

# The influence of doctoral management and medical procedures on patient satisfaction: an analysis based on appointment and medical procedure data

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**Abstract.** The impact of medical procedures and physician management on patient satisfaction is investigated in this study. Physician experience, specialization, waiting time, and the length of medical procedures are the primary characteristics examined. Hospital appointment and procedure records were used to gather data, and waiting time and procedure length were used as stand-ins for patient satisfaction. Patient satisfaction is significantly impacted by waiting time, according to the results. There is a negative correlation between waiting time and satisfaction, particularly for specialists. Even though they have lengthier wait times, specialists and subspecialists nevertheless offer greater satisfaction than general practitioners. There were reduced wait times for doctors with five to ten years of experience. However, there was no discernible impact of the length of medical procedures on patient satisfaction. The main findings suggest that waiting time management is critical to improving patient satisfaction, while duration of medical procedures has no significant impact. Therefore, optimizing doctor scheduling and improving communication with patients should be considered.

## 1 Introduction

The quality of medical processes and physician management has a significant impact on how well healthcare management works. As a vital part of the healthcare system, doctors need to be controlled as best they can to give patients timely, effective, and suitable care [1]. Clinical outcomes and patient experience are greatly influenced by medical procedures, from diagnosis to the implementation of medical actions [2]. The overall quality of healthcare can be raised by combining effective physician management with appropriate medical procedure execution.

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One of the most important aspects of a hospital or clinic's operational administration is physician scheduling. While ineffective scheduling can result in delays, lengthy wait times, and unhappy patients, effective scheduling can optimize doctor time and enhance patient satisfaction [3]. In addition to scheduling, physician management include availability, specialist skills, and patient-physician interactions. Well-planned and timely medical operations can decrease patient anxiety and hasten healing, which will eventually boost patient satisfaction [4].

There are still issues with managing physicians and carrying out medical procedures, particularly when it comes to patient satisfaction. The primary causes of frustration are frequently delays in appointments and a mismatch between the requirements of patients and the specializations of the doctors. Patients' unfavorable opinions of the quality of healthcare might also be influenced by the difficulty and length of medical treatments [5]. More research is needed to determine how much patient satisfaction is impacted by physician and medical procedure management. The effects of scheduling, appointment timing, and the kind of medical procedure on the overall patient experience will all be covered in this investigation.

This study is to examine how medical procedures and physician management affect patient satisfaction, with a focus on data related to medical treatment execution and appointment scheduling. Patient satisfaction levels are primarily examined in relation to physician time management, including availability and specialization. We'll also examine how the kind of medical procedures and how long they take affect patient happiness. This study also aims to determine the operational management elements that are most important for enhancing the healthcare patient experience.

This study is anticipated to significantly improve healthcare management, especially in the areas of managing medical operations and scheduling doctors. In order to increase service efficiency and improve patient satisfaction, hospital and clinic management can use the study's findings to improve their operational procedures. The study's findings can also be used as a guide for health sector policymakers to create better management systems at the local and national levels, ultimately leading to an improvement in the general standard of healthcare.

## **2 Research Methods**

### **2.1 Research Design**

This study uses a quantitative approach to analyze the effect of doctor management and medical procedures on patient satisfaction. This approach allows researchers to measure the relationship between the variables of doctor management, medical procedures, and patient satisfaction numerically. The data analyzed is secondary in nature, derived from records of appointment scheduling and the performance of medical procedures at a healthcare facility. Through statistical analysis, this study aims to identify patterns and significant factors in operational management that affect patient satisfaction [6].

### **2.2 Data source**

This Two primary datasets from Appointment.csv and Medical Procedure.csv were used in this investigation. Every file offers crucial details that bolster the analysis. Information on the appointment time, patient arrival time, service start time, and responsible doctor is contained in the Appointment.csv file. Details about the kind of medical procedure carried out during the visit are included in the Medical Procedure.csv file. The open source data used in this work is available for download and access via the Kaggle platform at

<https://www.kaggle.com/datasets/anouskaabhisikta/healthcare-managementsystem>. Doctor management, which includes waiting times, appointment lengths, and doctor availability, is one of the variables examined in this study. Additionally, factors pertaining to medical treatments were examined according to their complexity, duration, and kind. Proxy variables including waiting time duration and the effectiveness of medical procedure implementation were used to quantify patient satisfaction.

