the overall hospital rating and in most of the specific domains of patient satisfaction.

Regarding education, the lowest scores in the two overall scores (hospital rating and recommend the hospital) are recorded in patients with lower education. However, this finding is not accompanied with similarly low scores in other specific domains of patient satisfaction, and therefore it should be addressed at a caution.

As far as it concerns nationality, different trends are recorded between patients of Greek and other nationality. The improvement observed in patients with other than Greek nationality is probably related with the free treatment of all patients after the COVID pandemic, without insurance restrictions.

The satisfaction score varies significantly between hospital departments. The lowest scores were recorded in the specific COVID department, followed by the Internal Medicine department, the last being the main department which recorded a significant reduction of the score in several domains of patient satisfaction.

The patients suffering COVID-19 disease rated much lower the overall and most aspects of their hospital experience. The patients who needed surgery and therefore they were admitted in surgery departments, provided higher satisfaction scores than the non-surgical patients.

The patients who assess their health status as "Excellent" or "Very good" rated higher their hospital experience, however a significant reduction was observed in their scores during the post-COVID period, in most of the patient satisfaction domains.

Regarding the main determinants of the overall patient satisfaction, the study results indicate as most crucial determinants "Period" (pre or post COVID), "COVID-19 disease", "Communication with nurses", and "Provision of medicine information". When "Period" and "COVID disease" are



excluded from the analysis, then “Communication with doctors”, “Responsiveness” and “Provision of discharge information” are found to be also significant determinants of the patient satisfaction. Even though these findings converge with the similar of several other studies, they present the peculiarity that the “Provision of medicine information” and secondly the “Provision of discharge information” seem to be of much greater importance for the study patients than for patients of other studies.

Regarding to the “Willingness to recommend the hospital”, the results defined as most affecting factors “Period”, “COVID disease”, “Health status self-assessment” and “Communication with nurses”.

The study results indicate a need the hospital to take initiatives aiming to improve the level of patient satisfaction in all domains, giving priority in those aspects, (i) which recorded the greater worsening during the pandemic, such as “Communication with doctors” and “Pain management” and (ii) those more closely affected the overall hospital rating, such as “Communication with nurses” and “Provision of medicine information”.

Further research is needed to explore the parameters that they make each particular individual patient to feel or not satisfied with his or her hospital experience. Moreover, further research is needed to investigate whether the effects of the COVID pandemic on the hospital service quality and the patients’ satisfaction will not remain in the future, or if they remain long standing effects of the COVID pandemic.

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## APPENDIX I

### The study questionnaire

#### QUESTIONNAIRE OF PATIENT SATISFACTION

Please express your opinion about the services of our hospital by completing the questionnaire below. The information included in the questionnaire will help us improve our services.

- The questionnaire is completed anonymously. Our hospital has taken all the necessary measures to protect your personal data.
- You should only complete this survey if you were hospitalized in our hospital.
- Answer all the questions by choosing the appropriate box.
- Sometimes you will be asked to skip certain questions. When this happens, you will see an arrow with a note, telling you what question to answer next, like in the example:
  - Yes
  - No → If No, go to question 1.

#### PATIENT DETAILS

**Department in which you were admitted:** 1 \_\_\_\_\_  
 2 \_\_\_\_\_  
 3 \_\_\_\_\_

**Gender:** Male  Female

**Age:** \_\_\_\_\_ years old

**Are you insured?** 1  Yes  
 2  No

If YES, please specify your insurance organization: \_\_\_\_\_

**Who completes the questionnaire:**  The patient  Relative or escort

**Date:** \_\_\_\_\_

Please answer the survey questions only for your stay at our hospital. Do not include in your answers your experience of any hospitalization in other hospitals.

---

### YOUR CARE FROM NURSES

---

**1. During this hospital stay, how often did nurses treat you with courtesy and respect?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer

**2. During this hospital stay, how often did nurses listen carefully to you?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer

**3. During this hospital stay, how often did nurses explain things in a way you could understand?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer

**4. During this hospital stay, after you press the call button, how often did you get help as soon as you wanted it?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer  
 6  There was no call button

---

### YOUR CARE FROM DOCTORS

---

**5. During this hospital stay, how often did doctors treat you with courtesy and respect?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer

**6. During this hospital stay, how often did doctors listen carefully to you?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer

**7. During this hospital stay, how often did nurses explain things in a way you could understand?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer

---

### THE HOSPITAL ENVIRONMENT

---

**8. During this hospital stay, how often were your room and bathroom kept clean?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer



**9. During this hospital stay, how often was the area around your room quiet at night?**

- 1  Never
- 2  Sometimes
- 3  Usually
- 4  Always
- 5  I do not answer

### **YOUR EXPERIENCES IN THIS HOSPITAL**

---

**10. During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or in using a bedpan?**

- 1  Yes
- 2  No → If No, go to question 12

**11. How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?**

- 1  Never
- 2  Sometimes
- 3  Usually
- 4  Always
- 5  I do not answer

**12. During this hospital stay were you given any analgesic medicine?**

- 1  Yes
- 2  No → If No, go to question 15

**13. During this hospital stay, how often was the pain well controlled?**

- 1  Never
- 2  Sometimes
- 3  Usually
- 4  Always
- 5  I do not answer

**14. During this hospital stay, how often did hospital staff make everything they could to help you manage pain?**

- 1  Never
- 2  Sometimes
- 3  Usually
- 4  Always
- 5  I do not answer

**15. During this hospital stay, were you given any medicine that you had not taken before?**

- 1  Yes
- 2  No → If No, go to question 15

**16. Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?**

- 1  Never
- 2  Sometimes
- 3  Usually
- 4  Always
- 5  I do not answer

**17. Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?**

- 1  Never  
 2  Sometimes  
 3  Usually  
 4  Always  
 5  I do not answer

#### **WHEN YOU LEFT THE HOSPITAL**

---

**18. After you left the hospital, did you go directly to your home, to someone else's or to another health facility?**

- 1  Own home  
 2  Someone else's home  
 3  Another facility → If Another, go to question 2

**19. During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?**

- 1  Yes  
 2  No  
 3  I do not answer

**20. During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?**

- 1  Yes  
 2  No  
 3  I do not answer

#### **OVERALL RATING OF HOSPITAL**

---

**21. Using any number from 0 to 10, where 0 is the worst hospital possible and 10 the best hospital possible, what number would you use to rate this hospital during your stay?**

- 0 Worst hospital possible  
 1  
 2  
 3  
 4  
 5  
 6  
 7  
 8  
 9  
 10 Best hospital possible  
 11 I do not answer

**22. Would you recommend this hospital to your friends and family?**

- 1  Definitely no  
 2  Probably no  
 3  Probably yes  
 4  Definitely yes  
 5  I do not answer

**ABOUT YOU**

**23. In general, how would you rate your overall health?**

- 1  Excellent
- 2  Very good
- 3  Good
- 4  Fair
- 5  Poor
- 6  I do not answer

**24. What is the highest grade or level of school that you have completed?**

- 1  Primary school
- 2  3-year high school
- 3  6-year high school
- 4  University or Technological Institute
- 5  I do not answer

**25. What is your nationality?**

- 1  Greek
- 2  Other
- 3  I do not answer

**26. What is your native language?**

- 1  Greek
- 2  Other
- 3  I do not answer

**27. How long do you live in Greece?**

- 1  Permanent citizen
- 2  Other  
Please specify how long: \_\_\_\_\_
- 3  I do not answer

---

*Our Hospital sincerely thanks you for taking the time to complete the questionnaire, contributing to our efforts for continuous improvement of our services.*

*We wish you a speedy recovery.*

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## APPENDIX II: BOTTOM-BOX SCORES

**Table A1.** Bottom-box scores of “Overall hospital rating” and “Willingness to recommend the hospital, by demographic, social and health condition characteristics.

