Review Article

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A REVIEW ON COVID-19 AND INFECTION CONTROL IN DENTAL PRACTICE

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ABSTRACT:

The Pandemic Novel coronavirus infection [coronavirus disease 2019 (COVID-19)] has spread to more than 208 countries of including Africa, America, Europe, South East Asia and Western Pacific. The WHO had declared COVID-19 as the global public health emergency due to world wide spread . It is now one of the top-priority pathogens to be dealt with, because of high transmissibility, severe illness and associated mortality, wide geographical spread, lack of control measures with knowledge gaps in veterinary and human epidemiology, immunity and pathogenesis. The quick detection of cases and isolating them has become critical. Dental patients who cough, sneeze, or receive dental treatment including the use of a high-speed handpiece or ultrasonic instruments make their secretions, saliva, or blood aerosolize to the surroundings. Dental apparatus could be contaminated with various pathogenic microorganisms after use or become exposed to a contaminated clinic environment. Thereafter, infections can occur through the puncture of sharp instruments or direct contact between mucous membranes and contaminated hands. The unique characteristics of dental procedures where a large number of droplets and aerosols are generated, the standard protective measures in daily clinical work are not effective enough to prevent the spread of COVID-19, especially when patients are in the incubation period, or unaware they are infected, or choose to conceal their infection.

Keywords: COVID-19, dental, practice,infection.

INTRODUCTION

The prophetic exemplar by the Nobel Laureate Joshua Lederberg that "the microbe that felled one child in a distant continent can reach yours today and seed a global pandemic tomorrow" has once again proved its relevance with the emergence of coronavirus disease 2019 (COVID-19) as the recent pandemic that is affecting human health across the world.[1]

Corona viruses infect many species of animals, including humans. Human corona viruses caused only the common cold and in the spring of 2003, it became clear that a new human coronavirus was responsible for severe acute respiratory syndrome (SARS), then corona viruses became recognized.

In 1968 the term "coronavirus," is derived from the"corona"-like or crown-like morphology . In 1975, the Corona viridae family was established by the International Committee on the Taxonomy of Viruses.[2]

By the end of 2019, a pneumonia outbreak with unknown etiology occurred in Wuhan, China. Most of the cases were linked to a local seafood market selling live animals, suggesting

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that the pathogens were transmitted from animals to humans, soon escalating to human-to-human transmission. The pathogen was identified and named as 2019 novel coronavirus (2019-nCoV), and the disease was named corona virus disease2019 (COVID-19), which stands for corona virus disease 2019.[2] On January 8, 2020, a novel coronavirus was officially announced as the causative pathogen of COVID-19 .On January 30, 2020, the World Health Organization (WHO) announced that this outbreak had constituted a public health emergency of international concern. The novel coronavirus was initially named 2019-nCoV and officially as severe acute respiratory syndrome coronavirus 2 (SARSCoV-2). As of February 26, COVID-19 has been recognized in34 countries, with a total of 80,239 laboratory-confirmed cases and 2,700 deaths.[3] Dental patients and professionals can be exposed to pathogenic microorganisms, including viruses and bacteria that infect the oral cavity and respiratory tract. Dental care settings invariably carry the risk of 2019-nCoV infection due to the specificity of its procedures, which involves face-to-face communication with patients, and frequent exposure to saliva, blood, and other body fluids, and the handling of sharp instruments.[4]

Epidemology

Clusters of COVID-19, first reported from the Wuhan Metropolitan in People's Republic of China, in December 2019, have rapidly assumed a global form. The data reported in the current review are based on the real-time updates available through the WHO Situation Reports and the Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE) data visualization site till February 28, 2020. All confidence intervals (CIs)reported here have been computed as the exact central CI of a proportion .As of February 28, 2020, there have been 83,704confirmed cases of COVID-19 globally, with 2,859 deaths. Most cases (78,824 of 83,704; 0.9416 -95% CI 0.94 to 0.9433) and deaths (2,790 of 2,859;0.9758 95% CI 0.9696 to 0.9809) have been reported from mainland China. Of the 36,654 recovered cases reported, 36,268 (0.9895 95%CI 0.9884 to 0.9905) hailed from Mainland China. Outside of Mainland China, most cases were registered in South Korea (2,337 cases), on board the Diamond Princess (705) and Italy (655). The highest number of deaths outside China were reported from Iran (26 deaths), Italy (17deaths) and South Korea (13 deaths).[6]

Etiology

According to recent research, similar to SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV), SARSCoV-2 is zoonotic, with Chinese horseshoe bats (Rhinolophus

sinuous) being the most probable origin and pangolins as the most likely intermediate host.[7]

Incubation Period:

The incubation period of COVID-19 has been estimated at 5 to 6 d on average, but there is evidence that it could be as long as 14 d, which is now the commonly adopted duration for medical observation and quarantine of (potentially)exposed persons.[8]

The mean incubation period was 5.2 days(95% CI 4.1-7.0 days) in a study covering 425 cases and the median incubation period was 3.0 days(range 0-24 days) in another study based on1,324 cases25,38. It might be possible that the single case, with an outlying incubation period of 24 days, was actually a second exposure, rather than a single infection incubation period. This assertion, has led WHO to reinforce the current recommendations regarding isolation and quarantine.[9],[10]

Clinical Manifestations

The clinical presentation of infection ranges from asymptomatic to very severe pneumonia with acute respiratory distress syndrome, septic shock and multi-organ failure resulting in death. (10)

