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EVALUATION OF TRANSMISSION DURING ACTIVE DENTAL PROCEDURES DURING THE SARS-COV-2 PANDEMIC
SARS-COV-2 PANDEMISINDE AKTIF DENTAL PROSEDÜRLER SIRASINDAKI BULAŞMANIN DEĞERLENDIRILMESI

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ABSTRACT

of the study was to evaluate the measures taken in a dentistry faculty due to the COVID-19 (SARS-Cov-2) pandemic and their application methods and based to create a guide for infection control management in dentistry. After the onset of the COVID-19 pandemic, performed in the Dentistry Faculty of Erciyes University were only emergency treatments in the first 3 months (T1) and after this period, normalization procedures and routine treatments (T2) were performed by recruiting patients at much lower capacity than before the pandemic. COVID-19 infection and isolation status of all staff working in the hospital during these periods were recorded. The source of infection that reveals these situations is defined as an internal-source (IS) from within the hospital and as an external-source (ES) from a contact outside the hospital. In the T1 period, no physician had COVID-19 infection or was put into isolation. In the T2 period, 3 out of 176 physicians had COVID-19 infection due to ES and total of 12 physicians, 5 from IS and 7 from ES, were put into isolation. That there were no physicians, who had COVID-19 infection in the T1 and T2 time intervals due to IS, shows that the measures taken in our faculty were sufficient. We think that these rules, which were arranged separately for the needs of each department, in accordance with the pandemic conditions by our faculty's infection board, are an effective guide for dental clinics, oral and dental health polyclinics, hospitals, and dentistry faculties.

Keywords: COVID-19, dental procedures, dentistry, infection control

ÖZ

Bu çalışmanın amacı, bir diş hekimliği fakültesinde COVID-19 (SARS-Cov-2) pandemisi nedeniyle alınan önlemleri ve uygulama yöntemlerini değerlendirmek ve diş hekimliğinde enfeksiyon control yönetimi için bir rehber oluşturmaktır. COVID-19 pandemisinin başlamasından sonar Erciyes Üniversitesi Diş Hekimliği Fakültesi'nde ilk 3 ayda sadece acil tedaviler (T1) yapılmış ve bu dönemden sonra pandemic öncesi kapasiteye göre çok daha düşük sayıda alınarak hasta normalleşme işlemleri ve rutin tedaviler (T2) gerçekleştirilmiştir. Bu dönemlerde hastanede çalışan tüm personelin COVID-19 enfeksiyon ve izolasyon durumu kayıt altına alınmıştır. Bu durumları ortaya çıkaran enfeksiyon kaynağı, hastanede işlemler sırasındaki bir iç kaynaktan (İK) ve hastane dışındaki bir temastan bir dış kaynaktan (DK) olarak tanımlanmıştır. T1 döneminde hiç bir doktor COVID-19 enfeksiyonu geçirmedi veya izole edilmedi. T2 döneminde 176 hekimden 3'ü ES'ye bağlı COVID-19 enfeksiyonu geçirdi ve İK'tan 5 ve DK'tan 7 olmak üzere toplam 12 hekim izole edildi. İK nedeniyle T1 ve T2 zaman aralığında COVID-19 enfeksiyonu geçiren hekimin olmaması fakültemizde alınan tedbirlerin yeterli olduğunu göstermektedir. Fakültemiz enfeksiyon kurulu tarafından pandemic koşullarına uygun olarak her bölümün ihtiyacına gore ayrı ayrı düzenlenen bu kuralların diş klinikleri, ağız ve diş sağlığı poliklinikleri, hastaneler ve diş hekimliği fakülteleri için etkili bir rehber olduğunu düşünüyoruz.

Anahtar kelimeler: COVID-19, dental prosedürler, diş hekimliği, enfeksiyon kontrolü

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INTRODUCTION

The new corona virus disease 2019 (COVID-19), which emerged in China, attracted attention in December 2019 and was declared as a pandemic by World Health Organization (WHO) on March 11, 2020,because of its global spread (1). The International Virus Taxonomy Committee named this novel coronavirus Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) (2). SARS-CoV-2 resembles the single-stranded ribonucleic acid virus family called Coronaviridae (3). Studies show that the new corona virus is like the corona virus species found in bats and became zoonotic in nature and spread from animals to humans (4). It belongs to the same family as the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and Middle East Respiratory Syndrome Coronavirus (MERS-CoV), which were discovered in 2002 and 2012, respectively (5). Like the SARS-CoV and MERS-CoV viruses, SARS-CoV-2 is a zoonotic virus (6).