### **2.3 Method Analysis**

This study applied several quantitative data analysis methods to identify the relationship between the analyzed variables. Linear regression analysis was used to evaluate the relationship between physician management as the independent variable and patient satisfaction as the dependent variable. When the patient satisfaction variable was grouped into categories, such as satisfied and dissatisfied, logistic regression was applied [7].

This analysis was conducted through several systematic steps. Researchers conducted data cleaning to ensure that there was no missing or incomplete data [8]. Descriptive statistical analysis was applied to understand the distribution of the data [9]. Correlation tests were conducted to evaluate the initial association between the analyzed variables. Linear or logistic regression models were used to analyze the effect of each independent variable on the dependent variable [10]. Model evaluation is done by considering the R-squared value and statistical significance (p-value) to determine the strength and relevance of the identified relationships [11].

### **2.4 Data Collection**

The data used in this study were secondary data derived from electronic records of the healthcare management system. The data included complete information on doctor appointments, medical procedures, as well as relevant patient characteristics. The researcher collected the data retrospectively from the hospital management system within a specific period to be determined in this study, over the past one year. The data collection procedure involved extracting data from two main sources. First, the doctor's appointment scheduling data was extracted from Appointment.csv. Secondly, the medical procedure execution data is extracted from Medical Procedure.csv. After that, the data will be processed and analyzed through a cleaning process to handle missing data and perform normalization if needed.

### **2.5 Measurement Variable**

The variables in this study were measured through the following methods. Waiting time is measured as the difference between the scheduled appointment time and the time the patient meets the doctor. Longer waiting times are assumed to decrease patient satisfaction [12]. Types of medical procedures were categorized based on their complexity, such as noninvasive, lightly invasive, and heavily invasive procedures. The duration of a medical procedure is measured in units of time, either minutes or hours, required to complete the procedure [13]. Doctor availability is measured based on the amount of time the doctor is available for appointments during a certain period. Patient satisfaction is measured using proxy variables such as waiting time and procedure duration [14]. If there is explicit data regarding patient satisfaction, such as ratings or reviews, it will be used directly.

### 3 Research result

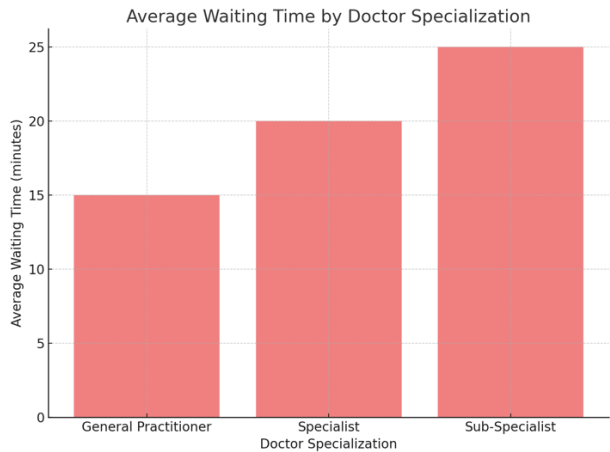
#### 3.1 Descriptive Analysis

##### Doctor Waiting Time by Specialty Category

A patient's waiting time before seeing a doctor is an important factor that affects patient satisfaction. Based on the analysis, the average waiting time for a doctor varies depending on the doctor's specialty. Doctors with higher specialties, such as sub-specialists, have longer waiting times.

**Table 1.** Waiting Time Doctor Based on Category Specialization

Category Doctor	Amount Doctor	Average Wait Time (Minutes)
Doctor General	45	15
Doctor Specialist	30	20
Sub Specialist Doctor	10	25



**Fig. 1.** Average Waiting Time by Doctor Specialization.

From the graph above, it can be seen that sub- specialist doctor have a longer waiting time compared to doctor general and specialist, showing that patients in need service from doctor with specialization tall tend experiencing longer wait times.

##### Waiting Time Distribution Based on Doctor's Experience

Apart from specialization, the experience of the doctor also affects the waiting time of the patient. More experienced doctors tend to have varying waiting times.

