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The experience of the rigid lockdown in the dental emergency room and urgency care during COVID-19 pandemic: a transnational multicenter observational study

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Abstract. – OBJECTIVE: The COVID-19 pandemic had a major impact on our lives all over the world. Changes have occurred in daily life as well as in all medical services. The aim of the present study was to evaluate the emergency accesses in four universities' emergency services during the lockdown period from March to June 2020 during the COVID-19 pandemic.

SUBJECTS AND METHODS: A cross-sectional study was carried out on 44,787 patients to evaluate the emergency services of university centers. The medical data of Medical Emergency Service Data (MESD) were assessed by five independent operators considering the epidemiological findings for statistics methods.

RESULTS: A lower level of emergency access was reported in March-July compared to the pre-COVID period. The epidemiological data confirmed that female pathologies were more frequent compared to male patients. A fluctuation for almost all urgent healthcare centers was detected, showing one/two peaks per year during the years 2017-2019. The COVID-19 pandemic period did not influence the variety of pathology detected.

CONCLUSIONS: After the lockdown period, the emergency services slowly increased in cases. The pre-COVID period showed an overlapping of the most frequent pathologies compared to the post-COVID period: periodontitis (Bari and Tirana), dental fractures (Bari and Bucharest), odontogenic abscess (Bari, Cluj and Tirana).

Key Words:
COVID-19, SARS-CoV-2, Dental emergency room, Emergency outpatient unit, Lockdown, Quarantine.

Abbreviations

Acute Respiratory Distress Syndrome (ARDS), Angiotensin-Converting Enzyme 2 (ACE2), Bisphosphonate-Related Osteonecrosis of The Jaw (BRONJ), Burning Mouth Syndrome (BMS), Cardiovascular Diseases (CVD), Chronic Pulmonary Disease (COPD), Computed Tomography (CT), Emergency Medical Services (MES), Filtering Facepiece 2 (FFP2), High-Efficiency Particulate Air (HEPA), Medical Emergency Data (MED), Med-

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ical Emergency Dental Attendance (MEDA), Medical Emergency Service Data (MESD), Otorhinolaryngological (ORL), Personal Protection Equipment (PPE), Polymerase Chain Reaction (PCR), Real Time Polymerase Chain Reaction (RT-PCR), Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2), Temporormandibular Joint (TMJ), Transmissible Spongiform Encephalopathy (TSE), Ultraviolet Germicidal Irradiation (UVGI).

Introduction

On the 11th of March, the World Health Organization declared the global pandemic caused by the SARS-CoV-2 virus (Severe Acute Respiratory Syndrome Coronavirus 2), which induces the COVID-19 disease. This affection caused by SARS-CoV-2 virus is very contagious and causes severe acute respiratory syndrome[1,2]. The ethiopathogenic agent is a β-coronavirus, which is spread through Flügger's droplets[3,4]. The same way of transmission, through respiratory droplets, is also encountered in viral diseases like influenza virus, rhinovirus, respiratory syncytial virus, enterovirus, and norovirus; measles morbillivirus and coronaviruses like SARS coronavirus (SARS-CoV-1)[5]. The spreading of the droplets is, as in other diseases with respiratory transmission encountered on a radius of 1,5-2 m during talking, coughing, and sneezing, but the vector could also be produced with direct contact with saliva. It was demonstrated that the viability of the virus in aerosol particles exceeds 3 hours[6]. The viable maintenance of the virus on various solid material surfaces is significantly longer, overpassing 72 hours, thus enhancing the risk of nosocomial transmission[5]. The virus, first detected in Wuhan, China, soon spread all across the globe, in over 188 countries. In June 2020, over 6 million cases and over 390.000 deaths were already confirmed worldwide, but it is assumed that the number of cases and casualties is, in fact, higher[7-16].

The spreading of the virus from animals (bats) to humans follows two other spilled-over diseases, namely Transmissible Spongiform Encephalopathy (TSE) Creutzfeld-Jakob (2008) and H10N3 bird flu (2011)[17-28]. Thus, diagnostic methods and telemedicine management of the infected patients and therapeutic decisions have been improved throughout the years 2020 and 2021 to prevent the spread of this illness with important respiratory signs and symptoms[10,11]. The virus has an incubation period that can last for more than two weeks, which makes it difficult to detect new variants[12]. Specific PCR tests are required to detect each variant. A significant virus load was found in the oral mucosa and in stimulated saliva[13] from the submandibular gland duct in adults as well as in children[14,15].

Dental and oral surgery procedures using piezo-electric ultrasonic devices or drills mounted in turbines and handpieces cause aerosol release, which spreads on a surface with a significantly wider radius compared to those spread by laborers in other medical specialties. Thus, the major risk to which dentists are subject explains why routine dentistry has been suspended in several countries, especially at the beginning of the COVID-19 pandemics[16,17]. In Europe, only indispensable medical and dental units remained functional but under reduced capacity[18]. Subsequently, even the most important clinical services in different towns retrenched, postponed, or even adjourned some of the surgical interventions[19,20]. There was an overall decrease in the public interest in medical procedures in various medical fields[21,24]. Because of postponed or suspended dental care over a substantial span of time, new cases of oral and maxillofacial pathologies appeared, along with aggravated clinical situations of the existing cases[25]. Generally, after screening, all patients attending dental medical services had to be included in one of the following categories: symptomatic SARS-CoV-2 positive (COVID-19), asymptomatic SARS-CoV-2 positive, SARS-CoV-2 negative, or healed after COVID-19, the clinical and therapeutic attitude depending on the category in which the patient was included[26]. Therefore, as in other branches of science and technology, the entire dental and maxillo-facial system was subjected to dramatic changes across Europe[27]. Epidemiological studies[28,29], to highlight the presence of immunity in the population, have to be considered and carried out keeping in mind that an important part of the population is still susceptible to infection even after the development of vaccines for the different types of Sars-CoV-2 viruses. Not only were medical services subjected to major changes, but the telemedicine system also had to be implemented for both patients and students enrolled in various universities in different years of study. Due to government limitations in all countries, the awareness of constant monitoring and personal participation – even if remote – in the healing process, was a solution that increased patient compliance and kept communication channels open between

doctors and patients and also between doctors and students[30]. Various dental offices and centers have implemented efficient and reliable methods to remotely manage patients receiving dental treatments. One such approach is for orthodontic patients to take a set of photographs using their smartphone and complete a questionnaire to assess the effectiveness of the treatment. Data were then analyzed for a descriptive statistic study[31,32]. Different centers from all over the world reported limited access to academic facilities during the pandemic. It was found that many of the universities had or were planning to ensure online teaching shortly after the pandemic broke out. An important percentage provided online pedagogical software tools by means of live or streamed videos, links to other online materials, or virtual meetings[33]. Despite the risk of infection, urgent dental care like traumatology and treatments for correcting dental-skeletal dysplasia had to continue. However, there was a significant reduction in diagnostic appointments and surgical procedures[34]. Due to the pandemic, tests are now crucial in managing dental patients. They guarantee safe conditions for elective treatments to be offered to COVID-19-negative patients[35,36]. Dental guidelines were published by national associations such as the American Dental Association, ADA (2020)[36], the Polish Dental Association[37], the "Società Italiana di Parodontologia e Implantologia"[18], and the Swiss Association of Dentists[38], all of them recommending avoiding the unurgent dental treatments during the COVID-19 pandemic. The regulatory aspects of access to facilities, triage methods, selection of operational priority levels were tightened as follows[39]: displaying information at the entrance of the facility for directing the patients, establishing entrances for patients with signs and symptoms of COVID-19; staff training on the signs and symptoms of COVID-19; designating well-equipped screening and triage stations, where questionnaires were filled in; ensuring adequate supplies of personal protective equipment (PPE); use of a screening algorithm for identifying patients suspected to carry COVID-19; accompanying these patients to special COVID-19 dedicated waiting areas; reducing the amount of time for patients suspected to have COVID-19 while waiting to be screened; urgent identification of patients needing immediate care[39]. Patients treated in the maxillo-facial service ambulatory are also subjected to temperature measuring and filling out a questionnaire regarding the onset of specific COVID-19-related symptoms in the previous 2 weeks or direct exposure to SARS-CoV-2. Also, questions about close contact with positive patients are part of the fill-in form, and answers are compulsory. For hospitalized patients, negative molecular oropharyngeal or nasopharyngeal swabs were also compulsory[40]. Vaporization and a great quantity of aerosol present in any dental operation, as well as the use of ultrasound and all rotating tools requiring water for cooling (turbines, micromotors, piezo-surgery), enhance the infection risks for dentists. Specific guidelines are, therefore, to be respected by dentists to prevent the spread of SARS-CoV-2. Dental professionals have to be familiar with the safety procedures, the air purifying systems, and specific procedures concerning dental treatments[41-55]. Professional staff in dental clinics have to learn the procedures for patient risk assessment, triage, and the necessary measures to prevent infection and nosocomial transmission[35,56-58]. With respect to sanitizing devices, the following rules are stipulated: healthcare services using natural ventilation systems should evacuate the contaminated air directly outdoors using an exhauster; mechanical ventilation systems like exhaust fans, whirlybirds, and high-efficiency particulate air (HEPA) are the most efficient. Ultraviolet germicidal irradiation (UVGI) has to be used because the air in the examination room has potentially high infectivity; spatial separation and physical barriers are indicated to divide rooms and patients[59]. A frequent, consistent, and correctly performed cleaning and disinfection procedure has to be ensured and respected[59]. Roughening of equipment rules for personal protection comprises optimizing rational use of personal protection equipment (PPE); coveralls, double layering of gloves or gowns, shoe protection or head covers (hoods) that cover the head and neck; decontamination of PPE by trained staff under controlled and standardized conditions[60], coordinate PPE supply chain management mechanisms[39]. The airways, namely the oral cavity and nostrils, are the access pathways for SARS-CoV-2. To protect themselves and their patients, they have to use full personal protective equipment[61]. In literature, the face mask used during continuing activity could potentially affect both physiological and psychological behavior, gas exchange, and respiratory function, producing discomfort[62]. In healthy oral surgeons, wearing an FFP2 covered

