

Literature Review : Dental Practice Management in the New Normal Era and Prevention Measures Regarding Dental Bioaerosol in Indonesia

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Abstract

Coronavirus 2019 (COVID-19) commonly spreads through droplets from the respiratory tract or contacts with contaminated surfaces. Risks of being infected with COVID-19 in work is mostly caused by close contacts less than 1 meter with people who are infected with COVID-19 and contact with contaminated surfaces and objects. All dental practitioners have a high risk of being infected with SARS-CoV-2 for face-to-face communication and saliva, blood droplets as well as other body fluids and the use of sharp instruments. To identify the procedures of dental practice management and prevention measures of dental bioaerosol in the new normal era of COVID-19. The descriptive analysis was done through a literature review. The data were from secondary data. Coronavirus is an RNA virus with a particle size of 120-160 nm. This virus mainly infects animals, including bats and camels. Some prevention measures applied by dental practitioners were wearing Personal Protective Equipment (PPE) level 3 with proper procedures of removing PPE, washing hands with soap by following six steps of handwashing suggested by World Health Organization, using a dental aerosol suction machine to reduce the aerosol concentration in rooms with poor ventilation, sterilizing all dental equipment with autoclave, disinfecting surfaces reached by patients and dentists, and having a protective vaccine for health workers, for example protecting vaccine. During the COVID-19 pandemic, nearly all dental practitioners are being at risk of transmitting and being infected with the SARS-COV-2 virus since the viral load is dominated by the aerosol in patients' mouths. Some prevention measures in the new normal era could be done by wearing Personal Protective Equipment (PPE) level 3 with proper procedures of removing PPE, washing hands with soap by following six steps of handwashing suggested by World Health Organization, using a dental aerosol suction machine, sterilizing all dental equipment with autoclave, disinfecting reachable surfaces, and getting the protective vaccine. The new normal era demands changes in behavior in daily activities by following the health protocols to prevent the spread of COVID-19.

Keywords: COVID 19, Dental bioaerosol, New Normal, Health Protocol

Introduction

In late December 2019, countries around the world were astounded by a new pneumonia epidemic that first emerged in a group of patients treated at hospitals and initially diagnosed as having pneumonia of unknown

etiology in Wuhan, Hubei Province. This case started spreading quickly to most of countries and territories. Firstly, this disease was temporarily given a name as 2019 novel coronavirus (2019-nCoV), but then World Health Organization announced its new name called Coronavirus Disease (COVID-19) which was caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2)¹. A letter from the Faculty of Medicine, University of Indonesia mentioned that Indonesia was ranked fifth with the highest Case Fatality Rate (CFR) in the world and with CFR 8-10%². In March 2020, the

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Indonesian Government announced COVID-19 firstly spread in Indonesia and was considered a national non-natural disaster³. COVID-19 generally spreads through droplets from the respiratory tract or contact with contaminated surfaces. Risks of being infected with COVID-19 at work are mostly caused by close contacts less than 1 meter with people who are infected with COVID-19 and contact with contaminated surfaces and objects. The risk levels are divided into three categories which can evaluate the risks of COVID-19 infection in the workplace, for example, low, medium, and high exposure risk. Low exposure risk occurs when a job does not contact closely and frequently with the public and other colleagues, visitors, clients, and other confirmed and suspected COVID-19 people. People with medium exposure risk work in an environment that closely and frequently contact with the public and other colleagues, visitors, clients or customers, or contractors, and other suspected COVID-19 people. While high exposure risk is experienced by people who have potential high and close contact with confirmed and suspected COVID-19 people and contaminated surfaces and objects^{4,5}. There are four basic spreading routes of pathogenic microorganism in dental clinics, for example, passing through the blood of infected patients, saliva or aerosol droplets of infected patients, gingiva secretion, periodontium, and teeth, aerosol droplets in handpieces in the dental unit, and finally direct contact with patients and contaminated equipment⁶. All dental practitioners have a high risk of being infected with SARS-CoV-2 for face-to-face communication and saliva, blood droplets as well as other body fluids and the use of sharp instruments⁷.