As seen in patients affected by SARS-CoV and MERS, coronaviruses can cause human illnesses ranging from the common cold to severe respiratory illness. Therefore, coronaviruses can be considered as the main pathogens of developing respiratory disease outbreaks (7). In humans, SARS-CoV-2 can be found in saliva and nasopharyngeal secretions and can be spread through direct contact or respiratory droplets (4). Large (> 5 μm diameter) and small (5 μm diameter) droplets or aerosols are formed when a person coughs, sneezes, laughs, or speaks. Due to gravity, larger droplets quickly fall to the ground; droplet transmission therefore requires physical proximity between an infected individual and a susceptible individual. However, small droplets or small particle residues of evaporating droplets have a low sedimentation rate, so they can stay in the air longer and travel farther before entering the respiratory tract or contaminate surfaces (8). Results from some studies have shown that highly virulent pathogens, such as severe acute respiratory syndrome-corona virus (SARS-CoV) can travel more than six feet with aerosols (9). However, since SARS-CoV-2 is identified in the stools of patients, stool passage is also possible (10). Qualitative detection of the SARS-CoV-2 nucleic acid is performed for the diagnosis of the disease. For the test, Real-Time Reverse Transcription Polymerase Chain Reaction (rRT-PCR) test is used with upper and lower respiratory tract samples obtained with nasopharyngeal and / or oropharyngeal swabs. Viral RNA has also been isolated from the plasma of some patients (11).

The asymptomatic incubation period of the virus is estimated to be between 2 and 12 days; however, some studies have reported an incubation period of up to 24 days (12). The most common symptoms of coronavirus disease are fever, fatigue, dry cough, and shortness of breath. More than 80% of the cases are mild and heal without the need for special treatment. However, about 15% of cases are classified as severely ill and the remaining 5% as critically ill. In severe and critical situations, acute respiratory disease can cause pneumonia, kidney failure, and even death (13). Currently, although there are examples of vaccines that have been approved for emergency use for COVID-19, there is no definite information about them that show long-term effectiveness and that any of them are protective (14). The currently available treatment option is supportive therapy that provides reduction of symptoms and oxygen therapy (15). Mild cases of COVID-19 do not require special treatment and usually symptomatic treatment and home isolation are sufficient. Oxygen therapy is the main treatment for patients with severe symptoms. However, patients in critical condition generally require intensive care (16-18).

Dental professionals (dentists and other dental personnel) are generally used to high standards of infection control and self-protection precautions, as dental personnel are among the most at-risk for any infection transmitted through contaminated aerosols, saliva, body fluids, blood, or tissue particles (19,20). However, as SARS-CoV-2 is isolated from the saliva of COVID-19 patients (21), and furthermore, salivary gland epithelial cells can potentially become infected with SARS-CoV-2, making saliva become the main source of the virus (22). Current evidence suggests three main routes for transmission of the virus in dental workplaces: 1- direct transmission through coughing, sneezing, or inhalation of droplets, 2- transmission through the eyes, nasal, or oral mucous membranes, and 3- contact with contaminated surfaces (23). In most dental procedures, in addition to blood and saliva contamination, droplets and aerosols are usually formed, so transmission of the disease is strengthened and facilitated by these means (9, 20-23). Considering the novelty of the disease and the high infectiousness of SARS-CoV-2 through direct contact with saliva and nasopharyngeal secretions or respiratory droplets (4), it is necessary to provide a healthy environment for patients and dentistry teams during this pandemic. For this reason, there is a need for innovations and changes in dentistry.

Against the COVID-19 outbreak, international and US federal public health agencies, as well as dentistry professional associations published special guidelines for the control of SARS-CoV-2 (24-26). These recommendations focus on 3 main areas to break possible contamination routes: 1- The application of teledentistry to prevent COVID-19 patients or potentially infected patients from coming to the office, 2- the use of personal protective equipment with strict protocols for advanced infection controls, and 3- limiting dental treatments to emergencies. In some studies, COVID-19 demands that emergency treatments of patients with symptoms be performed in a negative-pressure operating room with maximum personal protective equipment to reduce the risk of contamination (4, 27).

Avoiding risks from infectious aerosols is at the heart of all proposed changes in current dental practices. However, uncertainties regarding the transmission routes persist. This situation forces dentists to assume that they are working with the highest possible risk of infection and to act with appropriate precautions (28). As far as we know, dental practices were severely interrupted during the COVID-19 pandemic and might never return to the pre-COVID-19 clinical situation.

There are no universal protocols or guidelines for conducting dental treatments during the COVID-19 pandemic caused by the SARS-CoV-2 virus. In fact, there is no universal guide for dental treatments in times of any national disaster, global disaster, or pandemic. Therefore, in countries affected by the COVID-19 pandemic,

dental treatments have completely stopped or decreased significantly (13). The first case of COVID-19 in Türkiye was announced on March 10, 2020, and shortly after this date, it was decided to perform dental treatments only for emergencies permitted by the Ministry of Health. After June 1, 2020, normalization steps were taken in Türkiye, and as of July 1, 2020, our faculty started to implement routine dental treatments in line with the measures determined by the Infection Control Sub-Committee of the Erciyes University, Faculty of Dentistry.

Although there is no universal guide, there are many guidelines for dental treatments (1, 13, 29, 30). However, depending on the implementation of these guidelines, we do not have the knowledge of a study that evaluates whether there is contamination to the physicians and non-physicians responsible for the conduct of dental treatments or whether patients are infected during dental treatments. In this context, the aim of the study was to evaluate the measures taken in our faculty due to the COVID-19 pandemic and their application methods, to evaluate their protection against COVID-19 disease and based on these, to create a guide for infection control management in dentistry during and after the COVID-19 pandemic.