by a surgical mask for a longer period determined a reduction in circulating O_2 concentrations, but these findings had no clinical relevance. Other findings were tachycardia and sensation of shortness of breath, light-headedness, and headaches. These indicate that an N95 mask covered by a surgical mask determined discomfort in breathing, a decrease in both mental and physical performance and accuracy, along with increased fatigue, especially during long-lasting operations, being able to induce elevated CO_2 levels[61,63-66]. The authors evaluated the facial skin temperature and the heat discomfort associated with the use of medical surgical masks and N95 masks as personal protection devices through an infrared thermal assessment. The current study evaluated the perioral region temperature and discomfort perception ratings of dental workers, showing a significant difference in heat flow and facial skin between the two study groups. It has been seen that N95 respirators can induce an increased facial skin temperature, greater discomfort, and lower wearing adherence when compared to medical surgical masks. These facts show a higher difficulty for the dental practitioner when performing various dental treatments[67]. In all medical services, the use of an efficient and rapid diagnosing plan, screening, and checking are valuable factors for reducing transmission and preventing further infection. RT-PCR is an important means of confirming the data obtained through conventional diagnostic procedures like chest computed tomography (CT) imaging and chest ultrasound[68]. The cleaning and disinfection protocol of health care and dental clinic environment surfaces are also key elements in infection prevention, especially during the SARS-CoV-2 pandemic. Aerosolized hydrogen peroxide, H_2O_2 vapor, ultraviolet light, pulsed xenon, and gaseous ozone are used in decontamination, but the elective technique in dental clinics is peroxide and hypochlorous. These can be sprayed *via* a device at high turbine speed with the ability to produce small aerosol particles and are also recommended for their low cost[59,69-78]. In this way, the study hypothesis is that the epidemiology and context background could produce important psychological implications on the population and a variation of the flux access to the healthcare structures. The present multicenter investigation aimed to evaluate and characterize the dental healthcare access during the pandemic lockdown period from March to June 2020.

Subjects and Methods

Our research took place at the University Hospitals of Bari "Aldo Moro" Italy, at FMD University of Tirana Albania, at Titu Maiorescu University Bucharest, Romania, and at the Clinical Hospital affiliated with the "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, Romania. A cross-sectional study was carried out as part of a service evaluation in the emergency services of the 4 mentioned centers evaluating the period from February to May 2020. Our study aims to make a pertinent comparison of the epidemiological data collected in the dental and medical emergency services of four important medical and university centers in different countries. The comparison of data from different cities with varying addressability in COVID and pre-COVID periods allows for an objective evaluation of pathology types and their characteristics. This analysis facilitates the detection of the specificity of dentofacial pathologies but also of the need for specific treatment of each country/city that took part in the research.

Study Data Processing

Anonymous data were collected *via* a database search of patient attendance using medical records in each of the centers. For each center, there were five members involved: three operators for collecting data and two for the evaluation of data and data processing. The data collection process was designed to fit in with the patient's care pathway. Each patient was given to complete the form specially designed for this study, which is standard for all four centers for assessment, and then the clinician completed further relevant clinical details. The methodology included an epidemiological statistics approach, including the population distribution in accordance with the study variables and pathologies. The emergency accesses during the pre- and post-lockdown period have been grouped considering the following main classes: oral pathology and neoplasms, dentofacial trauma, periodontal issues, oral surgery complications, orthodontics and ATM disorders, otorhinolaryngological (ORL) problems and endodontics/restorative complications.

Inclusion Criteria

Demographic data, including age, gender, address, date of presentation, diagnosis, and outcome of MED attendance, was collected. The study included patients who could have been dis-

charged from MED and those who were suitable for treatment by a general dental practitioner but attended emergency services due to the COVID lockdown of dental offices. The inclusion criteria were aimed at any adult patient aged 16 and over; emergency dental care for children was provided by a different service and, therefore, excluded from this study. Exclusion criteria applied to patients admitted for hospitalization, as these individuals likely represented cases where attendance at the four clinics was definitively justified, given their need for inpatient care in the hospital. The standards of good clinical practice were followed. Informed consent from each patient was obtained.

Clinical Parameters

Pathology was divided as follows: Oral mucosa and skin lesions were grouped, including the following diagnostics: aphtha, biting trauma, buccal trauma, burning mouth syndrome (BMS), cheilitis candidiasis, glossitis, ulcer mouth, varices under tongue, leukoplakia, mouth sores, telangiectasia, mucocele, stomatitis, hyperkeratosis, and bruised lip. Soft tissue pathology and salivary gland pathology formed the second group and included cystic neoformation, glandular swelling, facial clefts, facial trauma, emphysema, erythema, head and neck tumor (neoplastic pathologies) hyposalivation, lymphadenopathy (Adenitis), muscle trismus, tongue neoformation, support tissue pathology like bleeding gingivorrhagia, chronic apical periodontitis, gingivitis, periodontal disease and periodontitis formed the third group while dental pathology consisting of caries, dental algae, dental descaling (decalcifications), dental fractures, impacted teeth, odontogenic abscess, necrosing roots, pulpitis, pulpoma, dental mobility, dental traumatic avulsion, dysodontiasis, post avulsive alveolitis and post avulsive bleeding formed the pathology group number four. Osseuse pathology consisting of lesions or trauma, craniofacial deformities, mandibular skull disorder (DCM), dento-skeletal anomalies, exostosis, mandibular fractures, mandibular osteonecrosis, maxillary fractures, maxillary osteonecrosis, jaw dislocation, osteomyelitis of the jaws, osteophlegmon, sinus mouth fistula and sinusitis were all included in the fifth group. Pathologies of the head and neck connected to other specializations were separately treated, forming the next two groups: ORL consulting (sixth group), neurologic disorders paralysis, and trigeminal neuralgia (seventh group). Other presentation motives like incongruous prosthesis, orthodontic appliance breakage, or lack of pathologies, along with patients' refusal and control visits, formed the last group.

Statistical Analysis

Included data were transferred in Excel tables and analyzed using descriptive statistics, *t*-test, and Chi-squared tests. The statistical analysis of the data was conducted using the SPSS software package, version 22.0 (IBM Corp., Armonk, NY, USA). The statistical significance level was determined to be below 0.05 based on the calculated *p*-value.

Results

Epidemiological Characteristics

Epidemiological data on the study populations showed some differences/similarities between different health centers. In Bari, it is noted that the prevalence of the disease, analyzed by gender, is lower in women than in men each year. This trend holds except for March and September 2018, March, May, August and October 2019, and February 2020.

In all centers, 44,787 patients were examined in the EMS. Out of these, 21,221 were males and 23,566 were females. In Cluj, there were 8,342 patients who visited the EMS in 2017-2020, out of which 3,877 were males and 4,465 were females. In Tirana, there were 28,643 patients, out of which 13,565 were males and 15,077 were females. In Bari, 3,185 patients requested an examination of the EMS, out of which 1,778 were males and 1,407 were females. Finally, in Bucharest, there were 4,618 patients who visited the EMS, out of which 2,001 were males and 2,617 were females.

