OVERVIEW OF THE COVID-19 PANDEMIC AND ITS IMPACT ON THE MORBIDITY IN THE SOFIA CITY REGION DURING 2020-2021

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ABSTRACT

The COVID-19 pandemic that began in early 2020 is associated with high global morbidity and mortality and represents a considerable burden on the national health systems, the economy, and society as a whole. This article presents the main epidemiological indicators characterizing the spread of COVID-19 in the Sofia City region: incidence, mortality, and case fatality rate. The age and monthly distribution of incidence and mortality, COVID-19-related admissions to healthcare facilities, and COVID-19 cases among healthcare professionals are described. The activities of Sofia City Regional Health Inspectorate, which was at the front line in efforts to limit the spread of the pandemic coronavirus, are reviewed.

INTRODUCTION

On 30 January 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern. In a short period, the causative virus - SARS-CoV-2 spread around the globe, and on 11 March 2020, the WHO classified the COVID-19 outbreak as a pandemic [1]. Bulgaria was strongly affected by the COVID-19 pandemic. The total number of confirmed cases from March 2020 to December 2021 was 744298 with 30890 deaths registered. The epidemic situation of COVID-19 and its impact on the morbidity in Sofia City Region is a reduced picture of what was happening in the country during 2020-2021

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MATERIALS AND METHODS

The main epidemiological indicators characterizing the spread of COVID-19 in comparison to all the other communicable diseases registered in Sofia City Region in 2020-2021 are presented. The analysis is based on data obtained through the epidemiological investigations of 178,147 COVID-19 cases confirmed by a Real-Time RT-PCR or a Rapid Antigen Test for SARS-CoV-2 in the confirmatory laboratories in the City of Sofia designated by Order No. 724/22.12.2020 of the Minister of Health and registered in the Unified Information System for Combating COVID-19. These methods detect the presence of SARS-CoV-2 RNA or antigen and are recommended by the WHO to diagnose a current infection with the virus. The data for the other reportable infectious diseases were obtained according to Ordinance No. 21/18.07.2005 of the Minister of Health. Representative population data from the National Statistical Institute are used. Cumulative incidence and mortality on a monthly and annual basis were used for the analysis.

RESULTS AND DISCUSSION

The important increases in the incidence of acute infectious diseases in the Sofia City region in 2021 and 2020 as compared to the preceding years were caused by the incidence of COVID-19, almost equal to the total incidence in the region (9,710.71 per 100,000 and 4,327.25 per 100,000, respectively) (Table 1).

The official annual data on COVID-19 submitted by the Sofia City Regional Health Inspectorate (RHI) to the National Centre for Public Health and Analyses (NCPHA) for 2021 indicated a two-fold increase in the number of registered cases and in the annual incidence as compared to 2020: 124,861 vs. 53,286, and 9,542.94 per 100,000vs., 4,010.11 per 100,000, respectively.

Thus, for a second consecutive year since the beginning of the pandemic, COVID-19 took the lead in the structure of infectious morbidity in the Sofia City region with a proportion of 98.17% in 2021, far ahead of chickenpox (0.86%), gastroenteritis/ enterocolitis (0.59%), scarlet fever (0.25%) and other acute infectious diseases (0.13%) (Figure 1).

Table 1. Incidence, mortality, and case fatality rate caused by acute infectious diseases* in the Sofia City region for five years (2017-2021)

Year	Total cases	Incidence per 100,000	Total deaths	Mortality per 100,000	Case fatality rate (%)
2021	127,048	9,710.71	2,426	185.42	1.90
2020	57,500	4,327.25	863	64.95	1.50
2019	12,414	940.59	20	1.52	0.16
2018	8,698	657.19	19	1.44	0.22
2017	11,797	893.84	20	1.52	0.17

