# The Impact of the COVID-19 Pandemic on Urological Outpatient Patients*

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**ABSTRACT**

**Aim:** This study aims to investigate the impact of the COVID-19 pandemic on patients' admission to the urology outpatient clinic. It aims to evaluate changes in the frequency and distribution of diagnosed diseases.

**Material and Methods:** Our study retrospectively examined patient records at the Mersin University Hospital Urology Clinic. The study period covers September 11, 2018, to September 11, 2021. Patient information, International Classification of Diseases (ICD-10) codes, age groups, and examination dates were obtained from the patient's files. Data of patients with duplicate records were not included in the study. Each code was analyzed as a separate data point for patients with multiple diagnosis codes.

**Results:** Following the detection of the pandemic in our country, a decrease of 12.52% in patient admissions to our urology clinic was observed during the 540 days. Furthermore, a significant reduction of 27.08% in newly diagnosed urology cases was identified. This decrease was observed across all disease groups except oncological diseases when overall admissions were evaluated. The general urology and andrology categories also followed a similar decrease in newly diagnosed cases. However, an increase in patient admissions was noted in the 25-34 and 35-54 age groups ($p<0.001$). When examining newly diagnosed cases across all age groups, a significant change was only detected in the 18-24 age group ($p=0.037$). Moreover, significant variations were observed among age groups in specific diagnoses.

**Conclusion:** The findings of this study indicate a decrease in urology clinic admissions across all age groups during the COVID-19 pandemic, except for the 25-34 and 35-54 age groups, which experienced an increase. Furthermore, aside from the decline in the 18-24 age group, no significant changes were observed in newly diagnosed cases. These variations suggest decreased patient visits to the urology clinic during the pandemic, depending on age groups and specific diagnoses.

**Keywords:** COVID-19; pandemic; urology outpatient clinic; health policies.

## COVID-19 Pandemisinin Üroloji Poliklinik Hastalarına Etkisi

**ÖZ**

**Amaç:** Bu çalışma, COVID-19 pandemisinin hastaların üroloji poliklinikine başvuruları üzerindeki etkisini araştırmak; tanı konulan hastalıkların sıklığı ve dağılımındaki değişiklikleri değerlendirmeyi amaçlamaktadır.

**Gereç ve Yöntemler:** Çalışmamızda, Mersin Üniversitesi Hastanesi Üroloji Polikliniğindeki hasta kayıtları retrospektif olarak incelendi. Çalışma dönemi 11 Eylül 2018 - 11 Eylül 2021 arasını kapsamaktadır. Hasta bilgileri, Hastalıkların Uluslararası Sınıflandırması (ICD-10) kodları, yaş grupları ve muayene tarihleri hastaların dosyalarından elde edildi. Tekrarlayan kayıtlara sahip olan hastaların verileri çalışmaya dahil edilmedi. Birden fazla tanı kodu olan hastalar için her kod ayrı bir veri noktası olarak analiz edildi.

**Bulgular:** Pandeminin ülkemizde tespitinden sonraki 540 günlük süreçte üroloji polikliniğimize başvurularda %12,52 oranında bir azalma olduğu gözlenmiştir. Ayrıca, yeni tanı konulan üroloji hasta sayısında %27,08 oranında büyük bir düşüş tespit edilmiştir. Bu düşüş, genel başvuru bazında değerlendirildiğinde onkolojik hastalıklar dışındaki tüm hastalık gruplarında görülmüştür. Aynı zamanda genel üroloji ile androloji kategorilerinde yeni tanı konulan vakalarda da aynı düşüş görülmüştür. Ancak, 25-34 ve 35-54 yaş gruplarında hastaların başvurularında bir artış gözlenmiştir (p<0,001).

Tüm yaş grupları için yeni tanı konulanlar incelendiğinde yalnızca 18-24 yaş grubundaki yeni tanı konulan vakalarda bir değişiklik saptanmıştır (p=0,037). Ayrıca belirli tanılarda yaş grupları arasında önemli değişiklikler yaşanmıştır.