Dental Emergency Trends

The graph showing the total number of patients shows a parallel evolution considering the gender-independent variable except for the periods December 2017- March 2018, May - June 2018, and November 2019- January 2020 (Figure 1). From the point of view of the number of patients per month, in Bari, the total number of patients shows fluctuations outside the lockdown period, with a maximum of patients in July 2019 and 2018, showing a seasonal character. There was a decrease in the lockdown period between February and May 2020, with a gradual return without reaching the number of patients registered in the

pre-lock-down period. When we compared the number of patients admitted to the emergency service in Bari for January, February, March, April, and May of the years 2017, 2018, 2019, and 2020, we observed an increase in the number of cases in January 2018 compared to the previous year. However, in January 2019, there was a decrease in the number of cases. Finally, the number of cases increased again in 2020. In February 2018, there were fewer cases than in February 2017, while in 2019, there was a slow increase in the number of cases, followed by a decrease in 2020. In April, the number of cases in Bari increased in 2018 compared to April 2017, remained in April 2019 at a significant level equal to April 2017, and finally decreased to close to zero in 2020. Comparing the number of cases in May in the four years, it was reported that it is higher in 2018 than in 2017 and that in 2019 the number returns to a value approximately equal to the one found in May 2017. Epidemiological data in the EMS Tirana show that in 2017, in all months except June, the number of females attending the EMS was higher than the number of males. A similar pattern can be observed in 2018, but an important difference between genders is present in March and May, with a smaller number of males. A different pattern is present in 2019 and 2020, with more male than female presentations in the EMS, except for the months of April and August. In Tirana, the average value of 800 patients per month in 2017 and 2018 suffered a sharp increase at the beginning of 2019 and then large fluctuations towards the end of the year. During the lockdown period, there was a sharp decrease in the number of patients after the first month and a sharp increase towards the end of this period, reaching even higher values than in the pre-lockdown period. The graph showing the total number of patients shows a parallel evolution considering the gender-independent variable except for the period November-December 2019 (Figure 1). In Bucharest, from an epidemiological point of view, the number of female cases for all four years (2017, 2018, 2019, and 2020), exceeded the number of male cases. The case number grew constantly in 2017, 2018, and 2019, reaching the maximum during the last month of 2019 and dropping in 2020 to a level below that of 2017. When comparing the months of January and February during the 4 years of our research, we can observe a constant and not very steep growth in the number of cases beginning in 2017 until 2020. On the contrary, the months of March-April show a doubling of the cases in 2018 compared to 2017 and an almost tripling of the cases in 2019, followed by an almost zero decrease in March-April 2020.It is worth mentioning that during the months of May-December 2019, there was an oscillation of the data, but the average value still had higher levels than in previous years. From the point of view of the number of patients per month in Bucharest, a gradual increase from 2017 to 2019, with a maximum of almost 250 patients in March 2019, and then a stabilization of the number of patients, around 175, is visible. During the lockdown period, there is a drastic decrease, reaching the value of 0 in April, which overlaps with the period when the outpatient services were taken over by another medical unit and with the period of lockdown. Epidemiological data in Cluj-Napoca showed that in the EMS during the whole year 2017, the presentation number of females in the EMS was higher than that of males. The same pattern was encountered in 2018. Except for March, August, September, and October. In 2019, only during July and August, a higher number of males attended the EMS in Cluj-Napoca, a visible fact also in 2020 during the months of March and April, when their number was also higher. When comparing years, we can observe a decrease in the number of cases in January and February in 2017, a number that was lower than the number of cases in 2018. In 2018, 5 times more cases were, in fact, registered in the EMS, and in 2019, the number of cases was even higher than in 2018. In 2020, we can see a rising trend from the value of zero up to almost the level registered in 2019. In March and April, quite steep growth of the cases was reported in 2017, an oscillating number in 2018 but still higher than in 2017, an even higher number of cases in 2019, and a quite steep decrease for 2020. In May, we can observe a steep rise in the number of cases, reaching the highest score when all years are compared and the highest score during the whole year 2017. In May 2018, a growing tendency of cases is present, while in 2019, the number of cases is almost constant but higher than in 2018 and 2020. In May 2020, at the end of the lockdown period, the lowest number of cases can be seen when all four years are compared. The evolution of epidemiological data is explained in the lockdown period by patients' reluctance to attend medical services in general. The same fact is encountered in dental emergency services. Another important reason for the evolution of cases was the closure of regular dental offices, which led to

the orientation of cases to the emergency service, which took over during this period, as well as cases that would not normally have accessed this service. The third feature of this lockdown period concerned the type of pathologies, something that will be discussed below, and included dental algae and clinical cases that would normally be handled at regular dental offices.

The total number of patients by month from January 2017 through May 2020 in the 4 studied centers is illustrated in Figure 1.

Dental Emergency Characterization

In Bari, the number of patients typically peaked in August. In the COVID lockdown of 2020, the number of patients bottomed in April 2020 to the absolute minimum, then somewhat recovered in May 2020 but remained still below all other months in the past (Figure 1). In Tirana, the number of patients typically peaked in March. During the COVID lockdown in 2020, the number of patients bottomed in March 2020, but not to the absolute minimum, and recovered in April 2020 to the absolute maximum (Figure 1). In Bucharest, the number of patients significantly peaked in March. During the COVID lockdown in 2020, the number of patients bottomed in April 2020, but not to zero, followed by a good recovery in May 2020, though not to the absolute maximum (Figure 1). In Cluj-Napoca, the total number of patients fluctuates around an average of 250 patients per month from September 2017 to the end of the year 2019. The number of patients dropped to zero in the pre-lockdown

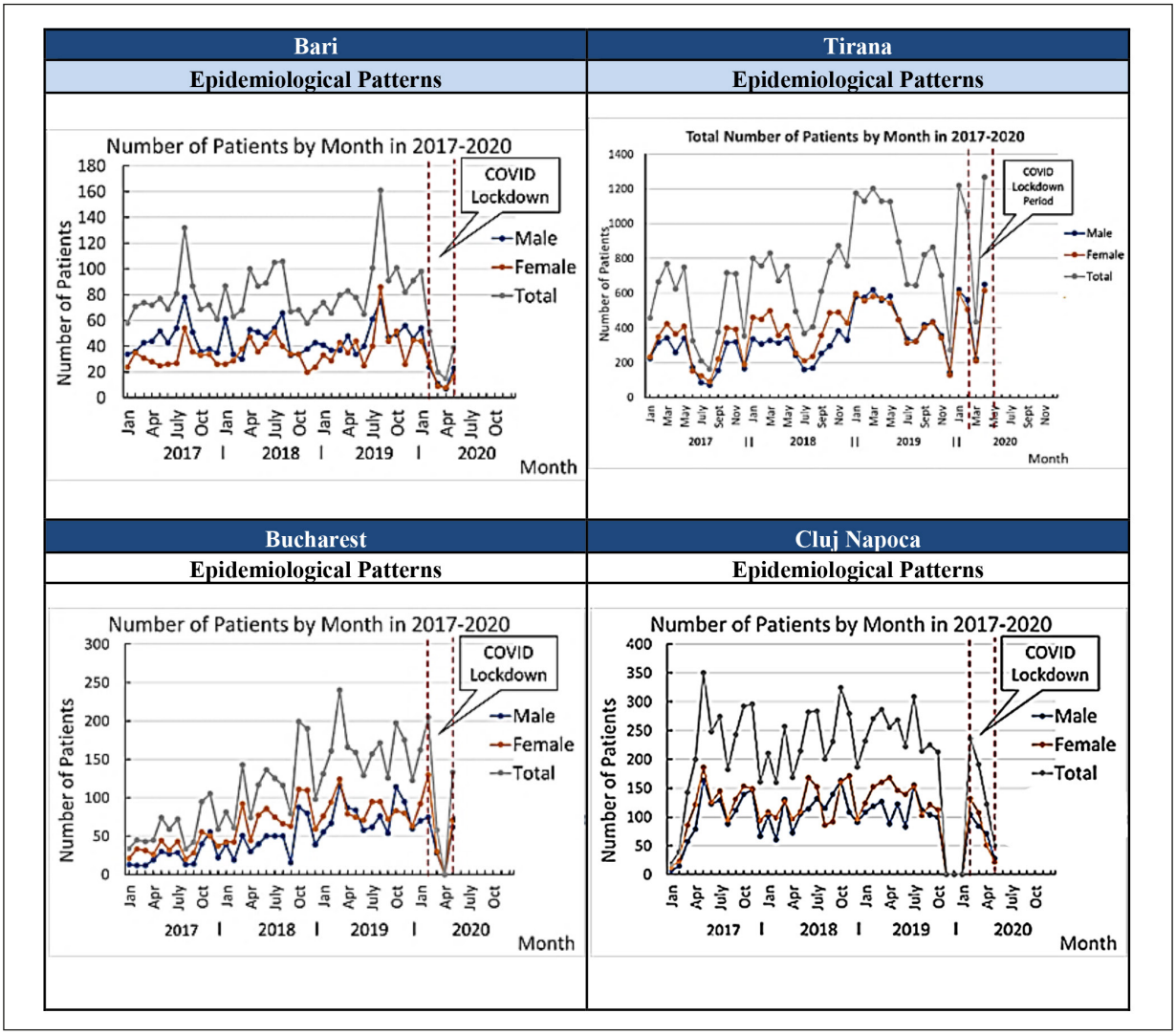


Figure 1. The total number of patients by month from January 2017 May 2020 in each center.

period, followed by an increase to nearly average in the first days of the lockdown in January 2020 (Figure 1). For 3 out of 4 centers, it was reported that there were different peak periods, while in 1 center, no specific peak was reached in a specific month (Cluj-Napoca). If we consider a 3-month average lockdown period, we can compare this duration of a quarter of a year (3 months) for each center in the pre-lockdown (December 2019 - February 2020) and lockdown period. In Bari, low average values were found during the lockdown period compared to previous months. On the same graph, it was reported that in the same decade per year, the values were significantly higher than the values in 2018 and 2019 compared to 2020 (Figures 1 and 2). For Tirana, we found relatively close values in the pre-lockdown period (January and