MATERIAL AND METHODS

This study was approved by the Clinical Research Ethics Committee of the Erciyes University (Decision number: 2020/540). Study groups were categorized for 2 periods; the period when only emergency dental treatments were applied (Time 1 (T1): 13/03/2020-30/06/2020) and the period when routine dental treatments restarted (Time 2 (T2): 01/07/2020 -15/10/2020).

Inclusion criteria in the study was determined as 1- Being a staff of the Erciyes University, Faculty of Dentistry and 2- Working actively during the COVID-19 Pandemic. Hospital staff, who met the inclusion criteria, was divided into 2 groups as physicians and non-physicians. The status of the personnel in these two groups was again divided into 3 groups, as non-contact, COVID -19, and isolation (Figure I). In addition, employees were classified as having internal sources (from in-hospital contact) or external sources (from non-hospital social life) as reasons for contracting the new coronavirus disease or being isolated. In addition, situations where hospital personnel were put in isolation because of contact with a COVID-19 patient or were in contact with personnel with COVID-19 were written as having internal sources. It was planned to change the status of those who had a positive COVID-19 PCR test into recovered from COVID-19.

Hospital infection control measures

Patient appointment system

Before the COVID-19 pandemic, patients without appointment were accepted in some departments, such as oral diagnosis and radiology and oral and dental maxillofacial surgery. With the pandemic, patient admission without an appointment was stopped and web-based online special patient appointment software was created (Figure II). In this program, dental units, and time zones available appear in green. Using this program, patients and physicians make appointments at available times. With the creation of an appointment, text messages are sent to patients. In this short message, the appointment time information, and rules that patients must comply with are written. In addition, children, elderly, and disabled patients were prohibited from entering with any attendants. Thus, the density of patients in the hospital was reduced and social distance rules were applied. Patients, who come by appointment, are allowed to enter the hospital 15 minutes before the appointment time. Patients arriving before this time are kept waiting in the hospital garden in accordance with social distance rules. Patients, whose appointment time comes first, go through faculty door triage.

In triage at the faculty door, the patient's temperature is measured, their HES (Life Fits into Home) QR code is checked, and their anamnesis is given to the physician. Patients in the Republic of Türkiye are cared for in a special data matrix (HES QR code, Figure III) and appli-

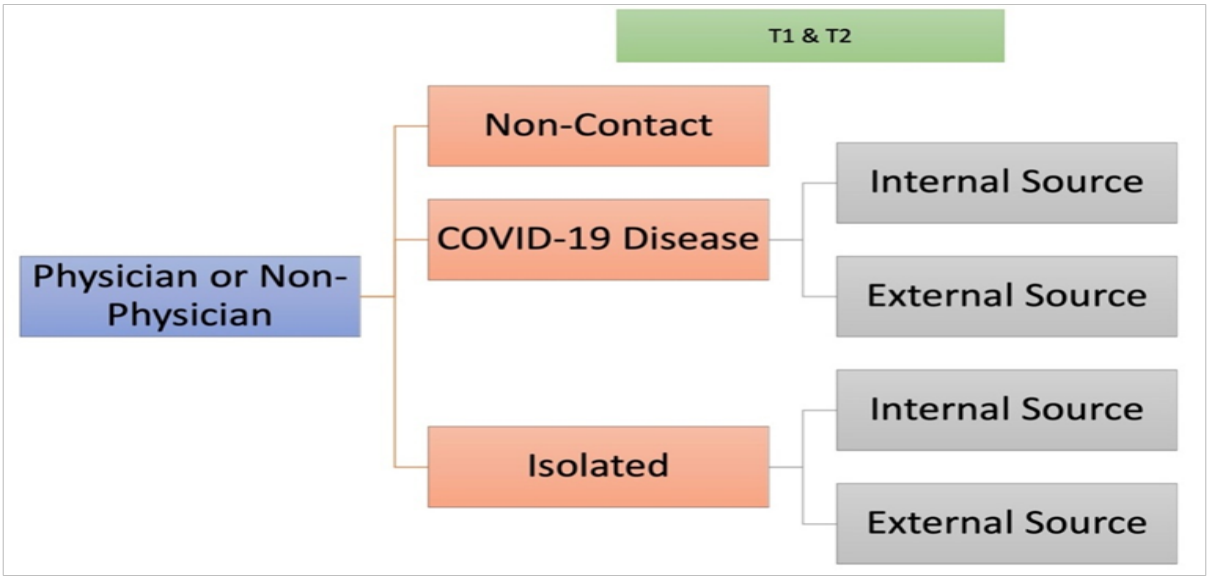

Figure I. Flowchart showing the creation of groups.

Figure II. Web based online patient appointment software. (W: Windows).