**Sonuç:** Bu çalışmanın bulguları, COVID-19 pandemisi sırasında tüm yaş gruplarında üroloji poliklinik başvurularında bir azalma olduğu gözlenirken 25-34 ve 35-54 yaş grupları bu duruma istisna olup bu her iki alt grupta da artış olduğu görülmüştür. Ayrıca 18-24 yaş alt grubundaki azalış dışında yeni tanı konulan hastalarda önemli bir değişiklik gözlenmemiştir. Bu değişiklikler, yaş gruplarına ve belirli tanılara bağlı olarak üroloji polikliniğine olan hasta ziyaretlerinde azalma olduğunu göstermektedir.

**Anahtar Kelimeler:** COVID-19; pandemi; üroloji polikliniği; sağlık politikaları.

## INTRODUCTION

The COVID-19 pandemic, caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), emerged as a global health crisis in late 2019 in Wuhan, China (1). In response to the virus's rapid spread, nations worldwide implemented various strategies and measures to curb its transmission. The Turkish healthcare system, like many others, underwent significant modifications to accommodate the demands and challenges posed by this unprecedented situation. Temporary changes were introduced to address the urgent need to combat Coronavirus Disease 2019 (COVID-19).

One of the notable adaptations within the Turkish healthcare system was the designation of numerous public and private hospitals as pandemic hospitals. As part of this effort, scheduled surgeries were postponed in alignment with guidelines, with exceptions made only for critical and non-deferrable procedures such as emergencies and oncology cases. This shift in healthcare priorities inevitably influenced the flow of patients, leading to alterations in the number of hospital admissions and new diagnoses. It is crucial to note that these measures were not unique to Turkey; countries worldwide implemented similar triage systems to manage healthcare resources efficiently during the pandemic (2,3).

The impact of such triage measures, coupled with the severity of COVID-19 on vital organs, sparked a wave of studies in the medical literature that began to explore the repercussions on global disease incidence and prevalence (4,5). However, amidst this evolving healthcare landscape, a critical aspect that deserves thorough investigation is the behavioral changes exhibited by individuals in response to the pandemic.

This study aims to delve into the profound effects of the COVID-19 pandemic on the population's health behaviors. In addition to the general decline in hospital admissions, we focus on understanding the specific shifts within different disease groups and age ranges. While it is anticipated that the impact of the pandemic on healthcare-seeking behaviors will be widespread, it is hypothesized that specific demographics, particularly young adults, may be less affected in terms of accessing healthcare services and their overall health behaviors.

The dynamic nature of the pandemic's influence on healthcare behaviors is evident in the existing literature.

Previous research has shown that patients' behavior patterns shifted during the pandemic, with reduced preferences for hospitals with high COVID-19 case rates and an increased reliance on internet-based healthcare information (6–8). Moreover, the recommendations and guidelines issued by healthcare authorities and organizations played a crucial role in shaping healthcare utilization patterns (2,3).

As part of our investigation, we also observe intriguing trends related to specific urological conditions. For instance, a decrease in the mean age of patients seeking care during the pandemic raises questions about the differential impact on age groups, particularly in light of curfew measures implemented for elderly individuals and those with chronic diseases (9,10).

In addition, we explore the intriguing interplay between COVID-19 and conditions like Benign Prostatic Hyperplasia (BPH) and lower urinary system symptoms. The observed variations in disease incidence within different age groups could shed light on the intricate relationship between age, comorbidities, and susceptibility to the virus (11-16).

Furthermore, the pandemic has introduced new challenges in managing andrological conditions, often exacerbated by quarantine measures and psychological factors. Understanding the shifts in patient behavior regarding these conditions can provide valuable insights into the multifaceted effects of the pandemic.

We comprehensively analyze healthcare behavior changes during the COVID-19 pandemic, focusing on urological conditions and age-related dynamics. Our findings contribute to a deeper understanding of the pandemic's impact and offer crucial insights for healthcare policymakers and practitioners navigating future crises.

