Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Review

Legal liability facing COVID-19 in dentistry: Between malpractice and preventive recommendations

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ABSTRACT

The dental profession is considered at high potential risk of exposure and transmission of SARS-Cov-2. Thus, dentists should implement special safety measures in order to prevent any possible contamination during dental sessions and should be aware of the legal implications of their act in order to avoid malpractice leading them to be a causative agent of transmission of this virus. This paper aimed to provide a global review on COVID-19 preventive recommendations at dental clinics and discussed the legal values of such procedures, the dentist criminal and civil liability arising from transmitting this virus to a patient, the obligation of care under COVID-19 and the possible solution to this dilemma. The review concluded that dentists should follow all modern scientific procedures which are in their interest and in the interest of patients to maintain their safety and advised dentists to document all steps taken during the period of COVID-19 outbreak, because any undocumented action is considered not to have taken place, and they shall be bound by the burden of proof.

1. Dentistry facing COVID-19

SARS-CoV-2 is a new betacoronavirus which deriving respiratory disease was named COVID-19. Clinical manifestations of COVID-19 include dry cough, fever, shortness of breath, sore throat, chest pain, headaches, myalgia, gastrointestinal symptoms, sometimes pneumonia and can lead to severe respiratory problems, multiple organ dysfunction, or death.[1,2] However, it is reported that virus spread can happen asymptomatically.[3] The main cell receptor of SARS-Cov-2 virus is angiotensin-converting enzyme II, which was found to be expressed on the mucosa of the oral cavity and highly enriched in epithelial cells of tongue.[4] So far, several routes of transmission have been described such as contact with oral, nasal, and eye mucous membranes and via droplets and aerosols.[4–6] Since most of the latter are generated during dental procedures, dentists, assistants and patients are considered at high potential risk of exposure and transmission of this virus. Consequently, dentists should be aware of the legal implications of their act in order to avoid malpractice leading them to be the causative agent of transmission of this virus. This paper aimed to provide dental practitioners with a global review on special COVID-19 safety measures that should be implemented in order to prevent any possible contamination in their clinics and to discuss the juridical point of view regarding COVID-19 related dental malpractice.

2. COVID-19 special safety measures in dental clinics

2.1. Patient screening

All patients must fill out a thorough medical history form concerning COVID-19 either by phone or mail. It includes questions regarding the personal travel in highly epidemic areas, and epidemiological history (symptoms and history of contact with positive cases) of the patient.[7] However, in some articles, authors suggest that patient triage should be performed at reception and no telephonic pretriage is described.[8–10] In both cases, based on the collected information, if a patient has/had a positive history of contact and/or symptoms, treatment should be postponed, and the patient should be proclaimed to the sanitary authorities.[5] Meng et al. recommend that a delay of dental treatments to up to 14 days after the exposure event should be set for asymptomatic patients who had contact with infected subjects and/or traveled to an

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at-risk area, thus suggesting a self-quarantine at home.[9]

2.2. Appointment scheduling

The appointments should be straggled and scheduled within a minimum of 15 min' interval in order to allow ventilation after each session and to avoid patients crowding.[10,11] Therefore, only in case of pediatric and special needs patients, companion is allowed.[12] The patient and the companion are asked to wait while wearing a mask.[13]

2.3. Patient reception

Before entering the clinic, shoe covers or disinfection of shoe soles should be available.[11] The body temperature is checked with a noncontact forehead thermometer,[14,15] however, with strict adequate usage as they present some disadvantages.[16] The patient is asked to rub hands for 30 s with World Health Organization -recommended formulations 80% (wt/wt) ethanol or 75% (wt/wt) 2-propanol -based hand rubs.[17]

2.4. The waiting area

Management of the waiting area includes limiting its use as much as possible,[18] a spatial separation of at least 1 m between the attendants,[19] and getting rid of objects present over any surface.[7,20] Disinfection of the surfaces is required at least twice per day, while ventilation three times per day for at least 15 min each time.[20–23] The access to the toilet is prevented except for any emergency.[7,23] Alcohol based hand rubbing (ABHR) should be provided within the area.[10,20]

2.5. Personal protective equipment

The personal protective equipment (P.P.E.) for the dentist and the assistant includes a disposable gown over the uniform, protective glasses, a face mask, a face shield, head and shoe covers, and disposable latex or nitrile gloves during all dental treatments. They should be disinfected/changed between patients' visits.[5,8,9] The Easy 3D face shield has been proved to be a practical effective type.[24,25] A particulate respirator face mask that is at least as secure as N95 or equivalent is recommended.[26,27] Upon changing between patients, cleaning the hands up to the elbows using soap and water or ABHR is mandatory.[10]