The majority of patients with COVID-19 represent relatively mild cases. The majority of patients experienced fever and dry cough, while some also had shortness of breath, fatigue, and other atypical symptoms, such as muscle pain, confusion, headache, sore throat, diarrhea, and vomiting. Symptoms such as pharyngeal pain, dyspnoea, dizziness, abdominal pain and anorexia are more likely to be present in patients with severe illnesses.[11] Less common symptoms are headache, dizziness, diarrhoea, nausea and vomiting.[12]

Among hospitalized patients in Wuhan, around one-fourth to one-third developed serious complications, such as acute respiratory distress syndrome, arrhythmia, and shock, and were therefore transferred to the intensive care unit . In general, older age and the existence of underlying comorbidities (e.g., diabetes, hypertension, and cardiovascular disease)were associated with poorer prognosis.[13]

Diagnosis

Patients who satisfy clinical case definition as mentioned below and are epidemiologically linked to a history of travel from the city of Wuhan in the last 14 days, or have come in contact with a reverse transcription (RT)-PCR confirmed case or with a patient who is under investigation for SARS-COV-2 within the same period, are considered to be suffering from COVID-19.[14]

Case definitions

Case definitions being used currently are based on the WHO's interim guidance documents. SARI - An acute respiratory infection with a history of fever or measured temperature >38°C, and cough, onset within 10 days and requiring hospitalization.

Surveillance case definitions for SARS-CoV-2 –A person with SARI with no other etiologies with one of the following:

1) History of travel to Wuhan, Hubei Province, China, in the last 14 days; and

2) Patient is a HCW who has been caring for patients with SARI of unknown etiology.

Patient with acute respiratory illness and at least one of the following:

(i) Close contact with a confirmed or probable case of SARS-CoV-2 in the 14 days before illness onset; and

(ii) Worked or attended a healthcare facility in the 14 days before onset of symptoms where patients with hospital-associated SARS-CoV-2infections were reported.[14]

Laboratory diagnosis and investigations:

Suspected cases should be tested for the virus with nucleic acid amplification tests, such as real-time reverse transcription - polymerase chain reaction (RT-PCR) with confirmation by nucleic acid sequencing when needed. Serological tests are still under development, and once these become available, field surveys will aid in better understanding of the outbreak, implementation of control measures and also understanding cross-reactivity with other viruses. Preferred clinical samples for establishing the laboratory confirmation of a suspected case include as opharyngeal and oropharyngeal swabs collected using Dacron swabs, expectorated sputum, BAL fluid, endotracheal aspirate and tissue. The test detects the presence of three genes-nucleocapsid(N), spike (S), envelope (E), and RNA-dependent RNA polymerase (RdRp).

In laboratory-confirmed case of COVID-19, two samples collected from anatomically distinct sites or two samples collected from the same site during two different days of illness, are positive in two different assays or on repeat PCR. The sero-conversion of the disease is seen by detection of antibodies in convalescent phase serum, after a negative result in acute phase serum sample or a four-fold rise in antibody titres between the acute and convalescent phases. Sero-conversion can be confirmed by ELISA or indirect fluorescent antibody test (IFA).[14]

The most common laboratory abnormalities among patients hospitalized with COVID-19 are marked lymphopenia, prolonged prothrombin time, elevated lactate dehydrogenase and elevated D-dimer. These laboratory abnormalities are similar to the ones seen in SARS-CoV and MERS-CoV infections.[14]

Computed tomography manifestations Of COVID-19pneumonia.[15]

Among patients who underwent chest computed tomography (CT), most showed bilateral pneumonia, with ground-glass opacity and bilateral patchy shadows being the most common patterns.[16]

Effective Infection Control Protocols

Hand hygiene has been considered the most critical measure for reducing the risk of transmitting microorganism to patients. SARS-CoV-2 can persist on surfaces for a few hours or up to several days, depending on the type of surface ,the temperature, or the humidity of the environment. This reinforces the need for good hand hygiene and the importance of thorough disinfection of all surfaces within the dental clinic. The use of personal protective equipment, including masks, gloves, gowns, and goggles or face shields, is recommended to protect skin and mucosa from(potentially) infected blood or secretion. As respiratory droplet sare the main route of SARS-CoV-2 transmission, particulate respirators (e.g., N-95 masks authenticated by the National Institute for Occupational Safety and Health or FFP2-standardmasks set by the European Union) are recommended for routine dental practice. [18]

Possible transmission routes of 2019-ncov in Dental Clinics:

Since 2019-nCoV can be passed directly from person to person by respiratory droplets, emerging evidence suggested that it may also be transmitted through contact and fomites.

The pathogenic microorganisms can be transmitted in dental practice through inhalation of airborne microorganisms that can remain in the air for long periods, direct contact with blood, oral fluids, other materials, contact of conjunctival, nasal, or oral mucosa with droplets and aerosols containing microorganisms generated from an infected individual transferred through short distance by coughing and talking without a mask, and indirect contact with contaminated instruments and surrounding surfaces. Infections could be present through any of these conditions involved in an infected individual in dental clinics and hospitals, especially during the outbreak of 2019-nCoV.[19]

Airborne spread:

The airborne spread of SARS-Cov (severe acute respiratory syndrome coronavirus) is well-reported in many literatures. The dental papers show that many dental procedures produce aerosols and droplets that are contaminated with virus. In addition to the infected patient’s cough and breathing, dental devices such as high-speed dental hand piece uses high-speed gas to drive the turbine to rotate at high speed and work with running water. When dental devices work in the patient’s oral cavity, a large amount of aerosol and droplets mixed with the patient’s saliva or even blood will be generated. Particles of droplets and aerosols are small enough to stay airborne for an extended period before they settle on environmental surfaces or enter the respiratory tract. Thus, the 2019-nCoV has the potential to spread through droplets and aerosols from infected individuals in dental clinics and hospitals.[19]