## MATERIAL AND METHODS

Our study is descriptive. The data were retrospectively obtained from the hospital database records of adult patients who presented to the Urology Department polyclinic at Mersin University Hospital between September 11, 2018, and September 11, 2021. This period covers 540 days before and 540 days after the onset of the pandemic in Turkey on March 11, 2020. The examination records of the patients were reviewed. Each record created on behalf of a patient and concluded with the examination was considered an individual case. Only individuals aged 18 or older were included in our study at the time of application. Patients with diagnoses unrelated to urological conditions were excluded. The International Classification of Diseases, Tenth Revision (ICD-10) codes, age groups, and application dates for each patient's diagnoses were recorded as data. The diseases were categorized into four groups: General Urology, Andrology, Stone Diseases, and Oncology. Patients were divided into age groups: 18-24, 25-34, 35-54, 55-69, and over 70. If patients received multiple diagnoses during their examination, each diagnosis was treated as a separate data point and recorded accordingly. The medical history and ICD codes of each patient registered in our hospital system were reviewed. If no previous diagnosis data were found for a patient, the current diagnosis was considered a new diagnosis.

Our study used the principles of the Helsinki Declaration. It obtained approval from the Mersin University Clinical Research Ethics Committee (2022/381). Informed consent was obtained from all individuals participating in the study. Participants were provided with detailed information about the study's purpose, process, potential risks, and benefits, and their written consent regarding their willingness to participate was obtained.

**Statistical Analysis**

The statistical analysis of the data was conducted using the IBM SPSS Statistic 21 for Windows software. The study was based on the distribution, rates, and frequencies of the data categorized by age and disease groups.

Descriptive statistics were employed to summarize the data by age and disease groups. The total number of patients, mean, standard deviation, minimum, maximum, and percentage distributions were calculated for each age and disease group. Descriptive data statistics were presented as n (%) and, if the variable followed a normal distribution, mean ± standard deviation; otherwise, as the median.

During the analysis phase, a normality test was conducted to determine the appropriate tests for the data set. If the data followed a normal distribution, parametric tests were applied; non-parametric tests were used if the data did not follow a normal distribution. The Kolmogorov-Smirnov test was utilized for the normality test.

Statistical tests were used to evaluate differences between groups. One-way analysis of variance (ANOVA) test was utilized to determine age differences between groups. The chi-square test or Fisher's exact test was employed to assess differences in disease distributions among groups.

During the analysis phase, a normality test was conducted to determine the suitability of the data set for various tests. If the data followed a normal distribution, parametric tests were employed; non-parametric tests were utilized if the data did not follow a normal distribution.

A paired t-test or Wilcoxon signed-rank test was also performed to evaluate changes between periods (pre-pandemic and post-pandemic).

A significance level of $p < 0.05$ was considered statistically significant in all statistical analyses.

**RESULTS**

Our study examined 54,764 admission records of 13,352 adult patients who visited the Urology Department Polyclinic at Mersin University Hospital—the study period covered 540 days before (B.P.) and after (A.P.) the start of the pandemic in Turkey, which was March 11, 2020. With the onset of the pandemic, there was a decrease in patient admissions. We observed changes in the follow-up practices of outpatient clinic patients and the admission patterns of patients with urological complaints. According to the data we obtained, there was a 12.52% decrease in patient visits compared to the previous 540-day period. Figure 1 provides information on the number and distribution of diagnoses based on disease groups.
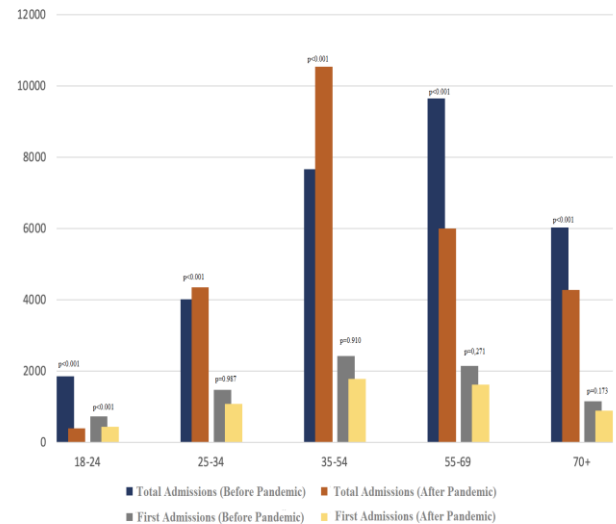


