

The Importance of Minimal Intervention Dentistry after the COVID-19 Pandemic: A Look to the Future

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Abstract

The new Coronavirus has caused thousands of deaths around the globe, challenged professionals, and collapsed the health systems of many countries, resulting in various measures to contain the spread of COVID-19 and minimize the number of deaths. In the face of this new scenario, researchers and health authorities have been outlining clinical recommendations for dental practice during and after the pandemic. The objective of this paper is to relate the Minimal Intervention Dentistry (MID) with a dental practice of less exposure to aerosols, and, therefore, safer in the current context, after the pandemic of COVID-19.

Index terms— COVID-19, 2019 new coronavirus, SARS-cov-2, aerosol, dental assistance, preventive dentistry.

The Importance of Minimal Intervention Dentistry after the COVID-19 Pandemic: A Look to the Future

Introduction n outbreak of pneumonia began in December 2019 in the city of Wuhan, Hubei province -China, and spread rapidly to several countries. 1,2 A new strain of Coronavirus has been identified as the causative agent of the disease, called COVID-19 by the World Health Organization (WHO). 2 COVID-19 is caused by a Betacoronavirus called SARS-CoV-2, which affects the lower respiratory tract and manifests as pneumonia in humans. Despite rigorous global efforts to elaborate preventive measures, the infection caused by COVID-19 continued to increase in many countries around the world. [1][2][3][4][5][6][7] Due to the high risk to countries with vulnerable health systems, the WHO considered the outbreak a Public Health Emergency of International Concern (PHEIC) on January 30, 2020. With the progress of the disease, on March 11, 2020, WHO decreed a pandemic of this disease. Dentistry professionals have a high risk of infection with SARS-CoV-2 due to exposure to saliva, blood, and aerosol/droplets during most dental procedures. 1,2,24,30 The transmission of the virus during dental procedures can occur by inhalation of aerosol/droplets of infected individuals or direct contact with mucous membranes, oral fluids, and contaminated instruments and surfaces. 7,27,31 The new Coronavirus challenged professionals and collapsed the health systems of many countries, which resulted in various measures to contain the spread of COVID-19 and minimize the number of deaths. In this regard, strict prevention and control measures adopted by governments establish the limitation of people who circulate on the streets, social distancing, the cessation of non-essential commercial activities, new remote work routines, the request to wear masks and the frequent hygiene of the hands. Dental professionals have an essential role in preventing the transmission of COVID-19. 1,7,45 Although many countries suspended routine dental care during the pandemic period, there is a need to handle events related to dental emergencies. Also, in places where the disease is controlled, flexibilization protocols establish the return of activities, including dental services, with the execution of elective procedures as well.

Thus, there is a need to establish service protocols that are safe for both professionals and patients, and convenient in technical and cost terms as well. [33][34][35][36] ??[37][38][39][40][41][42][43] Given the evidence of a high risk of infection of dentists and patients due to the aerosol production caused by most invasive procedures, the adoption of the Philosophy of Minimal Intervention in Dentistry has proved to be even more suitable. In this respect, health promotion conducts can benefit professionals and patients. 7,27 By definition, the Minimum

6 B) CURRENT PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR DENTAL PRACTICE

Intervention Dentistry (MID) has the potential to cover all areas of the profession, and it aims to preserve dental tissue as well as to prevent the evolution of the illness. [46][47][48] Therefore, the principles of the minimal intervention are determined by educational and preventive paradigms to minimize restorative needs and make dental treatments more long-standing. 49,50 Although there is still a relative resistance and a need for convincing in the implementation of this therapeutic form, 47,48 the MID needs to be incorporated by dental specialties to prevent diseases from occurring, and minimize dental strain, hence increasing the longevity of dental elements of individuals who, in the present days, live longer. Furthermore, the MID, in the face of the current health scenario, endorses the decrease in exposure of droplets and aerosols in the dental office, for both the dental team and patients. [36] [37][38][39][40][41][42][43][44][45][46][47][48][49][50][51][52] The objective of this paper is to relate the Minimal Intervention Dentistry, a philosophy known for conducts and procedures that preserve the dental structure, with a dental practice of less exposure to aerosols, and, therefore, safer in the current context, post-pandemic of COVID-19. This study also discusses aspects related to bio safety in dentistry, including aerosol control, and lists some of the MID strategies.

