

## ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

# The impact of the COVID-19 pandemic on the treatment of emergency urological patients during lockdown – Serbian tertiary center experience

Nebojša Prijović<sup>1</sup>, Veljko Šantrić<sup>1,2</sup>, Uroš Babić<sup>1,2</sup>, Danica Stanić<sup>3</sup>, Branko Stanković<sup>1</sup>, Luka Kovačević<sup>1</sup>, Predrag Nikić<sup>1,2</sup>

<sup>1</sup>University Clinical Center of Serbia, Clinic of Urology, Belgrade, Serbia;

<sup>2</sup>University of Belgrade, Faculty of Medicine, Belgrade, Serbia;

<sup>3</sup>University Clinical Center of Serbia, Emergency Center, Clinic of Emergency Surgery, Belgrade, Serbia



## SUMMARY

**Introduction/Objective** The COVID-19 pandemic affected the functioning of health care systems, including emergency services worldwide. The aim of this study was to examine the impact of the pandemic and lockdown on the care of urgent urological patients in daily practice.

**Methods** Data were retrospectively collected from patients urgently hospitalized at Emergency Department of Clinic of Urology, University Clinical Center of Serbia, during the first three months of lockdown between March 15 and June 15, 2020, and compared to the same period in 2019. The collected data included demographic and clinical characteristics, as well as treatment characteristics and treatment outcomes.

**Results** This study included 80 patients who were hospitalized during the 2020 lockdown and 68 patients who were hospitalized in the same period in 2019. There was no difference in total number of hospitalized patients, age and sex when comparing these two periods. Among patients with urinary tract infection, the number of patients with urosepsis was significantly higher in 2020 ( $p = 0.028$ ). The median time from symptoms' onset to hospitalization was significantly longer in patients who were hospitalized in 2020 ( $p = 0.049$ ). No difference was found in duration of hospitalization and characteristics of treatment between the two periods. The number of deaths was significantly higher in 2020 ( $p = 0.034$ ).

**Conclusion** During lockdown in Serbia, patients sought emergency urology service significantly later. Furthermore, a higher number of patients with urosepsis and a higher number of deaths among hospitalized patients were found during lockdown compared to the previous year.

**Keywords:** COVID-19; pandemic; lockdown; urological emergencies; urology

## INTRODUCTION

Since the first case of pneumonia caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified in Wuhan, China, in December 2019, the disease has spread around the world in a few months. On March 11, 2020, the World Health Organization declared coronavirus disease 19 (COVID-19) a pandemic [1]. From there on, the COVID-19 pandemic has become a global challenge for health care systems in terms of providing necessary treatment to both COVID-19 and non-COVID-19 patients with adherence to epidemiological measures and strict separation of these pathways. Given the limited capacity of health systems being faced with the growing demands in management of COVID-19 patients, it was necessary to adopt guidelines and prioritize the care of other diseases and conditions [2, 3]. However, reorganization of health systems with limited access to health care, numerous lockdown restrictions and other anti-pandemic measures parallel with fear of getting COVID-19 infection, altogether affected the number of emergency department patient visits [4, 5]. The first case of COVID-19 in Serbia was reported on March 6, 2020 [6].

Soon after, a state of emergency was declared in the country and lockdown was introduced on March 15 [7, 8]. Implemented epidemiological measures included restriction to free movement affecting all persons, but especially those over 65 years old [7, 8]. Also, the functioning of the health system has changed.

During lockdown, initial examination, triage and testing for suspected COVID-19 patients were managed in primary care, while most of secondary and tertiary institutions were transformed into COVID-19 hospitals [9, 10]. Consequently, in Belgrade, among five emergency departments that were available for urgent urological conditions in pre-pandemic period, only the University Clinical Center of Serbia (UCCS), Clinic of Urology, remained open to take care of both urgent and elective urological conditions of non-COVID patients from the beginning of the pandemic until today.

Since the previously published studies related to the impact of COVID-19 on urological practice have mainly focused on the elective treatment, data on hospital care of urgent urological conditions during the COVID-19 pandemic are limited [2, 11, 12]. The findings of previous studies indicated the impact of the

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## Correspondence to:

Predrag NIKIĆ  
Resavska 51  
1100 Belgrade, Serbia  
[nicksha@gmail.com](mailto:nicksha@gmail.com)

COVID-19 pandemic on the care of patients with other emergency conditions [13, 14].