2.6. Ventilation

There are several measures that can be performed: 1) High volume evacuation (HVE). It improves the general ventilation of the room, controls the airflow patterns and filters the circulating air. The filters in the suction apparatus must be cleaned daily.[28] 2) High efficiency particulate air (HEPA) filters. However, their effectiveness against SARS-CoV-2 should be evaluated.[29] 3) Extra-oral evacuation devices and special aerosol reduction devices (ARD). They have shown usefulness to reduce the number of droplets and aerosols while using the high speed turbine and ultrasonic scalers.[30] However, their efficacy against specifically SARS-CoV-2 should be investigated. 4) Ultra-low-volume fogging machine might be useful.[31] 5) Air Conditioner. It is recommended to minimize the usage as much as possible.[32] A frequent opening of windows should be ensured.[20,23]

2.7. Air disinfection

Its effectiveness against the SARS-CoV-2 has not been proven yet. The role of these technologies may be complementary to have good ventilation within the clinic. Several air disinfection systems, or air purifiers, are available in the market like ultraviolet germicidal irradiation (UVGI) devices[33] and the ozone air purification devices.[34]

2.8. Disinfection of the clinic settings

Disinfection of frequently touched surfaces and the clinic floor with an approved virucidal surface cleaner with any of different types of biocidal agents such as alcohols, hydrogen peroxide, benzalkonium or sodium hypochlorite chloride is mandatory.[5,9,35,36]

3. 2019-nCoV special precautions in routine practice

The patient is asked to rinse with a virucidal antiseptic solution.[37] Dental radiographs must be taken with precautions.[7,10] A rubber dam is obligatory whenever it is possible.[3,7,10] It is important to consider the use of chemo-chemical caries removal, atraumatic restorative techniques, excavators, hall technique for stainless steel crowns,[8] manual instruments for scaling and polishing,[38] and red or blue contra-angle handpiece rather than the high speed handpiece. While using the handpiece, the water deposit should be reduced to the minimum possible.[5,7] To prevent any stimulation of coughing during the impression, a careful choice of the trays before the procedure is mandatory.[7] An appropriate virucidal disinfectant solution is used on dental prosthesis, impressions, and other prosthodontic materials upon removal from the patient's mouth and once receiving from laboratory. Simple extraction procedures are done while the patient is in the supine position to prevent operating in the patient's breathing tract.[21,38] The use of nitrous oxide and equimolar mixture of oxygen and nitrogen peroxide (MEOPA) for dental treatment is not recommended.[39,40] In case of absolute necessity, very strict requirements are imposed: avoid using systems that provide the final rejection of exhaled gas at the outlet of the suction pump and adopt a ready to use kit (15 utilizations) provided to throw the mask and filter (0,22µ; reference number 19212T) systematically after each use (single use mask and filter). Disinfect the reusable part of the kit but throw all the kit after 15 usages.[40,41]

In conclusion, precautions must be strictly implemented not only for health protection, but also for prevention of any legal consequence. In addition, even with the usage of the most advanced equipment and technologies, there is still a risk of COVID transmission during the care within the dental clinic especially that most of the proposed precautions are still not evidence based.

4. The Law

Although the dental profession is recognized as one of the most hazardous medical professions in transmitting coronavirus to the patient as mentioned above, international human rights law, namely the International Covenant on Economic, Social and Cultural Rights ratified by most states, guarantee the right of everyone to the enjoyment of the highest attainable standard of health, and compelled states to take measures to prevent a public health threat and provide healthcare to those in need. In addition, the local laws of most countries have bound the dentist to provide the necessary treatment to the patient. *(In this context, Article 9 of the Responsibilities of the Dentist under Lebanese Law No. 487 issued on December 12, 2002. The Law allowed the dentist (Article 25) to refuse, except in cases of emergency or in the event of a breach of a human duty, to provide treatment for personal or professional reasons, restricting the rejection to three conditions, (1) not to harm the patient, (2) to ensure the continuity of treatment and provide for this purpose all necessary guidance, and (3) not to exercise this right except in light of respecting the rule of non-discrimination in terms of the patients' origins, customs, family status, or affiliation to a race, nationality, religion, or party, and whatever their health status, reputation, and feelings towards them).*[42]

It is true that dentists' clinics in most countries were closed at the time of COVID-19 pandemic[43,44] (*The routine practice of the dental profession was suspended in the United Kingdom in January 2020, and then began to return to normal after nearly three months. Although the National Health Services (NHS) advised dentists and their teams to pursue the provision of routine care to people not showing any COVID-19 symptoms, taking*

into account social distancing, the GPD did not welcome the advice and considered that it was morally appropriate that the routine dentistry practice be reduced for fear of virus transmission to patients) but this closure was temporary, and only intended to prevent its outbreak. Consequently, the dentist cannot invoke the pandemic in order to stop providing healthcare to patients and shall practice work in light of this circumstance.

Today, after life gradually returning to normal worldwide, dentists return to practicing their profession at a time when COVID-19 continues to spread, albeit at a slower rate, which seriously addresses the possibility that patients may become infected, and resort to claim the dentist for damages incurred as a result; thus raising the liability of the dentist in this regard.