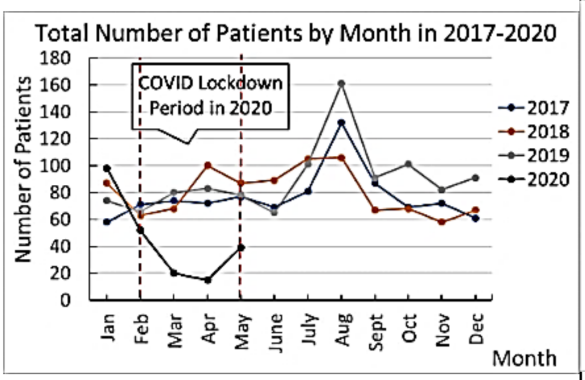
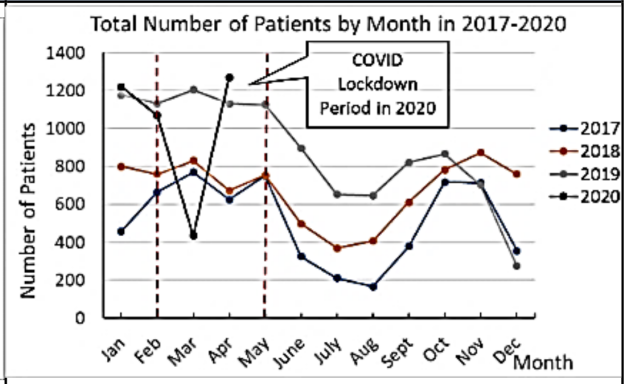
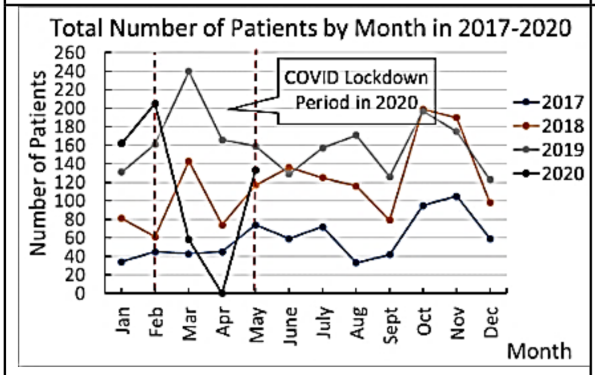
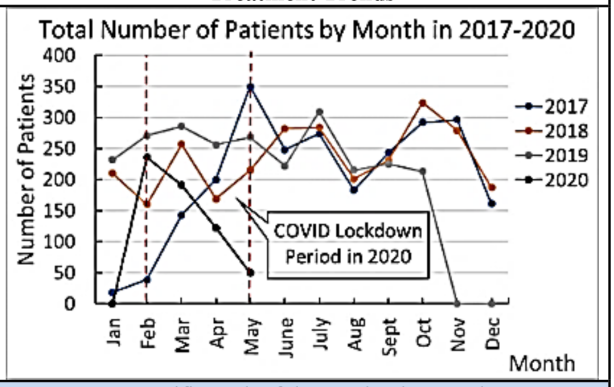
Bari	Tirana
Treatment Trends	**Treatment Trends**
	
Pattern: The number of patients typically peaked in August	**Pattern:** The number of patients typically peaked in March
COVID: In the COVID lockdown in 2020, the number of patients • bottomed in April 2020 to the absolute minimum • somehow recovered in May 2020 but still below all other months in the past	**COVID**: In the COVID lockdown in 2020, the number of patients • bottomed in March 2020 but not to the absolute minimum • recovered in April 2020 to the absolute maximum
Bucharest	**Cluj Napoca**
Treatment Trends	**Treatment Trends**
	
Pattern: The number of patients typically significantly peaked in March	**Pattern:** No specific peak of the number by month
COVID: In the COVID lockdown in 2020, the number of patients • bottomed in April 2020 but not to zero Well recovered in May 2020 but not to the absolute maximum	**COVID**: In the COVID lockdown in 2020, the number of patients • bottomed in May 2020 • have not yet recovered

Figure 2. Total number of patients by month in each center.

February 2020) to the values reached at the end of the lockdown period, respectively, in April 2020. We can also notice a reversed peak in the lockdown period (with the minimum in March 2020), compared to significantly higher values over the same period in previous years (2017, 2018, 2019) and a maximum in the same period in these years (Figures 1 and 2). In Bucharest, there was a significantly higher number in the pre-lockdown period compared to the lockdown period. Per year, we observe normal fluctuations in 2018 and 2019 and a relatively high number of patients in 2017, as well as a reversed peak during the lockdown period with a minimum in April (Figures 1 and 2). In Cluj-Napoca, a maximum was reached in 2020 during the month right before the lockdown period, while during the lockdown period, the number of patients decreased significantly until May 2020. The number of patients had an increasing trend in 2017; in 2018 and 2019, it was relatively constant, while in 2020, it had a steep decrease (Figure 2). The graphs show that the number of patients per month dropped significantly during the lockdown period. In some centers, the count even reached zero. During the Tirana lockdown, COVID cases decreased. The city's statistics showed a delay in reaching the highest number of cases, with the incidence peak in February 2021 (Figure 3).

From the point of view of the monthly average of presentations in the emergency services of each center during the pre-COVID and lockdown period, we found that only one of the centers had a lower average number of case presentations in 2020 (Table I). This can be explained by the prolonged period of time with a high infection rate in Italy, compared to the other countries. A high number of cases were reported in Tirana EMS compared to the other centers, and they were present in the pre-lockdown as well as in the lockdown period.

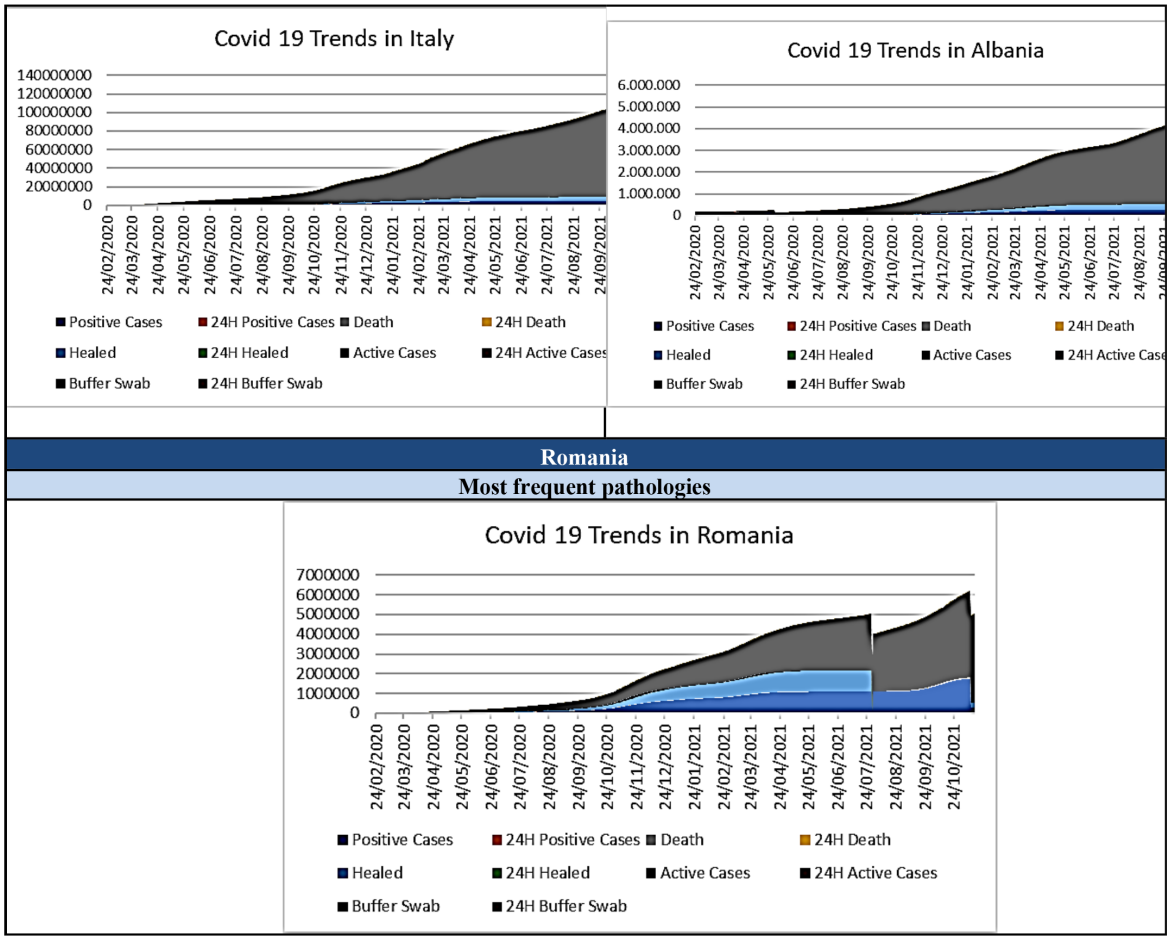


Figure 3. Statistics of COVID-19 cases in 2020 for each center.