Therefore, the aim of this study was to examine the impact of the COVID-19 pandemic on routine work of Emergency Department of the Clinic of Urology, UCCS, Belgrade and treatment outcomes of hospitalized patients during the first three months of lockdown in Serbia compared to the same period in 2019.

## METHODS

This was a single-center observational retrospective study focused on evaluating the daily urologic practice during the COVID-19 pandemic at the Emergency Department of the Clinic of Urology, University Clinical Center of Serbia. The data were retrospectively collected from electronic and paper medical records of patients urgently hospitalized at the Emergency Department during the first three months of lockdown, between March 15 and June 15, 2020, as well as from patients urgently hospitalized at the department during the same period of 2019 [7, 8]. The collected data included demographic and clinical characteristics, as well as treatment characteristics and treatment outcomes. The study has been approved by the Ethics Committee of the University Clinical Center of Serbia (number 602/5).

At the time of diagnosis, all patient met criteria for urgent hospital admission. Reasons for hospitalization were urologic emergencies which required urgent care and were categorized as the following: fever, hematuria, hydronephrosis, azotemia, urological malignancy, urinary tract calculosis, urinary tract infections, scrotal phlegmon, testicular torsion, priapism, urogenital trauma and urinary retention. Noteworthy, one patient could have more than one admitting diagnosis. Among patients with urinary tract infection, those who met the criteria for urosepsis represented the subgroup of special interest [15, 16].

Time from symptoms' onset to hospitalization was defined as a number of days between the date of the first appearance of symptoms related to the disease which led to hospitalization and the date of admission to hospital. Treatment interventions performed during hospitalization were categorized as the following: surgery (open or minimally invasive / endoscopic), hemodialysis, blood transfusion, transfer to intensive care unit, mechanical ventilation. Treatment outcome was defined as cured or improvement, or death for any reason. Duration of hospitalization was defined as the time from hospital admission to discharge, or death for any reason. During 2020, patients who were hospitalized and suspected of COVID-19 infection later on were tested by PCR and/or serological tests for the presence of COVID-19 infection. Patients with confirmed COVID-19 infection would be immediately transferred to COVID-19 institution, and were not included in this study.

### Statistics

We used the methods of descriptive and analytical statistics for statistical analysis. The significance of the difference

for variables with normal distribution among groups of patients was analyzed by the Student's t-test for two independent samples, while the Mann-Whitney U-test was used for variables without normal distribution. Differences in frequency between subgroups of patients were analyzed by the  $\chi^2$  test or Fisher's exact test. The value of  $p < 0.05$  was considered statistically significant. We used IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., Armonk, NY, USA) for statistical analysis.

The study has been approved by the Ethics Committee of the University Clinical Center of Serbia (decision number 602/5; date: December 31, 2021).

## RESULTS

This observational study included 80 patients hospitalized during the lockdown from March 15 to June 15, 2020, and 68 patients hospitalized in the same period of 2019. All the patients met criteria for urgent hospital admission to the Emergency Department of the Clinic of Urology, UCCS, Belgrade.

Demographic and clinical characteristics at the time of hospital admission are shown in Table 1. Most of the patients in both groups were men. No significant difference in terms of age and sex was found between the two observed periods. Moreover, there was no difference in the total number of hospitalized patients when comparing these two periods. Among patients who were hospitalized with a diagnosis of urinary tract infection in 2020, the number of patients with urosepsis was significantly higher ( $n = 10$ ) compared to the same period in 2019 ( $n = 3$ ) ( $p = 0.028$ ) (Table 1). However, no significant differences were observed in terms of other admitting diagnoses between the two periods. The median time from symptoms' onset to hospitalization was significantly longer in patients who were hospitalized in 2020 (4.5 days) compared to the same period in 2019 (three days) ( $p = 0.049$ ) (Table 1).