1 II.

2 MATERIALS AND METHODS

Bibliographical research was done in the MEDLINE (US National Library of Medicine -NLM) database accessed through PubMed, with the keywords "Aerosol," "COVID-19," "Dental Care," "Preventive Dentistry," between the years of 2012 and 2020. Inclusion criteria were articles in English, in their full and free versions.

3 III.

4 RESULTS AND DISCUSSION

5 a) Understanding the transmission of SARS-CoV-2

In search of new evidence, researchers and health authorities have been outlining clinical recommendations for dental practice during and after the pandemic. Thus, understanding the behavior of the COVID-19 agent, as well as how to prevent its transmission, is extremely necessary. 26 SARS-CoV-2 infections usually spread through respiratory droplets or contact. 24 Therefore, the coughing or sneezing of an infected person can spread SARS-CoV-2 in the air, with the potential to infect individuals in close contact. 7,25,30,35 Such fact determined the recommendation of social distancing, frequent hand washing and use of masks by the population to minimize the spread of the disease by the community. [35][36] [37][38][39][40][41][42][43] Another significant route is through the droplets of SARS-CoV-2 on inanimate objects located around an infected individual that is subsequently touched by other individuals. 53,54 The virus can survive on surfaces for a few hours; thus, to maintain a safer environment in the dental office, it is necessary to disinfect the surfaces after each dental procedure. 54 The recommended disinfectants are sodium hypochlorite at 0.1%, hydrogen peroxide at 0.5% and alcohol at 70%. 31,34,45,[55][56][57][58][59][60][61][62][63][64] Given the direct transmission through contact, the mucosa of the oral cavity is recognized as a potentially high-risk route of SARS-CoV-2 infection 1, in addition to contaminated hands, which could facilitate the transmission of the virus to patients. Undoubtedly, SARS-CoV-2 is present in the saliva of affected patients. This virus binds to receptors of the human angiotensin-converting enzyme 2, which is present in a high concentration in the salivary glands. 1,30,32,61 The biological risk of transmission of SARS-CoV-2 by inhalation when performing dental procedures is high due to the use of hand pieces under irrigation and ultrasound, which leads to the diffusion of aerosol particles of saliva, blood, and secretions. This aerosol production promotes contamination of the environment, instruments, dental appliances, dental team professionals, patients, and surfaces. 2,7,24,31,53 Although symptomatic patients with COVID-19 have been the major source of transmission; recent observations suggest that asymptomatic patients and patients in incubation are carriers of the SARS-CoV-2. 45,[65][66][67] Such epidemiological factor of COVID-19 made its control challenging since it is difficult to identify these patients and place them in restricted quarantine, which contributes to the dissemination of SARS-CoV-2 in the communities. Thus, adequate protection, disinfection of objects and hand washing are indispensable to prevent the spread of this disease. 2,7,35,45 Therefore, every patient should be considered a potential asymptomatic carrier of COVID-19 7,45,68. To this date, no effective treatment is available for COVID-19. Moreover, even with a future vaccine, complete eradication of the virus can take time, which reinforces the need for caution in the dental environment. 40,43 COVID-19, just as HIV infection in the 1980s, will lead to a paradigm shift in biosafety care in dentistry. Standard precautionary measures should be reviewed and improved to adapt the clinical routine to the new Coronavirus. [34][35][36] [37][38][39][40][41][42][43][44]

