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The impact of the Covid-19 pandemic on patient flow and Key Performance Indicators of Hippocration General Hospital of Athens

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Introduction

In response to the Covid-19 outbreak in Greece, the NHS swiftly implemented critical measures to enhance hospital readiness, including:

- Bolstering hospitals with equipment and staff for Covid-19 management.
- Enhancing digital infrastructure for efficient data coordination.
- Reorganizing healthcare facilities for dedicated Covid-19 patient care.
- Temporarily suspending non-urgent care to prioritize pandemic response.

The Hippocration General Hospital, in particular, established a specialized Covid-19 Clinic and ICU, demonstrating adaptability by reallocating beds. These measures highlight the Greek healthcare system's resilience in addressing Covid-19 challenges. This study examines their impact on hospital preparedness and patient care.

Objectives

The main aim of this study was to assess the impact of the Covid-19 pandemic on inpatient and outpatient patient flow and at key performance indicators at Hippocration General Hospital of Athens. Specifically, the main objective was to determine whether the pandemic affected patient attendance at Outpatient Clinics, the Emergency Department and Afternoon Outpatient Clinics, not covered by national health system (private payments), and if it had any notable influence on key performance indicators in 2020 and 2021.

This was approached through two core research questions:

1. Did the emergence of the Covid-19 pandemic bring about significant changes in patient attendance patterns at Outpatient Clinics, Emergency Department, and Afternoon Outpatient Clinics of Hippocration General Hospital, Athens?
2. Were key performance indicators, such as Average Length of Stay, Occupancy rates, Admission Rates, and Turnover Interval, substantially impacted by the onset of the Covid-19 pandemic?

These questions underpinned this study, aiming to provide a comprehensive understanding of the pandemic's effects on both patient engagement and the operational dynamics of the hospital during this challenging period.

Methods

- The methodology employed for this study drew upon the hospital's claims records for the years' 2019 to 2021.
- The dataset encompassed a comprehensive range of patient hospitalization statistics, including data for hospital's Outpatient Clinics indicators, the Emergency Department and Afternoon Outpatient Clinics.
- Data was categorized by department and organized on monthly intervals for the years 2019, 2020, and 2021.
- Furthermore, data, concerning the total number of hospital beds, patient counts, admissions, and the number of Hospital Days across all clinics and units within the Hippocrates General Hospital, was gathered for the same time frame.
- To perform data analysis, Microsoft Office's spreadsheet software, Excel was leveraged. The primary analytical technique employed was the Paired Two Sample t-Test for Means, which allowed for ascertaining whether to accept or reject the null hypothesis. In each of these tests, the null hypothesis posited that there were no significant differences between the means of the two sample groups being compared.
- This rigorous methodological approach allowed to derive meaningful insights into the impact of the Covid-19 pandemic on patient attendance and key performance indicators at the Hippocration General Hospital of Athens during the pivotal years of 2020 to 2021.

Table 1. Hospital Clinics and Departments Analyzed in Data Study

Clinics/ Departments	
Internal Medicine	
• A' University Cardiology Department	• Internal Medicine Department
• B' University Internal Medicine Department	• Gastroenterology
• Cardiology	• Nephrology
	• Neurology
	• Endocrinology
Surgical Department	
• A' University Surgery	• Maxillofacial Surgery
• A' University Otolaryngology	• Plastic Surgery
• Surgery	• Ophthalmology
• Thoracic Surgery	• Anaesthesiology
	• Urology
Interdisciplinary departments	
• Short-term care	• Special wards
• Emergency Department	
Special Units	
• Intensive care Unit	• Peritoneal Dialysis
• Cardiac surgery Unit	• Artificial Kidney
• Infarction Unit	• Oncology
• Intensive Care Unit	• Haematology B' Pathology University Hospital
• Special Infections	• Mediterranean Anemia
Clinics	
• Outpatient Clinics	• Evening Clinics

Results

Outpatient Attendance

The analysis of outpatient attendance in various departments/clinics settings revealed significant findings. In the Outpatient Department, there was a statistically significant difference when comparing the years 2019 to both 2020 and 2021, supported by the results of the Paired Two Sample t-Test for Means. The Pearson correlation coefficients of 0.930 and 0.882, with corresponding p-values of 0.03 (<0.05) and 0.03 (<0.05), respectively, highlighted strong positive correlations and led to the rejection of the null hypothesis in the 2019 compared to 2020 and 2021 comparison. Similarly, in the Afternoon Outpatient Clinics, a significant change in patient attendance between 2019 and both 2020 and 2021 was observed, with Pearson correlation coefficients of 0.991 and 0.943 and p-values of 0.003 (<0.05) and 0.0043 (<0.05), respectively, leading to the rejection of the null hypothesis in both cases. At the Emergency Department, a statistically significant difference in patient attendance between the years 2019 and 2020 was identified, with a Pearson correlation coefficient of 0.978 and a p-value of 0.049 (<0.05), reinforcing the rejection of the null hypothesis. These compelling results underscore the substantial changes in patient attendance across these clinic settings during the specified time periods.