**Figure 1.** Comparison of all applications and newly diagnosed applications by age groups

The mean age of our patients during their initial admissions before the pandemic was 52.24 ± 19.21. For the one and half year period after the pandemic, the mean age of the patients was calculated as 50.72 ± 19.62. Figure 1 displays the number of diagnoses made within these three years, categorized by age group. The General Urology group had the highest number of admission diagnoses before and after the pandemic. The diagnoses in this group numbered 14,774 before the pandemic and 12,392 after the pandemic ($p < 0.001$). The number of newly diagnosed patients in this group decreased by 22.27% (B.P: n= 4,987, A.P. n= 3,876, $p < 0.001$) (Figure 1). Significant changes were observed in certain diseases within the General Urology group and summarized in Table I. All patients with specific diagnoses and newly diagnosed who have urinary system infection (sequentially, $p < 0.001$, $p < 0.001$), stress (sequentially, $p < 0.001$, $p < 0.001$), and urgency (sequentially, $p < 0.001$, $p < 0.001$) incontinences were changed statistically significantly. Nevertheless, before the pandemic, known BPH ($p < 0.001$) and urethral stenosis ($p = 0.001$) patients' diagnoses were altered significantly.

Before the pandemic, there were 4,094 applications resulting in the diagnosis of andrological diseases, with 1,320 newly diagnosed cases ($p < 0.001$). After the pandemic, the number of applications decreased to 3,857, and the number of new diagnoses decreased to 800 ($p < 0.001$) (Figure 1). Only Impotence and Male Infertility showed a significant change among the diseases within the andrological diseases group. The number of patients diagnosed with male infertility decreased from 2,633 to 2,538 after the pandemic ($p < 0.001$).

Before the pandemic, 5,086 applications were diagnosed with urinary system stone diseases, with 1,154 newly diagnosed patients. After the pandemic, the number of applications decreased to 4,814 ($p < 0.001$), with 812 newly diagnosed cases ($p = 0.200$) (Figure 1). Patients with renal colic increased from 566 before the pandemic to 633 ($p < 0.001$).

**Table 1.** Changes in diseases within the general urology group before and after a pandemic

| | Before Pandemic (n) | Tamhane Post Hoc Analysis P-value | After Pandemic (n) | Tamhane Post Hoc Analysis P-value | ANOVA p-value |
|---|---|---|---|---|---|
| **Certain Diagnosis** | | | | | |
| BPH | 4802 | $<0.001^2$ $<0.001^3$ $<0.001^4$ $<0.001^5$ | 3526 | $<0.001^2$ $<0.001^3$ $<0.001^4$ $<0.001^5$ | $<0.001^a$ |
| Urethral Stenosis | 307 | $<0.001^1$ $0.094^3$ $0.993^4$ $0.244^5$ | 204 | $<0.001^1$ $0.084^3$ $0.098^4$ $0.099^5$ | $0.001^a$ |
| Urinary Incontinence (Urgency Type) | 1519 | $<0.001^1$ $0.094^2$ $0.995^4$ $0.942^5$ | 995 | $<0.001^1$ $0.084^2$ $1.000^4$ $0.039^5$ | $<0.001^a$ |
| Urinary Incontinence (Stress Type) | 134 | $<0.001^1$ $0.993^2$ $0.995^3$ $1.000^5$ | 65 | $<0.001^1$ $0.098^2$ $1.000^3$ $0.099^5$ | $<0.001^a$ |
| Urinary System Infection | 7055 | $<0.001^1$ $0.244^2$ $0.942^3$ $1.000^4$ | 6856 | $<0.001^1$ $0.099^2$ $0.039^3$ $0.099^4$ | $<0.001^a$ |
| **Newly Diagnosed Cases** | | | | | |
| Urinary Incontinence (Stress Type) | 47 | $<0.001^3$ $0.072^5$ | 11 | $<0.001^3$ $0.084^5$ | $<0.001^a$ |
| Urinary Incontinence (Urgency Type) | 461 | $<0.001^4$ $0.125^5$ | 241 | $<0.001^4$ $0.042^5$ | $<0.001^a$ |
| Urinary System Infection | 2015 | $<0.001^3$ $0.992^4$ | 1604 | $<0.001^3$ $<0.955^4$ | $<0.001^a$ |

