MPPKI Vol 4 No 3 September 2021

ISSN 2597– 6052

MPPKI

Media Publikasi Promosi Kesehatan Indonesia

The Indonesian Journal of Health Promotion

Review Article **Open Access**

Prevention and Infection Control in Dental Practices During the Covid-19 Pandemic: A Literature Review

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Abstract

Dental practices have a high risk of infected Covid-19 when providing dental and oral health services. The highest infections among all health care professions are dentists, dental assistants, and dental hygienists, because these professions are associated with patients and exposure to salivary secretions and aerosols. To be able to reduce the risk and the transmission of Covid-19 virus in dental practice, it is necessary to prevent and control infection during the Covid-19 pandemic. Therefore, the purpose of this study is to analyze infection control prevention in dental practices during the Covid-19 pandemic. This type of research is a literature review with a qualitative approach through descriptive analysis. The selection of articles according to the specified inclusion and exclusion criteria. The search process for this article was carried out using Google Scholar, Pubmed, DOAJ and Springerlink databases using the keywords "infection control, dental practice, and covid-19". The articles obtained from research year 2019 to 2021. From various literatures it is found that prevention efforts can be carried out in several ways, including through the application of triage to patients, patient management, use of personal protective equipment for dentists and clinical staff, and management of the practice environment.

Key word: Infection control, dental practice, and Covid-19

INTRODUCTION

The Covid-19 virus outbreak started from Wuhan at the end of December 2019 and spread rapidly outside China even within 2 months almost infecting the whole world. The World Health Organization (WHO) declared a public health emergency of international concern on January 30, 2020 (1). Indonesia announced the Covid-19 outbreak that entered Indonesia on March 2, 2020 in Jakarta, West Java, and Bali. In a short time of less than 1 month there were 34 provinces detected Covid-19. Based on data from the mitigation team of the Indonesian Dentist Association (PDGI) as of December 2020, there were 15 dentists who died exposed to the Covid-19 virus. The Head of BNPB and the Ministry of Health urge dentists to temporarily stop providing services except for emergency cases at the beginning of the pandemic. This is because dental procedures have a high risk of infected COVID-19 when providing dental and oral health services (2). It was recently reported that the highest potential for infection among all health care professions is dentists, dental assistants, and dental hygienists, due to these professions dealing with patients as well as exposure to splashes of salivary secretions and aerosols(3). As of February 8, 2021, the head of the Indonesian Dental Association (PDGI) reported that there were 338 dentists who were confirmed positive for Covid-19 and 33 dentists who died because they are infected to the Covid-19 virus.

Dental practice activities were stopped at the beginning of the pandemic for almost 4 months so that at that time dentists could not practice knowledge and competence in the form of community service. (2). Dentists as health workers play a role in the prevention, management and care of oral health for people living with various diseases. Dentists are considered unethical if they do not provide services to people because the people only suffers from infectious diseases such as AIDS or HIV, HBV, seropositive HCV, and even Covid-19. This refusal is also

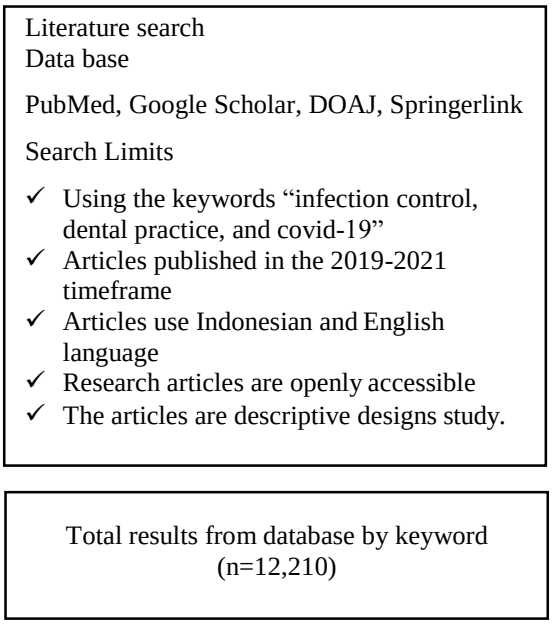
considered illogical when other patients who carry an undetected disease have received daily care at the practice or clinic. However, to carry out this task, dentists also need to pay attention to health and safety for themselves.