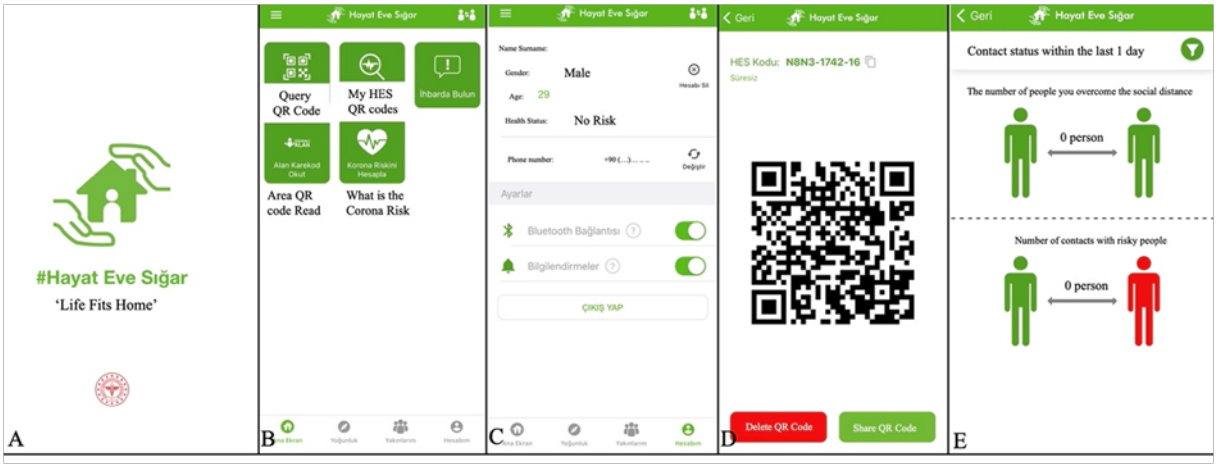

Figure III. Screenshots of the HES code used to determine the patient's COVID-19 contact and risk status

cation formed by the Ministry of Health (https://hayatevesigar.saglik.gov.tr/). Physicians approve accepted patients at the entrance to the hospital prior to initiation of treatment. With the HES code, patients with COVID-19, those with close family with COVID-19, and COVID-19 quarantine violations are detected. If patient has a HES code marked as risky, and patient does not need urgent dental treatment and admission to the hospital is denied and the public health units are informed. Thus, the risk of in-hospital contamination caused by COVID-19 patients or potential COVID-19 patients is minimized. Other patients admitted to the hospital are considered potential COVID-19 patients and below are the rules are applied in clinics during the dental treatment process.

General Rules and Personal Protective Equipment (Figure IV) Usage to be Followed in Dental Clinics presented in Table I (31, 32). In addition, the rules prepared specifically for the internal dynamics of each department are given in Table II.

Statistical analysis

The data was analyzed with Minitab 17 (Version 17, Minitab Inc., State Collage, Pennsylvania, and USA) statistical analysis program. Fisher's Exact test was used to

Figure IV. Personal protective equipment of dentists and dental staff.

Table I. General Rules and Personal Protective Equipment Usage to be Followed in Dental Clinics.

General Rules to be Followed in Dental Clinics
• A form should be created for body temperature monitoring of personnel working in departments and regular follow-up should be done.
• The clinical working order should be organized in a way that lecturers, research assistants, doctoral students, physician assistants, and cleaning staff work as a team.
• All cleaning, disinfection, and sterilization procedures in the clinic should be carried out in accordance with the recommendations of the "Recommendations Guide for Infection Control in Dentistry" (32).
• Procedures for increasing water quality and preventing contamination in dental units should be carried out in accordance with the "Recommendations Guide for Infection Control in Dentistry" (32).
• The use of disinfectants should be provided while bringing the patient into the treatment area.
• Patients should be brought and removed from the treatment area in groups while following social distancing.
• Clinic patients should be looked after only in the clinic units that are ventilated directly with open glass and have at least 2 meters distance between the units and sections. Units that are not ventilated with fresh air should not be used.
• The height of the separators between the units should be adjusted by calculating that the droplets formed by aerosols can rise 1-1.5 meters.
• Measures should be taken for the evacuation of aerosols in the environment; natural ventilation should be preferred and an air conditioning system that does not provide appropriate ventilation should not be used.
• Patients and their relatives should be questioned at the entrance to the building in terms of COVID-19 findings by checking their HES code and if possible, patients with suspected COVID-19 should be referred to the pandemic hospital.
• Consent forms regarding COVID-19 should be obtained from patients.
• The use of mouthwash (0.2% povidone iodine) should be provided before examinations.
• All academic staff and physician assistants must wear a full uniform (both top and bottom) while in the hospital.
• Physicians, physician assistants, and all other personnel should wear a surgical mask while in the building. Cloth masks should not be used.
• In the hospital, separate shoes, or slippers (completely covered, without holes) should be worn. If not, overshoes or shoe covers should be used.
• Each department should determine the treatment protocols and form treatment sets accordingly. By ensuring this, personnel and patient entry and exit should be prevented, especially in aerosolized areas.
• In cases where material is needed during a patient's treatment, the treating physician or the assisting person should not leave the patient's head and outside staff should give the necessary materials to the physician while following social distancing rules.
• Large-headed saliva ejectors, with high suction power, should be used to reduce aerosolization during treatment.
• If appropriate, a rubber-dam should be used.
• Suitable material medical waste bins should be placed around the edges of the units.
• After the treatment of a patient, all personal protective equipment will be removed next to the unit, in a certain order, and thrown into medical waste bins. Non-treatment areas should not be passed through with personal protective equipment.
• Visor / goggles used during treatments should be placed on a tray in the unit.
• After the treatment of all patients is finished and the last patient leaves the clinic, cleaning procedures should begin.
• Dirty and clean areas should be separated in department sterilization rooms. No material should be left uncovered.
• Washing instruments in departmental sterilization rooms should be avoided.
• Piercing and cutting tools used by the physician (scalpel, injector tips, tips used in irrigation) MUST BE DISPOSED OF BY THE PHYSICIAN into special marked containers.