Characteristics of treatment and treatment outcomes are shown in Table 2. The median duration of hospitalization was seven days in 2020, and did not differ significantly compared to 2019. Moreover, there was no significant difference in terms of the number and type of treatment interventions performed during hospitalization in two observed periods. In assessing treatment outcome, the number of deaths was significantly higher in 2020 ( $n = 10$ ) compared to 2019 ( $n = 2$ ) ( $p = 0.034$ ) (Table 2).

None of the hospitalized patients at the Department of Emergency Urology had a confirmed COVID-19 infection in the observed period in 2020.

## DISCUSSION

The COVID-19 pandemic has disrupted functioning in all spheres of society, including healthcare systems worldwide. Hence, healthcare systems have suddenly faced the demand of caring for an increasing number of COVID-19 patients, with numerous unknowns in the epidemiology,

**Table 1.** Demographic and clinical characteristics of patients

Characteristics	2019	2020	p
Number	68	80	0.324 <sup>a</sup>
Sex, n (%)			
Male	51 (75%)	50 (62.5%)	0.104 <sup>a</sup>
Female	17 (25%)	30 (37.5%)	
Age (years), mean $\pm$ SD	57.93 $\pm$ 19.056	60.88 $\pm$ 17.469	0.328 <sup>b</sup>
Time from symptoms' onset, days (range)	3 (0–30)	4.5 (0–30)	0.049 <sup>c</sup>
Admitting diagnoses, n (%)			
Fever	23 (33.8%)	26 (32.5%)	0.865 <sup>a</sup>
Hematuria	11 (16.2%)	23 (28.7%)	0.070 <sup>a</sup>
Hydronephrosis	28 (41.2%)	40 (50%)	0.283 <sup>a</sup>
Azotemia	29 (42.6%)	33 (41.8%)	0.864 <sup>a</sup>
Urological malignancy	28 (41.2%)	37 (46.2%)	0.535 <sup>a</sup>
Calculosis	16 (23.5%)	19 (23.8%)	0.975 <sup>a</sup>
Urinary tract infection	30 (44.1%)	30 (37.5%)	0.083 <sup>a</sup>
Urosepsis	3 (10%)	10 (33.3%)	0.028 <sup>a</sup>
Scrotal phlegmon	0 (0%)	1 (1.2%)	1.000 <sup>d</sup>
Testicular torsion	2 (2.9%)	1 (1.2%)	0.467 <sup>d</sup>
Priapism	3 (4.4%)	1 (1.2%)	0.237 <sup>d</sup>
Trauma	3 (4.4%)	3 (3.8%)	0.839 <sup>d</sup>
Urinary retention	1 (1.5%)	5 (6.2%)	0.219 <sup>d</sup>

SD – standard deviation;

<sup>a</sup>Pearson's  $\chi^2$  test;<sup>b</sup>Student's t-test;<sup>c</sup>Mann-Whitney U-test;<sup>d</sup>Fisher's exact test**Table 2.** Characteristics of treatment and outcomes

Characteristics	2019	2020	p
Duration of hospitalization (days), median (range)	7 (1–55)	7 (1–55)	0.622 <sup>a</sup>
Surgery, n (%)			
Open	38 (55.9%)	41 (51.2%)	0.573 <sup>b</sup>
Minimally invasive / endoscopic	16 (42.1%)	16 (39%)	
Both	21 (55.3%)	24 (58.5%)	0.909 <sup>b</sup>
	1 (2.6%)	1 (2.4%)	
Hemodialysis, n (%)	3 (4.4%)	8 (10%)	0.196 <sup>b</sup>
Blood transfusion, n (%)	20 (29.4%)	31 (39.2%)	0.212 <sup>b</sup>
Transfer to intensive care unit, n (%)	6 (8.8%)	7 (8.8%)	0.987 <sup>b</sup>
Mechanical ventilation, n (%)	0 (0%)	2 (2.5%)	0.500 <sup>c</sup>
Death, n (%)	2 (2.9%)	10 (12.5%)	0.034 <sup>b</sup>

<sup>a</sup>Mann-Whitney U test;<sup>b</sup>Pearson's  $\chi^2$  test;<sup>c</sup>Fisher's exact test

clinical presentation and treatment of the disease itself. Consequently, all of it resulted in the redirection of resources to the management of COVID-19 patients, thus limiting the proper diagnostic workup and treatment of other diseases.