To approach the dentist's liability, whether criminal or civil, for transmitting COVID-19 to a patient, a traditional opinion considers that, in order to determine the dentist's liability, the general liability rules shall be resorted to, thus proving the fault, the damage, and the causation relationship. On the other hand, another new old opinion considers that it is necessary to provide immunity to physicians in general, including dentists, when they practice their work on the "front lines" fighting COVID-19, thus, they cannot be held accountable at all in this case. Another opinion believes that physicians shall be held accountable only in cases of gross negligence and willful misconduct.

How does the dentist criminal and civil liability arise from transmitting the virus to a patient in light of COVID-19 pandemic and under the compliance to the procedures detailed in this study? and what is the legal value of such procedures? Are they obligatory for dentists who shall be held accountable in case of non-compliance or not? In general, did the obligation of care imposed on the dentist change under COVID-19 pandemic and what shall be considered to reduce the possibility of accountability? Furthermore, will the provision of full or partial immunity to dentists constitute a solution to this dilemma?

We shall start by determining the legal value of the procedures included in this study, which dentists are supposed to regard and adhere to.

There is no doubt that there are procedures imposed by governments and ministries of health as well as Orders of Dentists in various countries and which dentists abide thereby. Physicians undertake to implement such procedures and not violate them, otherwise, they are considered to have violated a requirement imposed by law. Various laws give the Minister of Health and the Order of Physicians the right to issue instructions to physicians restricting them in the exercise of their profession.[45] *[For example, in light of the outbreak of the "Asian flu" pandemic in Lebanon in 1957, the Law of Communicable Diseases in Lebanon (promulgated on December 31, 1957) was issued, setting regulations in force to date, regarding the powers of the public administration in time of pandemics to reduce the spread of communicable diseases.*[46] *As the pandemic threatened the country and widespread and the local means of prevention were insufficient, as is our case today, the Ministry of Public Health had to "issue a decree" specifying the measures that would prevent the spread of the pandemic, as well as determine the powers of each public authority or administration entrusted with implementing such measures, provided that the necessary implementation power is* granted*).*[47] *In addition, Article 64 of the Responsibilities of the Dentist under Lebanese Law, mentioned above, explicitly* granted *the Order of Physicians the right to specify the technical equipment required in clinics to ensure patient safety. Article 38 of the said law obligated the dentist to cooperate with the competent authorities in order to maintain public health. Article 7 of the bylaws of the Order of Dentists in Lebanon obligated the dentist to abide by the laws and regulations of the Order and the decisions of the Order Council, under penalty of criminal prosecution.*[42]

Therefore, if the Order of Physicians or the Ministry of Health chooses some of the procedures stipulated in the study, they become binding on physicians who can easily be held accountable for damages resulting from non-compliance thereto.

But what if such procedures are not imposed by the Order of Dentists or the Ministry of Health? Will they have the same effect? In other words, will the dentist be held accountable for damage arisen as a result of the failure to adhere to one of the procedures stipulated in this study, or any other scientific study in the same context?

One may think that the answer to this question is self-evident, which is that, as long as these procedures were not issued by a body granted by law the right to issue instructions to physicians, they are not considered obligatory and physicians may not abide thereby. However, an in-depth review makes this answer hasty and incorrect. How?

Laws in most countries, obligate physicians, including dentists, to adhere to modern scientific and professional principles in the treatment of their patients, [*In this context, Article 26 of the Responsibilities of the Dentist under Lebanese Law referred to above*][42] and the principles and instructions mentioned in this study, and other specialized studies, constitute with no doubt scientific principles that dentists are supposed to observe and adhere to.

As we will demonstrate later on, when the physicians' behavior is assessed to determine whether they are mistaken, the judge refers to the awareness, intelligence and knowledge of other physicians, and conducts a comparison to the physician's duties, including the obligation to adhere to modern scientific principles. In other words, this study establishes clear scientific principles, which adherence thereto prevents any COVID-19 positive cases. Physicians shall be subject to accountability if it is proven that they did not observe any of the principles, that led to the transmission of the disease to one of the patients.

After presenting the legal value of the scientific principles concluded in this study, we shall discuss the opinion demanding that physicians, including dentists, be granted full immunity against accountability when addressing the treatment of a COVID-19 patient.