	Overall hospital rating			Willingness to recommend the hospital		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>						
Male	1,1	5,7	( <sup>3</sup> ) 6,0	0,0	3,1	( <sup>3</sup> ) 5,7
Female	3,7	6,5	1,3	1,9	5,4	2,8
Total	2,3	6,1	( <sup>3</sup> ) 6,1	0,9	4,2	( <sup>2</sup> ) 7,5
<b>Age group</b>						
5-25	4,1	4,3	0,0	2,1	0,0	0,9
26-45	2,2	2,3	0,0	0,0	0,0	-
46-65	3,4	1,2	1,0	0,0	6,2	( <sup>3</sup> ) 5,5
66-85	1,3	8,5	( <sup>2</sup> ) 8,1	1,4	5,8	( <sup>3</sup> ) 4,2
85+	0,0	36,4	( <sup>2</sup> ) 7,2	0,0	0,0	-
<b>Education</b>						
6 years	1,1	10,0	( <sup>3</sup> ) 6,4	1,1	0,0	0,5
9 years	0,0	13,5	( <sup>2</sup> ) 7,3	0,0	0,0	-
12 years	3,8	0,9	2,0	1,9	6,5	2,8
University	1,4	2,0	0,1	0,0	2,0	1,4
<b>Nationality</b>						
Greek	2,4	5,8	( <sup>3</sup> ) 4,3	1,0	3,4	3,8
Other	0,0	0,0	-	0,0	0,0	-
<b>Hospital department</b>						
Internal Medicine	0,9	4,2	2,7	0,0	9,4	( <sup>1</sup> ) 11,2
Cardiology	0,0	11,8	( <sup>2</sup> ) 7,8	3,1	0,0	0,5
Surgery	7,0	8,0	0,0	0,0	0,0	-
Orthopaedics	5,5	0,0	1,1	0,0	0,0	-
Paediatrics	0,0	5,4	1,7	3,4	0,0	1,2
Gynaecology	0,0	0,0	-	0,0	0,0	-
COVID Department			-			-
<b>Surgery need</b>						
Yes	-	11,1	-	-	0,0	-
No	2,3	4,7	2,6	0,9	5,2	( <sup>2</sup> ) 10,4
<b>COVID-19 disease</b>						
Yes	4,9	3,4	0,2	0,0	0,0	-
No	0,5	6,9	( <sup>1</sup> ) 12,0	1,5	5,3	( <sup>3</sup> ) 4,6
<b>Health status self-assessment</b>						
Excellent	1,5	2,1	0,1	0,0	0,0	-
Very good	0,0	0,0	-	0,0	0,0	-
Good	3,3	9,6	3,3	3,3	1,8	0,5
Fair	6,0	5,9	0,0	0,0	5,9	( <sup>3</sup> ) 4,1
Poor	0,0	22,2	3,6	0,0	44,4	( <sup>2</sup> ) 8,0

(<sup>1</sup>) p<0.001    (<sup>2</sup>) p<0.01    (<sup>3</sup>) p<0.05

**Table A2.** Bottom-box scores of “Communication with nurses” and “Communication with doctors” by demographic, social and health condition characteristics, over the two periods.

	Communication with nurses			Communication with doctors		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>						
Male	3,2	6,3	( <sup>3</sup> ) 5,8	3,1	14,5	( <sup>1</sup> ) 44,0
Female	1,9	2,8	1,0	2,7	6,5	( <sup>2</sup> ) 8,0
Total	2,6	4,7	( <sup>3</sup> ) 6,4	2,9	10,7	( <sup>1</sup> ) 48,8
<b>Age group</b>						
5-25	4,1	0,0	( <sup>3</sup> ) 5,8	2,1	0,0	2,9
26-45	2,2	3,1	0,2	2,2	8,4	( <sup>3</sup> ) 5,2
46-65	2,7	9,0	( <sup>2</sup> ) 9,3	1,9	4,6	2,8
66-85	2,2	3,5	1,3	3,2	17,2	( <sup>1</sup> ) 47,9
85+	2,0	12,1	( <sup>3</sup> ) 4,0	9,8	26,9	3,7
<b>Education</b>						
6 years	2,5	2,0	0,1	1,1	22,3	( <sup>1</sup> ) 56,8
9 years	1,3	0,0	1,5	3,3	16,2	( <sup>1</sup> ) 13,6
12 years	3,5	4,8	0,7	4,4	8,5	( <sup>3</sup> ) 4,4
University	1,9	5,7	( <sup>3</sup> ) 4,4	1,5	4,7	( <sup>3</sup> ) 3,9
<b>Nationality</b>						
Greek	2,8	5,0	( <sup>3</sup> ) 5,9	2,8	11,3	( <sup>1</sup> ) 48,3
Other	3,0	0,0	0,8	9,1	0,0	2,6
<b>Hospital department</b>						
Internal Medicine	2,8	7,6	( <sup>1</sup> ) 15,5	4,6	5,2	0,9
Cardiology	4,6	5,6	0,1	4,6	9,5	1,8
Surgery	1,2	5,1	3,6	1,2	2,6	0,7
Orthopaedics	2,4	0,0	1,5	2,5	0,0	1,5
Paediatrics	3,3	0,0	3,8	0,0	0,0	-
Gynaecology	0,0	0,0	-	0,0	0,0	-
COVID Department			-			-
<b>Surgery need</b>						
Yes	-	3,2	-	-	36,6	-
No	2,6	5,1	( <sup>2</sup> ) 7,8	2,9	3,8	1,1
<b>COVID-19 disease</b>						
Yes	1,4	2,2	0,5	1,4	1,1	0,1
No	3,4	5,4	3,0	3,9	13,2	( <sup>1</sup> ) 35,3
<b>Health status self-assessment</b>						
Excellent	1,0	1,4	0,1	0,5	20,8	( <sup>1</sup> ) 42,4
Very good	3,5	3,7	0,0	3,1	13,9	( <sup>1</sup> ) 17,0
Good	2,5	5,3	2,9	3,6	4,1	0,1
Fair	3,5	7,4	3,0	4,5	13,2	( <sup>2</sup> ) 9,6
Poor	6,7	11,1	0,4	4,4	3,7	0,0