***** Not including influenza, acute respiratory diseases, AIDS and STIs

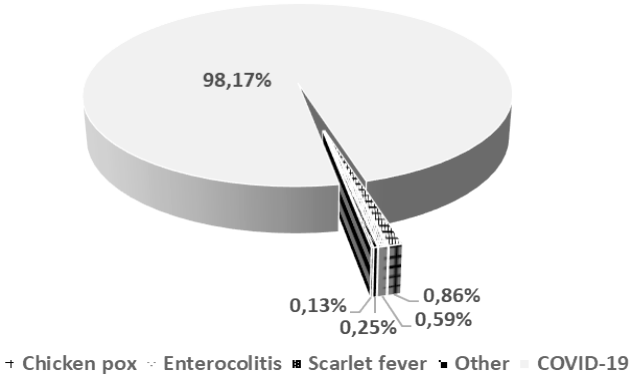


Figure 1. Structure of acute infectious diseases in the Sofia City region in 2021

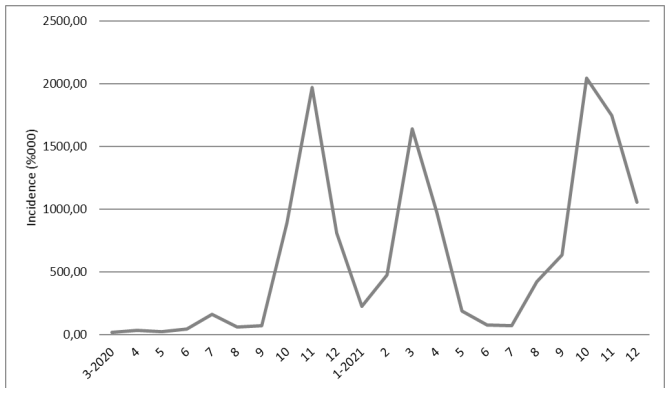


Figure 2. Incidence of COVID-19 in Sofia City region, 2020-2021

The registered deaths and cumulative mortality caused by acute infectious diseases in 2021 (2,426 cases.; 185.42 per 100.000) and 2020 (863 cases; 64.95 per 100,000) exceeded manyfold those in the previous years (Table 1). The mortality rate due to deaths from COVID-19 observed in 2021 was 120 times higher, while the rate for 2020 was more than 40 times higher than the ones in the preceding three non-epidemic years, i.e., 859 deaths in 2020 (mortality of 64.65 per 100,000) and 2,424 deaths in 2021 (mortality of 185.26 per 100,000). The total case fatality rate from acute infectious diseases was 1.50% and 1.90% in 2020 and 2021, respectively, whereas the COVID-19-related case fatality rate alone was higher than the total case fatality rate associated with acute infectious diseases during both years and accounted for 1.61% and 1.93%, respectively (Table 2).

Table 2. Total deaths, mortality, and case fatality rate from COVID-19 in the Sofia City region

Year	Total deaths	Deaths per 100,000	Case fatality rate (%)
2021	2,424	185.26	1.93
2020	859	64.65	1.61

The epidemic spread of COVID-19 in the region began on 10.03.2020. The epidemic curve resembled that of the rest of the country. After the first two epidemic waves registered in 2020 (July-August and October-November) and the overall morbidity plummeting to 225.16 per 100,000 reported in December 2020, a smooth increase was observed again in January 2021, which subsequently reached 1,642.30 per 100,000 in March (third wave). This was followed by a steep drop in May 2021 and very low levels (below 100 per 100,000) in June and July, respectively, 72.07 per 100,000 and 70.31 per 100,000, and a new epidemic rise (fourth wave) with a peak in October 2021 at 2,046.22 per 100,000 (Week 44) (Figure 2). Similar epidemic waves have been registered throughout the European region (2).

In the present study, both sexes were equally affected with a male to female ratio of 1:1.1 (83,488/94,659). For comparison, a study analyzing data from the 20 most severely affected European countries, USA and Canada, reported that male patients accounted for less than half of the confirmed cases in all countries, except for Austria. In contrast, male patients accounted for more than 50% of SARS-CoV-2-associated deaths in most of the countries (3).