Contact spread:

This is the possible route of spread where a dental practitioner come in direct or indirect contact with patient materials, contaminated instruments, or environmental surfaces. In addition, dental professionals and other patients have likely contact of conjunctival, nasal, or oral mucosa with droplets and aerosols containing microorganisms generated from an infected individual and propelled a short distance by coughing and talking without a mask. Effective infection control strategies are needed to prevent the spread of 2019-nCoVthrough these contact routines.[19]

Contaminated surfaces spread

Human coronaviruses such as SARS-CoV, Middle East Respiratory Syndrome coronavirus (MERS-CoV), or endemic human corona viruses (HCoV) can persist on surfaces like metal, glass, or plastic for up to a couple of days. Therefore, contaminated surfaces that are frequently contacted in healthcare settings are a potential source of coronavirus transmission. Dental practices derived droplets and aerosols from infected patients, which likely contaminate the whole surface in dental offices. In addition, it was shown at room temperature that HCoV remains infectious from 2 h up to 9 days, and persists better at 50% compared with30% relative humidity. Thus, keeping a clean and dry environment in the dental office would help decrease the persistence of 2019-nCoV.[19]

Infection controls for dental practice

Dental professionals should have knowledge that how coronavirus spreads, should be able to identify patients with COVID-19 infection, and what protective and cautious measures should be considered during the practice, to prevent the transmission of COVID-19.[20]

Patient evaluation

First of all, dental professionals should be able to identify a suspected case of COVID-19.

In general, a patient with COVID-19 who is in the acute febrile phase of the disease is not recommended to visit the dental clinic. If this does occur, the dental professional should not treat the patient in the dental clinic, but immediately quarantine the patient and report to the infection control department as soon as possible. The body temperature of the patient should be measured in the first place. A contact-free forehead thermometer is strongly recommended for the screening.

A questionnaire should be used to screen patients with potential infection of 2019-nCoV before proceeding further.

(1) Did you feel feverish , sick or had fever within the past two weeks?

(2)Did you experience cough or difficulty in breathing or shortness of breath within the past 2 weeks?

(3) Have you, traveled to Wuhan city and its surrounding areas, or visited the

neighborhood with documented 2019-nCoV transmission within the past 14 days?

(4)Did you contact a patient with confirmed 2019-nCoV infection within the past 14 days?

(5)Did you contact people with travel history from Wuhan city and its surrounding areas, or people from the neighborhood with recent confirmed fever or respiratory problems within the past14 days?

(6)Have you contacted at least a person who recently experienced fever or cough within last 14 days?

(7) Have you recently participated in any gathering, meetings, or had close contact with any unacquainted people?

If a patient says “yes” to at least one of the screening questions, and his/her body temperature is detected below 37.3 °C, the dentist can put off the treatment until 14 days after the exposure event. The patient should be instructed to self-quarantine at home and report any fever experience or flu-like syndrome to the local health department.

If a patient says “yes” to any of the above questions, and his/her body temperature is detected no less than 37.3 °C, the patient should be immediately quarantined, and the dental professionals should report to the infection control department of the hospital or the local health department.

If a patient says “no” to all the above screening questions, and his/her body temperature is detected below 37.3 °C, the dentist can treat the patient with extra protection measures, and avoids aerosol-generating treatments .

If a patient says “no” to all the above screening questions, but his/her body temperature detected is no greater than 37.3 °C, the patient should be instructed to visit the fever clinics or special clinics for COVID-19 for further medical care.[20]

Hand hygiene

Although appropriate hand hygiene is the routine prerequisite for dental practice, hand-washing compliance is relatively low, which imposes a great challenge to the infection control during the epidemic period of 2019-nCoV transmission. Reinforcement for good hand hygiene is of the utmost importance. A two-before and-three-after hand hygiene guideline is proposed by the infection control department of the West China Hospital of Stomatology, Sichuan University, to reinforce the compliance of hand washing. Specifically, the oral professionals should wash their hands before patient examination, before dental procedures, after touching the patient, after touching the surroundings and equipment without disinfection, and after contacting the rima oris, blood, body fluid secretions, wounds or damaged skin. More caution should be taken for the dental professionals to avoid touching their own eyes, mouth, and nose.[20]

Personal protective measures for the dental professionals:

Presently there is no specific guideline for the protection of dentists and dental health care workers for covid-19 infection in the dental work places. As we know airborne droplet transmission of infection is considered as the possible route of spread, particularly in dental clinics and hospitals, equipments such as protective eyewear, masks, gloves, caps, face shields, and protective outwear, is strongly recommended for all healthcare givers in the clinic/hospital settings during the this epidemic period.

The three-level protective measures of the dental professionals recommended for specific situations based on mode of spread.

(1) Primary protection is the standard protection for staff in clinical settings. It is must to wear disposable working cap, disposable surgical mask, and working clothes, using protective eye wear or face shield, and disposable latex gloves or nitrile gloves if necessary.

(2) Secondary protection is advanced protection for dental professionals. Wearing disposable doctor cap, disposable surgical mask, protective goggles, face shield, and working clothes (white coat) with disposable isolation clothing or surgical clothes outside, and disposable latex gloves. (3) Tertiary protection is strengthened protection when patient with suspected or confirmed covid-19 infection. Although a patient with 2019-nCoV infections not expected to be treated in the dental clinic, in the unlikely event that this does occur, and the dental professional cannot avoid close contact, special protective outwear is needed.