Table I. The monthly average of presentations in the emergency services of each center.

	Pre-COVID			Post- COVID
Healthcare University Center	2017	2018	2019	2020
Bari	38.45	40.20	44.70	22.40
Tirana	255.33	337.95	441.01	399.10
Bucharest	29.41	54.83	80.62	55.80
Cluj -Napoca	101.95	116.62	99.54	59.90

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

Clinical Characteristics

The University of Bari reported a strong fluctuation of the most frequent pathologies during the study period. The most frequent pathology was the odontogenic abscess, periodontitis, and dental algae, but the 2020 incidence was lower compared to the previous years. Moreover, the first 3 pathologies are generally correlated to untreated dental conditions. Facial fractures and trauma showed a lower incidence during lockdown than in previous years, a fact that can be explained by the established restrictions (Table II).

In comparison to the other centers, the EMS Tirana showed a high number of control visits that were maintained during the pre-lockdown and lockdown periods. Moreover, the number of patients evaluated has a large share in the general number of cases. In 2017, 2018, and 2019, but also during the COVID period, the cases of caries and pulpitis associated with untreated dental conditions were highly frequent. These events were also 5-10 times more common than the other centers. In 2020, by contrast with the other years, other untreated dental conditions, like periodontitis and periodontal abscess, had higher rankings (Table III). In Table IV, we can see the results of the most frequent pathologies pre-COVID and during the COVID-19 period in Bucharest. The most common reason for emergency care in Bucharest is routine checkups. Tooth decay is the second most common diagnosis.

In Cluj-Napoca, the events of chronic apical periodontitis were the most frequent pathology encountered during the pre-lockdown and lockdown periods. Dento-skeletal anomalies, head and neck tumors, and facial clefts were the next 3 common pathologies in 2020. From this ranking, it was reported that in Cluj, the pathologies do not overlap with the ones encountered in the other centers, but when spam 2017-2019 was compared, we were able also to see the same tendency and the maintenance of the same types of diagnostics, that it should be correlated to a specific feature of the assigned area and of the pathologies treated also during hospitalization (Table V). This current epidemiological evaluation documented disease monitoring and multicenter comparison in the pre-lockdown period but not during the national lockdown period.

For each center, the top 10 reasons for presentation were selected. We noticed an overlap of pathologies in Bari and Tirana in terms of odontogenic abscesses, periodontitis, and decays. The most common complaints were pain and trauma but also dental fractures.

When comparing the pathologies from Bari and Bucharest, the epidemiological data reported overlap in terms of decay and dental fractures. In these last 2 centers, the reason for presentation was also the post-treatment or post-surgery control. Tirana and Bucharest report high frequencies of post-treatment control, decays, pulpitis, necrotic roots, and gingivitis. Cluj-Napoca and Bari share only dental abscesses and periodontitis. The only overlapping pathologies between Cluj-Napoca and Tirana are gingivitis and post-treatment controls. The situation was similar when we compared the reasons for the presentation for Cluj-Napoca and Bucharest. When comparing Bari to Cluj-Napoca, an overlapping was found only for odontogenic abscesses. Worth mentioning for Cluj-Napoca is the increased frequency of head and neck tumors and facial clefts. Comparing the most common pathologies during pre-lockdown and during lockdown, a change in the healthcare access trend, emerging diseases, and pathologies frequency were present. In the University of Bari, the DCM (mandibular skull disorder) and dysodontiasis are present in the pre-lockdown period and are missing, being replaced by aphtha and glandular swelling. In Bucharest

Table II. The most frequent 10 pathologies pre-COVID/COVID period in Bari.

	Bari most frequent dental pathologies pre-COVID-19 pandemic							
	Bari	1st Mar 2017-31th Mar 2017	Bari	1st Mar 2018-31th Mar 2018	Bari	1st Jan 2019-28th Feb 2019	Bari	1st Jan 2020-28th Feb 2020
1	Odontogenic abscess	37	Odontogenic abscess	48	Odontogenic abscess	54	Odontogenic abscess	23
2	Periodontitis	30	Periodontitis	42	Buccal Trauma	38	Periodontitis	13
3	Dental Algias	15	Dental Algias	20	Periodontitis	33	Dental algias	6
4	Patient referred	15	Buccal Trauma	17	Dental algias	24	Dental Fractures	5
5	No pathologies	14	DCM (Mandibular skull disorders)	10	Dental Fractures	15	Buccal Trauma	3
6	Buccal trauma	12	Dental Fracture	10	DCM (Mandibular skull disorders)	13	Caries	3
7	DCM (Mandibular skull disorders)	11	Dysodontia	10	Bleedings	6	No pathologies	3
8	Pulpitis	11	Facial Trauma	10	Stomatitis	6	Aphta	2
9	Dental Fracture	8	No pathologies	8	Caries	5	DCM (Mandibular skull disorders)	2
10	Facial Trauma	7	Osteophlemon	8	Cysts	5	Glandular swelling	2

Table III. The most frequent 10 pathologies pre-COVID/COVID period in Tirana.

	Tirana most frequent dental pathologies pre-COVID-19 pandemic							
	Tirana	1st Mar 2017-31th Mar 2017	Tirana	1st Mar 2018-31th Mar 2018	Tirana	1st Jan 2019-28th Feb 2019	Tirana	1st Jan 2020-28th Feb 2020
1	Control Visit	1,092	Control Visit	1,048	Control Visit	1,857	Control Visit	767
2	Caries	458	Caries	452	Pulpitis	710	Pulpitis	268
3	Necrotic roots	150	Necrotic roots	206	Caries	449	Periodontitis	233
4	Pulpitis	147	Pulpitis	191	Mouth Sores	125	Periodontal Diseases	233
5	Gingivitis	106	Gingivitis	109	Periodontitis	115	Odontogenic abscess	91
6	Dental descaling (decalcifications)	106	Periodontal Diseases	104	Periodontal Diseases	102	Patients referred	30
7	Periodontal Diseases	42	Periodontitis	78	Odontogenic abscess	27	Gengivitis	15
8	Periodontitis	11	Odontogenic abscess	30	Necrotic roots	20	Cysts	11
9	Cysts	11	Exostosis	16	Buccal Trauma	14	Suture removal	8
10	Odontogenic abscess	3	Mouth Sores	9	Dental Mobility	10	Aphta	6

Table IV. The most frequent 10 pathologies pre-COVID/COVID period in Bucharest.

	Bucharest most frequent dental pathologies pre-COVID-19 pandemic							
	Bucharest	1st Mar 2017-31th Mar 2017	Bucharest	1st Mar 2018-31th Mar 2018	Bucharest	1st Jan 2019-28th Feb 2019	Bucharest	1st Jan 2020-28th Feb 2020
1	Pulpitis	31	Control visit	72	Control visit	127	Control visit	54
2	Control visit	28	Caries	58	Incongruous prosthesis	82	Caries	37
3	Caries	26	Pulpitis	44	Caries	80	Pulpitis	27
4	Dental fractures	23	Dental fractures	43	Pulpitis	78	Dental fractures	16
5	Incongruous prosthesis	15	Incongruous prosthesis	33	Dental fractures	65	Incongruous prosthesis	16
6	Dental descaling (decalcifications)	12	Dental descaling (decalcifications)	27	Dental descaling (decalcifications)	27	Dental descaling (decalcifications)	11
7	Necrotic roots	5	DCM (mandibular skull disorders)	10	Necrotic roots	18	Dental mobility	6
8	Decidous exodontia	4	Gingivitis	10	Gingivitis	15	No pathologies	5
9	Dental mobility	4	Necrotic roots	9	Dental trauma	13	Suture removal	4
10	Suture removal	3	Dysodontiasis	8	Dental mobility	11	Dental trauma	3

Table V. The most frequent 10 pathologies pre-COVID/COVID period in Cluj-Napoca.