In this study, we aimed to examine the impact of the COVID-19 pandemic on the routine work of the Emergency Department of the Clinic of Urology, UCCS, Belgrade and treatment outcomes of hospitalized patients during the first three months of lockdown in Serbia compared to the same period in 2019.

In this study, we have found that number of emergency hospitalizations increased by 17% in the pandemic period, but the difference was not significant compared to the prepandemic period. Movement restrictions during lockdown, limited availability of health services, and

the fear of infection with COVID-19 during visits to healthcare facilities had an impact on the frequency of patient visits to emergency services [4, 17]. By reviewing available literature, a decline in the number of patient visits to emergency urological services was reported in many countries during the beginning of the pandemic. However, conflicting results were obtained considering emergency urological hospitalizations and surgical treatments [18, 19, 20].

In our study, the emergency hospitalized patients did not differ in sex and age when comparing prepandemic and pandemic periods. Partly in line with ours are the results obtained in Portugal, where no difference in age was observed, but fewer women visited emergency urology services during the pandemic period compared to the previous year [19]. Similar findings were obtained in Turkey, with no difference in age between hospitalized patients in the Emergency General Surgery Department and in the Burn Department during the first months of the pandemic [21, 22].

When compared with prepandemic, during the pandemic period our results showed a significantly longer time from symptoms' onset to hospital admission. Similar results were reported in Brazilian study that included patients with obstructive pyelonephritis in the pandemic period [23]. Our findings may be partly explained by the restricted free movement and reduced transportation during lockdown, but also by the patients' fear of getting infected in a healthcare facility [4]. Moreover, the establishment of COVID clinics in primary healthcare centers for initial examination of febrile patients and the conversion of secondary and tertiary healthcare centers into COVID-19 hospitals potentially influenced the time from the symptoms' onset to hospital admission [21].

In this study we have found that established diagnoses for urgent admission did not significantly differ between the two periods. However, among patients with urinary tract infection we noticed a significantly higher number of patients who met the criteria for urosepsis in the pandemic period. A study conducted in Brazil showed a significantly higher percentage of patients with systemic inflammatory response syndrome among patients with obstructive pyelonephritis in the pandemic period, which is comparable with our results [23]. A recent study by Kaczmarek et al. [24] also showed increased values of inflammatory parameters in patients with stones treated at a urology emergency department during the pandemic period, which the authors potentially interpret as the later coming of these patients to the emergency department. Given the fact that prolonged time from symptoms' onset to receiving definitive treatment may lead to more complicated course of urinary tract infection, it can explain the higher number of patients with urosepsis found in our study.

Our findings show that duration of hospitalization was similar when comparing the COVID and the pre-COVID

period. Currently, the data from studies related to the emergency urological service during the COVID-19 pandemic is limited. Studies published so far are mainly focused on data from emergency urological outpatient clinics or on specific urological pathology [18, 19, 23]. In contrast to our results, Silva et al. [23] showed a significantly longer duration of hospitalization of patients treated for obstructive pyelonephritis in the pandemic period.

Moreover, inconsistent findings were reported in studies related to the emergency departments of other surgical branches even in the same country. Namely, one study group from Turkey showed no difference in the duration of hospitalization among patients who were hospitalized for the treatment of burns in the pre-pandemic and pandemic periods [22]. In contrast, another study group from the same country found longer hospital stays in emergency general surgery departments during pandemic period [21].

In our study, we found no significant difference in the requirement for surgical treatment of hospitalized patients between the two observed periods, both in terms of number and types of surgery. Consistent with our results are the findings of Cicerello et al. [18], who also did not notice a difference in the need for both open and endourological surgeries in the pre-pandemic and pandemic periods. In contrast, Madanelo et al. [19] reported an increase in the number of patients who required surgical urological treatment at the beginning of the pandemic, even though the number of visits to the emergency urological service were reduced. A study conducted in the United Kingdom indicates constant surgical treatment of urgent urological conditions during the autumn peak of the pandemic, in contrast to the reduction recorded during the first spring lockdown in 2020 [25].