According to the Circular Letter Number 2776/PB PDGI/III-3/2020 concerning guidelines of services, dentists are asked to delay treatments to people without symptoms, elective treatments related to aesthetic treatment using a dental bur, scalar or suction during the COVID-19 pandemic⁷. However, the Indonesian Government now regulates the citizen's lives to be normal again, and this later condition is called the new normal. The term "new normal" emphasizes more on changes in the community's culture to practice healthy behavior. New normal is a change in culture, such as practicing hygiene and a healthy lifestyle, wearing masks when going outside the home, washing hands, and so on⁸.

Since dentists have high exposure risk to COVID-19 transmission, COVID-19 articles published in 2020 were under review. Several questions arose from this study was how dental practice management in the new normal era is (applied by operators, such as dentists and dental assistants) and patients and what prevention measures are used to prevent dental bioaerosol. These questions were based on the idea that dentists always have contact with bioaerosol which may transmit COVID-19 through droplets.

Materials and Method

The method used in this research is the study of literature, which is the study of the object of research in the form of scientific journals, books, articles in mass media, or statistical data. The literature will be used to examine research problems and how to deal with them. The nature of the study conducted is descriptive analysis which is to give a picture to the reader so that it can be a medium of public education. The type of data used is secondary data. The articles reviewed in the discussion were published from September 2005 to March 2020.

Results and Discussion

Coronavirus Disease (COVID-19) and Its Transmission. Coronavirus, an RNA virus, has a particle size of 120-160 nm. This virus primarily infects animals, such as bats and camels. Before the COVID-19 pandemic, there are 6 types of coronavirus which can infect humans, for example, alphacoronavirus NL63, betacoronavirus OC43, betacoronavirus HKU1, SARS-CoV, and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Coronavirus was named for its crown shape with spikes on the surface. The virus will enter the susceptible cells to the body through nose, mouth, or eyes, and they will attach to respiratory tract cells which produce ACE2 protein⁹. The preliminary study showed oral cavity has high potential risks of the coronavirus confinement. Based on the existing data, comorbidities such as hypertension and diabetes mellitus, male subjects, and active smokers are the risk factors of SARS-CoV-2 infection. The disease distribution mostly occurs to males because they have a high prevalence of active smokers. In smokers and people with hypertension and Diabetes Mellitus, the expression of ACE2 receptor assembly increases. Besides, >65-year-old people with asthma, chronic lung disease, cardiac arrest, obesity,

immune system disorder, and liver problems have a high risk of SARS-COV-2 infection.

Personal Protective Equipment (PPE) for Dentist

PPE is obligatory for dentists and dental assistants. Recommendations of PPE use based on the protection level are divided into three levels, such as level 1, level 2, level 3. PPE level 1 consists of a 3-ply surgical mask, disposable latex gloves, and scrub suit. Surgical masks only give partial protection to people from bio aerosol. Health workers who work in the dental public practice which does not have high risks and aerosol will wear PPE level 1. While PPE level 2 includes an eye protector, a surgical mask, eye goggles, disposable latex

gloves, and a gown. The PPE level 2 should be worn by health workers, doctors, nurses, and laboratorians who work in inpatient rooms, where non-respiratory specimens are taken, and in laboratories. Whereas, the PPE level 3 consists of an eye protector and face shield, an N95 mask or equivalent, disposable latex gloves, eye goggles or head cape, all cover gown, apron, and boots. PPE level 3 should be worn by health workers who have direct contact with suspected and confirmed COVID-19 patients and who give a surgical treatment that generates aerosol¹⁰. However, another study found an N95 mask is not enough to protect people from droplets, thereby wearing PAPRs (Powered Air-Purifying Respirators).