6 b) Current personal protective equipment (PPE) for dental practice

In the dental practice environment, the intense production of aerosols during the procedures exposes workers and patients to the risk of inhaling small particles and droplets, potential carriers of microorganisms such as bacteria

and viruses. So, it is crucial to establish a protocol to reduce the risk of contagion, providing a safer environment and protecting patients and oral health professionals. [36] [37][38][39][40][68][69][70] Aerosols are liquid and solid particles smaller than 50 μm in diameter suspended in the air for long periods. The COVID-19 virus is around 0.12 μm . Hence, for procedures involving the production of aerosol in dental care, it is necessary a more refined filtration as promoted by the masks N95 and PFF2, also called respirators. N95 and PFF2 masks reduce user exposure to particles up to 0.3 μm with a minimum filtration rate of 95%. Surgical masks, regularly used in dentistry, offer filtration of larger particles, spatter, and oral/body fluids when used correctly and are frequently changed. 43,51,52 For the complete and adequate personal protection of the professional and the team, the PPE The importance of Minimal Intervention Dentistry after the COVID-19 pandemic: A Look to the future that must be used routinely are disposable apron with the weight between 30 and 50 g/m², disposable cap, professional mask (N95 and PFF2), safety goggles, face shield and gloves (figure 1). [37][38][39][40][41][42][43][44] The face shields or visors provide an ample protection of the face when associated with the use of the professional mask and the goggles with side seal, even if the professional already wears glasses. 7 The disinfection of the face shields and safety goggles after each attendance is advisable so that there is no contamination. Also, the PPE should be removed carefully. [37][38][39][40] Dental professionals should implement strict infection prevention and control measures to avoid the transmission of microorganisms during attendance. [36] [37][38][39][40][41][42][43][44] After the COVID-19 pandemic, for the assistance of asymptomatic patients and suspected or confirmed cases of infection by SARS-CoV-2, dentists should follow new guidelines regarding prevention and control measures, according to the available evidence. Thus, it is recommended a protocol with guidelines to be followed for dental care, determining more rigorous prevention and control actions for patients and dental staff (Table ??). 7,30,[32][33][34][35][36] [37][38][39][40][41][42][43][44]

7 d) Health Promotion and Minimal Invasion Dentistry

For the management of dental procedures, it is necessary, in addition to being aware of the transmission routes of SARS-CoV-2, to acknowledge and implement the Minimal Intervention Dentistry. Dentists should adopt strict measures of personal protection and avoid/minimize operations that may produce droplets or aerosols. 27,35 The risk of direct inhalation of the virus is mainly related to the use of handpieces and ultrasonic cleaners, which generate aerosol and droplets, often mixed with saliva and blood. 45 Thus, it is advisable to avoid and lessen the use of handpieces to reduce the production of aerosols/droplets and use manual instruments, use rubber dams to significantly reduce the spreading of aerosols/droplets and use surgical aspirators to control the diffusion of particles in the air. 30,32,36,40 In this context, the MID, which endorses preservation of the dental structure, extended longevity of teeth, avoids the restorative surgical cycle and reduces treatment costs, should be pointed out as the principal philosophy of dental practice after the COVID-19 pandemic, since it allows performing procedures that, for the most part, minimize or prevent the production of aerosols (figure 2). 27,40 Among the actions related to MID, they go from adequate diagnosis to inclusion of educational measures related to the production of self-care, chemical-mechanical removal of decayed tissue, ART, sealants and esthetic procedures of minimal intervention (table 2). 47,48 It is noteworthy that in many countries, efforts to contain COVID-19 have resulted in an economic recession. The sudden decline in demand for goods and services and unprecedented unemployment have exacerbated the complexity of the current situation. Hence, inevitably, the new reality will imply changes for restructuring and recovery of the economy. 6 The reflections of COVID-19 on the world economy will represent an impoverishment of populations, justifying the need to adopt MID procedures, since they have lower costs. That will more democratic access to dentistry, which is essential especially in underdeveloped and developing countries. 6,24,27,69,70 IV.