	Cluj-Napoca most frequent dental pathologies pre-COVID-19 pandemic							
	Cluj-Napoca	1st Mar 2017-31th Mar 2017	Cluj-Napoca	1st Mar 2018-31th Mar 2018	Cluj-Napoca	1st Jan 2019-28th Feb 2019	Cluj-Napoca	1st Jan 2020-28th Feb 2020
1	Chronic apical lesions	126	Chronic apical lesions	174	Chronic apical lesions	348	Chronic apical lesions	293
2	Head and neck disorders	46	Facial clefts	142	Head and neck disorders	123	Dento-skeletal disorders	114
3	Impacted teeth	41	Dento-skeletal disorders	132	Dento-skeletal disorders	99	Facial clefts	99
4	Control visits	35	Dental fractures	127	Pulpitis	75	Dental fractures	83
5	Dento-skeletal disorders	32	Control visits	51	Odontogenic abscess	65	Odontogenic abscess	37
6	Facial clefts	30	Impacted teeth	47	Facial trauma	27	Gengivitis	24
7	Odontogenic abscess	12	DCM (mandibular skull disorders)	16	Control visit	14	Impacted teeth	18
8	Cysts	5	Odontogenic abscess	15	Tongue neoformation	14	Salivary glands pathologies	15
9	Periodontitis	5	Periodontal diseases	14	Impacted teeth	13	Caries	14
10	DCM (mandibular skull disorders)	3	Sinusitis	11	Gingivitis	12	Control visits	13

gingivitis and necrotic roots were found in the top 10 in the pre-COVID period and have been replaced by Dental trauma during the lockdown. In Cluj-Napoca, facial trauma was not found between the most common 10 pathologies during COVID. More cases of gingivitis and caries were found instead. In Tirana, in the pre-COVID period, caries, necrosing roots, and mouth sores were present in the top 10 pathologies, while in the COVID period, those three pathologies were substituted by cystic neoformation, aphtha, and post-avulsive alveolitis. During 2017, 2018, 2019, and 2020, the most encountered reason for presentation in Bari was the odontogenic abscess during the lockdown period. Control visits were the most frequent reason for Tirana, followed by different diagnostics pre-COVID and caries and pulpitis during COVID-19. In Bucharest, the control visit is also the most frequent reason for presentation in the EMS, but if it should take into account the most frequent diagnostic, it was reported that this one- namely caries maintains the second place in ranking but has a significantly lower number of cases. In Cluj-Napoca, the most common reason for presentation remains the chronicle apical lesion during non-COVID and COVID periods as well, but the second-ranking pathology differs in non-COVID and COVID periods: namely head and neck tumors and, respectively, into-skeletal anomalies (Tables VI-VII).

According to the distribution of the pathologies, the University of Bari reported that for the first 4 frequent pathologies, there is some variety in distribution during the evaluated periods and a quite close similarity for the next 6 pathologies (Figure 4). The University of Tirana reported a difference in the cases of pulpitis and caries between 2020 and the previous years, with uniformity for the remaining 8 frequent pathologies during the periods (Figure 4). In Bucharest, it was reported a slight difference in the number of cases of dental fractures between the year 2017 and the other 3 years, but for all other pathologies, there was a close number of cases in all 4 years. That means that the COVID period did not influence the types of pathology in the studied period in a major way (Figure 4). For Cluj-Napoca, no differences over 5% between the frequency of cases are found except for the control visit and facial clefts. These differences suggest that in 2020, so during lockdown, patients did not attend the EMS service for control visits but for more important reasons from the point of view of their health condition. A difference of over 15% was reported in the case of odontogenic abscesses in 2020 compared to the other years, a fact that can be associated with the lockdown restrictions (Figure 4).

Some pathologies, such as those highlighted in green, belong to the top 10 pathologies in both Bari and Tirana. Some pathologies, as highlighted in cyan, belong to the major 10 pathologies in both Tirana and Bucharest. Cluj-Napoca shows quite a different pattern of the 10 highest pathologies. Some pathologies, as highlighted in orange, belong to the 10 major pathologies in both Bari and Bucharest (Figures 6).

Pathologies Characterization

During the pre-lockdown pandemic period, the most frequent medical accesses of the University of Bari dental clinic was represented by odontogenic access with a mean of 15.13±7.01 number of cases/months [95% C.I. 12.83-17.43]. No cases of jaw fracture, maxillary osteonecrosis, or mouth sores have been reported (Table VIII).

A significant decrease in medical accesses was detected between the pre-lockdown and lockdown period in Bari ($p<0.05$), while the most frequent access was recorded for odontogenic abscesses with a mean of 2.3±3.97 number of cases/months [95% C.I. -0.54-5.14] (Table IX).

The University of Bucharest reported during the pre-lockdown period, the control visit was the most frequent access to the dental clinic with a mean of 24.82±12.9 cases/month [95% C.I. 20.58-29.06] (Table X).

A significant reduction in the number of control visits was observed during the lockdown period, with a decrease to an average of 5.4±14 cases per month [95% C.I. -4.6-15] ($p<0.05$) (Table XI).

Similar evidence was detected for the Cluj-Napoca University with pre-lockdown control visits of 12±12 cases/month [95% C.I. -7.8-16] that was reduced during the lockdown pandemic restrictions to 0.6±1.3 number of cases/months [95% C.I. -0.37-1.6] ($p<0.05$) (Table XII).

A significant decrease in the accesses in terms of cases/month was observed for Bari, Cluj-Napoca, and Bucharest Universities for all pathologies evaluated ($p<0.05$) (Table XIII).

Post-lockdown Cluj-Napoca University [number of cases/months; *t*-student test. Level of significance $p<0.05$]

Table VI. The most common pathologies in Bari, Tirana, Bucharest and Cluj-Napoca during the pre-COVID period.

	Most frequent dental pathologies pre-COVID-19 pandemic							
	Bari	1st Jan 2017-28th Feb 2020	Bucharest	1st Jan 2017-28th Feb 2020	Cluj-Napoca	1st Jan 2017-28th Feb 2020	Tirana	1st Jan 2017-28th Feb 2020
1	Odontogenic abscess	575	Control visit	943	Chronic apical	2,524	Control visit	13,955
2	Periodontitis/gengivitis	473	Caries	755	Head and neck disorders	1,321	Caries	4,131
3	Dental algias	302	Pulpitis	631	Facial clefts	1,278	Pulpitis	2,501
4	Buccal trauma	286	Incongruous prosthesis	525	Dento-skeletal disorders	886	Nectrotic roots	1,266
5	DCM (mandibular Skull disorder)	135	Dental fractures	513	Odontogenic abscess	403	Periodontal diseases	1,132
6	Dental fracture	131	Dental descaling (decalcifications)	361	Control visit	391	Periodontitis	1,012
7	No pathologies	105	Periodontitis/gengivitis	111	Impacted teeth	389	Gengivitis	696
8	Caries	97	Dental mobility	90	Facial trauma	151	Mouth sores	467
9	Dysodontiasis	83	Necrotic roots	87	Glandular swelling	93	Patients referred	316
10	Patients referred	81	Suture removal	82	Cysts	92	Odontogenic abscess	258

Table VII. The most common pathologies in Bari, Tirana, Bucharest and Cluj-Napoca during the COVID period.

	Most frequent dental pathologies pre-COVID-19 pandemic							
	Bari	1st Mar 2020-31th Mar 2020	Bucharest	1st Jan 2017-28th Feb 2020	Cluj-Napoca	1st Jan 2017-28th Feb 2020	Tirana	1st Jan 2017-28th Feb 2020
1	Odontogenic abscess	23	Control visit	943	Chronic apical	2,524	Control visit	13,955
2	Periodontitis/gengivitis	13	Caries	755	Head and neck disorders	1,321	Caries	4,131
3	Pulpitis	6	Pulpitis	631	Facial clefts	1,278	Pulpitis	2,501
4	Dental fracture	5	Incongruous prosthesis	525	Dento-skeletal disorders	886	Nectrotic roots	1,266
5	Buccal trauma	3	Dental fractures	513	Odontogenic abscess	403	Periodontal diseases	1,132
6	Caries	3	Dental descaling (decalcifications)	361	Control visit	391	Periodontitis	1,012
7	No pathologies	3	Periodontitis/gengivitis	111	Impacted teeth	389	Gengivitis	696
8	Aphta	2	Dental mobility	90	Facial trauma	151	Mouth sores	467
9	DCM (mandibular skull disorder)	2	Necrotic roots	87	Glandular swelling	93	Patients referred	316
10	Glandular swelling	2	Suture removal	82	Cysts	92	Odontogenic abscess	258