Table I. General Rules and Personal Protective Equipment Usage to be Followed in Dental Clinics. (More-I)

Personal Protective Equipment Usage
Personal hygiene practices should be carried out in accordance with the recommendations of the WARNINGS GUIDE FOR INFECTION CONTROL IN DENTISTRY (Belgium High Health Council No: 8363) (31,32).
General rules
Medical Personnel in Dental Procedures/Physicians and Non-Physicians (in one-to-one patient treatment) • Wear a short-sleeve scrubs (Figure IV) • Wash your hands with soap and water or disinfect them with 70% alcohol-based hand sanitizer. • Wear a N95 mask and a surgical mask on top of it • Wear an astronaut head cover (covering the whole head, neck, and shoulder area except the face area) • Wear a fluid resistant gown • Use protective face shield (and goggles if needed) • Wear surgical gloves • Personnel who do not have one-to-one treatment / who are more than 1 meter away from the patient • Wear a short-sleeve scrubs • Wash your hands with soap and water or disinfect them with 70% alcohol-based hand sanitizer. • Wear a surgical mask • Follow the social distance rules • Use the following equipment when necessary • Wear a head cover • Wear a protective face shield • Wear a fluid resistant gown • Wear surgical gloves • Wear an N95 mask and a surgical mask on top of it (Technicians working in the Laboratory) • Wear waterproof boots or slippers (For Cleaning Staff and Staff in the Central Sterilization Unit (Dirty Area)) • Wear long rubber gloves (For Personnel in the Central Sterilization Unit (Dirty Area))
Order of Wearing Personal Protective Equipment 1. Wear a fluid resistant gown 2. Wear a the N95 mask 3. Wear a head cover 4. Wear a facial shield 5. Wear gloves
Order of Removal of Personal Protective Equipment 1. Remove the gloves: One should be peeled off the hand and turned inside out, held with the other gloved hand, the other glove should be peeled from the wrist with the fingers without gloves, the 2nd glove should be turned inside out, and discarded as a small bag consisting of both gloves. 2. Then remove the facial mask (start by lifting from the back) and goggles (remove glasses without gloves only and pull them off close to the ear area) after hand hygiene is ensured. 3. Pull the apron off the shoulders: The apron should be grasped by the shoulders, the contaminated outer face should be turned inwards, it should be rolled up and folded, and when removed, only the clean side should be visible. 4. Remove the head cover in one forward motion 5. Remove the mask from the side lining 6. Wash your hands and face always at the end of the procedure and wash your hands after each step (or use an alcohol-based hand sanitizer).
Wearing a N95 / FFP2 Mask and Usage Rules 1. Wash your hands before the N95 masking. 2. Place the mask on your nose, mouth, and chin. 3. First, slide the lower elastic under your ear. Then, put the upper elastic over your ear. 4. Bend the metal tape on the upper edge to fit your nose. Make sure that the mask covers the nose edges completely. 5. Do a fit test by breathing. Ensure that the mask fits on the face so that it does not leak. 6. Wear a surgical mask over the N95 for each patient and discard after each use. 7. The N95 mask can be used continuously for 8 hours without removing it, or it can be used up to 5 times, then it needs to be removed. It should be stored in a tissue or a paper bag.

compare the rates. Analysis results are presented as frequency (percentage). The significance level was taken as $p < 0.05$.

RESULTS

The total number of the people working at the Dental Hospital, including physicians and non-physicians, is