8 CONCLUSION

The risk of SARS-CoV-2 infection is high to dentistry professionals and their patients. Therefore, it is necessary to adopt rigorous and functional biosafety protocols, along with the strategies of Minimal Intervention Dentistry. The MID advocates the production of self-care, aims to control the health disease process, avoids the repetitive restorative cycle, decreases cost, preserves the healthy dental structure, minimizes pain, and aerosol production. Such a model of practice allows dentistry to have a more positive and safer look to the future after the COVID-19 pandemic.

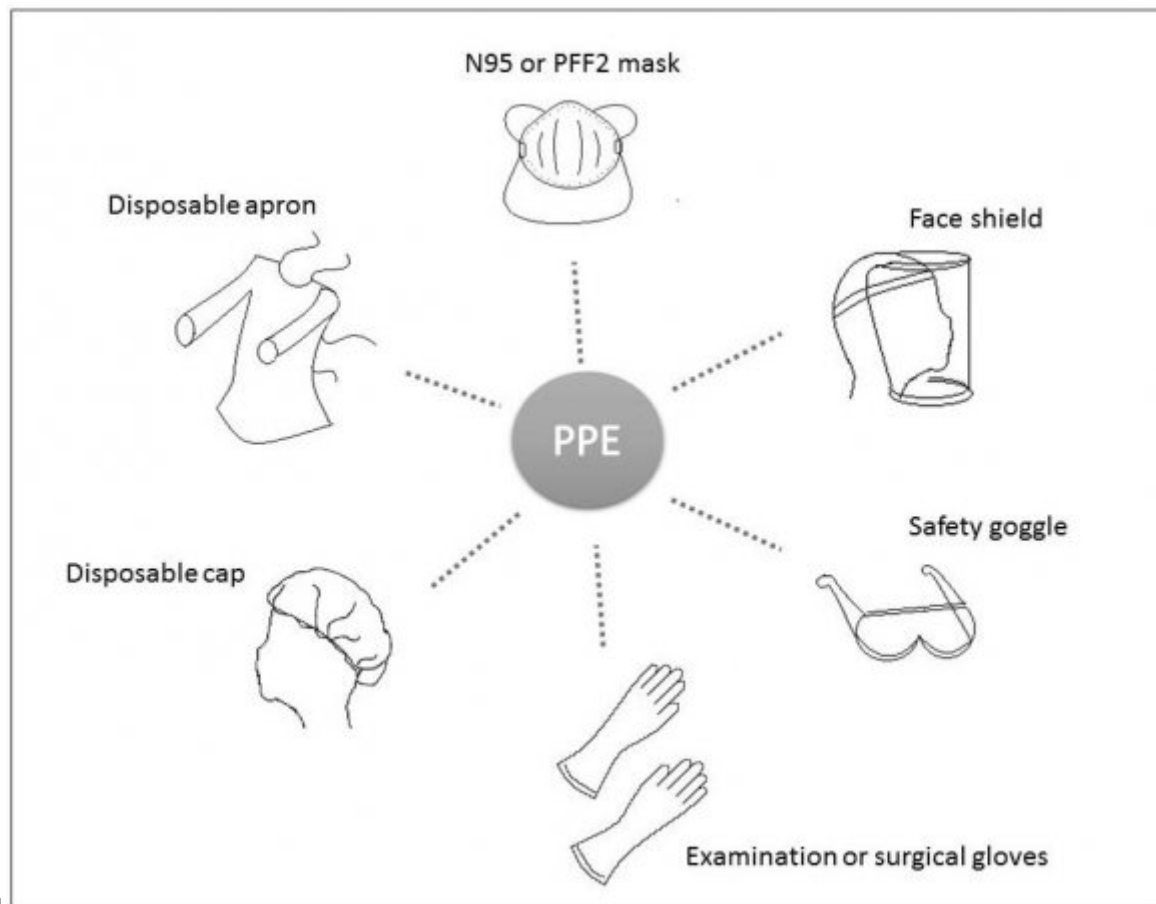


Figure 1: Figure 1 :