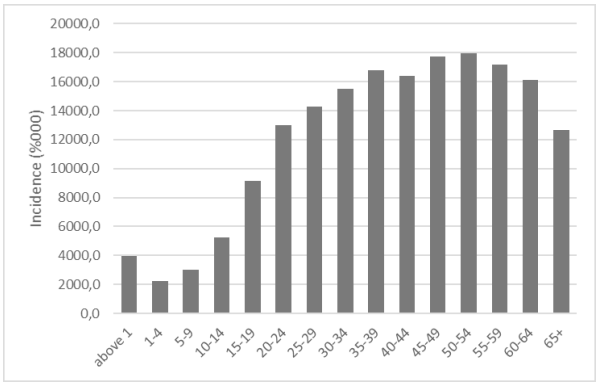


Figure 3. Incidence by age

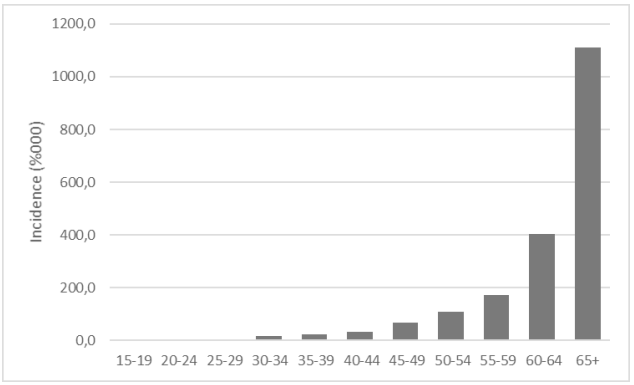


Figure 4. Mortality by age

Reported age-related morbidity varies widely (4,5). In the study population, adults were the most affected, with the highest incidence being registered in the 50-54 age-group, i.e., 17,965.9 per 100,000 (Figure 3). Despite the high incidence rate, this age-group often reported mild or asymptomatic progression of the disease.

Already at the beginning of the COVID-19 epidemic, the highest proportion of severe cases and fatal outcomes was reported in persons over 65 years of age (6-11). ICU admission and mortality have been associated with older age and underlying co-morbidities (12). In this study, a lower incidence (12,660 per 100,000) was reported among seniors (65+) as compared to adults. Regardless of the lower morbidity, the elderly (65+) experienced a much higher disease severity, i.e., disease progression was characterized by pronounced clinical symptoms, complications, and much higher mortality (1,110.2 per 100,000) (Figure 4). The case fatality rate reached 8.61%. Out of a total of 3,283 deaths, 2,611 (79.5%) were registered in the high-risk age group of seniors (65+).

During the entire study period, the proportion of cases with a mild or asymptomatic course of the disease treated at home accounted for 81.5% (145,263 cases), which is in line with data from other countries (13). There were 32,884 hospital admissions with 4,321 patients (13.1%) requiring intensive care.

Most often, outside of the specialized COVID-wards in healthcare facilities, cases were reported by emergency care departments, emergency care centers, departments of surgery, urology, intensive care, orthopedics and traumatology, pulmonology, internal medicine, ophthalmology, vascular surgery, cardiology, neurology and mental care in the Sofia City inpatient and outpatient care facilities; by independent or group primary care practices, as well as by pharmacies located in various neighbourhoods in the City of Sofia.

During the two years considered, the largest number of cases with a registered address in the City of Sofia or settlements in the Sofia City Region were treated in Pirogov University Multiprofile Hospital for Active Treatment (UMHAT) and Emergency Care, Saint Anna UMHAT, Sofia Military Academy Multiprofile Hospital for Active Treatment (MHAT), Acibadem City Clinic Tokuda MHAT, Professor Ivan Kirov Specialised Hospital for Active Treatment (SHAT) of Infectious and Parasitic Diseases, Medical Institute of the Ministry of Interior in Sofia, Saint John the Baptist University I MHAT, Tsaritsa Yoanna ISUL UMHAT, Fifth Sofia MHAT, Sofiamed UMHAT, Aleksandrovska UMHAT, National Cardiological MHAT, Saint Sofia SHAT of Lung Diseases, Second Sofia MHAT and Saint Ivan Rilski UMHAT (Figure 5).