a. One-Way ANOVA

The mean difference is significant at the 0.05 level. The data with substantial findings in the One-way ANOVA test were further analyzed through Tamhane's Post Hoc analysis to compare the mean ages of diseases. The statistical numerical values indicated in the Post Hoc columns in this table represent the results of the Post Hoc analysis among the diseases explained below as [1,2,3,4,5] corresponding to the numerical description in the column of the numerical data and the disease to which the table row belongs.
1. BPH
2. Urethral Stenosis
3. Urinary Incontinence (Urgency Type)
4. Urinary Incontinence (Stress Type)
5. Urinary System Infection

Before the pandemic, there were 5,258 patients with urooncological diagnoses, which decreased to 4,489 after the pandemic (p=0.067). Of these, 475 were newly diagnosed cases before the pandemic, which fell to 299 after the pandemic (p=0.040) (Figure 1). A significant decrease was observed in patient admissions diagnosed with prostate cancer during the pandemic (B.P. n=1,809, A.P. n=1,100, p<0.001). However, there was a significant increase in patients monitored for elevated Prostate Specific Antigen (PSA) levels (B.P. n=581, A.P. n=700, p<0.001), those diagnosed with adrenal gland cancer (B.P. n=32, A.P. n=46, p=0.031), and kidney cancer (B.P. n=702, A.P. n=758, p<0.001). The only significant change observed within the newly diagnosed urooncological diseases group was related to patients monitored for elevated PSA levels. When comparing patients with PSA elevation for the first time before and after the pandemic within 1.5 years, the number of cases increased from 52 before the pandemic to 157 after the pandemic (p<0.001). In our study, we also classified patients into age groups. As shown in Figure 1, an increase in the number of patient admissions was observed only in the 25-35 and 35-54 age groups, unlike the general population. When analyzing newly diagnosed cases in our outpatient clinic, urgency-type incontinence (B.P. n=121, A.P. n=12, p<0.001) decreased in the 18-24 age group. In the 35-54 age group,

a decrease was observed only in patients diagnosed with male infertility (B.P. n=1,017, A.P. n=956, p<0.001). However, there was an increase in cases of PSA elevation (B.P. n=47, A.P. n=142, p<0.001), kidney cancer (B.P. n=229, A.P. n=399, p=0.002), bladder cancer (B.P. n=192, A.P. n=339, p=0.004), urinary system infection (B.P. n=2,108, A.P. n=3,052, p=0.019), and benign prostatic hyperplasia (B.P. n=621, A.P. n=948, p=0.027).
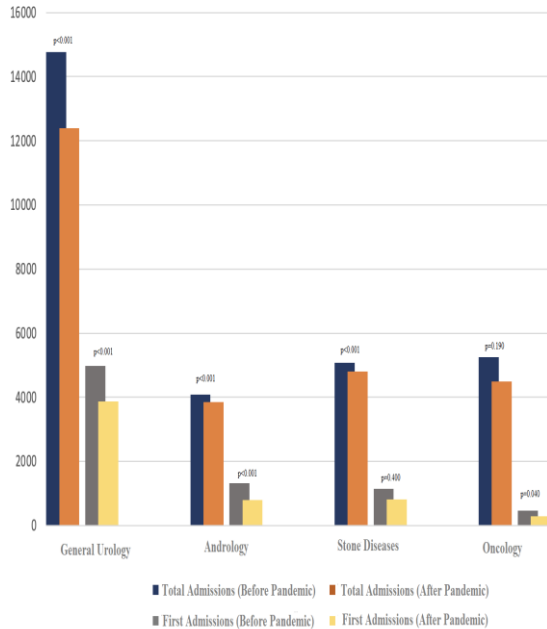