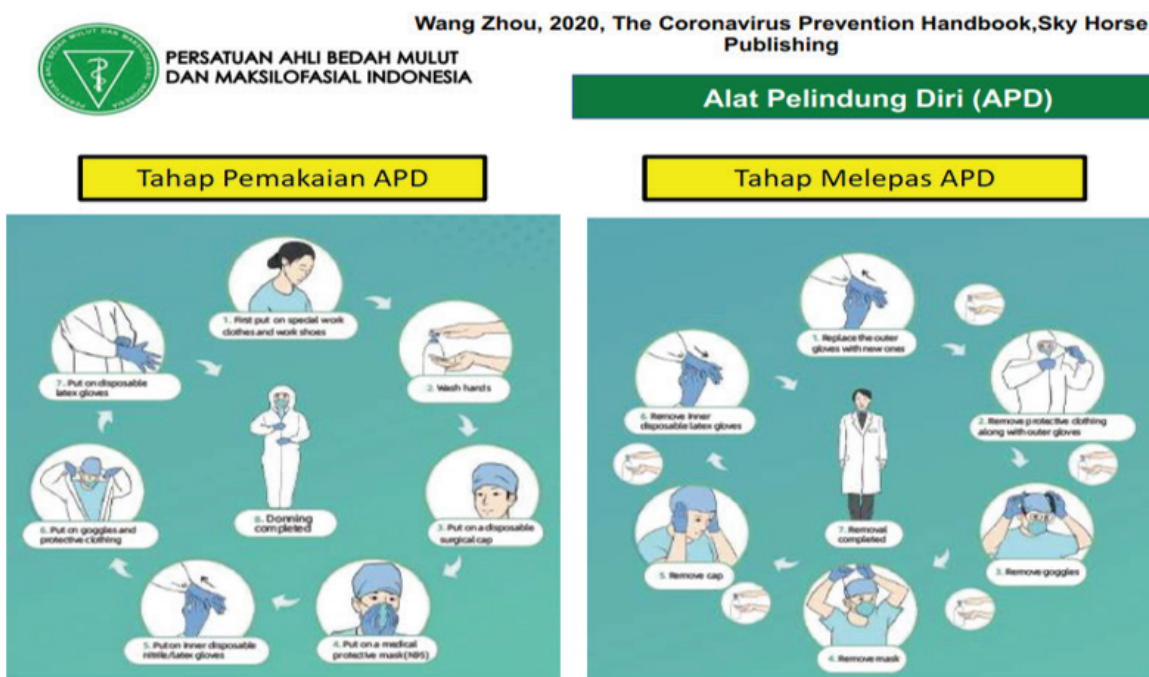


Figure 1. How to take off and use Personal Protective Equipment

Procedures for putting on PPE include wearing a scrub suit, removing all jewelry or accessories, handwashing prior and after putting on PPE, putting on and removing PPE in the Antero room, and taking a bath after removing PPE¹¹. Whang Zhou (2020) stated the above figure was based on the Coronavirus Prevention Handbook. Some procedures for wearing and putting on PPE were entering the Antero room after putting on a scrub suit in the fitting room, checking PPE in good condition, and washing hands with soap or hand sanitizer

in six steps, and then putting on boots. If health workers wear sneakers or other covering shoes, they shall wear shoe covers protecting the outer part of their shoes and pants by firstly putting feet in, covering sleeves and tightening coverall over the body by zipping it to the neck and letting hood or head cape of the coverall open behind the neck. Then, health workers should wear a surgical mask by putting in front of the nose and mouth by pulling two sides of straps and fastening it to the backside. Next, they put on a head cape that covers

the head and ears thoroughly and wears goggles with a tightening cover throughout the eyes. Finally, they need to cover the gown sleeves, and PPE is ready to wear¹².

While procedures for removing PPE range from standing in the unsterile area, removing hood or coverall head cape by removing the head cape from the head to the front until it is released. Health workers then shall remove the coverall gently by opening the zipper from the top to bottom and gently pull the inner front part of the coverall to the front part of the body. At the same time, hands slowly remove gloves and parts covering feet by flipping the outer part inside. During removing the coverall, always keep a distance from the health workers' body. After that, the coverall is thrown to an infectious waste container. Then, disinfect hands with hand sanitizer in six steps. Remove goggles by putting down the head a little bit and pull the left and right side of the goggles at once. Then, remove it from the face and throw the goggles into a secured box. Remove the surgical mask by slowly pulling mask straps and throw it into an infectious waste container. Disinfect hands with hand sanitizer in six steps. After removing scrub suit, health workers should shower and then wear casual clothes^{11,12}.