The discussion of this opinion reviews the trend in the United States of America, where 23 states, have granted some immunity ranks to senior healthcare providers.in this context, any health care provider who in good faith renders care or assistance, with or without compensation, in connection with the COVID-19 pandemic, including taking measures to coordinate, arrange for, respond to, provide, or address issues related to the delivery of health care services, shall not be liable for any civil damages for any acts or omissions that occur during a period where there is in effect an executive order issued by the governor of Missouri declaring that a state of emergency exists …. ". The question for such opinion surpassed the issue of immunity during the fight against COVID-19 pandemic, and, the question would be whether the "in connection with the COVID-19 pandemic" language would be broad enough to immunize providers who are not on the front line but who have delayed or modified non-COVID-19 care because of the public health emergency and related guidance.[47]

Governor Cuomo of New York, through Executive Order No. 202.10, granted immunity from civil and criminal liability to healthcare facilities and professionals for "any injury or death alleged to have been sustained directly as a result of an act or omission by such medical professional in the course of providing medical services in support of the State's response to the COVID-19 outbreak," unless the act or omission was caused by gross negligence or willful misconduct. Governor of Illinois took similar action through Executive Order No. 17, which granted healthcare facilities and professionals immunity from civil liability for any injury or death which occurs while the provider rendered health care services in response to COVID-19. Like New York, the immunity does not extend to injuries caused by gross negligence or willful misconduct.[47,48]

In comparison with the decisions taken by the state governors of New York and Illinois, Governor of Kansas tied immunity fairly directly to COVID-19 care, providing immunity for "making clinical and triage decisions and rendering assistance, testing, care or advice in the care of patients reasonably suspected or confirmed to be infected with COVID-19" through Executive Order 20–26. The order does not provide liability protection for healthcare providers delaying or deferring non-urgent care to non-COVID-19 patients during the declared emergency.[49]

This approach may not find much support, as the complete immunity

from lawsuits would lead to lax safety standards that endanger public health,[50] and we do not prefer to adopt them. Accordingly, we move on to present an opinion that does not recognize any immunity for dentists during their work and provide them with normal treatment during which they apply the rules of accountability, whether civil or criminal.

In applying the rules of liability, whether civil or criminal, the different legal systems, Anglo-Saxon and Latin, are similar in terms of this liability, and they require the fault or unlawful act, the damage, and the causation relationship. The patient who was affected by the work of a physician shall prove that the latter made a fault or unlawful act that resulted in the injury complained about in order to obtain compensation.

We begin to define the elements of liability, which, as mentioned above, are the fault or unlawful act, the damage, and the causation relationship. So a person seeking compensation for clinical negligence must establish three things: 1. that the defendant owed the patient a duty of care, 2. that the defendant was in breach of that duty; and 3. that the breach of duty of care caused harm to the patient.

In order to establish that the defendant was negligent, the claimant must show that the defendant fell below the required standard of care. The standard of care demanded of the doctor is the standard of the reasonably skilled and experienced doctor. In *Bolam v. Friern Hospital Management Committee,* McNair directed the jury: The test is the standard of the ordinary skilled man exercising and professing to have that special skill. A man need not possess the highest expert skill; it is a well-established law that it sufficient if he exercises the ordinary skill of an ordinary competent man exercising that particular art. In what became known as the *Bolam* test, he said: [A doctor] is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a responsible body of medical men skilled in that particular art … merely because there is a body of opinion who would take a contrary view.[51,52]

The obligation of physicians in general, including the dentist, is an obligation of means,[53] [*The French Court of Cassation considered in its initial decision issued on May 20,* 1936 that *the relationship between the physician and his client is contractual, and results in an obligation not to cure the patient, but to offer him medical help, conscientiously and diligently, in conformity with the data of medical science, except for exceptional circumstances*] that is, they seek, according to their knowledge, to treat and cure the patient, but they do not guarantee the result. Therefore, the failure to achieve the result does not necessarily mean that they have committed any fault. However, this principle is not based on its issuance, as the dentist may be obligated according to the result as is the case in the dental implants, to bear responsibility in the event of a broken dental bridge.[54]

Hence, we say that the dentist shall adhere to the obligations imposed thereon by the relevant Order, as well as the scientific principles established thereupon, among which, for example, the precautions that should be taken during the exercise of the profession in light of COVID-19 outbreak, mentioned in this study.

Hence, the question arises: what if dentist did not adhere to one of these obligations? What if he/she did not use a face mask or did not sterilize the room? What if he/she did not adhere to the time interval between each patient appointment, and it was found that the patient had been infected with COVID-19 and was able to prove the infection in the dentist's office? Does the patient have to prove that the dentist did not comply with this obligation? Or should the dentist prove the adherence thereto? In other words, who should bear the burden of proving that the dentist adhered or not to the procedures in light of COVID-19 pandemic?

In fact, the evidence is on the claimant. As long as the patient claims that the physician did not abide by these procedures, the patient shall refer to said procedure and the burden of proof will become the responsibility of the physician who in this case has to prove the performance of this obligation, or the inability to demonstrate the performance, meaning that the dentist has committed a fault-related mistake bestowing the liability.

We consider that the dentist's obligation to adhere to the procedures compatible with the treatment in the event of COVID-19 outbreak is an obligation of result, meaning that the dentist cannot, in the justification of his lack of commitment to the procedures imposed thereon, demonstrate to have made efforts to perform the obligation without being able to do so, as all obligations imposed thereon are achievable and may be confirmed. In other words, the mere evidence that the physician did not perform the obligation imposed thereon is a fault and it remains only to prove that it caused the damage.