Healthcare workers (HCWs) are at increased risk of contracting COVID-19 and transmitting the infection to their patients (14). During the early phase of the pandemic, 6% of HCWs in two hospitals in the Netherlands have been infected with SARS-CoV-2 (15). A high positivity rate (42.37%) for SARS-CoV-2 infection among symptomatic HCWs has been reported in Brazil (16). A systematic review and meta-analysis showed a pooled prevalence of 11% [95% CI: 7 to 16%] of COVID-19 among the HCWs (17). In the present study, 4,386 (2.5%) of all confirmed COVID-19 cases, were healthcare professionals. Of these, physicians accounted for 38.8%, whereas 36.6% were nurses, midwives, laboratory technicians, and medical assistants/paramedics, and 24.6% were janitors, caregivers, pharmacists, kinesitherapists,

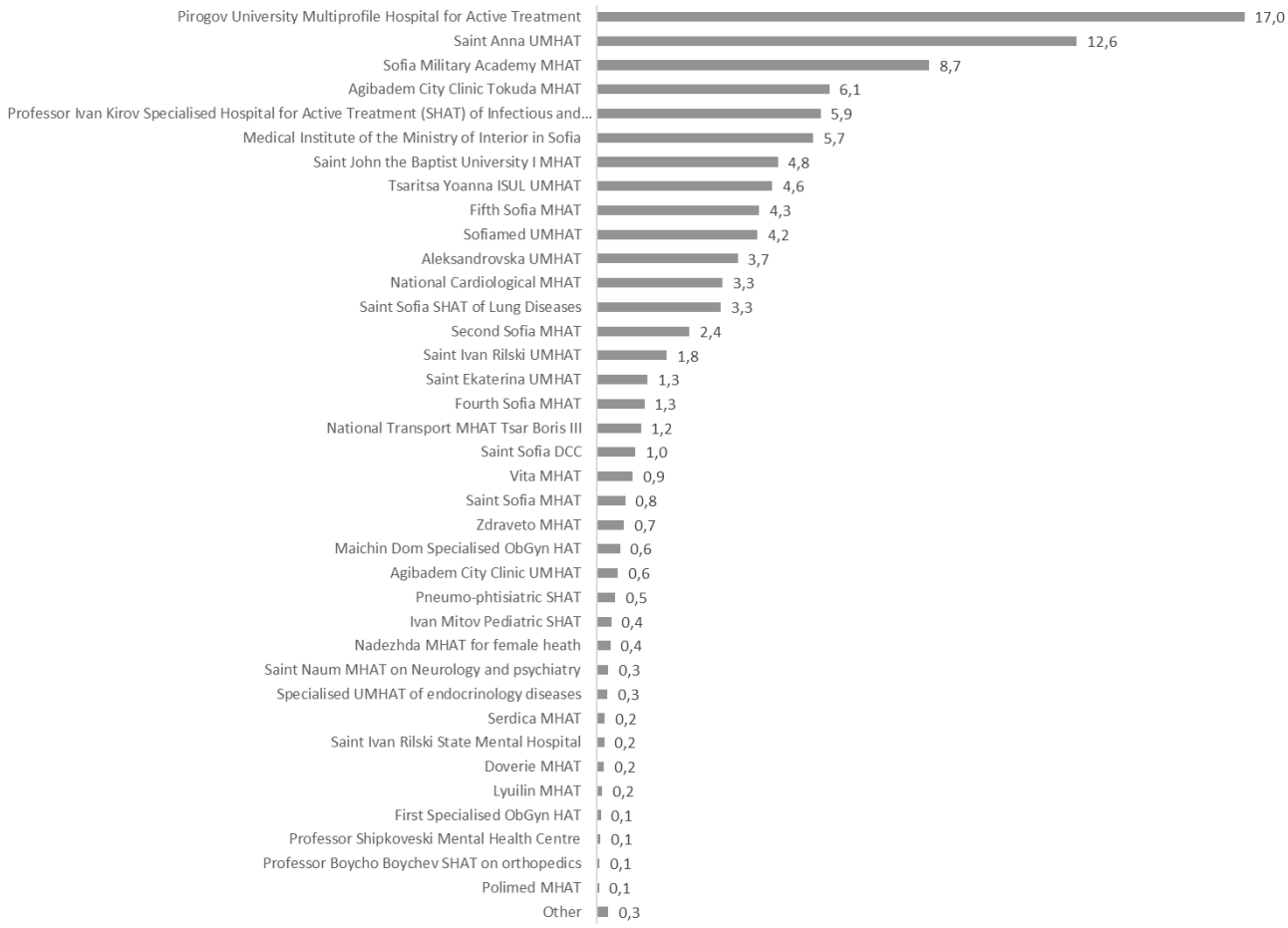


Figure 5. COVID-19-related admissions to healthcare facilities (in %) in Sofia City, 2020-2021