Based on previous research by Kohli A and Puttaiah R showed around 17-64% of dentists felt that all patients were not considered potentially infectious, 50-86% felt that the patient's medical history and appearance determined the level of infection control applied, 18-65% felt that the procedure correct when refusing to treat a patient whose infection status is known. Research by Ina Permata Dewi et al said that compliance with the use of personal protective equipment was related to age, knowledge, attitude, availability of facilities, training and supervision.

The American Dental Association (ADA) and the Centers for Disease Control and Prevention (CDC) recommend that every patient must be considered potentially infectious and the standard precautions should be applied to all patients. It aims to reduce and prevent iatrogenic infection, nosocomial or blood exposure, and other infectious materials. The existence of the Indonesian government's discourse to implement a new normal life (New Normal era) makes PB-PDGI provide an opportunity for dentists throughout Indonesia to start practicing again with various rules that must be adhered to. These rules are intended to protect dentists and supporting health workers from contracting Covid-19, as well as to avoid cross-infection in the dental practice room. To be able to reduce the risk of transmitting the Covid-19 virus in dental practice, practice room management, flow and procedures for working on patients and PPE, need to be regulated in such a way (2). Therefore, the purpose of this study is to analyze infection control prevention in dentistry practices during the Covid-19 pandemic.

MATERIALS AND METHODE

This study is a literature review. The literature review articles in this study was using method Preferred Reporting Items for Systematic Reviews and Meta-analyses or regular called PRISMA, this method is carried out systematically by following the correct stages or research protocol. The search process for this article was carried out using Google Scholar, Pubmed, DOAJ, Springerlink database using the keywords "Infection control, Dental practice, and Covid-19". The articles obtained from research year 2019 to 2021. After the articles were obtained, the researchers then selected articles that matched the specified inclusion and exclusion criteria. The inclusion criteria in this literature review are: (1) Articles about infection control and prevention in dental practice during the Covid-19 pandemic,(2) Articles published in the 2019-2021 timeframe, (3) Articles use Indonesian and English language, (4) Research articles can be accessed openly and the articles are descriptive designs study. From the results of the filtering the articles, 15 articles were determined that were appropriate and relevant in this study. The flow diagram and article selection are presented in Figure.1



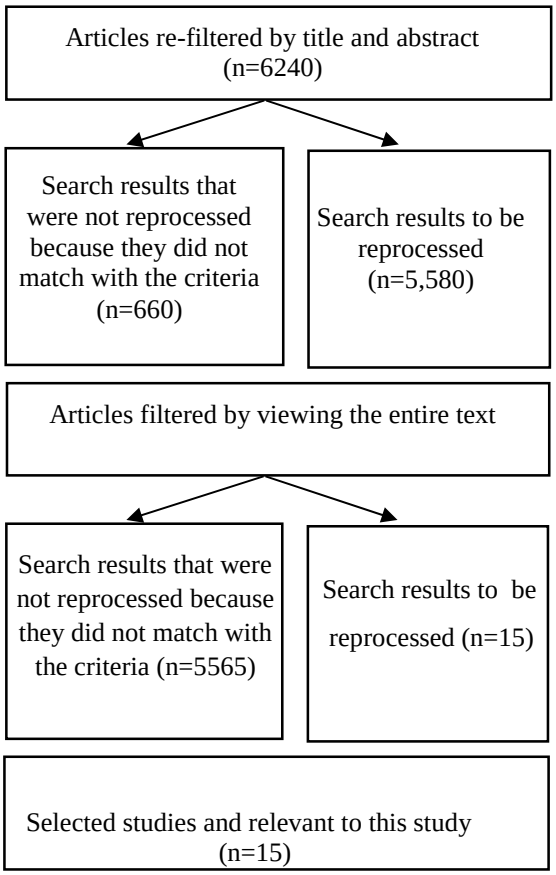


Figure 1. Flow diagram and article selection

RESULT

Based on a literature review conducted on 15 sources from national and international articles, the results obtained can be seen in table 1