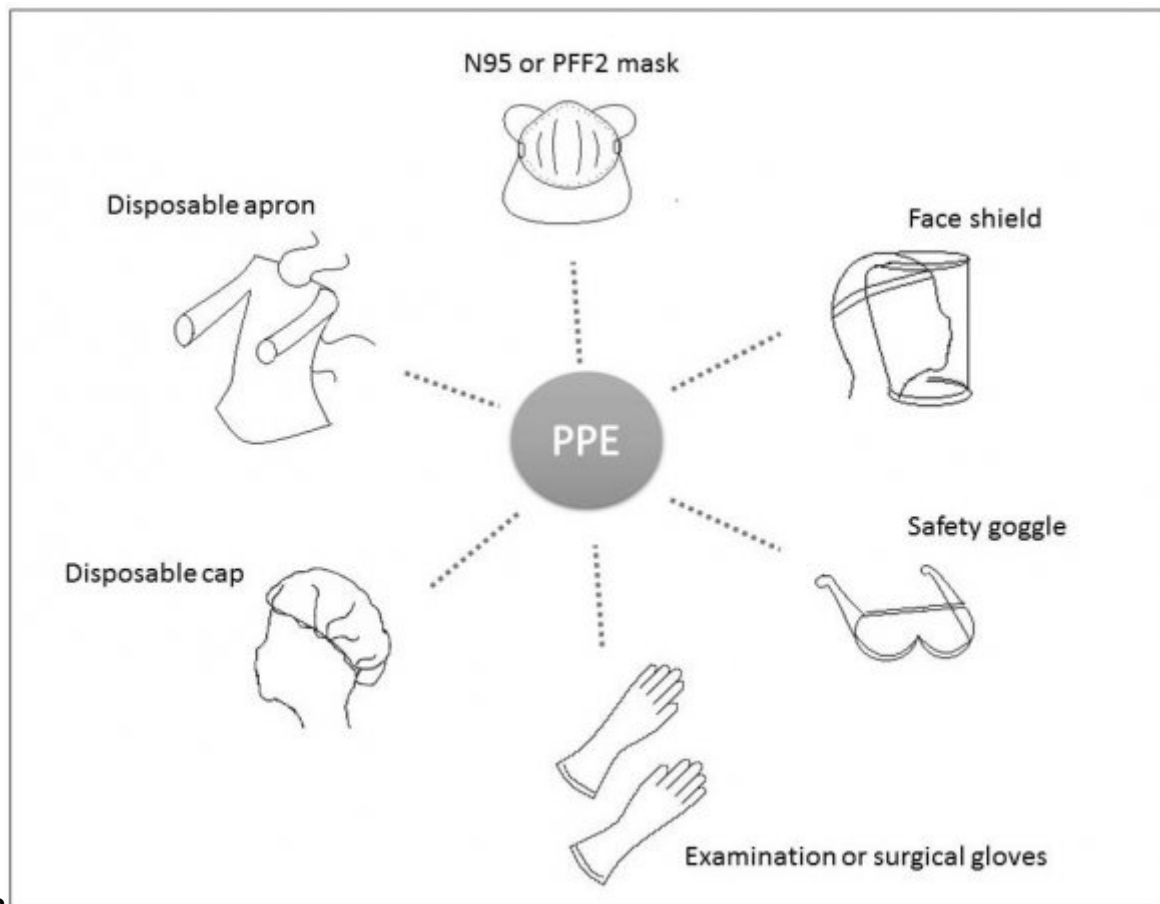
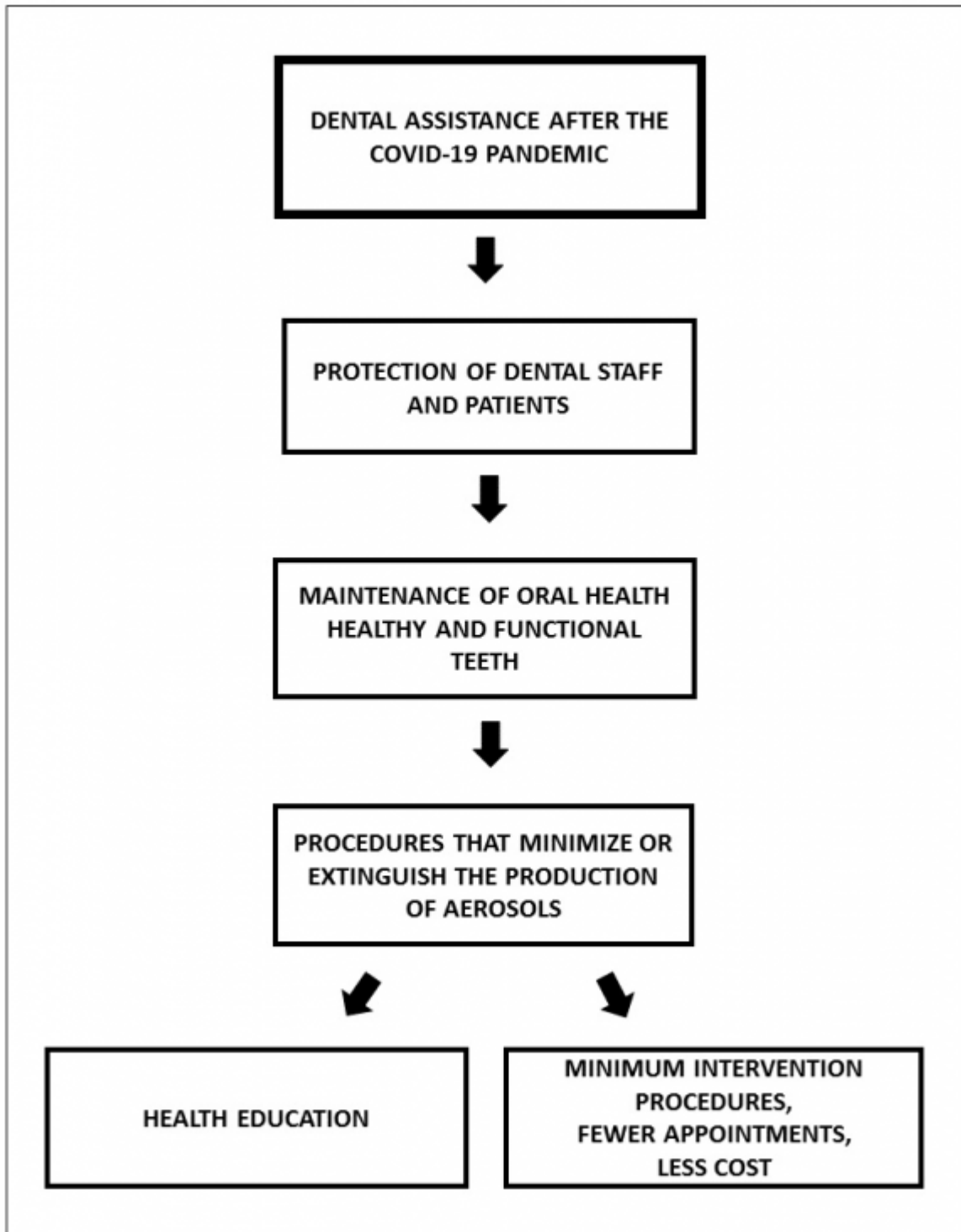


Figure 2: Figure 2 :



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Figure 3: Table 1 : 8 Year

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