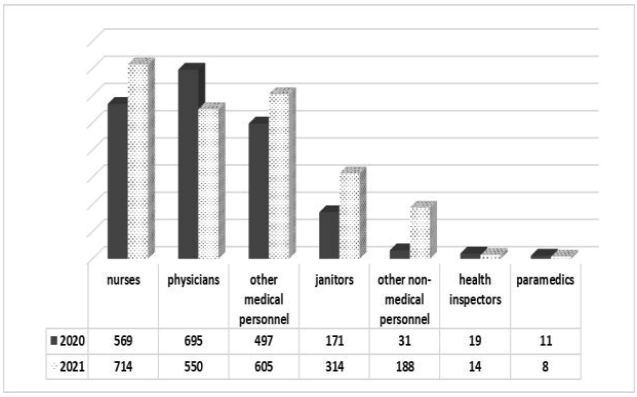
and administrative and maintenance staff, including coordinators, secretaries, maintenance technicians, and drivers (Figure 6). Healthcare professionals working in specialized COVID departments, infectious diseases departments, anaesthesiology, and intensive care clinics, emergency care departments, and emergency care centers were the most affected.

Clinical symptoms requiring admission to the hospital were identified in 84.5% (3,706 cases). In 165 (3.8%) healthcare professionals, the disease progressed to severe, with complications and a need for intensive care and assisted ventilation. A fatal outcome was reported in 19 health professionals. Similar to our data, in a study in Mexico, 4.58% of the SARS-CoV-2 positive HCWs developed severe COVID-19, 4.12% required hospitalization, and 0.58% needed mechanical-ventilatory support (18). In a Canadian study, conducted during the pre-vaccination period of COVID-19, 5.6% of infected physicians were admitted to hospitals and noone died (19). According to the data submitted by the healthcare facilities in our study, 11,831 staff members and 5,104 patients were tested as contacts of confirmed COVID-19 cases for two years. Of these, 131 staff and 86 patients (including social home residents) had a positive RT-PCR test result.

In 96.7% of the cases, infection occurred at the workplace during the performance of their official duties as healthcare professionals, i.e., through direct contact with, treatment of, or care for COVID-19 patients or carriers.

During the two studied years, numerous outbreaks of COVID-19 were detected in healthcare facilities, schools, kindergartens, and public facilities located on the territory of the region. Epidemiological information on the more significant outbreaks was reported to the Ministry of Health monthly in the period July 2020 – December 2021, concerning 2,010 investigated infected persons and their 17,508 contacts in 307 outbreaks.

Immediate epidemic control measures were taken in healthcare facilities where nosocomial outbreaks



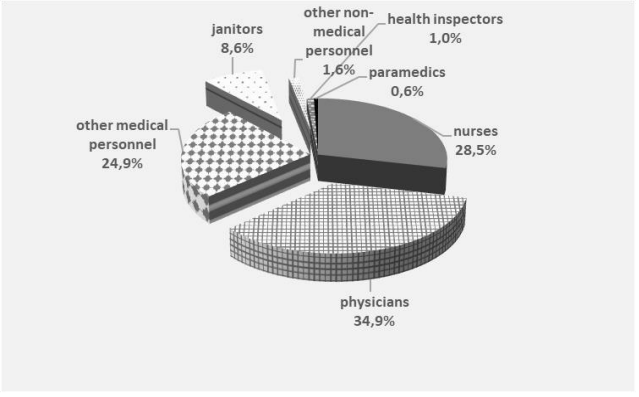


Figure 6. Breakdown of COVID-19 cases among healthcare professionals in healthcare facilities in the Sofia City region, March 2020 – December 2021

were reported, with confirmed cases being promptly isolated or referred to healthcare facilities with available COVID-wards where they were treated by dedicated healthcare professionals; all contact persons among the staff were tested regularly, and those who tested positive were placed under isolation; orders for temporary discontinuation of the activities of the affected departments were issued until staff tested negative. Bedridden contacts were tested for COVID-19 and, where possible, discharged for home treatment, with a recommendation for observation by the GP during their quarantine. Timely final disinfection was performed in the affected departments.