Table 1. Article about Prevention and Infection Control in Dental Practices During the Covid-19 Pandemic

No.	Author	Year	Title	Conclusion
1.	Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B	2020	Transmission routes of 2019-nCoV and controls in dental practice.	Several strategies for preventing the transmission of 2019-nCov during dental diagnosis and treatment, including patient evaluation, personal protective measures for the dental professionals, and disinfection of the clinic settings
2.	Amtha R.	2019	Panduan Dokter Gigi Dalam Era New Normal	Dentists who are at high risk of contracting COVID-19 while providing dental and oral health services, temporarily stop providing services except for emergency cases

3.	Fallahi HR, Keyhan SO, Zandian D, Kim S-G, Cheshmi B	2020	Being a front-line dentist during the Covid-19 pandemic: a literature review	Dentists can play a significant role in disrupting the transmission chain, thereby reducing the incidence of disease by simply postponing all non-emergency dental care for all patients
4.	Amato A, Caggiano M, Amato M, Moccia G, Capunzo M, De Caro F	2020	Infection control in dental practice during the covid-19 pandemic	Efficient sanitizing procedures combined with the correct use of PPE can significantly reduce the probability of SARS-CoV-2 being transmitted during dental practice
5.	Peditto M, Scapellato S, Marcianò A, Costa P, Oteri G	2020	Dentistry during the covid-19 epidemic: An italian workflow for the management of dental practice	Understanding the role of dental enviroment in Covid-19 transmission may have a positive impact in the prevention of infection. It will be necessary to keep sanitizes the work environment and sterile the instruments
6.	Giudice A, Barone S, Muraca D, Averta F, Diodati F, Antonelli A, Fortunato L[8]	2020	Can Teledentistry Improve the Monitoring of Patients during the Covid-19 Dissemination? A Descriptive Pilot Study	In this condition, awareness is always monitored and patient participation greatly helps improve patient compliance and build relationships between dentists and patients on a remote scale.
7.	Hudyono R, Bramantoro T, Benyamin B, Dwiandhono I, Soesilowati P, Hudyono AP, et al	2020	During and post COVID-19 pandemic: prevention of cross infection at dental practices in country with tropical climate	No single protocol may fully guarantee the safety of the patients and dental workers. We suggest to combine the protocol to minimize self and cross-contamination during practice
8.	Wang C, Miao L, Wang Z, Xiong Y, Jiao Y, Liu H	2021	Emergency Management in Dental Clinic During the Coronavirus Disease 2019 (COVID-19) Epidemic in Beijing	The 'Emergency only' policy of the dental clinic is appropriate to implement during the epidemic threshold period to reduce the cross-infection risk
9.	Patel M	2020	Infection control in dentistry during COVID – 19 pandemic: what has changed?	A modified infection prevention and control regime will protect the dental practitioner, assistant and staff, patients and the community
10.	Abdelrahim RK, Abdoun HAE, Koppolu P, Swapna LA	2021	Infection control measures in dental clinics during coronavirus disease-19 pandemic in kingdom of saudi arabia: A pilot study	Majority of dentists working in KSA are following recommended measures to minimize the spread of COVID-19. Some dentists modified their PPE used during the pandemic