Figure 1. Outpatient attendance 2019 Vs 2020

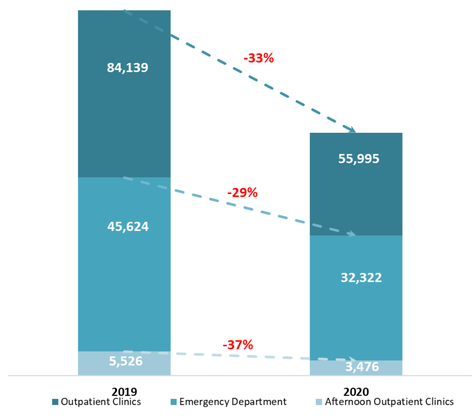
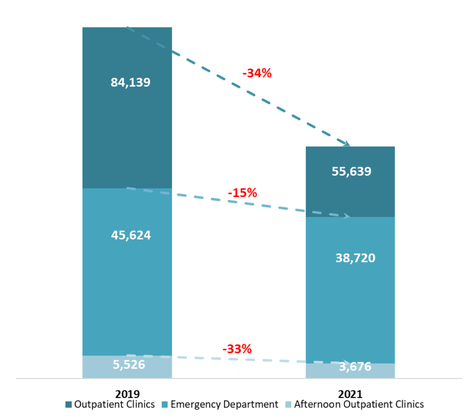


Figure 2. Outpatient attendance 2019 Vs 2021



Inpatient Attendance

The analysis encompassed all clinics and units within the Internal Medicine and the Department of Surgery in evaluating inpatient data. In the Internal Medicine, no statistically significant difference was observed, with a Pearson correlation coefficient of 0.964 and a p-value of 0.251 (>0.05) for the 2019-2020 comparison, and a positive correlation with a p-value of 0.719 (>0.05) for the 2019-2021 comparison, leading to the non-rejection of the null hypothesis in both cases. However, in the surgical area, a significant difference emerged when comparing 2019 to 2021, as indicated by a strong positive correlation with a Pearson coefficient of 0.986 and a p-value of 0.04 (<0.05), resulting in the rejection of the null hypothesis.

Figure 3. Inpatient attendance 2019 Vs 2020

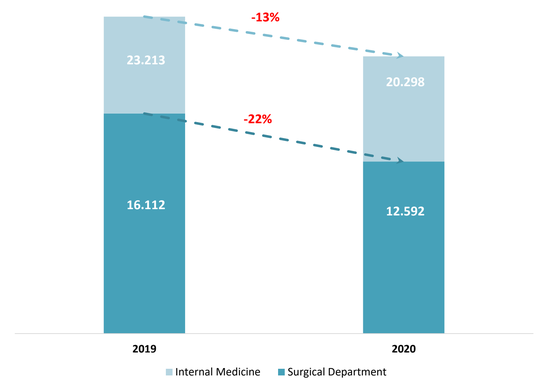
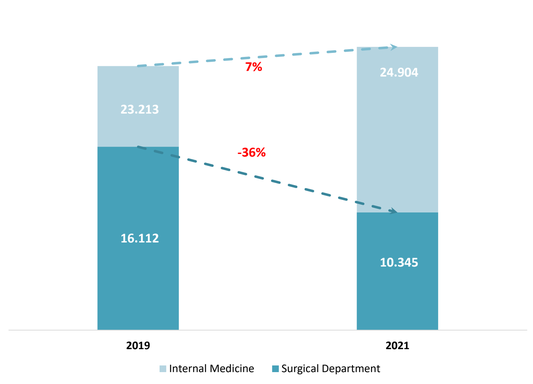


Figure 4. Inpatient attendance 2019 Vs 2021



Key Performance Indicators (KPIs)

In the Internal Medicine sector from 2019 to 2021, a 13% increase was observed in Average Length of Stay, a 7% decrease in Occupancy rates due to added beds from the Surgical sector, an 18% drop in Admission Rate, and a 1-day Turnover Interval during the pandemic. In the Surgical Sector, the Average Length of Stay remained stable with a 3% decrease, while Occupancy rates decreased by 15% and the Admission Rate dropped by 12%, mainly because the Internal Medicine Sector handled most cases. Notably, the Turnover Interval in Surgical Sector Clinics increased by 47%, reaching 2.6 days.

Table 2. Surgical Department's KPIs 2019-2021

Average Length of Stay					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	3.4	3.4	3.3	1%	-3%
Occupancy rates					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	66.1	53.0	56.3	-20%	-15%
Admission rates					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	70.4	56.1	61.8	-20%	-12%
Turnover internal					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	1.8	3.1	2.6	74%	47%

Table 3. Internal Medicine's KPIs 2019-2021

Average Length of Stay					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	3.0	3.0	3.4	0%	13%
Occupancy rates					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	83.5	72.6	77.3	-13%	-7%
Admission rates					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	102.3	88.6	83.5	-13%	-18%
Turnover internal					
Overall	2019	2020	2021	Percentage (%) Change 2019-2020	Percentage (%) Change 2019-2021
	0.6	1.1	1.0	91%	68%

Conclusions

This study sheds light on notable changes in both outpatient and inpatient attendance patterns at the Hippocration General Hospital of Athens during the Covid-19 pandemic. The outpatient departments experienced distinct shifts and the Internal Medicine and Surgery departments adapted their resource allocation strategies for Covid-19 patient care. These findings underscore the critical role of flexibility in healthcare systems and provide valuable insights to guide future planning and adaptation in times of crisis.

References

1. General Hospital of Athens Hippocration (2021) Retrieved from http://www.hippokrateio.gr/en/about-us/
2. Greek Ministry of Health (2022)) Retrieved from https://www.moh.gov.gr/