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PREVENTION AND CONTROL OF CROSS INFECTION AT DENTAL LABORATORIES IN EAST JAVA PROVINCE OF INDONESIA

PENCEGAHAN DAN PENGENDALIAN INFEKSI SILANG PADA LABORATORIUM GIGI DI PROPINSI JAWA TIMUR, INDONESIA

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Research Report
Penelitian

A B S T R A C T

Background: *Infectious disease is one major important health issue. Dental technician is an occupation which has a risk to get infectious disease transmitted from saliva, blood or contaminated tools if universal precaution utensils did not use properly. Infection can be transferred through dental impression from surface contact, handpiece, burs, pumice, aerosol etc.* ***Purpose:*** *This study aim to find out desinfection implementation in dental laboratories located in East Java as a preventive and controlling action towards cross infection.* ***Method:*** *Data were obtained through questionnaire, the questionnaires were designed to get the information related to infection control from dental laboratories in East Java. The survey was conducted in 36 dental laboratories listed by Association of Dental Technician in East Java.* ***Result:*** *As much as 90% dental laboratories did not performed desinfection procedure to the dental impression received from dentist and never follow any desinfection training. AS much as 95% Dental laboratories believe universal precaution utensils can be infected but only 50% utilize universal precaution utensils. Eventhough if such infection occurs, the owner will be fully responsible.* ***Conclusion:*** *Prevention and management towards cross infection control in dental laboratories located in East Java still very low. Development and supervision towards dental laboratories operational by Indonesian government and professional association need to be improved. Education regarding infection control need to be performed through trainings and inserted infection control matters in dental technician study programme curriculum in Indonesia.*

A R T I C L E I N F O

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A B S T R A K

Latar belakang: Penyakit menular merupakan salah satu masalah kesehatan utama yang penting. Teknisi gigi adalah pekerjaan yang beresiko tertular penyakit menular dari air liur, darah atau alat yang terkontaminasi jika alat pencegahan universal tidak digunakan dengan benar. Infeksi dapat ditularkan melalui cetakan gigi dari kontak permukaan, handpiece, burs, batu apung, aerosol dan lain-lain. **Tujuan:** Penelitian ini bertujuan untuk mengetahui implementasi desinfeksi di laboratorium gigi yang berlokasi di Jawa Timur sebagai tindakan *preventif* dan pengendalian terhadap infeksi silang. **Metode:** Data diperoleh melalui kuesioner yang dirancang untuk mendapatkan informasi terkait pengendalian infeksi dari laboratorium gigi di Jawa Timur. Survei dilakukan di 36 laboratorium gigi yang terdaftar di Ikatan Teknisi Gigi se-Jawa Timur. **Hasil:** Sebanyak 90% laboratorium gigi tidak melakukan prosedur desinfeksi terhadap cetakan gigi yang didapat dari dokter gigi dan tidak pernah mengikuti pelatihan desinfeksi. Sebanyak 95% Laboratorium gigi percaya bahwa peralatan pencegahan universal dapat terinfeksi tetapi hanya 50% yang menggunakan peralatan pencegahan universal. Padahal jika terjadi infeksi tersebut, pemilik akan bertanggung jawab sepenuhnya. **Kesimpulan:** Pencegahan dan penatalaksanaan pengendalian infeksi silang di laboratorium gigi yang berlokasi di Jawa Timur masih sangat rendah. Pengembangan dan pengawasan operasional laboratorium gigi oleh pemerintah Indonesia dan asosiasi profesi perlu ditingkatkan. Edukasi mengenai pengendalian infeksi perlu dilakukan melalui pelatihan dan hal-hal mengenai pengendalian infeksi seharusnya dimasukkan dalam kurikulum program Studi Teknisi Gigi di Indonesia.

Kata kunci:
Infeksi silang, Laboratorium gigi, Pencegahan, Pengendalian

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INTRODUCTION

Infection is a serious health problem faced by many countrie (Khanghahi et al,2013). Dental technicians are one of the occupations that are at risk of contracting an infectious disease that can occur from transmission through saliva, blood, or contaminated equipment. Dental impression sent to the dental laboratory always contain saliva and sometimes blood. These saliva and blood can contain many non-pathogenic and pathogenic microorganisms such as Candida albicans, Streptococcus aureus, viral Hepatitis, herpes simplex, HIV and others (Baseer et al.,2013; Ibrahim et al,2017). Dental laboratories are areas where dental technicians can get infected especially when conditions are unsterilized. It is difficult to disinfect the mold because microorganisms can enter the inside part of the cast so as to make disinfection less optimal. Bacteria in the oral cavity can stay alive for a week even within gypsum (Sammy and Benjamin,2016). Therefore, all dental impression received from the dentist must be disinfected (Rodrigues et al,2013). Technicians working in the dental laboratory can be exposed to infection through direct contact with items that have not been disinfected through cuts and abrasions while working without using gloves and masks. Infection can be transferred through dental impression performed by dental technicians related to surface contact, hand pieces, burs, pumice, aerosols, etc. (Al-kheraif,2008).