Procedures in Health Facilities

Proving washbasin or hand sanitizer is useful for everyone who enters a room and is required to wash their hands. Besides, using a thermometer infrared before entering a room can check the body temperature of people in the room. If someone's body temperature is suspected to 38oC, he will not be allowed to enter the room. Then, an anamnesis of whether the symptoms are COVID-19 or not was done. Furthermore, proper management of ventilation is significant. Good working ventilation will reduce the concentration of airborne microbes and avoid microbiologically contaminated air circulation. Avoid using split/central Air Conditioning and commercial windows except being equipped with High-Efficiency Particulate Air (HEPA) filter. Natural ventilation and mechanical ventilation in exhauster are recommended to use¹¹.

Purification of microbes pollutants in the air can be done by using a dental aerosol suction machine that can absorb droplets and aerosol up to 99%. The machine has 62 dB sound equivalent to the sound of a hairdryer

with little noise which does not disturb operators and patients. Carbon activation filtering and HEPA filter can result in a 0.3-micron filter, with the SARS-COV-2 particle size of 0.06 to 0.14 micron¹³. Use rubber dam tape when health workers wear a highspeed handpiece. Until now, further studies have not differentiated the use of aerosol suction machines and rubber dam to fight against aerosol. Both types of equipment are useful to avoid aerosol in the oral cavity. When using four-handed dentistry, dentists and dental assistants face patients in the supine position. Coordination between dentists and dental assistants is the key factor to implement the best practice, do sterilization, and save time spent during the procedures¹³.

Sterilizing dental equipment uses autoclave, especially B-class autoclave for handpieces or scalar (before and after its usage) by ensuring the inner and outer parts. The use of an N-class autoclave is not recommended in dental practices. Regularly disinfecting medical equipment at clinics is required when health workers start working and having contact with patients. The clinical contact surface can be contaminated through patients in forms of spray or sparks during the dental procedures or through contaminated gloves. Places that need to be disinfected are handle, dental lamp, radiography tools, dental chair, and cuspidor. Use a protector to avoid contamination of surfaces to clean and disinfect enclosed surfaces among patients¹⁴. Always do routine hygiene to the surfaces, such as floors, walls, and sink with detergent and water or the disinfected surfaces. Finally, health workers should do protective vaccines of Dental Health Care Personnel Safety, such as the BCG vaccine, influenza vaccine, meningitis vaccine, MMR vaccine, and varicella vaccine.

Preventive Measures for Patients

Some procedures need to be done when patients come to healthcare facilities especially dental clinics are firstly always wearing a sheet mask in the waiting room. Do physical distancing especially in the waiting room. Lastly, gargling with antiseptics before dental procedures. It is recommended to apply antiseptics for gargling with 1% of hydrogen peroxide (H₂O₂) and 0.2% of povidone-iodine. The Vice of General Secretary of Indonesia Dental Association (PDGI) drg. Iwan Dewanto, MMR, Ph.D. based on the research done,

stated that the use of 0.23% of povidone-iodine in 2 minutes can control the quantity of SARS-CoV-2 until the concentration of the virus is not detected anymore. While, the use of povidone-iodine has been proven to reduce up to 99.9% of the concentration of other types of coronavirus, such as Mers-CoV when it is used for 30 seconds.

Conclusion

During the COVID-19 pandemic, nearly all dental practices are at the risk of SARS-COV-2 transmission since aerosol from patients' oral cavity is dominant. Teeth bioaerosol could not stop thoroughly, but it can be reduced significantly by taking some preventive measures in the new normal era. These include wearing PPE level 3, frequently washing hands with soap in 6 steps as suggested by WHO, using a dental aerosol suction machine to reduce the concentration of aerosol in a poorly ventilated room, sterilizing all dental equipment by using autoclave, disinfect surfaces accessible to patients or dentists, and getting a protective vaccine, such as BCG vaccine, influenza vaccine, meningitis vaccine, MMR vaccine, and varicella vaccine. New normal means changing behavior in doing the daily activity by following health protocols to prevent COVID-19 transmission. Even though dentists and patients are now in the new normal, dentists and patients have to follow preventive protocols.

Acknowledgments : The author would like to thank Universitas Airlangga, which has allowed completing this final project

Conflict of Interests : Nil

Ethical Clearance: This study utilizes secondary data that has been published. So there is no need for ethical clearance

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