If protective outwear is not available, working clothes (white coat)with extra disposable protective clothing outside should be worn. In addition, disposable doctor cap, protective goggles, face shield, disposable surgical mask, disposable latex gloves, and impermeable shoe cover should be worn.[20]

Mouth rinse before dental procedures

A preoperational antimicrobial mouth-rinse is generally believed to reduce the number of oral microbes. However, as instructed by the Guideline for the Diagnosis and Treatment of Novel Coronavirus Pneumonia (the 5th edition) released by the National Health Commission of the People's Republic of China, chlorhexidine, which is commonly used as mouth-rinse in dental practice, may not be effective to kill 2019-nCoV. Since 2019-nCoV is vulnerable to oxidation, pre-procedural mouth-rinse containing oxidative agents such as 1% hydrogen peroxide or 0.2% povidone is recommended, for the purpose of reducing the salivary load of oral microbes, including potential 2019-nCoV carriage. A pre-procedural mouth-rinse would be most useful in cases when rubber dam cannot be used.[20]

Rubber dam isolation

The use of rubber dams can significantly minimize the production of saliva- and blood-contaminated aerosol or spatter, particularly in cases when high-speed hand pieces and dental ultrasonic devices are used. It has been reported that the use of rubber dam could significantly reduce airborne particles in ~3-foot diameter of the operational field by 70%. When rubber dam is applied, extra high-volume suction for aerosol and spatter should be used during the procedures along with regular suction. In this case, the implementation of a complete four-hand operation is also necessary. If rubber dam isolation is not possible in some cases, manual devices, such as Carisolv and hand scaler, are recommended for caries removal and periodontal scaling, in order to minimize the generation of aerosol as much as possible.[20]

Anti-retraction handpiece

The high-speed dental handpiece without anti-retraction valves may aspirate and expel the debris and fluids during the dental procedures. A study has shown that the anti-retraction high-speed dental handpiece can significantly reduce the backflow of oral bacteria and HBV into the tubes of the handpiece and dental unit as compared with the handpiece without anti-retraction function.

Therefore, the use of dental handpieces without anti-retraction function should be prohibited during the epidemic period ofCOVID-19. Anti-retraction dental handpiece with specially designed anti-retractive valves or other anti-reflux designs are strongly recommended as an extra preventive measure for cross infection. Hence , the use of dental handpieces without anti retraction function should be avoided during the epidemic period. Anti-retraction dental handpiece with designed anti-retractive valves are strongly recommended as an extra protective measure for cross-infection.[20]

Disinfection of the clinic settings

Medical institutions should take effective and strict disinfection measures in both clinic settings and public area. The clinic settings should be cleaned and disinfected in accordance with the Protocol for the Management of Surface Cleaning and Disinfection of Medical Environment. Disinfection of appliances should also be done frequently, including door handles, chairs, and desks and elevator should be disinfected regularly. People taking elevators should wear masks correctly and avoid direct contact with buttons and other objects.[20]

Management of medical waste

The medical waste (including disposable protective equipment after use) should be transported to the temporary storage area of the medical institute timely. The reusable instrument and items should be pretreated, cleaned, sterilized, and properly stored in accordance with the Protocol for the Disinfection and Sterilization of Dental Instrument (WS 506-2016) released by the National

Health Commission of the People's Republic of China. The medical and domestic waste generated by the treatment of patients with suspected or confirmed 2019-nCoV infection are regarded as infectious medical waste. Double-layer yellow color medical waste package bags and "gooseneck" ligation should be used. The surface of the package bags should be marked and disposed.[20]

American Dental Association algorithms during covid-19 pandemic

The purpose of the algorithms is to assist dentists and dental offices in making informed decisions concerning patient triage, evaluation, and treatment during the COVID-19 crisis. The algorithms are based on the best scientific information currently available to the American Dental Association .The algorithms do not constitute legal advice or legal guidance, but because their goal is to minimize transmission of the coronavirus to patients and the dental team to the reasonable extent possible in the context of providing for patient healthcare needs, the algorithms may serve to help lower legal exposure by lowering the risk that anyone will contract the virus in a dental office that follows them.[21]

ADA and many state dental associations have urged dental offices to treat only emergency patients; some states or local governments have mandated this. During the active COVID-19 crisis and beyond, risk must be minimized during dental treatment. Screen for dental emergencies using tele-dentistry or other remote modalities, minimizing the risk of transmission.

Fully utilize available PPE, understanding that surgical masks, which do not seal around the nose and mouth, are not adequate to completely protect against aerosol-borne disease transmission. Take extra-oral radiographs whenever possible; intraoral techniques may induce coughing. Reduce aerosol production as much as possible through use of hand instrumentation and employment of dental dam and high speed suction. N95 masks, with a positive seal around the nose and mouth, in combination with a full face shield, should be worn when treating patients in close proximity to their respiratory system, similar to the protocol for medical teams performing intubations. If N95 masks are not available, surgical FDA approved masks must be worn for each patient and not reused, in conjunction with proper utilization of goggles, gowns and gloves.