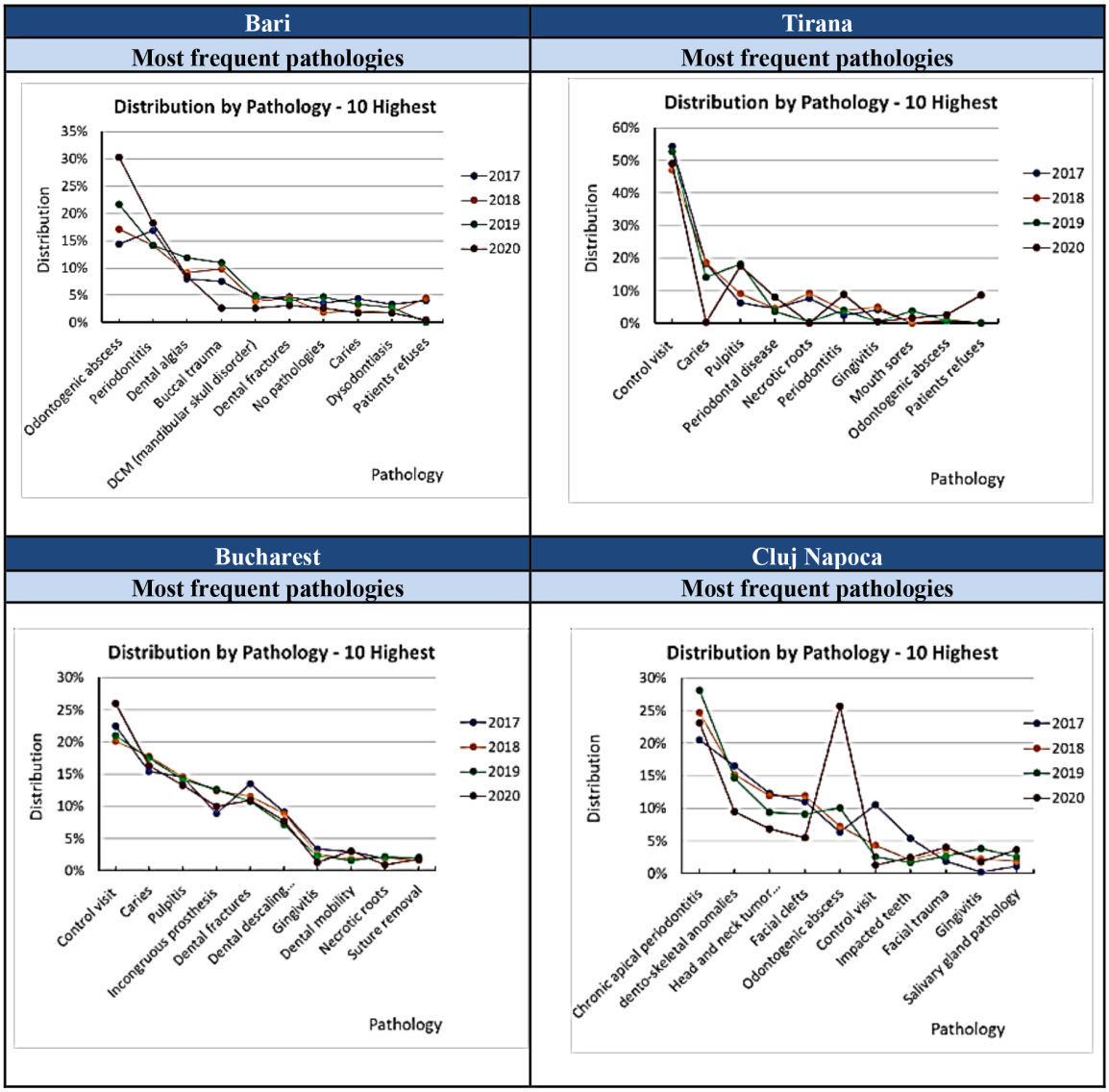


Figure 4. Frequency of major pathologies in each center 2017-2020. Major pathologies are different in Bari, Tirana, and Bucharest.

The University of Tirana reported the control visit as the most frequent condition for medical access before the pandemic, with a mean of 367±157 number of cases/months [95% C.I. 316-419] (Table XIV).

No significant difference was detected during the lockdown period, where the control visits reported a mean of 384±243 cases/month [95% C.I. 396-563] (p<0.05). No significant difference was reported about the accesses in terms of cases/month, which was observed for all pathologies classified (Table XV).

Discussion

This research studied dental healthcare access and pre-lockdown pathologies in males and females for the past 42 months. The study reported a decline in emergency room visits and a change in dental problems due to COVID-19 lockdown measures in four emergency services across four universities. The main evidence was the consistently significant decrease in the first visit/control class frequency determined by the quarantine regulations applied in Albania, Ro-

Table VIII. Pre-lockdown medical accesses of University of Bari.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	8.71	14.37	16.16	3.816	4.605	0.3684	6.237	28.29
SD	3.94	4.801	5.539	2.459	2.237	0.6334	4.023	11.29
SE	0.63	0.7788	0.8985	0.3989	0.3628	0.1027	0.6526	1.832
Lower 95% CI	7.416	12.79	14.34	3.008	3.870	0.1602	4.914	24.58
Upper 95% CI	10.00	15.95	17.98	4.624	5.340	0.5766	7.559	32.00

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

Table IX. Post-lockdown medical accesses of University of Bari.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	0.7000	0.9000	1.500	0.2000	0.2000	0.000	3.500	0.7000
SD	1.889	1.912	3.171	0.6325	0.4216	0.000	6.060	1.889
SE	0.5972	0.6046	1.003	0.2000	0.1333	0.000	1.916	0.5972
Lower 95% CI	-0.6510	-0.4677	-0.7684	-0.2524	-0.1016	0.000	-0.8350	-0.6510
Upper 95% CI	2.051	2.268	3.768	0.6524	0.5016	0.000	7.835	2.051

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

Table X. Pre-lockdown medical accesses of Bucharest University.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	0.2632	14.92	16.82	2.026	1.474	0.000	39.53	0.2632
SD	0.5032	7.309	10.54	1.966	1.370	0.000	18.92	0.5032
SE	0.08163	1.186	1.711	0.3189	0.2223	0.000	3.070	0.08163
Lower 95% CI	0.09776	12.52	13.35	1.380	1.023	0.000	33.31	0.09776
Upper 95% CI	0.4286	17.32	20.28	2.672	1.924	0.000	45.75	0.4286

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

mania, and Italy. This evidence seems to be aligned with all other classes correlated with oral pathology/neoplasms, dentofacial trauma, periodontal issues, oral surgery complications, orthodontics and ATM disorders, otorhinolaryngological (ORL) problems, and endodontics/ restorative complications. The presentation of a multicenter experience with a huge sample size represents the strengths of the study and a point of originality of the research, while the demographic differences could also represent a study limitation in a comparative way. The important growth of the number of infected cases and deceased patients is of great concern, especially because symptoms are vague and similar to other forms of flu infection or corona syndrome infections, characterized by fever, fatigue, dry cough, and dyspnea. For all

Table XI. Post-lockdown medical accesses of Bucharest University.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	0.2000	1.900	1.900	0.1000	0.5000	0.1000	6.500	0.2000
SD	0.4216	4.012	4.067	0.3162	1.080	0.3162	15.31	0.4216
SE	0.1333	1.269	1.286	0.1000	0.3416	0.1000	4.843	0.1333
Lower 95% CI	-0.1016	-0.9704	-1.010	-0.1262	-0.2727	-0.1262	-4.455	-0.1016
Upper 95% CI	0.5016	4.770	4.810	0.3262	1.273	0.3262	17.45	0.5016

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

Table XII. Pre-lockdown medical accesses of Cluj-Napoca University.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	37.26	59.84	6.158	10.24	4.684	2.368	72.08	37.26
SD	16.65	33.65	4.517	5.524	3.222	2.410	37.05	16.65
SE	2.702	5.458	0.7328	0.8960	0.5227	0.3909	6.010	2.702
Lower 95% CI	31.79	48.78	4.673	8.421	3.625	1.576	59.90	31.79
Upper 95% CI	42.74	70.90	7.643	12.05	5.743	3.160	84.26	42.74

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

Table XIII. Post-lockdown medical accesses of Cluj-Napoca University.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	6.100	6.300	0.2000	1.700	0.5000	0.1000	20.80	6.100
SD	13.63	12.56	0.6325	3.335	1.080	0.3162	36.66	13.63
SE	4.309	3.972	0.2000	1.055	0.3416	0.1000	11.59	4.309
Lower 95% CI	-3.647	-2.686	-0.2524	-0.6857	-0.2727	-0.1262	-5.425	-3.647
Upper 95% CI	15.85	15.29	0.6524	4.086	1.273	0.3262	47.02	15.85

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

symptomatic subjects, the first reported signs affected the respiratory and circulatory systems, but also frequent neurological symptoms were reported by several authors[57,79-81]. Frequently, the headache and giddiness were commonly reported and often associated with encephalopathy and delirium[82]. In these cases, the most frequent neurological complications were associated with cerebrovascular implications, Guillain-Barré syndrome, acute transverse myelitis, and acute encephalitis. In addition, one of the most common clinical signs of the peripheral nervous system has been associated with hyposmia and dysgeusia. In fact, these neurological symptoms could anticipate the typical SARS-CoV-2 manifestations with fever and cough in COVID-19 subjects[83]. Other recorded symptoms are chest and heart pain, intestinal disorders[84-87], head-

Table XIV. Pre-lockdown medical accesses of Tirana University.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	40.23	4.263	114.0	60.41	1.389	0.03846	40.23	4.263
SD	43.72	4.323	96.29	35.83	2.801	0.1961	43.72	4.323
SE	8.574	0.7012	15.62	6.334	0.4668	0.03846	8.574	0.7012
Lower 95% CI	22.57	2.842	82.35	47.49	0.4412	-0.04075	22.57	2.842
Upper 95% CI	57.89	5.684	145.7	73.32	2.337	0.1177	57.89	5.684

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

Table XV. Post-lockdown medical accesses of Tirana University.