Table II. Rules Specially Prepared for Each Department of Dentistry

Department of Oral and Maxillofacial Radiology
• There should be 30 minutes between examinations (for dental examination + x-ray + disinfection and ventilation)
• Ensure that patients coming from the medical faculty inpatient service come by appointment and are examined as the first patients.
• If possible, panoramic radiography should have no more than 5 patients per hour.
• If necessary, periapical radiography should have no more than 6 patients per hour.
• In intraoral radiographies, the patient should be provided with gloves to hold the film. Hand hygiene must be ensured after the gloves are removed.
• After an x-ray, the room should be disinfected and ventilated.
• There should be at least 20 minutes between computerized tomography.
Department of Periodontology
• The use of a cavitron should be avoided whenever possible.
• Treatment time should be maximum 45 minutes and after the treatment, 15 minutes of waiting 30 minutes of cleaning, and disinfection and ventilation should be allocated.
• The instruments used in the local operating room should be sorted in the room where the surgery was performed and placed in baskets leading to the central sterilization unit.
• The table where the instruments are placed should be disinfected in the room where the surgery is performed.
Department of Prosthodontics
• Treatment time should be 45 minutes at most and after the treatment, 15 minutes of waiting, 30 minutes of cleaning, and disinfection and ventilation should be allocated.
• After measurements are taken for appliances and prosthesis parts, they should be washed and disinfected and then they should be placed in bags and sent to the laboratory in special containers, with signs documenting that they were disinfected.
• Prosthesis parts that will go to the laboratory should not be left in the treatment areas.
• Officials representing implant companies should be present at the clinic only at their appointment time.
• Company representatives, who will be in close contact with the patient during implant applications, should wear the necessary Personal Protective Equipment.
• Implant cleaning steps should be done in the central sterilization unit.
Department of Endodontics
• Treatment time should be 45 minutes at most and after the treatment, 15 minutes of waiting, 30 minutes of cleaning, and disinfection and ventilation should be allocatedIf possible, periapical x-rays should be avoided between treatment sessions.
• Endomotor, ultrasonic, and apex locator cables should be covered with special covers.
• Gutta-perchas and paper points should not be given in boxes but should be given to the physician in the required number in separate petri dishes.
Department of Restorative Dentistry
• Treatment time should be 45 minutes at most and after the treatment, 15 minutes of waiting, 30 minutes of cleaning, and disinfection and ventilation should be allocated Bite-wing radiography should be avoided whenever possible.
• Aesthetic applications should be postponed.
Department of Orthodontics
• In aerosolized procedures, the treatment time should be 45 minutes at most and after the treatment, 15 minutes of waiting, 30 minutes of cleaning, and disinfection and ventilation should be allocated
• For aerosol-free procedures, there should be at least 20 minutes between patients.
• In orthodontic examinations, a patient should be taken every 30 minutes.
• After the measurements are taken for appliances and prosthesis parts, they should be washed and disinfected and then they should be placed in bags and sent to the laboratory in special containers with signs documenting that they were disinfected.
• Pliers used during treatment should be sterilized in an autoclave.
• Brackets should be disinfected before and after sandblasting.
• The wires to be used should be measured to the required lengths and used as sterile.
• Procedures to be performed during the photo shoot should be done by maintaining social distance and without touching patients.
• Photo shoots should be done in areas with ventilation.
• Obtained dental models should be stored in bags in a separate area.

Table II. Rules Specially Prepared for Each Department of Dentistry (More-II)

Department of Pediatric Dentistry
• The treatment time should be 45 minutes at most and after the treatment, 15 minutes of waiting, 30 minutes of cleaning, and disinfection and ventilation should be allocatedIf possible, the patient's relative should not be allowed into the treatment area. If necessary, at most, one patient relative should be taken into the treatment area.
• In endodontic treatments, if possible, taking periapical x-rays should be avoided between treatment sessions.
• Endomotor, ultrasonic, and apex locator cables should be covered with special covers.
• Gutta-perchas and paper points should not be given in boxes but should be given to the physician in the required number in separate petri dishes.
• After the measurements are taken for appliances and prosthesis parts, they should be washed and disinfected and then they should be placed in bags and sent to the laboratory in special containers with signs documenting that they were disinfected.
Department of Oral, Dental, and Maxillofacial Surgery (Clinical and Local Operating Room Areas)
• Fever measurement and Covid-19 questioning should be done at the entrance to the building.
• The waiting time between patients in the clinic should be 30 minutes.
• In the local operating room, dirty instruments should be separated in the treatment rooms; they should be placed in the basket, covered with a green cover, and then transferred to the dirty instrument section with clean gloves.
• Cleaning of the operating table should be done in the room.
General Operating Room and Inpatient Service
• Preoperative PCR testing for COVID-19 should be performed at least 48 hours before the surgical procedure.
• The beds in the patient rooms should be positioned at a distance of 2 meters between them.
• An attendant should not be accepted and if necessary, only one relative should be allowed to stay with pediatric patients.
• It should be ensured that the patients and their attendants wear a medical mask during bedtime.
• The patient and his attendant should be informed about hand hygiene.
• The patient should have a mouthwash with povidone iodine or hydrogen peroxide before surgery.
• Anesthesia circuits in the operating room should be changed after each patient.
• Anesthesia masks should be changed for each patient or disinfected with high-level disinfectants.
• The surface of anesthesia machines should be covered with disposable transparent covers.
• The anesthesia team, which will leave the operating room after intubation, should leave the room only after removing the protective equipment inside the room.
• Medical personnel leaving a sick room must remove the protective equipment in the designated area just outside the patient's room and place it into the relevant waste bins.
• After the patient leaves the operating room, the room should not be entered for the first 15 minutes, after 15 minutes, all surfaces should be disinfected and cleaned, and at least 30 minutes should be waited until the next patient.
• Hand hygiene should be provided before and after contact with a patient.
• It should be ensured that there is at least 1 meter distance between the patient bed and the file containing the patient follow-up forms.
• Hand hygiene should be provided at the entrance and exit of patient rooms.
• Attention should be paid to hand hygiene in common sinks, entrances, and exits.
• Attendants should be prevented from leaving the patient room and the use of the nurse call button should be provided when needed.
• Attendant meals will be given in single-use packages and should be consumed in patient rooms.
• After the patients are discharged, the patient rooms and toilets should be disinfected, cleaned, and waited for at least 30 minutes before the next patient is allowed in the room.
Prosthodontic and Orthodontic Laboratories
• Technician tables should be placed in accordance with social distance.
• Recommended PPE must be used.
• If hand hygiene cannot be carried out between each job, hands should be disinfected.
• Tables should be arranged to provide easy cleaning and disinfection.
• Only necessary materials and tools should be available in the work area.
• Every table should have hand and surface disinfectant.
• Unused tools and materials should be stored in the warehouse.
• Jobs for more than one patient should not coexist at the same time.
• The table, hand piece, and used tips must be disinfected between operations.
• Separate areas should be prepared for holding incoming and outgoing jobs. Jobs from clinics should not be kept open in the laboratory.
• Eating and drinking is not allowed.
• Regular cleaning and disinfection should be provided. Technicians are responsible for the establishment of this order.