11.	Duruk G, Gümüşboğa ZŞ, Çolak C	2020	Investigation of Turkish dentists' clinical attitudes and behaviors towards the COVID-19 pandemic: A survey study	Dentist are strongly recommended to take maximum precautions in the clinical setting.
12.	Pereira LJ, Murata RM, Pardi V, Mattos FF	2021	Streamlining the dental care during COVID-19 pandemic: updated clinical recommendations and infection control management framework	Appropriate cleaning and surface disinfection are mandatory. The dental staff must be trained to use appropriate Personal Protective Equipment (PPE), following a risk assessment and standard precautions
13.	Benzian H, Beltrán-Aguilar E, Niederman R	2021	Systemic Management of Pandemic Risks in Dental Practice: A Consolidated Framework for COVID-19 Control in Dentistry	There's a five distinct areas of pandemic control, comprising planning and protocols, patient screening, preparation of facilities, PPE and infection control, and procedures and aerosol control
14.	Khader Y, Al Nsour M, Al-Batayneh OB, Saadeh R, Bashier H, Alfaqih M, et al	2020	Dentists awareness, perception, and attitude regarding COVID-19 and infection control: Cross-sectional study among Jordanian dentists	Dentists had limited comprehension of the extra precautionary measures that protect the dental staff and other patients from COVID-19. To make sure that dentists are well informed and aware of best practices and recommended disease management approaches
15.	Ahmadi H, Ebrahimi A, Ghorbani F	2020	The impact of COVID-19 pandemic on dental practice in Iran: a questionnaire-based report	Dental practitioner lower their work hours and limit dental procedures to emergency treatments to reduce the risk of COVID-19 transmission

DISCUSSION

Dental practitioners have a high risk of being exposed to Covid-19 infection, because generally dental procedures are carried out within a distance of less than one meter between patients and dentists and are always exposed to saliva, blood and other body fluids from patients. Moreover, some dental procedures can generate aerosols which will increase the risk of airborne infection (4). Based on a literature review that has been carried out on 15 sources from national and international articles, it can be seen that there are several things that can be done to prevent and control Covid-19 infection in dental practice, including applying triage to patients, patient management, using protective equipment for dentists and clinic staff, and management of the practice environment.

Principle of Triage in Patient

As is well known, the majority of dental treatment is considered the treatment of choice because it has been planned and scheduled in advance so that it can be postponed to avoid the risk of infection. On the other hand, some complaints are urgent and must be treated immediately (5). It is important for dentists to classify patient complaints according to the degree of urgency, so as to reduce the risk of cross-infection by limiting the number of patient visits.

Table 2. Classification Degrees of Urgency

Degrees of Urgency	Complaints, Symptoms, and Desired service	Visit Status
Emergency	1. Toothache (Acute) 2. Dental trauma 3. Maxillofacial trauma 4. TMJ dislocation 5. Persistent bleeding	Immediately to the clinic
Secondary Emergency	1. Orthodontic Control 2. Toothache (Chronic) 3. Dental fillings 4. Root canal treatment	Need an appointment or via online consultation
Optional	1. Orthodontic Insersion 2. Implants 3. Dental hygiene care 4. Prosthodontics	Recommended after the pandemic or through online consultation

Source: Wang *et al*, 2020

Online consultation or better known as Teledentistry can be an alternative to monitor patients, reduce costs, and limit contact between doctors and patients so as to reduce the risk of COVID-19 infection (6).

Patient Management

After determining the degree of urgency of treatment for the patient, screening is needed for patients who visit the dentist's practice. Several questions have been designed for screening in non- emergency patients, including:

1. Do you have a history of fever in the last 14 days?
2. Is there a history of cough, and respiratory problems in the last 14 days?
3. Do you have a history of travel to COVID-19 red zone areas in the last 14 days?
4. Have you had a history of contact with people who have a fever, cough and have respiratory problems in the last 14 days, and are suspected of having COVID-19?
5. Have you participated in meetings and contact with many strangers in the last 14 days?

If there is an answer "Yes" to the above question, then the patient is asked not to continue treatment. Patients are advised to self-isolate and immediately be directed to the nearest health facility. Dentists may only treat patients who answer “No” to all questions, provided that the patient's body temperature is below 37.3℃ (7).
In the case of an emergency patient who may be a suspected COVID-19 patient, it is better to take care in a hospital with more adequate health personnel and equipment. If possible, treatment can be carried out in a dentist's practice by scheduling the patient as the last patient to minimize the possibility of infection to other patients, the treatment is carried out in a room with good airflow, using a rubber dam, avoiding all AGP (Aerosol generating procedures), performed quickly to minimize intervention time. All PPE used by doctors and teams must be disposed of in separate bags (4).