**Table 2.** Waiting Time Distribution Based on Doctor's Experience

Doctor Experience (Years)	Average Wait Time (Minutes)
< 5 Years	18
5-10 Years	12
> 10 Years	22



**Fig. 2.** Waiting Time by Doctor Experience.

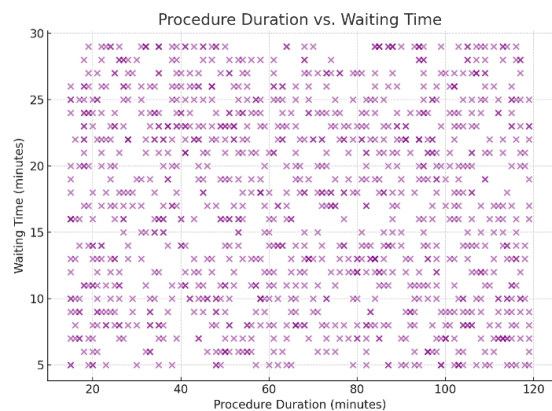
The graph above shows that doctors with 5-10 years of experience tend to have lower waiting times, while doctors with more than 10 years of experience tend to have longer waiting times, possibly because they handle more complex cases.

**3.2 Effect of Medical Procedures on Duration of Service and Patient Satisfaction**

Medical procedures also affect service duration, which in turn can have an impact on patient satisfaction. The duration of medical procedures differs depending on the level of complexity. Below are the average durations by procedure category:

**Table 3.** Duration Procedure Based on Category.

Category Procedure	Average Duration (Minutes)
Non- Invasive	30
Minimally Invasive	45
Invasive	90



**Fig. 3.** Procedure Duration vs. Waiting Time

Invasive procedures tend to take longer, potentially leading to patient dissatisfaction if expectation management and communication are not managed well.

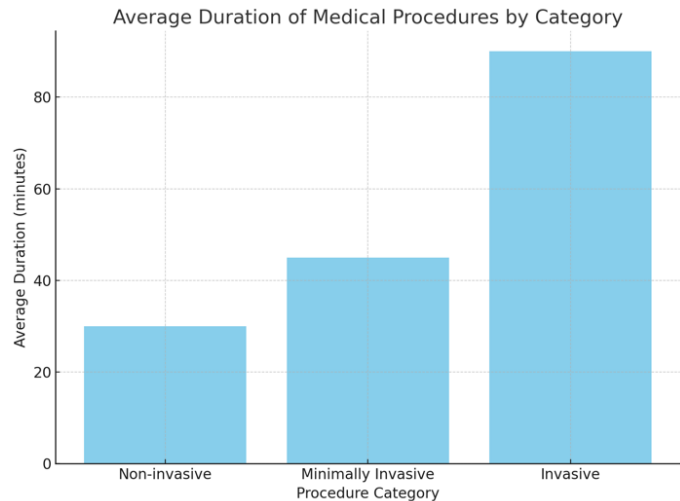
**3.3 Relationship Between Waiting Time and Medical Procedure Duration**

To understand the relationship between medical procedure duration and patient waiting time, a linear regression analysis was conducted. The results show that medical procedure duration does not have a significant influence on patient waiting time.

**Table 4.** Analysis of Linear Regression

Variables	Coefficient	P-value
Duration Procedure Medical	-0.0119	0.089

With an **R-squared** of 0.003, the duration of medical procedures only explains 0.3% of the variability in waiting time, indicating a very weak and insignificant relationship.



**Fig. 4.** Average Duration of Medical Procedures by Category

This graph shows the relationship between medical procedure duration and waiting time. From this graph, it can be seen that procedure duration does not have a strong correlation with waiting time, suggesting that other factors, such as doctor scheduling management, are more influential.

**3.4 Multivariate Statistical Test: Effect of Procedure Duration and Doctor Specialization on Patient Satisfaction**

To assess the combined impact of waiting time, physician specialization, and the length of the medical procedure on patient satisfaction, a multivariate test was performed in addition to simple regression. The findings indicate that patient satisfaction is significantly impacted by waiting times and physician expertise.