Table II. Rules Specially Prepared for Each Department of Dentistry (More-II)

Arrangement of Waiting Room, Secretariats and Elevators
• Marker tags and safety strips should be placed in front of the secretaries, where patients can stay 1 meter away.
• To prevent contamination, patient entries should be made with personal numbers or names, not with patient cards.
• The seats in the waiting room will be placed in such way seats are left empty and the seats that will not be used should be closed in order to comply with social distancing.
• The seat arrangement in the waiting room should be arranged in a way that prevents patients from sitting back-to-back.
• A layout plan should be created with signs in elevators.
• Elevators should be cleaned regularly every three hours.

305 (Table III). Of them, 178 are physicians (lecturers, specialty students, and doctoral students). The number of non-physician personnel (administrative staff, secretaries, physician assistants, technicians, domestic help, disabled personnel, etc.) is 127. In the T1 period, 12 physicians were not included in the assessment because they did not work actively due to chronic illness, pregnancy, and nursing leave. In T1, 31 non-physician personnel were excluded from the study for the same reasons. For the same reasons, 2 physicians and 12 non-physicians were excluded from the study in the T2 period.

Table III. Descriptive and comparative statistics of rates

	T1 (13.03.2020 - 30.06.2020)					T2 (01.07.2020 - 30.10.2020)				
	Physician		Non-Physician			Physician		Non-Physician		
	N	%	N	%	p values *	N	%	N	%	p values *
Non-contact	166	100.0	88	(91.1)		161	(90.7)	64	(49.6)	
COVID-19 Disease										
Internal Source	0	(0.0)	0	(0.0)	-	0	(0.0)	0	(0.0)	-
External Source	0	(0.0)	2	(2.3)	0.119	3	(1.9)	15	(11.6)	**<0.001**
Isolated										
Internal Source	0	(0.0)	6	(6.8)	***0.002***	5	(3.1)	21	(16.3)	**<0.001**
External Source	0	(0.0)	0	(0.0)	-	7	(4.3)	29	(22.5)	**<0.001**

Note: After 01.07.2020, 2 non-physician personnel had two contacts with different Covid 19 patients. For this reason, one of the personnel was isolated twice and the PCR tests were negative. The PCR test of 1 personnel was positive after the second contact. For this reason, the number of employees in the contactless group was written as 64 instead of 62. Statistically significant degree: $p < 0.05$. *: Results of Fisher's Exact test Significance values.

In T1, no physician was infected by COVID-19 or was put into isolation. In T2, only 3 out of 176 physicians had COVID-19 infection due to an external source, and a total of 12 physicians, 5 for internal sources and 7 for external sources, were put into isolation.

In T1, only 2 of the 96 non-physician personnel had an external source COVID-19 infection and 6 were isolated due to internal sources. In T2, 15 out of 129 non-physician personnel had an external COVID-19 infection and a total of 50 non-physician personnel, 21 due to internal sources and 29 due to external sources, were put into isolation. Since none of the non-physician personnel, who were put into isolation tested positive for COVID-19, their status was not changed.

While the external source rate was 0% for physicians, who had COVID-19 in time T1, it was found to be 2.3% for other personnel, and there was no statistical difference between these rates (Table III, $p > 0.05$). While the rate of internal sources was 6.8% for other personnel, for those who were isolated, internal sources were not observed among physicians and a statistical difference was observed between these rates (Table III, $p < 0.05$).

Those who had COVID-19 in T2 were 1.9% for external source physicians and 11.6% for other personnel, and a statistically significant difference was observed between these rates (Table III, $p < 0.05$). While the internal source rate was 3.1% for physicians in those who were put into isolation, it was 16.3% for other personnel, and these rates differed statistically (Table III, $p < 0.05$). The external source rate was found to be 4.3% for physicians, 22.5% for other personnel, and these rates differed statistically (Table III, $p < 0.05$).