Personal Protective Equipment (PPE)

The use of PPE by dentists is an infection control precautions during the COVID-19 pandemic. PPE plays an important role in avoiding the possibility of being exposed to and infected with COVID-19. The US Centers for Disease Control and Prevention recommends the use of gloves, gowns, respiratory protection, and eye protectors as standard PPE for the control of COVID-19 infection in health workers (8).
Another recommendation is the use of visor or protective goggles, a full covered disposable gown, surgical mask or respirator, gloves, and headcaps accompanied by a hand rub procedure before and after using PPE (4). For dental practitioners there are several PPE that are highly recommended to be used because they protect the face, nose, and mouth areas during treatment, including:

- Surgical mask or N95 respirator
- Face shield
- Goggles

The three PPEs function are to protect dentists from the possibility of inhaling contaminated airborne particles, reduce aerosol exposure to the facial area, and prevent the transmission of COVID-19 through the conjunctiva, because as previous research results stated that the COVID-19 virus has a transmission route through the conjunctiva (7).

Dental Practice Environmental Management

Management of the practice environment should not be ruled out, the success of infection control depends on the arrangement of the practice room as described in the 2003 CDC guidelines. During the Covid-19 pandemic, several modifications can be made to prevent cross-contamination and transmission of infectious material. One of them is the installation of a High efficiency particulate air (HEPA) filter and a UV chamber in the ventilation system which can reduce aerosols (9).

The use of Air Conditioner in the practice room is not recommended during the pandemic because it can act as a facilitator for the spread of the virus in the room, so the room disinfection process will be quite complex. The importance of a dentist's practice room with natural ventilation has been described in several previous studies (7).

In addition to setting up the practice room, installing filters, and natural air ventilation, another thing that can be done in order to control and prevent infection in dental practice is disinfection of the practice environment. Disinfection of the practice environment plays an important role in preventing cross-infection of Covid-19 in dental practice. It is well known that most dental procedures will produce large amounts of droplets and aerosols which may potentially be a medium for virus transmission (8). As explained that every surface in the waiting room or treatment room is considered a risk as a medium for cross-infection transmission (5). so that the standard disinfection of the practice environment is described in table 3.

Table 3. Dental Practice Environmental Disinfection Standards

Area	Location	Desinfection Method	Desinfection Frequency
Treatment room	Dental instrument	Sterilization with autoclave	Every patient
	Dental chair and table	Wipe with 75% alcohol or 1000 mg/L chlorine solution.	Every patient
	Air	Aerosol spray with 10% sodium hypochlorite solution; disinfection with an ultraviolet lamp for 30 minutes; open the window	Every patient change
Clean or semi-polluted area	Floor	Mop floors with chlorine solution 1000 mg/L	Twice a day
	Office equipment	Wipe with 75% alcohol or 1000 mg/L chlorine solution.	Twice a day
	Air	Aerosol spray with 10% sodium hypochlorite solution; disinfection with an ultraviolet lamp for 30 minutes; open the window	Twice a day
Registration area and waiting room	Floor	Mop floors with chlorine solution 1000 mg/L	Twice a day
	Thermometer infrared	Wipe with 75% alcohol or 1000 mg/L chlorine solution.	Every patient
	Registration table	Wipe with 75% alcohol or 1000 mg/L chlorine solution.	Every 2 hours
	Chair	Wipe with 75% alcohol or 1000 mg/L chlorine solution.	Twice a day
	Air	Aerosol spray with 10% sodium hypochlorite solution; disinfection with an ultraviolet lamp for 30 minutes; open the window	Twice a day

Source: Wang *et al*, 2020

During treatment, the door of the treatment room must always be closed to prevent the spread of aerosols to other rooms (4).

CONCLUSION

Various efforts are certainly needed to control and prevent infection and transmission of Covid-19 in dental practice. From literature, it was found that prevention efforts can be carried out in several ways, including through the application of triage to patients, patient management, use of personal protective equipment for dentists and clinical staff, and management of the dental practice environment.

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