**Figure 2.** Comparison of all applications and newly diagnosed applications according to disease groups

## DISCUSSION

This study evaluates the changes induced by the COVID-19 pandemic (1), which is caused by Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), affects people's lifestyle and health issues at various levels, from local to global, based on current literature. During the pandemic, previous studies have shown that there has been a shift in patient's behavioral patterns, such as a reduced preference for hospitals with highly favorable COVID-19 case rates and an increased reliance on the Internet for problem-solving (6–8). In response to the extraordinary circumstances created by the increasing number of COVID-19 cases, various associations, organizations, and the Ministry of Health have provided recommendations for managing urological diseases (2,3). These recommendations emphasize limiting urology practices to vital and emergency cases while postponing non-essential operations or treatments unless they involve active pain, bleeding, or cancer progression. Following these suggestions, appointments were made in our clinic.

Due to the higher vulnerability of elderly individuals and those with chronic diseases to the pandemic, curfews were implemented for these specific groups in our country (9,10). Our study observed a decrease in the mean age of patients admitted during the pandemic. Additionally, there was a significant increase in the number of visits to urology outpatient clinics by individuals aged 25-34 and

35-54 compared to the pre-pandemic period. Conversely, the number of visits by individuals over 65 who were subject to the curfew decreased significantly.

BPH is a common cause of lower urinary tract symptoms in older men, and its occurrence is strongly associated with age and androgen receptors. Some studies have suggested a link between androgens and the more severe course of COVID-19 in men (11–13). However, a survey by Nabeeh et al. showed contradictory findings, where an increase in urinary retention and International Prostate Symptom Scores (IPSS) was observed after COVID-19. Still, a decrease in the number of patients diagnosed with conditions such as urethral stenosis and BPH was noted (14). In our study, the reduction in BPH diagnoses during the pandemic can be attributed to the frequent comorbidities in older age groups and the extension of medication prescriptions by the Ministry of Health (15). Additionally, we found a decrease in patients diagnosed with urethral stricture in the 18-24 age group. This can be explained by the higher affinity of the coronavirus for ACE (Angiotensin Converting Enzyme) 2 receptors, which are found at varying levels in different organs and age groups. The higher compliance among young individuals may contribute to the lower incidence of lower urinary system symptoms in this age group (16).

Kaya et al. conducted a study on patients hospitalized for COVID-19. They found significant changes in the Urinary Symptom Profile (USP) score, indicating increased stress incontinence before and after the disease (17). While the risk factors associated with other types of urinary incontinence, such as restricted mobility, pharmacological treatments, and psychological factors, may have led to an expectation of increased incontinence cases during COVID-19, our study showed a significant decrease in patients diagnosed with incontinence. This discrepancy may be because similar studies focused on inpatients, and the patients included in our study did not associate incontinence with COVID-19. Several studies have investigated the effects of the virus on urinary system infections, but apart from findings indicating local irritation, no significant urinary system infection has been detected (18–24). In our outpatient clinic, we observed decreased urinary system infections among patients of all age groups. This can be attributed to the increase in personal hygiene measures, decreased ascending urinary tract infections, and restrictions on urological surgeries during the pandemic, in line with the recommendations of the Ministry of Health and the World Health Organization. Testosterone plays a crucial role in healthy erectile function. Çayan et al. observed changes in testosterone levels associated with COVID-19 (25). Quarantine measures, social distancing, restricted access to andrologists, and psychological factors have made the management of existing andrological pathologies more complex during the pandemic. Psychological well-being has a significant correlation with sexual activity (26,27). However, contrary to expectations, we observed a decrease in patients with andrological diseases seeking outpatient care and a reduction in newly diagnosed cases. It can be inferred that patients sought outpatient care based on the vital risks associated with their diseases during the pandemic or that the recommendations of the Ministry of Health postponed their visits.