It is necessary to differentiate between two cases: the arrival of a patient to the dentist's clinic not showing any COVID-19 symptoms (Case 1), and the arrival of a patient showing clear symptoms and testing positive for the virus (Case 2). Accordingly, we ask, will the physician's obligation to provide healthcare change between the two cases?

In fact, in Case 2, when the dentist is aware and sure of dealing with a patient with COVID-19, then the vigilance and attention will increase significantly, and if the dentist neglects any of the measures imposed thereupon, he/she will have committed a gross fault, which may reach potential intent. In other words, when the dentist is aware of a COVID-19 patient, and does not take any of the obligatory procedures, it means that the result of the infection was clear and the dentist accepted the risk, thus, he/she shall be liable for an intentional fault. *[In this context, Article 191 of Lebanon Penal Code stipulates the following: "The crime is unintended, whether the perpetrator did not expect the result of his act, his failure to do it, or the wrongful act thereof, and he was able to expect it, or should have expected it and whether he expected it and could have avoided it."].*[55]

Another question arises, what if it is proven that the dentist has complied with all procedures that prevent COVID-19 infection; however, the virus was transmitted? Will the dentist bear the responsibility thereof?

In fact, an answer to the above question can only be provided, after determining whether the procedures stipulated in this study and other similar scientific studies strictly prohibit the transmission of infection from one patient to another in the dentist's clinic. If following such procedures definitely prevents the transmission of the virus, the mere transmission to a patient in the dentist's clinic means that the latter failed to take the imposed measures, or they were incorrectly applied. If we consider that these procedures cannot completely prevent the transmission of the virus, this means that the dentist's compliance to the procedures will not absolutely prevent the transmission of infection, and therefore, in the event of its transmission, the dentist shall not be liable as long as the adherence to the procedures is proven.

As for the harm that the patient may incur, it is either harm that he/she may suffer a lot to recover therefrom or lose his/her life. The transmission of the virus to the patient may lead to his/her suffering, improvement and recovery (Case 1), or to his/her suffering that will end with death (Case 2).

In Case 1, the patient can prosecute the physician based on civil liability, and can also resort to criminal liability. In both cases, the patient shall prove that the physician committed a fault. In our current case, the patient shall prove that the physician did not comply with one of the obligations imposed thereon and which prevents the transmission of the infection, the damage caused thereto and the causation relationship, whereas the heirs of the deceased patient in Case 2 may also prosecute the physician based on the civil and criminal liabilities by proving that the physician made a fault, which causally caused the patient's death. *[Article 564 of the Lebanon Penal Code stipulates the following: "Anyone who causes the death of an individual from negligence, lack of precaution, or failure to observe laws or regulations shall be punished by imprisonment from six months to three years," while Article 565 of the same Law prescribes the following: "If the offender's mistake only results in harm as stipulated in Articles 556 to 558, the punishment shall be from two months to a year. Any other unintended injury shall be punished by imprisonment for a maximum of six months or by a fine not exceeding two hundred thousand pounds. The prosecution shall be suspended on a complaint, if the victim does not result in illness or disability from work for a period exceeding ten days, and the complainant's assignment of his right shall have the same effects as described*

in Articles 554 and 555].[55]

We add that if the dentist's mistake leads to a COVID-19 outbreak, meaning that more than one patient is infected, the dentist may be subject to criminal liability, in addition to the damages that afflicted the patients because of the pandemic outbreak. [*Article 604 of the Penal Code stipulates the following: "Anyone who, due to lack of precaution, negligence, or failure to observe laws or regulations, causes the spread of a human pandemic, shall be punished by imprisonment for up to six months.*"].[55]

We before conclusion, draw attention to the fact, that the law requires the dentist to maintain the professional secrecy, but at the same time, and in the event of a specific pandemic outbreak, the dentist is obligated to inform the public authorities. Dentists shall pay attention to whether the law in their countries obliges them to inform the competent authorities to have treated a COVID-19 suspected patient, otherwise they shall become liable as a result of their failure to do so. *[In Lebanon, for example, the Law stipulates that the physician, each family member, and others, shall be responsible of informing the health authorities about communicable diseases. The Law allowed the Minister of Public Health to issue a decision amending the list of communicable diseases set forth in the Law and which shall be communicated, and to condemn the physician who fails to comply with the obligation to inform of imprisonment and fine].*[46]

In conclusion, we pointed out in the study to the obligations and precautions that dentists shall observe, during the exercise of their tasks during the period of COVID-19 outbreak. We indicated that these procedures as a scientific opinion are binding and shall be applied, under penalty of liability for the harm caused due to non-compliance. We differentiated between the opinion that provides the physician absolute or partial immunity during the exercise of the profession during the period of COVID-19 pandemic. This is an opinion we do not support because it may lead to the physician's lax endangering the lives of patients. We also demonstrated the elements of liability, upon which almost all legal systems in the world unanimously agree, namely the necessity of fault, harm and causation relationship.