(<sup>1</sup>) p<0.001 (2) p<0.01 (3) p<0.05

**Table A3.** Bottom-box scores of the indices “Responsiveness” and “Cleanness” and “Quietness” by demographic, social and health condition characteristics.

	Responsiveness			Cleanness			Quietness		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>									
Male	12,5	7,7	0,9	7,6	5,2	0,8	11,2	18,6	3,7
Female	5,7	3,2	0,2	3,7	4,7	0,2	12,1	7,8	1,6
Total	9,5	5,6	1,2	5,8	5,0	0,2	11,6	13,4	0,5
<b>Age group</b>									
5-25	1,3	0,0	1,2	4,1	0,0	1,8	17,0	15,2	0,1
26-45	13,6	0,0	2,5	6,7	0,0	3,0	4,5	4,7	0,0
46-65	7,8	12,8	3,4	7,1	5,9	0,1	14,8	9,6	1,0
66-85	9,2	3,8	2,1	5,4	7,2	0,4	8,2	16,1	( <sup>3</sup> ) 4,1
85+	19,6	0,0	( <sup>3</sup> ) 3,9	5,9	9,1	0,1	29,4	36,4	0,1
<b>Education</b>									
6 years	7,8	0,0	( <sup>3</sup> ) 4,2	4,3	2,1	0,5	14,4	19,1	0,5
9 years	15,6	0,0	( <sup>3</sup> ) 6,4	7,8	2,7	1,1	6,1	17,6	2,8
12 years	8,7	9,4	0,5	6,6	8,1	0,2	15,7	11,7	0,7
University	9,5	3,2	0,0	5,8	2,0	1,6	4,4	6,9	0,5
<b>Nationality</b>									
Greek	9,8	5,9	1,0	6,6	5,3	0,5	11,1	13,9	1,0
Other	7,1	0,0	0,6	0,0	0,0	-	30,0	0,0	3,2
<b>Hospital department</b>									
Internal Medicine	8,1	10,6	1,7	9,2	2,2	3,5	12,4	9,2	0,4
Cardiology	10,1	3,6	0,1	6,3	11,8	0,6	14,1	5,9	0,8
Surgery	7,5	0,0	1,5	3,6	30,8	( <sup>1</sup> ) 12,3	9,3	0,0	2,3
Orthopaedics	20,6	0,0	( <sup>3</sup> ) 4,1	1,8	0,0	0,4	18,9	10,5	0,7
Paediatrics	2,1	0,0	1,3	3,3	0,0	1,2	0,0	18,9	( <sup>3</sup> ) 5,9
Gynaecology	0,0	0,0	-	6,5	0,0	0,9	6,5	0,0	0,9
COVID Department		-			-			-	
<b>Surgery need</b>									
Yes	11,9	0,0	( <sup>3</sup> ) 5,6	3,5	13,6	( <sup>2</sup> ) 6,9	12,3	3,6	3,5
No	8,4	7,3	0,0	7,4	3,1	( <sup>3</sup> ) 4,3	11,2	16,0	2,1
<b>COVID-19 disease</b>									
Yes	-	2,2	-	-	4,2	-	-	29,0	-
No	9,5	6,6	0,5	5,8	5,2	0,1	11,6	9,2	0,9
<b>Health status self-assessment</b>									
Excellent	2,2	3,1	0,2	1,5	6,3	1,9	1,5	2,1	0,1
Very good	5,3	2,1	2,1	2,6	6,9	1,5	13,2	12,5	0,0
Good	4,9	3,1	0,9	8,7	1,8	( <sup>3</sup> ) 5,3	16,3	17,5	0,1
Fair	7,5	3,7	1,8	10,4	8,8	0,1	14,9	16,2	0,0
Poor	0,0	11,1	3,5	6,7	0,0	0,6	13,3	22,2	0,3

(<sup>1</sup>) p<0.001 (2) p<0.01 (3) p<0.05

**Table A4.** Bottom-box scores of “Pain management”, “Provision of medicine information” and “Provision of discharge information” by demographic, social and health condition characteristics.