Our hospital is located in an area with a high incidence of stone diseases; only patients with active pain were operated on based on our clinic's recommendations. No literature study related to the formation of urinary system stones and COVID-19 was available during our research. Regular follow-up is essential for urooncological diseases, as oncological patients are at a higher risk of contracting COVID-19 (28,29). In our study, we did not observe a significant change in new diagnoses of prostate cancer, which constitutes a substantial portion of oncological cases. However, there was a significant decrease in patients with previously known diagnoses. This suggests that patients undergoing prostate cancer follow-up may have discontinued their visits, although they continued to use prescribed medications until their next appointment. Despite the significant increase in patients diagnosed with elevated Prostate-Specific Antigen (PSA) levels in our study, it is essential to note that not all PSA elevations indicate prostate cancer. The localized irritation caused by COVID-19 in the urinary system may have contributed to this elevation. We also observed a significant increase in adrenal gland cancer and kidney cancer cases, among other urooncological diseases. However, there was no substantial change in newly diagnosed patients. The increase in the number of patients newly diagnosed with kidney cancer is consistent with the findings of pre-pandemic data from European and American regions and a pandemic-affected region in China (30).

When examining specific age groups, we observed an increase in outpatient visits among patients aged 35-54 after the pandemic, contrary to general population behaviors. Furthermore, most diagnoses that showed a significant decrease in the general population exhibited a substantial increase within this age group. The notable aspect of these diagnoses is that they require routine follow-up. Individuals in this age group likely completed their follow-up appointments despite the pandemic. The lack of a significant increase in new diagnoses, but only in total admissions, suggests that pre-pandemic follow-up patients in this age group did not postpone their visits to the outpatient clinic and continued to seek regular check-ups.

## CONCLUSION

Our study aimed to compare the characteristics of patients admitted to the hospital during the COVID-19 pandemic with those before the pandemic. The objective was to examine the direct effects of COVID-19 on diseases and the decisions and procedures implemented during this period that may have influenced changes in disease diagnosis (2,3,25,26).

We found that hospital admissions decreased in all age groups compared to the pre-pandemic period, except for the 25-34 and 35-54 age groups. However, apart from an adverse change in the 18-24 age group, there was no statistically significant change in newly diagnosed patients. This suggests that overall hospital admissions decreased, and new diagnoses remained relatively stable across most age groups.

Among the four disease groups analyzed, including benign prostatic hyperplasia (BPH), andrological diseases, stone diseases, and urooncological diseases, there was a decrease in hospital admissions. However, this decrease was not statistically significant in the urooncological disease group, indicating that patients with pre-existing oncological conditions continued to seek medical care during the pandemic. Additionally, a decrease was observed in the total number of patients and newly diagnosed cases in these disease groups, with statistically significant reductions observed in all groups except for stone diseases.

Overall, our findings suggest that the COVID-19 pandemic and the measures taken during this period, such as restrictions on hospital admissions and changes in healthcare-seeking behavior, impacted the number of hospital admissions and diagnoses across various urological diseases. However, it is essential to note that further research and analysis are needed to fully understand the complex relationship between the pandemic, healthcare systems, and disease diagnoses.

**Authors's Contributions:** Idea/Concept: M.B., E.E.; Design: E.E.; Data Collection and/or Processing: M.B., E.A.; Analysis and/or Interpretation: E.E., E.A.; Literature Review: M.B., E.E.; Writing the Article: M.B.; Critical Review: E.E., E.A.

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