Members of the dental team within six feet of the treatment aerosol area should be limited to the operator and the assistant.[22]

CONCLUSION:

Microorganisms antedated human beings. They will continue to cause pandemics because of their in genuity and basic survival instinct. It is obvious following the spread of COVID-19 that not withstanding the phenomenal advances in epidemiology, disease

biology, molecular biology, genomics and proteomics ,humanity is still unable to predict and prevent the unsuspected onset of epidemics and pandemics of infectious diseases.[23] The COVID-19 transmission via contact with droplet sand aerosols generated during dental clinical procedures is expected. There is a need to increase investigations to the detection of COVID-19 in oral fluids and its impact on the transmission of this virus, which is crucial to improve effective strategies for prevention, especially for dentists.[24] This has serious implications for the dental team, in terms of personal protective equipment (PPE), treatment room disinfection and treatment of patients. It is important that dentists and dental teams thoroughly understand the risks of treating patients, the need to continue treating patients with emergency oral health issues so they do not present to hospital emergency room departments.[25]

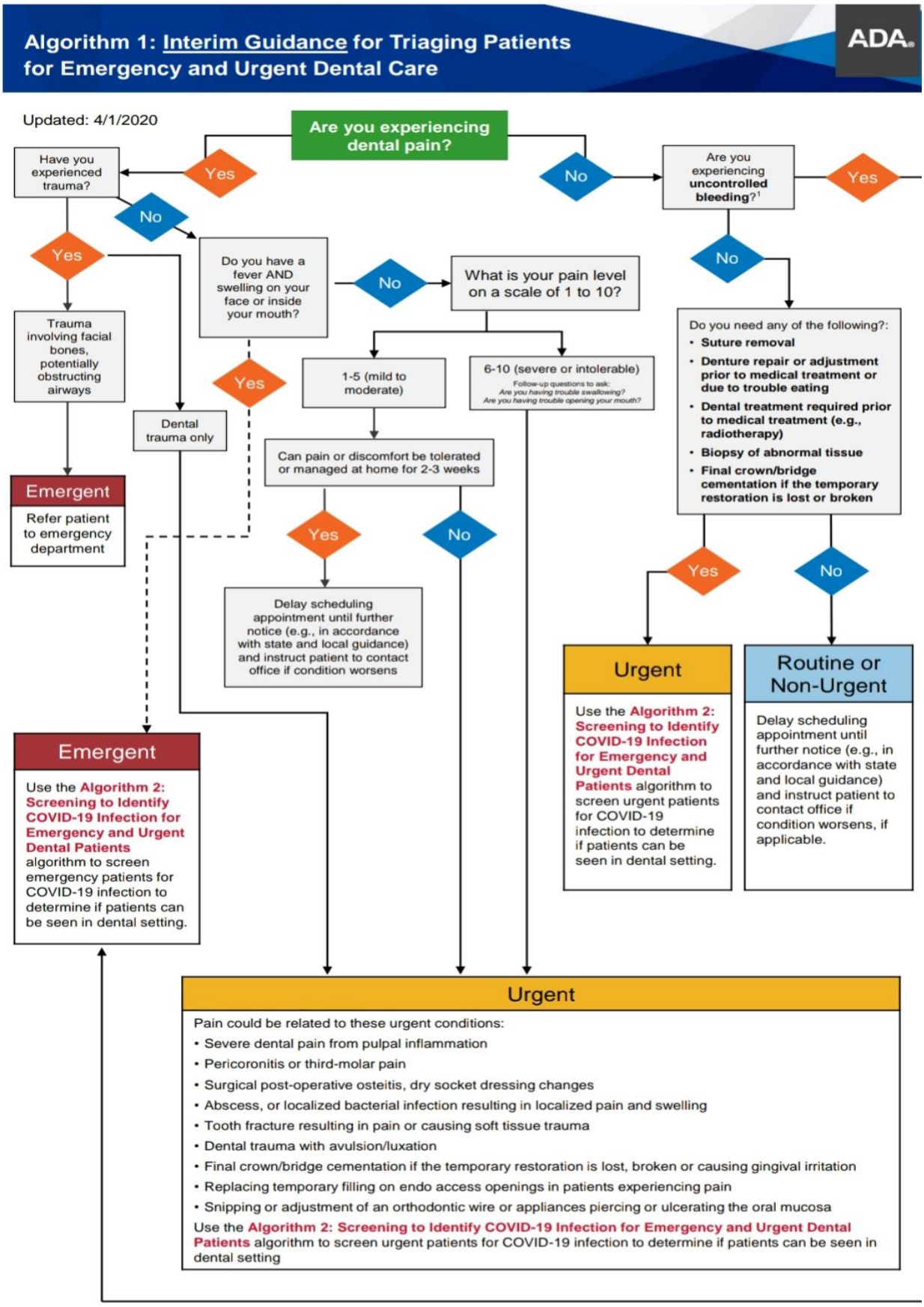
REFERENCES:

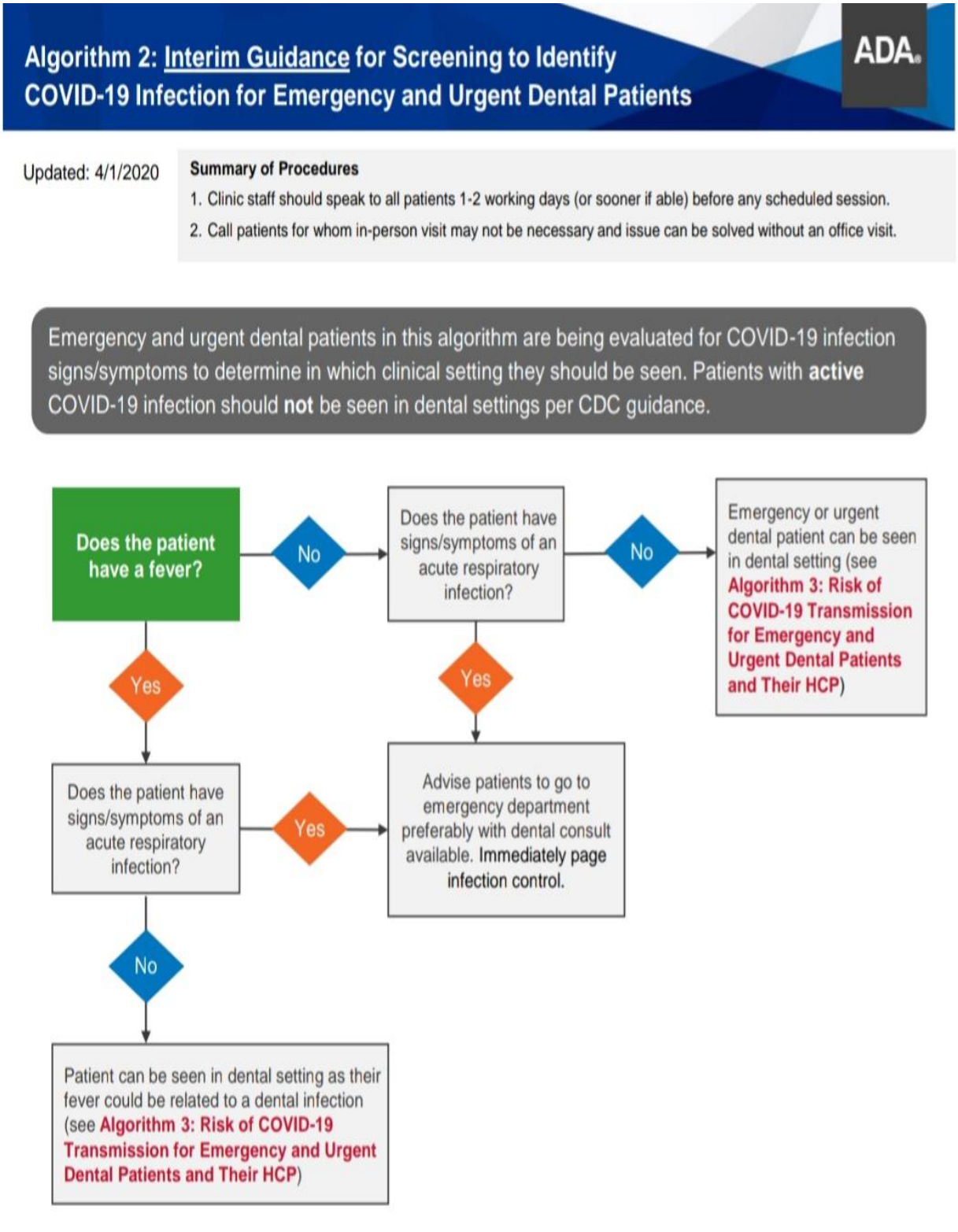
1. Tandon, P., 2020. COVID-19: Impact on health of people & wealth of nations. *Indian Journal of Medical Research*, 0(0), p.0.
2. Weiss, S. and Navas-Martin, S., 2005. Coronavirus Pathogenesis and the Emerging Pathogen Severe Acute Respiratory Syndrome Coronavirus. *Microbiology and Molecular Biology Reviews*, 69(4), pp.635-664.
3. Meng, L., Hua, F. and Bian, Z., 2020. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *Journal of Dental Research*, p.002203452091424.
4. Peng, X., Xu, X., Li, Y., Cheng, L., Zhou, X. and Ren, B., 2020. Transmission routes of 2019-nCoV and controls in dental practice. *International Journal of Oral Science*, 12(1).
5. Transmission pik
6. Chatterjee, P., Nagi, N., Agarwal, A., Das, B., Banerjee, S., Sarkar, S., Gupta, N. and Gangakhedkar, R., 2020. The 2019 novel coronavirus disease (COVID-19) pandemic: A review of the current evidence. *Indian Journal of Medical Research*, 0(0), p.0.
7. Meng, L., Hua, F. and Bian, Z., 2020. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *Journal of Dental Research*, p.002203452091424
8. Meng, L., Hua, F. and Bian, Z., 2020. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *Journal of Dental Research*, p.002203452091424
9. Chatterjee, P., Nagi, N., Agarwal, A., Das, B., Banerjee, S., Sarkar, S., Gupta, N. and Gangakhedkar, R., 2020. The 2019 novel coronavirus disease (COVID-19) pandemic: A review of the current evidence. *Indian Journal of Medical Research*, 0(0), p.0.
10. Mourya, D., Sapkal, G., Yadav, P., Belani, S., Shete, A. and Gupta, N., 2020. Biorisk assessment for infrastructure & biosafety requirements for the laboratories providing coronavirus SARS-CoV-

2/(COVID-19) diagnosis. *Indian Journal of Medical Research*, 0(0), p.0.