When analyzing treatment outcomes, we found a significantly higher incidence of deaths among hospitalized patients during the first three months of lockdown. Noteworthy is that none of the hospitalized patients at the Department of Emergency Urology of the UCCS had a confirmed COVID-19 infection. To the best of our

knowledge, the impact of the pandemic and lockdown on mortality among emergency urology patients has not been assessed so far. However, in one study from a tertiary hospital, Italian investigators reported a negative effect of the COVID-19 pandemic and lockdown on the treatment outcomes of urgent surgical conditions [26]. Based on the findings that delayed access to the emergency department was associated with increased 30-day mortality risk from that study, we could hypothesize a potential association between our results. It is likely that longer time from symptoms' onset to hospital admission additionally with higher population with urosepsis among hospitalized patients have the greatest impact on the increased number of deaths in the pandemic period in our cohort.

### Limitations of study

The limiting factor of our study is that it is a single-center observational retrospective study with a small number of patients. Also, the reasons for a delayed patient visit were not examined. However, these limitations reflect everyday clinical practice, which is also the quality of this study.

### CONCLUSION

During lockdown in Serbia, patients applied to the emergency urology service significantly later. Furthermore, a higher number of patients with urosepsis and a higher number of deaths among hospitalized patients were found during lockdown compared to the previous year. In the future, prospective studies to evaluate a more complex factors which may influence daily urological practice in emergency departments are needed. These well designed studies will certainly help to detect the field for improvements in taking care of emergency urological conditions.

**Conflict of interest:** None declared.

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## Утицај пандемије ковида 19 на лечење ургентних уролошких болесника током карантина – искуство терцијарног центра у Србији

Небојша Пријовић<sup>1</sup>, Вељко Шантрић<sup>1,2</sup>, Урош Бабић<sup>1,2</sup>, Даница Станић<sup>3</sup>, Бранко Станковић<sup>1</sup>, Лука Ковачевић<sup>1</sup>, Предраг Никић<sup>1,2</sup>

<sup>1</sup>Универзитетски клинички центар Србије, Клиника за урологију, Београд, Србија;

<sup>2</sup>Универзитет у Београду, Медицински факултет, Београд, Србија;

<sup>3</sup>Универзитетски клинички центар Србије, Ургентни центар, Клиника за ургентну хирургију, Београд, Србија

### САЖЕТАК

**Увод/Циљ** Пандемија ковида 19 има утицај на функционисање здравствених система широм света, укључујући и ургентне службе.

Циљ овог рада био је испитивање утицаја пандемије и карантина на збрињавање ургентних уролошких болесника у свакодневной пракси.

**Метод** Подаци су прикупљени ретроспективно од болесника ургентно хоспитализованих на Одељењу ургентне урологије Клинике за урологију Универзитетског клиничког центра Србије, током прва три месеца карантина, између 15. марта и 15. јуна 2020. године, и поређени су са истим периодом током 2019. године. Прикупљени подаци су обухватили демографске и клиничке карактеристике, као и карактеристике лечења и исходе лечења.

**Резултати** Ова студија је укључила 80 болесника који су били хоспитализовани током карантина 2020. године и 68 болесника који су били хоспитализовани у истом периоду

2019. године. Нисмо уочили разлику у укупном броју хоспитализованих болесника, старости и полу поредећи ова два периода. Међу болесницима са инфекцијом уринарног тракта, број болесника са уросепсом је био значајно већи у 2020. години ( $p = 0,028$ ). Просечно време од почетка симптома до хоспитализације било је значајно дужи код болесника хоспитализованих у 2020. години ( $p = 0,049$ ). Нисмо уочили разлику у дужини хоспитализације и карактеристикама лечења између ова два периода. Број смртних исхода је био значајно већи у 2020. години ( $p = 0,034$ ).

**Закључак** Током карантина у Србији, болесници су се јављали у ургентну уролошку службу знатно касније и утврђен је већи број болесника са уросепсом и већи број умрлих међу хоспитализованим болесницима у односу на претходну годину.

**Кључне речи:** ковид 19; пандемија; карантин; ургентна урологија; урологија