DISCUSSION

There is no universal guide for dental treatments in times of national disaster, global disaster, or pandemic. During the COVID-19 pandemic, caused by the SARS-CoV-2 virus, a universal protocol or guideline for conducting dental treatments has been published (13). In this case, it can be concluded that the current global dental practice is limited to the provision of emergency treatments only. This step is appreciative as it reduces the spread of COVID-19, but simple dental problems that cannot be done in time around the world have led to advanced dental and periodontal problems, leading to increased tooth loss. Although work on the development of a COVID-19 vaccination continues, all post-COVID-19 governments and health regulatory agencies need to establish new infection control protocols.

During routine dental treatments, applied in line with the measures determined by the infection control subcommittee of our hospital, the rate of external source was 0% for physicians in the T1 period, while it was

2.3% for other personnel, and there was no statistical difference between these rates. The fact that these rates are so low is thought to be due to the relatively low number of COVID-19 patients because only emergency dental procedures were performed during the T1 period. In fact, a limited number of patients were cared for in the first months of the pandemic and all necessary measures are taken immediately and meticulously in our faculty after the announcement of the pandemic. While the internal source rate was 6.8% for other personnel for those who were put into isolation during the T1 period, no internal source was observed in physicians, and there is a statistically significant difference between these rates. It is thought that this difference in the rates of internal isolation between physicians and non-physician personnel is due to the more careful application of the rules by the physicians.

While there was 1.9% in external source physicians in those who had COVID-19 during the T2 period, it was found to be 11.6% in other personnel, and there is a statistically significant difference between these rates. While the internal source rate for those under isolation was 3.1% for physicians, it was 16.3% for other personnel, and these rates differ statistically. During T2, when routine dental procedures were restarted, the percentages of those, who contracted COVID-19 infection or who were put into isolation due to internal sources was low for physicians. This was thought to be a result of 1- Adequate measures were taken in accordance with the requirements of each department, 2- Careful implementation of these measures by physicians in the time spent in and during patient care throughout the hospital. The fact that the percentage of non-physician personnel was statistically higher than physicians suggests that non-physician personnel are not as careful as physicians in obeying rules. In T2, the external source rate was 4.3% for physicians, 22.5% for other personnel, and these rates differ statistically. This again shows that non-physician personnel do not pay attention to COVID-19 measures as much as physicians do in their social life outside the hospital.

During the T1 and T2 periods, no physician or other non -physician personnel, who were isolated due to internal sources, became COVID-19 positive. Based on this result, it can be concluded that the infection control measures in the hospital are sufficient.

Dentists and auxiliary staff, who are among the most at risk for any infection transmitted through contaminated aerosols, saliva, body fluids, blood, or tissue particles, are generally used to high standards of infection control and personal protection measures (19,20). Supporting this position in our study in both T1 and T2, physicians' rates of being put into isolation due to COVID-19 and any contact were quite low. These rates were found to be statistically higher in the assistant personnel than in the physician group. This state can be attributed to the level of education and awareness between physicians and non-physician personnel.

SARS-CoV-2 can be isolated from the saliva of COVID-19 patients (21). In addition, it can become the main source of the virus, as salivary gland epithelial cells can potentially become infected with SARS-CoV (22). When performing dental procedures with a high-speed hand piece in most dental procedures, excessive heat will be generated due to friction between the tooth and the rapidly rotating bur. In the absence of coolant, heat can damage hard tooth tissue and cause pathological changes in dental pulp. Therefore, there is a universal consensus to use a water cooler when performing dental procedures, including dental preparation, oral prophylaxis, and oral surgery to avoid high temperatures (9). Since this creates droplets and aerosols in addition to blood and saliva contamination, because of the use of water as a coolant, transmission of the disease is strengthened and facilitated by these means (20, 21, 23). Considering the novelty of the disease and the high infectiousness of SARS-CoV-2 through direct contact with saliva and nasopharyngeal secretions or respiratory droplets (4), it is necessary to provide a healthy environment for patients and the dentistry team during this pandemic.

CONCLUSION

Dentists are at risk of exposure to infectious diseases by nature of their profession. The emergence of COVID-19 has brought new challenges and responsibilities for dental professionals. A better understanding of aerosol delivery and its implications in dentistry can help us detect and correct any negligence in daily dental practice. In addition to standard precautions, applying special precautions can prevent transmission of the disease from asymptomatic carriers. These specific measures not only help control the spread of COVID-19, but also act as a guide for the management of other respiratory diseases. 10 the fact that there were no physicians, who had COVID-19 infection in time intervals T1 and T2 due to internal sources shows that the measures taken in our faculty were sufficient. For this reason, we think that these rules, which have been arranged separately for the requirements of each department, in accordance with the pandemic conditions, by our faculty's infection board, are effective guidelines for dentists' offices, oral and dental health polyclinics, hospitals, and dentistry faculties. The limitation of the study stems from the difficulties in determining exactly where or from whom the COVID-19 transmission is.

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Ethics Statement

Informed consent forms were obtained from all individuals included at the beginning of the study. The approval required to conduct this study was obtained from the Erciyes University Clinical Research Ethics Committee (Approval Code: 2020/540).

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