We advise physicians to follow all modern scientific procedures agreed upon that contribute to limiting the spread or transmission of COVID-19, which is in their interest and in the interest of patients to maintain their health and safety. We also advise dentists to document all steps taken during the period of COVID-19 outbreak, where, the old risk management adage "if it isn't documented it wasn't done" applies. In other words, what seems unforgettable today the considerable efforts dentists are taking to provide safe care will be easily overshadowed in the event of tragic outcomes. Therefore, dentists should take the time to document their protocols and other actions taken to comply with applicable guidance. If a dentist cannot meaningfully comply with the applicable guidelines, then the dentist should wait to resume elective care until compliance is manageable.

CRediT authorship contribution statement

Rola Elzein: Writing dental part - Original draft preparation. **Bilal Bader:** Writing law part. **Achraf Rammal:** Writing law part. **Hassan Husseini:** Writing dental part- Original draft preparation. **Houssam Jassar:** Writing dental part- Original draft preparation. **Mustapha Al-Haidary:** Writing dental part- Original draft preparation. **Maria Saadeh:** Reviewing and Editing. **Fouad Ayoub:** Conceptualization, Supervision.

Declaration of competing interest

The Authors declare that there is no conflict of interest.

References

1. Ozma MA, Maroufi P, Khodadadi E, et al. Clinical manifestation, diagnosis, prevention and control of SARS-CoV-2 (COVID-19) during the outbreak period. *Inf Med.* 2020;28(2):153–165.
2. Tu YF, Chien CS, Yarmishyn AA, et al. A review of SARS-CoV-2 and the ongoing clinical trials. *Int J Mol Sci.* 2020;21(7):2657. https://doi.org/10.3390/ijms21072657.
3. Gao Z, Xu Y, Sun C, et al. A systematic review of asymptomatic infections with COVID-19 [published online ahead of print, 2020 may 15. *J Microbiol Immunol Infect.* 2020. https://doi.org/10.1016/j.jmii.2020.05.001, 10.1016/j.jmii.2020.05.001.
4. Xu H, Zhong L, Deng J, et al. High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. *Int J Oral Sci.* 2020;12(1):8. https://doi.org/10.1038/s41368-020-0074-x.
5. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci.* 2020;12(1):9. https://doi.org/10.1038/s41368-020-0075-9.
6. To KK, Tsang OT, Yip CC, et al. Consistent detection of 2019 novel coronavirus in saliva. *Clin Infect Dis.* 2020;71(15):841–843. https://doi.org/10.1093/cid/ciaa149.
7. Fini MB. What dentists need to know about COVID-19. *Oral Oncol.* 2020 Jun;105:104741. https://doi.org/10.1016/j.oraloncology.2020.104741. Epub 2020 Apr 28.
8. Li ZY, Meng LY. Prevention and control of novel coronavirus infection in department of stomatology. *Zhonghua Kou Qiang Yi Xue Za Zhi.* 2020;55(4):217–222. https://doi.org/10.3760/cma.j.cn112144-20200210-00044. PMID: 32268622.
9. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. J Dent Res. 2020;99(5):481-487. doi: 10.1177/0022034520914246.
10. Cabrera-Tasayco FDP, Rivera-Carhuavilca JM, Atoche-Socola KJ, Peña-Soto C, Arriola-Guillén LE. Biosafety measures at the dental office after the appearance of COVID-19: a systematic review [published online ahead of print, 2020 Jul 27] *Disaster Med Public Health Prep*. 2020:1–16. https://doi.org/10.1017/dmp.2020.269.
11. Guo ZD, Wang ZY, Zhang SF, et al. Aerosol and surface distribution of severe acute respiratory syndrome coronavirus 2 in hospital Wards, Wuhan, China, 2020. *Emerg Infect Dis.* 2020;26(7):1583–1591. https://doi.org/10.3201/eid2607.200885.
12. Shroff S, Hughes C, Mobley C. Attitudes and preferences of parents about being present in the dental operatory. *Pediatr Dent.* 2015;37(1):51–55.