	Pain management			Medicine information			Discharge information		
	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value	Pre-COVID	Post-COVID	$\chi^2$ value
<b>Gender</b>									
Male	7,8	11,0	1,5	19,6	19,8	0,0	16,8	11,7	2,5
Female	4,9	8,5	2,2	13,5	16,5	0,6	13,5	17,5	1,6
Total	6,4	9,8	3,5	16,8	18,3	0,3	15,3	14,5	0,1
<b>Age group</b>									
5-25	13,2	15,2	0,1	16,0	3,8	( <sup>3</sup> ) 4,3	17,6	5,1	( <sup>3</sup> ) 5,7
26-45	5,0	6,8	0,2	13,3	2,6	3,1	24,7	18,0	1,0
46-65	5,6	8,1	0,6	23,9	20,6	0,4	13,8	8,8	1,4
66-85	4,3	10,5	( <sup>3</sup> ) 5,2	14,8	21,8	3,1	11,4	21,2	( <sup>2</sup> ) 7,6
85+	16,3	0,0	2,9	8,3	57,1	( <sup>1</sup> ) 11,4	22,2	0,0	( <sup>3</sup> ) 4,5
<b>Education</b>									
6 years	6,7	14,1	2,7	16,6	23,0	1,3	12,1	23,2	( <sup>3</sup> ) 4,8
9 years	5,6	6,9	0,1	12,1	26,3	3,7	6,9	13,1	1,3
12 years	7,4	10,4	0,8	14,4	9,9	1,3	17,9	16,1	0,2
University	4,7	7,6	0,7	23,0	17,4	0,9	16,6	8,5	( <sup>3</sup> ) 4,0
<b>Nationality</b>									
Greek	6,3	10,4	( <sup>3</sup> ) 4,2	16,5	18,7	0,6	14,2	14,8	0,1
Other	0,0	0,0	-	22,2	0,0	1,1	15,0	0,0	2,0
<b>Hospital department</b>									
Internal Medicine	7,0	11,0	2,4	14,6	19,3	2,3	9,6	18,9	( <sup>2</sup> ) 8,1
Cardiology	3,1	0,0	0,5	22,3	0,0	( <sup>3</sup> ) 5,5	18,1	3,3	3,4
Surgery	7,7	11,8	0,3	23,0	37,5	1,4	23,5	18,1	0,7
Orthopaedics	10,8	10,5	0,0	20,0	11,5	1,0	19,4	17,4	0,0
Paediatrics	2,9	16,6	( <sup>3</sup> ) 3,9	4,2	5,6	0,1	15,9	4,3	( <sup>3</sup> ) 4,6
Gynaecology	2,3	10,7	2,3	7,5	15,0	0,8	14,7	16,7	0,1
COVID Department		-			-			-	
<b>Surgery need</b>									
Yes	7,9	11,0	0,8	18,1	19,2	0,0	19,7	16,9	0,3
No	5,3	9,9	( <sup>3</sup> ) 4,2	16,0	19,0	0,8	12,6	14,6	0,8
<b>COVID-19 disease</b>									
Yes	-	4,6	-	-	19,3	-	-	13,2	-
No	6,4	11,5	( <sup>3</sup> ) 6,3	16,8	15,8	0,1	15,3	14,9	0,0
<b>Health status self-assessment</b>									
Excellent	1,5	4,2	1,6	4,5	7,3	0,8	3,7	18,8	( <sup>1</sup> ) 14,0
Very good	5,3	4,2	0,2	10,5	11,1	0,0	17,8	8,3	( <sup>3</sup> ) 5,7
Good	5,4	7,5	0,7	10,3	10,1	0,0	7,6	12,3	2,4
Fair	6,7	6,6	0,0	13,4	11,0	0,4	11,9	9,6	0,4
Poor	6,7	16,7	1,2	33,3	16,7	1,6	3,3	11,1	1,2

(1) p&lt;0.001 (2) p&lt;0.01 (3) p&lt;0.05