	Oral pathology and neoplasms	Dentofacial trauma	Periodontal issues	Oral surgery complications	Orthodontic and ATM disorders	ORL issues	First visit/ control	Endodontic/ restorative complications
Mean	13.00	4.500	244.5	5.500	2.000	0.000	13.00	4.500
SD	15.56	6.364	201.5	6.364	2.828	0.000	15.56	6.364
SE	11.00	4.500	142.5	4.500	2.000	0.000	11.00	4.500
Lower 95% CI	-126.8	-52.68	-1566	-51.68	-23.41	0.000	-126.8	-52.68
Upper 95% CI	152.8	61.68	2055	62.68	27.41	0.000	152.8	61.68

Number of cases/months; Student's *t*-test. Level of significance $p < 0.05$.

ache, difficulty concentrating, memory loss[88], and tachycardia[89]. Balzanelli et al[56] have reported a higher fatality rate in elderly male patients with chronic pulmonary disease (COPD) or other comorbidities such as cancer and cardiovascular diseases (CVD). The spike protein located on the surface of the coronavirus has a high affinity towards specific human cell receptors, namely the receptor angiotensin-converting enzyme 2 (ACE2), while it provides the entry point for the coronavirus to cling to human cells and infect them[90]. The first step of the infection is the detection and recognition of the human receptors, followed by the stage of attachment, insertion, and invasion of the cell. Because of the spike of SARS-CoV-2, the virus also shares the same receptor with the host cells- angiotensin-converting enzyme 2, but the latter is characterized by a higher affinity than the spike of SARS-CoV[91]. ACE2 is detected in various organs in the human body, for example, in type II alveolar cells in the lung, in epithelial cells in the esophagus, in the nasal epithelial cells[92], in the ileum and colon enterocytes, in the gallbladder epithelial cells, in myocardial cells, in renal tubular cells, and urethral cells of the bladder[93]. Several research[94,95] analyze in detail the process of SARS-CoV-2 virus entry into the host cell and its significant persistence at the level of the oral mucosa research, as well as regarding the role of ACE2 receptors and Furin. The ability to activate local macrophage in the immune responses may be triggered differently by oral pathogens. Studies[96] have found an increased polarization of macrophages in healthy individuals *vs.* patients with various oral pathologies. During the pandemic, preventive protocols are recommended for dental practitioners to ensure a safe and healthful workplace[97-102]. Untreated dental caries in permanent teeth is the most common health condition in the world. This pathology is also encountered in the studied centers. Odontogenic abscess can sometimes be caused by unsuccessful interventional treatment

or the misuse of antimicrobials. Periodontal abscess can lead to greater periodontal attachment loss and adversely affect tooth prognosis[79]. Odontogenic abscess can sometimes be caused by unsuccessful interventional treatment or the misuse of antimicrobials[80,81]. Periodontal abscess can enhance the loss of periodontal attachment and diminish the lifespan of the affected tooth[82]. A cross-sectional study[83] in Wales, England, shows that in EMS (emergency medical services), periodontal pocketing is prevalent, with 45% of dentate adults having at least one such periodontal pocket. There are several case reports of dental conditions causing sepsis, such as dental abscesses and caries, followed by tooth extractions[103,104]. Other British authors[105] found that 44.2% of the attendances included tooth-related problems, and 42.3% were for diseases of soft tissue, salivary glands, or the tongue. On average, patients with dental problems attended their doctor twice as frequently as other patients. The majority (75%) of oral/dental attendances were related solely to these problems. A quote of 70% of the telephone-triaged subjects were accepted for a face-to-face visit within 24 hours[106]. Very similar results were reported by Eggmann et al[107] in Switzerland. Similarly, the pandemic lockdown had a significant impact on dental emergency care, including diagnoses, treatment needs, and the characteristics of emergency room care. Often, pathologies like decay and odontogenic abscesses lead to extractions[108]. Studies[104,109] reported the cases that entered the EMS related to the self-administered medication (antiviral, antibiotic, paracetamol, or ibuprofen) by the patients. The most encountered diagnostics were symptomatic apical periodontitis or abscess, bisphosphonate-related osteonecrosis of the jaw (BRONJ), irreversible pulpitis, oral medicine conditions, and pericoronitis as well as necrotizing ulcerative gingivitis[110]. Hong et al[111] found the most encountered pathologies related to pain as being dental caries, temporomormandibular joint (TMJ) disorders, pulpitis and periapical abscess, cheek and lip injuries, and fractured teeth. In Bucharest, caries and pulpitis were the most common diagnostics in 2017-2019 as in 2020 as well, but besides these two pathologies we encountered in the lockdown period, other pathologies caused by untreated dental conditions like dental fractures, dental mobility, and dental descaling. We assume that this specificity is due to the nonfunctioning of the regular dental offices during the lockdown period (Table IV). The most common 4 diseases out of the first 10 rankings were in Bari: odontogenic abscesses, periodontitis, dental alias, and buccal trauma. In Tirana, besides the control visit, which was the most common reason for presentation, the following three pathologies were caries, pulpitis, and periodontal diseases. In Bucharest, in the first position was also the control visit, followed by caries, pulpitis, and incongruous prosthesis. In Cluj, somehow, different pathologies ranked positions 1-4, namely: chronic apical periodontitis, dental-skeletal abnormalities, neoplastic pathologies, and facial clefts. A study conducted by Sayers[112] found that there was a seasonal increase in treatment between January-March and May-July at the emergency dental service in London in 2001. On the contrary, a decrease in frequency was found in April-May compared to January-February in Zagreb[113]. In the future, our survey could track:

- Weekend/weekday/holiday visits.
- Previous use of service.
- Pre-lockdown dentist visits.
- Time between onset of dental issues and emergency service visit.
- Increased risk of analgesia overdose during pandemics, leading to dental phobia. As Coulthard et al[25] showed, there is an urgent need for organized emergency dental care. Restructuring of the dental care services is imperative and takes effort. Rapid response to acute dental emergencies is compulsory to avoid overcrowded emergency services and hospitalization. Even the limits of the present study, our opinion is that the present investigation presents several novelties; the main one is that the paper is one of the first studies that describes the experiences of 4 different university healthcare dental emergency rooms taken in different hospitals and countries during the lockdown period. No other similar research on large multicenter investigations has been reported in literature[114]. Closed regular dental offices during lockdown led to an augmentation of patients who needed admission for urgent interventions due to acute dental infections. On the other hand, ambulatory services have limited ability to screen patients for COVID-19[115]. In conclusion, there is a possibility of the virus spreading in hospitalized patients, even when screened. Among COVID-19-positive patients who eventually develop symptoms, 99% will exhibit symptoms by day 14[6]. In 7-13% of cases, the patients present minimal or no symptoms at all but

maybe spreading the virus for long periods, up to 2 weeks. Also, it is shown that convalesced COVID-19 patients have exhibited prolonged viral shedding after complete symptom resolution[115]. It has been observed that false negative test rates are encountered at the beginning and end of the disease in asymptomatic, infected patients and in patients that are in resolution, in the healing stage[6,116].

Conclusions

Considering the recent literature in the field, it was pointed out that the pathology frequency and patient access in dental units and healthcare hospitals during the pandemic lockdown period was very poor. Even with some limitations regarding the epidemiological and demographical differences between the structures and national measures contrasting the COVID-19 diffusion, the present research successfully offered a detailed panoramic overview based on a multicenter database with a very wide sample size.

In all four centers, more females attended the EMS, with some exceptions in a couple of months following a seasonal fluctuation with one or two peaks per year during the years 2017-2019. In all centers, the number of patients decreased almost to zero or close in the lockdown and grew afterward, with a different gradient for each of the studied centers. The types of pathologies maintained their specificity for each center during the pre-COVID and during the COVID period, but also new pathologies appeared or made their way to the top 10 rankings during COVID, especially some connected to untreated dental conditions.

Authors' Contributions

Conceptualization, C.G.I., I.R.B., F.I., G.D., F.L., A.S. and H.M.B.; Methodology, A.M., F.I. , A.D.I., C.G.I. and G.D. ; Software, M.M., A.M., A.D.I, M.G.B., S.K.A., G.D. , A.M.I. and F.L.; Validation, M.G.B., G.D., F.I., I.R.B. , G.F., H.M.B., E.X., R.M.C. and M.R.; Formal Analysis, S.K.A., I.R.B., G.D., F.I., A.S., C.G.I., A.M.I. and A.D.I.; Investigation, C.G.I., T.P.I., A.F., G.D. and I.R.B.; Resources, M.M., A.M., and E.X.; Data Curation, A.M., S.K.A., M.R., ; Writing – Original Draft Preparation, F.I., G.D., C.G.I.; Writing – Review & Editing, F.I, A.S., F.L., C.G.I., I.R.B., H.M.B. ; Visualization, A.C., M.S.D.C., O.L., and S.B.; Supervision, F.I, F.L., A.S. , G.F., I.R.B., G.D., M.G.B., M.R., A.D.I.; Project Administration, F.I., G.D.; Funding Acquisition, F.I., A.M., M.M..

Ethics Approval

As the study was of an observational retrospective nature, ethics approval was not deemed necessary.

Informed Consent

All patients signed an informed consent for the use of their data.

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Data Availability

All experimental data to support the findings of this study are available by contacting the corresponding author upon request. The authors have annotated the entire data-building process and empirical techniques presented in the paper.

Conflicts of Interest

The authors declare no conflict of interest.

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