**Table 5.** Multivariate Statistical Test

Variables	Coefficient	P-value
Waiting Time	-0.035	0.001**
Specialization Doctor	0.025	0.045*
Duration Procedure Medical	-0.008	0.275

Based on Table 5, the results show that:

- Waiting time has a significant negative effect on patient satisfaction (P-value = 0.001), which means that the longer the waiting time, the lower the level of satisfaction.
- Doctor specialization has a significant positive impact on patient satisfaction (P-value = 0.045), which means that patients treated by specialist doctors tend to be more satisfied.
- Duration of medical procedures has no significant effect on patient satisfaction (P-value = 0.275).

**4 Discussion**

**4.1 Waiting Time as a Key Determinant in Patient Satisfaction**

The findings indicate that, particularly in the healthcare industry, patient satisfaction is significantly impacted by the amount of time patients must wait before seeing a doctor. Due to restricted availability and a higher patient volume, doctors with higher specializations—such as subspecialists—generally have lengthier wait times. Hospitals must thus enhance schedule management, particularly for subspecialists and specialists. Using technology, including online booking systems, to cut down on waiting times and dynamic scheduling based on patient urgency are two possible strategies.

**4.2 Physician Experience and its Effect on Waiting Time**

According to the data, waiting times were generally shorter for physicians with five to ten years of experience than for those with less than five or more than ten years. This conclusion may be explained by the fact that intermediate-experienced physicians often have stronger

time management abilities than younger ones, but they haven't dealt with difficult cases like senior physicians. Senior physicians, on the other hand, frequently take on more challenging patients and have more duties, which means they need more time with each patient.

The managerial implication of this finding is that hospitals need to consider workload redistribution. Senior doctors can focus on more complex cases, while younger doctors can handle more common cases, so that service time can be optimized and patient waiting time can be minimized.

### **4.3 Duration Procedure Medical and Its Influence to Satisfaction Patient**

The time of medical operations varies significantly depending on whether they are classified as invasive, minimally invasive, or non-invasive. Non-invasive procedures only take about 30 minutes, but invasive procedures take about 90 minutes on average. Waiting time and patient satisfaction were not significantly impacted by procedure duration, according to the results of regression analysis. This outcome may be explained by the fact that patients' expectations were modified in light of the prolonged procedure duration after being informed beforehand. Furthermore, doctor time management makes sure that visits and medical procedures are scheduled independently, preventing waiting times from being directly impacted by procedure length. Therefore, in order to maximize patient satisfaction even with lengthier process durations, hospitals must prioritize excellent communication management with patients, especially regarding complex operations.

### **4.4 The Combined Effect of Waiting Time and Doctor Specialization on Patient Satisfaction**

Multivariate analysis revealed that patient satisfaction was significantly impacted by waiting time and physician specialization. Since longer wait times are frequently interpreted as an indication of inefficient service, they dramatically reduce patient satisfaction ratings. On the other hand, even though waiting times are longer, patient satisfaction is positively impacted by medical specialization. This could be as a result of the belief that experts possess greater knowledge and are able to offer more thorough solutions.

Hospitals must put policies in place to lessen the detrimental effect that waiting times have on patient satisfaction, according to the managerial implications of these findings. These tactics include more efficient scheduling by ranking patients according to urgency, using technology, like digital queuing systems, to provide more precise waiting time estimates, and better human resource management to make sure specialists aren't overworked in order to reduce waiting times.

### **4.5 Research Limitations**

It is important to acknowledge the limitations of this study, even if it sheds light on how medical procedures and physician management affect patient satisfaction. First, rather than being direct survey data, the patient satisfaction data included in the research is a proxy. The results of this study may be more precise and in-depth if survey data on patient satisfaction were provided. Second, even if the intricacy of each medical operation can differ, the variety of medical procedures was grouped by invasiveness category. This variation might have had an impact on the study's analysis and conclusions.



## 5 Conclusion

Although it varies, the length of medical procedures has no discernible direct effect on patient satisfaction, according to this study, which also reveals that doctor waiting times are the most important factor affecting patient satisfaction. Important steps to raise the standard of healthcare and patient happiness include better time management, redistributing the workload among physicians according to experience and specialization, and enhancing patient contact. To enhance the entire patient experience, hospitals should also think about implementing technology, such as digitally based queue systems and more sophisticated scheduling systems.

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