The following lessons were learned:

Although all current WHO and ECDC guidelines and recommendations, as well as orders and regulations of the Ministry of Health for limiting the spread of COVID-19, were regularly discussed during the period under review, several important risk factors were identified as underpinning the existing risk of nosocomial spread of the coronavirus infection and its transmission to healthcare professionals:

At the onset of the epidemic, when the first cases emerged, there was no clinical association with COVID-19;

The workload was high due to a shortage of staff and extended working hours;

High-risk patients prevailed, in whom the main manifestations of the disease were masked;

Patients were cared for “at any cost”. i.e., saving a patient’s life quite often took priority over one’s safety;

Personal protective equipment (PPE) was seen as something extraordinary and proper use of PPE was rare;

With the advancement of the epidemic, however, a shift to the other extreme was observed in the Sofia City healthcare facilities, i.e., for a short period, every patient was treated as a potential COVID-19 case.

A significant improvement to the organization of work was achieved as a result of the instructions and protocols elaborated and implemented under the control of the Sofia City Regional Health Inspectorate, the regular briefings held, as well as of the flexible designation of units for isolation and treatment of symptomatic, potentially infected or suspected COVID-19 cases. Strict compliance with the control measures in place, the established organization for systemic internal control of adherence to work protocols and regulations, the monitoring and timely replenishment of PPE stocks, and the establishment of stereotypes of behaviour guaranteed healthcare professionals’ safety and prevention of a nosocomial spread of COVID-19.

In total, the Sofia City RHI placed 361,771 persons under quarantine including 178,147 confirmed cases (isolated at home or admitted to hospital), 82,985 contacts of confirmed cases, and 100,639 arrivals from risk countries at the Sofia Airport border crossing, Terminals 1 and 2, for the period 2020-2021. Compliance with COVID-19 control measures listed in the current orders of the Minister of Health was monitored by the Sofia City Regional Health Inspectorate effectuating 6,996 inspections. As a result, 761 mandatory instructions and 292 statements of administrative violation were issued to the authorized healthcare facilities in the region

regarding the application of epidemic control measures in healthcare facilities or public facilities, as well as concerning the immunization process or conducting COVID-19 tests.

Once COVID-19-specific immunoprophylaxis was introduced, the main goal of the health sector was to contain viral transmission by reaching a high vaccination coverage of the population within a short period. From the end of 2020 (when the vaccination campaign was launched in Sofia) to 31.12.2021, 523,114 persons, or 42.1% of those eligible for vaccination in the region were fully immunized (with a completed vaccination course). In total, the vaccines administered reached almost one million doses: 992,959. The booster doses accounted for 79,727, i.e., 15.2% of those fully vaccinated were reimmunized.

The emphasis in conducting the vaccination campaign against COVID-19 in the Sofia City region was placed on the groups at risk, e.g., persons in whom the infection progressed to severe clinical symptoms and complications requiring admission to hospital and intensive care, and with high mortality and case fatality rate reported. Efforts were focused on vaccinating the elderly over 65 years of age, including social home residents, as well as the healthcare professionals, educators, teachers, and staff working in educational facilities and nurseries. To that end, the Sofia City Regional Health Inspectorate arranged to set up stationary, outsourced, and mobile vaccination offices, in cooperation with teams from the Centre for Emergency Health Care and Sofia Municipality. As a result, the full vaccination course was administered to 47,493 (20.6%) persons aged over 65, 654 (31.7%) social services users, 8,271 (27.2%) teaching staff, and 18,252 (60.6%) healthcare professionals in the region.

CONCLUSIONS

During the period 2020-2021 COVID-19 took the lead in the structure of infectious morbidity and mortality in the Sofia City region.

The burden was significant in persons aged above 65, with increased complications and mortality rate. Children and immunized persons experienced mild or asymptomatic disease if infected.

As a result of the pandemic, medical professionals were directly exposed to the risk of infection and took on a negative experience.

The current pandemic flatly demonstrates that unprotected populations have experienced the disease more frequently and more severely with a more frequent fatal outcome (20). Even though the immunization coverage in the region of Sofia City is high, as compared to the national coverage (42.1% vs. 29.8% completely vaccinated in the country), public health efforts should be predominantly directed toward increasing the immunization coverage among the most vulnerable risk population.

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