11. Meng, L., Hua, F. and Bian, Z., 2020. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *Journal of Dental Research*, p.002203452091424.
12. Chatterjee, P., Nagi, N., Agarwal, A., Das, B., Banerjee, S., Sarkar, S., Gupta, N. and Gangakhedkar, R., 2020. The 2019 novel coronavirus disease (COVID-19) pandemic: A review of the current evidence. *Indian Journal of Medical Research*, 0(0), p.0.
13. Meng, L., Hua, F. and Bian, Z., 2020. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *Journal of Dental Research*, p.002203452091424.
14. Chatterjee, P., Nagi, N., Agarwal, A., Das, B., Banerjee, S., Sarkar, S., Gupta, N. and Gangakhedkar, R., 2020. The 2019 novel coronavirus disease (COVID-19) pandemic: A review of the current evidence. *Indian Journal of Medical Research*, 0(0), p.0.
15. An, P. and Liu, B., 2020. Computed tomography manifestations of COVID-19 pneumonia. *British Journal of Hospital Medicine*, pp.1-2.
16. Meng, L., Hua, F. and Bian, Z., 2020. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *Journal of Dental Research*, p.002203452091424.
17. An, P. and Liu, B., 2020. Computed tomography manifestations of COVID-19 pneumonia. *British Journal of Hospital Medicine*, pp.1-2.
18. Meng, L., Hua, F. and Bian, Z., 2020. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *Journal of Dental Research*, p.002203452091424.
19. Peng, X., Xu, X., Li, Y., Cheng, L., Zhou, X. and Ren, B., 2020. Transmission routes of 2019-nCoV and controls in dental practice. *International Journal of Oral Science*, 12(1).
20. Peng, X., Xu, X., Li, Y., Cheng, L., Zhou, X. and Ren, B., 2020. Transmission routes of 2019-nCoV and controls in dental practice. *International Journal of Oral Science*, 12(1).
21. ADA Interim Guidance for Management of Emergency and Urgent Dental Care
22. Summary of ADA Guidance During the COVID-19 Crisis
23. Tandon, P., 2020. COVID-19: Impact on health of people & wealth of nations. *Indian Journal of Medical Research*, 0(0), p.0.
24. Sabino-Silva, R., Jardim, A. and Siqueira, W., 2020. Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis. *Clinical Oral Investigations*, 24(4), pp.1619-1621.
25. Summary of ADA Guidance During the COVID-19 Crisis

FIGURE:


Algorithm 1: Interim Guidance for Triaging Patients for Emergency and Urgent Dental Care
ADA
Updated: 4/1/2020
Are you experiencing dental pain?
Yes
No
Have you experienced trauma?
Yes
No
Are you experiencing uncontrolled bleeding?[1]
Yes
No
Yes
No
Trauma involving facial bones, potentially obstructing airways
Dental trauma only
Do you have a fever AND swelling on your face or inside your mouth?
Yes
No
What is your pain level on a scale of 1 to 10?
1-5 (mild to moderate)
6-10 (severe or intolerable)
Follow-up questions to ask:
Are you having trouble swallowing?
Are you having trouble opening your mouth?
Can pain or discomfort be tolerated or managed at home for 2-3 weeks
Yes
No
Delay scheduling appointment until further notice (e.g., in accordance with state and local guidance) and instruct patient to contact office if condition worsens
Do you need any of the following?:
• Suture removal
• Denture repair or adjustment prior to medical treatment or due to trouble eating
• Dental treatment required prior to medical treatment (e.g., radiotherapy)
• Biopsy of abnormal tissue
• Final crown/bridge cementation if the temporary restoration is lost or broken
Yes
No
Emergent
Refer patient to emergency department
Emergent
Use the Algorithm 2: Screening to Identify COVID-19 Infection for Emergency and Urgent Dental Patients algorithm to screen emergency patients for COVID-19 infection to determine if patients can be seen in dental setting.
Urgent
Use the Algorithm 2: Screening to Identify COVID-19 Infection for Emergency and Urgent Dental Patients algorithm to screen urgent patients for COVID-19 infection to determine if patients can be seen in dental setting.
Routine or Non-Urgent
Delay scheduling appointment until further notice (e.g., in accordance with state and local guidance) and instruct patient to contact office if condition worsens, if applicable.
Urgent
Pain could be related to these urgent conditions:
• Severe dental pain from pulpal inflammation
• Pericoronitis or third-molar pain
• Surgical post-operative osteitis, dry socket dressing changes
• Abscess, or localized bacterial infection resulting in localized pain and swelling
• Tooth fracture resulting in pain or causing soft tissue trauma
• Dental trauma with avulsion/luxation
• Final crown/bridge cementation if the temporary restoration is lost, broken or causing gingival irritation
• Replacing temporary filling on endo access openings in patients experiencing pain
• Snipping or adjustment of an orthodontic wire or appliances piercing or ulcerating the oral mucosa
Use the Algorithm 2: Screening to Identify COVID-19 Infection for Emergency and Urgent Dental Patients algorithm to screen urgent patients for COVID-19 infection to determine if patients can be seen in dental setting