13. MacIntyre CR, Chughtai AA. A rapid systematic review of the efficacy of face masks and respirators against coronaviruses and other respiratory transmissible viruses for the community, healthcare workers and sick patients. *Int J Nurs Stud.* 2020;108:103629. https://doi.org/10.1016/j.ijnurstu.2020.103629.
14. Mattos FF, Pordeus IA. COVID-19: a new turning point for dental practice. *Braz Oral Res.* 2020;34:e085. https://doi.org/10.1590/1807-3107bor-2020.vol34.0085.
15. Hsiao S, Chen T, Chien H, Yang C, Chen Y. Body temperature measurement to prevent pandemic COVID-19 in hospitals in Taiwan: repeated measurement is necessary. *J Hosp Infect.* 2020;105(2):360–361. https://doi.org/10.1016/j.jhin.2020.04.004.
16. Aw J. The non-contact handheld cutaneous infra-red thermometer for fever screening during the COVID-19 global emergency. *J Hosp Infect.* 2020;104(4):451. https://doi.org/10.1016/j.jhin.2020.02.010.
17. Kratzel A, Todt D, V'kovski P, et al. Inactivation of severe acute respiratory syndrome coronavirus 2 by WHO-recommended hand rub formulations and alcohols. *Emerg Infect Dis.* 2020;26(7):1592–1595. https://doi.org/10.3201/eid2607.200915.
18. Spagnuolo G, De Vito D, Rengo S, Tatullo M. COVID-19 outbreak: an overview on dentistry. *Int J Environ Res Publ Health.* 2020;17(6):2094. https://doi.org/10.3390/ijerph17062094.
19. Sun C, Zhai Z. The efficacy of social distance and ventilation effectiveness in preventing COVID-19 transmission. *Sustain Cities Soc.* 2020;62:102390. https://doi.org/10.1016/j.scs.2020.102390.
20. Izzetti R, Nisi M, Gabriele M, Graziani F. COVID-19 transmission in dental practice: brief review of preventive measures in Italy. *J Dent Res.* 2020;99(9):1030–1038. https://doi.org/10.1177/0022034520920580.
21. Zhao Z, Gao D. Precaution of 2019 novel coronavirus infection in department of oral and maxillofacial surgery. *Br J Oral Maxillofac Surg.* 2020 Apr;58(3):250–253.
22. Zhou J, Otter JA, Price JR, et al. Investigating SARS-CoV-2 surface and air contamination in an acute healthcare setting during the peak of the COVID-19 pandemic in London. *Clin Infect Dis.* 2020. https://doi.org/10.1093/cid/ciaa905. ciaa905.
23. Liu Y, Ning Z, Chen Y, et al. Aerodynamic analysis of SARS-CoV-2 in two Wuhan hospitals. *Nature.* 2020;582(7813):557–560. https://doi.org/10.1038/s41586-020-2271-3.
24. Neijhoft J, Viertmann T, Meier S, et al. Manufacturing and supply of face shields in hospital operation in case of unclear and confirmed COVID-19 infection status of patients. *Eur J Trauma Emerg Surg.* 2020;46(4):743–745. https://doi.org/10.1007/s00068-020-01392-3.
25. Lemarteleur V, Fouquet V, Goff SL, et al. 3D-printed protected face shields for healthcare workers in Covid-19 pandemic. *Am J Infect Contr.* 2020. https://doi.org/10.1016/j.ajic.2020.08.005. S0196-6553(20)30772-0.
26. Wang X, Pan Z, Cheng Z. Association between 2019-nCoV transmission and N95 respirator use. *J Hosp Infect.* 2020 May;105(1):104–105.
27. Long Y, Hu T, Liu L, et al. Effectiveness of N95 respirators versus surgical masks against influenza: a systematic review and meta-analysis. *J Evid Base Med.* 2020 May;13(2):93–101.
28. Ravenel TD, Kessler R, Comisi JC, Kelly A, Renne WG, Teich ST. Evaluation of the spatter-reduction effectiveness and aerosol containment of eight dry-field isolation techniques. *Quintessence Int.* 2020;51(8):660–670. https://doi.org/10.3290/j.qi.a44919.
29. Christopherson DA, Yao WC, Lu M, Vijayakumar R, Sedaghat AR. High-efficiency particulate air filters in the era of COVID-19: function and efficacy. *Otolaryngol Head Neck Surg.* 2020;163(6):1153–1155. https://doi.org/10.1177/0194599820941838.

30. Junevicius J, Surna A, Surna R. Effectiveness evaluation of different suction systems. *Stomatol.* 2005;7(2):52–57.
31. Gore RK, Saldana C, Wright DW, Klein AM. Intubation containment system for improved protection from aerosolized particles during airway management. *IEEE J Transl Eng Health Med.* 2020;8:1600103. https://doi.org/10.1109/JTEHM.2020.2993531. Published 2020 May 11.
32. Mouchtouri VA, Koureas M, Kyritsi M, et al. Environmental contamination of SARS-CoV-2 on surfaces, air-conditioner and ventilation systems [published online ahead of print, 2020 Aug 13 *Int J Hyg Environ Health*. 2020;230:113599. https://doi.org/10.1016/j.ijheh.2020.113599.].
33. Yang H, Hu J, Li P, Zhang C. Ultraviolet germicidal irradiation for filtering facepiece respirators disinfection to facilitate reuse during COVID-19 pandemic: a review [published online ahead of print, 2020 Aug 4] *Photodiagnosis Photodyn Ther*. 2020;31:101943. https://doi.org/10.1016/j.pdpdt.2020.101943.
34. Li CS, Wang YC. Surface germicidal effects of ozone for microorganisms. *AIHA J*. 2003;64(4):533–537. https://doi.org/10.1202/559.1.
35. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents [published correction appears in J Hosp Infect. 2020 Jun 17] *J Hosp Infect.* 2020;104(3):246–251. https://doi.org/10.1016/j.jhin.2020.01.022.
36. Fathizadeh H, Maroufi P, Momen-Heravi M, et al. Protection and disinfection policies against SARS-CoV-2 (COVID-19). *Inf Med.* 2020;28(2):185–191.
37. Vergara-Buenaventura A, Castro-Ruiz C. Use of mouthwashes against COVID-19 in dentistry. *Br J Oral Maxillofac Surg.* 2020. https://doi.org/10.1016/j.bjoms.2020.08.016. S0266-4356(20)30403-30404.
38. Ge ZY, Yang LM, Xia JJ, Fu XH, Zhang YZ. Possible aerosol transmission of COVID-19 and special precautions in dentistry. *J Zhejiang Univ - Sci B*. 2020;21(5):361–368. https://doi.org/10.1631/jzus.B2010010.
39. Souza RCC, Costa PS, Costa LR. Dental sedation precautions and recommendations during the COVID-19 pandemic. *Rev Bras Odontol*. 2020;77:e1788.
40. La Société Française d'ORL et de la chirurgie de la tête et du cou (SFORL).. *Conseils de bonne pratique concernant l'usage du MEOPA en contexte covid-19*; Avril 2020. https://www.sforl.org/wp-content/uploads/2020/04/MEOPA.pdf.
41. ANSM. Agence nationale de sécurité du médicament et des produits de santé. Mélange équimolaire d'oxygène et de protoxyde d'azote (MEOPA): ANTASOL ® , ENTONOX ® , KALINOX ® , OXYNOX ® et ACTYNOX ®. Covid-19 - précautions d'emploi lors de l'administration du MEOPA aux patients. https://ansm.sante.fr/S-informer/Informations-de-securite-Lettres-aux-professionnels-de-sante/COVID-19-Melange-equimolaire-d-oxygene-et-de-protoxyde-d-azote-MEOPA-ANTASOL-ENTONOX-KALINOX-OXYNOX-et-ACTYNOX-Precautions-d-emploi-lors-de-l-administration-du-MEOPA-aux-patients-Lettre-aux-professionnels-de-sante-actualise-le-20-05-2020; Avril 2020.
42. Responsibilities of the Dentist under Lebanese Law No. 487 issued on 12/2/2002. Official Gazette No./69/date19/12/2002,p.7448.
43. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. *J Dent Res*. 2020. https://doi.org/10.1177/0022034.
44. Coulthard P. Dentistry and coronavirus (COVID-19) – moral decision-making. *Br Dent J*. 2020;228:7.
45. Nammour K. Panic and law in the time of corona. The Legal Agenda website https://www.legal-agenda.com/article.php?id=6550. Accessed May 6, 2020.
46. Law of Communicable Diseases in Lebanon, Promulgated on 31/12/1957. Official Gazette No./2/dated 8/1/1958,p.7-11.
47. Holloway L. COVID-19: has the standard of care changed and are providers immune from liability? *Mo Med.* 2020 May-Jun;117(3):199–201.
48. Illinois Government. Executive order in response to covid-19 (covid-19 executive order no. 17). https://www2.illinois.gov/Pages/Executive-Orders/ExecutiveOrder2020-19.aspx. Accessed July 31, 2020.
49. Governor Laura Kelly. Executive order no. 20-26. https://governor.kansas.gov/wp-content/uploads/2020/04/EO-20-26-Executed.pdf. Accessed July 31, 2020.
50. Feldman N. A solution to the coronavirus liability problem. West central Tribune: https://www.wctrib.com/opinion/6460799-Noah-Feldman-A-solution-to-the-coronavirus-liability-problem; April 29th 2020. Accessed July 31, 2020.
51. Bolam v Friern Hospital Management Committee, 1 WLR 583 http://www.e-lawresources.co.uk/Bolam-v–Friern-Hospital-Management-Committee.php; 1957. Accessed July 31, 2020.
52. Goldberg Richard. Medical malpractice and compensation in the UK. *Chic Kent Law Rev.* 2012;87:131.
53. Cass. Civ. 20 mai 1936, D.P 1936. 1, 88 rapport Josserand.
54. *CA d'Aix-en-Provence 28 janvier 2009, n°07/15053, site internet du legifrance*; 2009. www.legifrance.gouv.fr.
55. Penal Law, Legislative Decree No/340/dated 1/3/1943. *Official Gazette No./4104/, dated 27/10.* 1943:1–78.