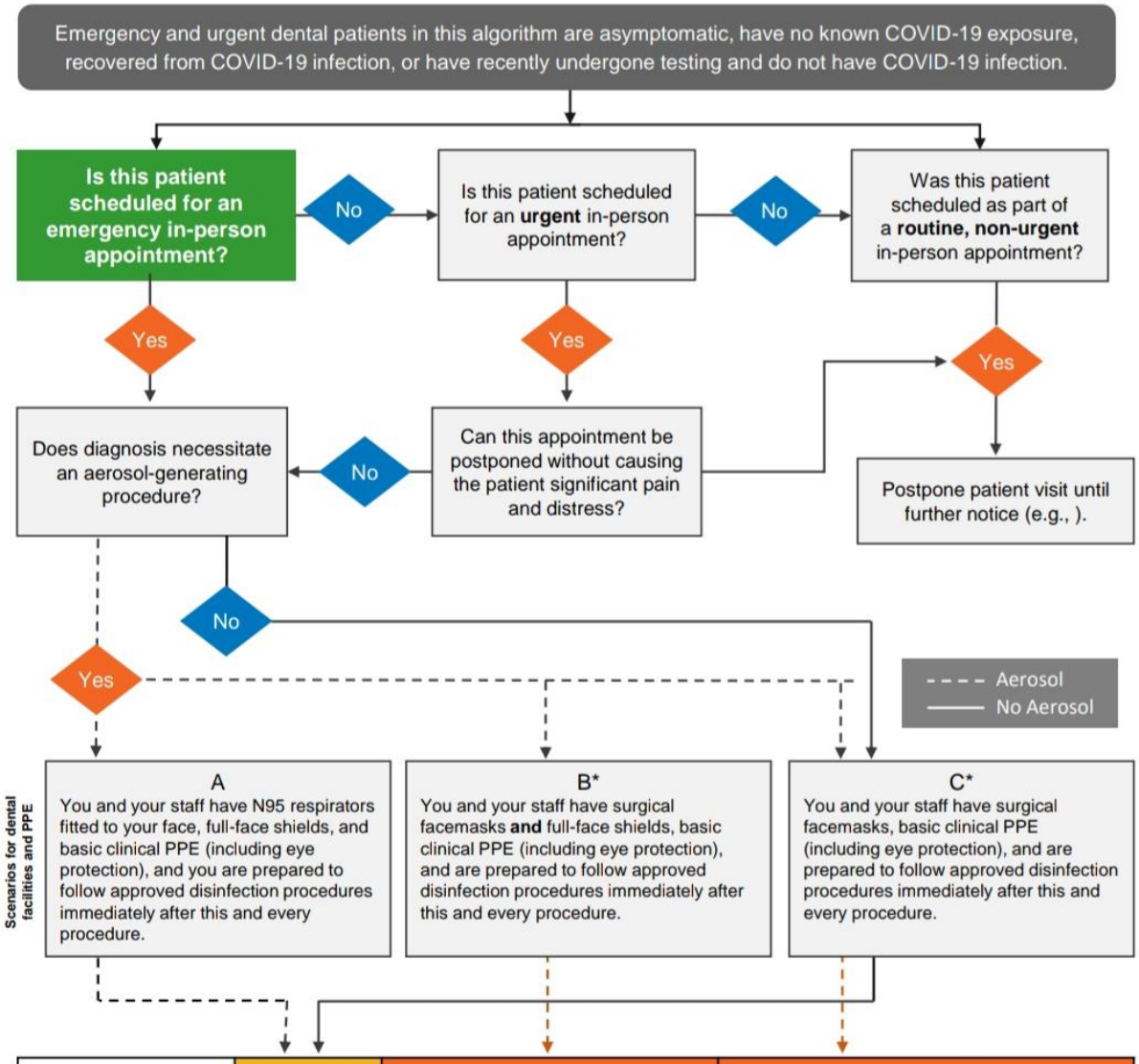

Algorithm 2: Interim Guidance for Screening to Identify COVID-19 Infection for Emergency and Urgent Dental Patients
ADA
Updated: 4/1/2020
Summary of Procedures
1. Clinic staff should speak to all patients 1-2 working days (or sooner if able) before any scheduled session.
2. Call patients for whom in-person visit may not be necessary and issue can be solved without an office visit.
Emergency and urgent dental patients in this algorithm are being evaluated for COVID-19 infection signs/symptoms to determine in which clinical setting they should be seen. Patients with active COVID-19 infection should not be seen in dental settings per CDC guidance.
Does the patient have a fever?
No
Does the patient have signs/symptoms of an acute respiratory infection?
No
Emergency or urgent dental patient can be seen in dental setting (see Algorithm 3: Risk of COVID-19 Transmission for Emergency and Urgent Dental Patients and Their HCP)
Yes
Yes
Does the patient have signs/symptoms of an acute respiratory infection?
Yes
Advise patients to go to emergency department preferably with dental consult available. Immediately page infection control.
No
Patient can be seen in dental setting as their fever could be related to a dental infection (see Algorithm 3: Risk of COVID-19 Transmission for Emergency and Urgent Dental Patients and Their HCP)

Algorithm 3: Interim Guidance to Minimize Risk of COVID-19 Transmission for Emergency and Urgent Dental Patients and HCP

Updated: 4/1/2020

Summary of Procedures

1. Clinic staff should speak to all patients 1-2 working days (or sooner if able) before any scheduled session.
2. Call patients for whom in-person visit may not be necessary and re-schedule.
3. See emergency triage and COVID-19 infection screening procedures.



Risk for Transmission to HCP and patients	Low risk	Moderate risk*	Moderate-high risk*
Quarantine for HCPs	No 14-day quarantine required	• Use clinical judgment and take all precautions to prevent transmission. • Suggest that the patient is tested for COVID-19 infection after dental treatment. If positive, dental HCP should quarantine for 14 days.	• Given that asymptomatic patients may carry the virus, CDC suggests a 14-day quarantine. • Use clinical judgment and take all precautions to prevent transmission. • If treatment is implemented, require that the patient is tested for COVID-19 infection immediately after dental care; if positive, dental HCP should quarantine for 14 days.
Recommended Treatment Plan for Patient	Treat Patient	• Refer patient to emergency department or dental facility that meets criteria for scenario A. If not feasible, treat patient.*	