Dental laboratories must be as safe as possible from any type of infection. The potential for disease transmission can be minimized through; (a) Immunization, especially hepatitis B. (b) Barrier Techniques include hand washing with antimicrobial soap or rubbing hands with alcohol-based ingredients before starting work in a dental laboratory. When working, a dental technician must always use personal protective equipment such as gloves, masks, glasses, and laboratory coats. Gloves must be used when cleaning or filling dental impression. Mask, protector glasses or clothing must be used when there is potential for splashing, spraying, or aerosols such as when operating a machine while polishing, cutting the casting results, etc. Laboratory coats must be used at any time during the fabrication process in the laboratory and replaced or washed every day and may not be used outside the laboratory. This prevents transmission from the laboratory towards environment or vice versa (Al-kheraif,2008; Sammy and Benjamin,2016).

All disinfection procedures must be carried out in a laboratory by trained technicians if the disinfection status is unknown. Disinfection must be correct to prevent corrosion of metal components, dimensional changes and surface texture of the work (Sammy and Benjamin,2016). Some effectiveness of disinfectants has been reported, including chlorhexidine digluconate and glutaraldehyde (Kohn et al,2003). Infection control is considered to be a very important concern in the dental laboratory so that dental technicians can avoid cross infection (Pavarina et al,2003; Sammy and Benjamin,2016). This study aims to determine the implementation of disinfection in dental laboratories in East Java as a preventive measure and control of cross infection.

MATERIAL AND METHOD

This research is a descriptive study, data was obtained by giving questionnaires to dental laboratory owners in East Java Province. The questionnaires were designed to get the information related to infection control. There were 10 questions to provide overview of current practices in dental laboratories in East Java and sent by email. Each responden voluntarily signed inform concern. The survey was conducted to 36 dental laboratories listed by Association of Dental Technicians in East Java. Four weeks were given for completion the questionnaire and reminders has done by phone for the deadline. The final response was 20 dental laboratories or 55,6%.

RESULT

The results were obtained from the 20 dental laboratories and were interpreted using descriptive formats. Thirty five percent (35%) of the laboratories had been existed for 16 - 20 years. Twenty five percent (25%) of the laboratories had been existed for more than 20 years. Twenty percent (20%) of the laboratories had been existed for 1 - 5 years and 10% for 6 - 10 years and 11 -15 years (Fig. 1).

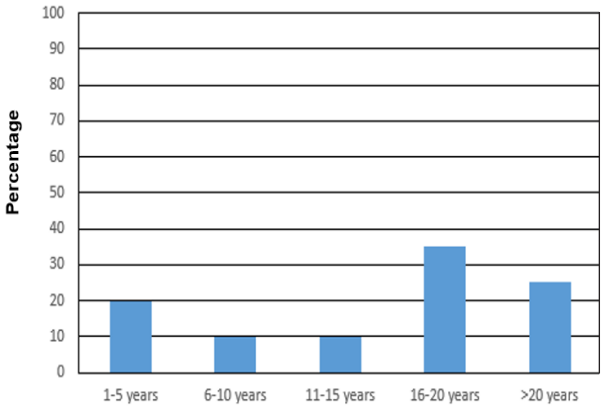

Figure 1. The existence of dental laboratories

Related to the disinfection of the working model received by the dental laboratories, as many as 90% of dental laboratories did not disinfect and the remaining 10% of dental laboratories performed disinfection procedure using glutaraldehyde and chlorhexidine on dental impression of patients, dental models of patients, and denture prostheses (Fig. 2).

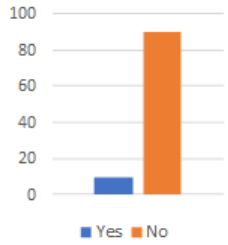

Figure 2. Disinfection practice of dental laboratories

Regarding disinfection in specific areas, 95% of dental laboratories did not disinfect and 5% of dental laboratories did it (Fig. 3).

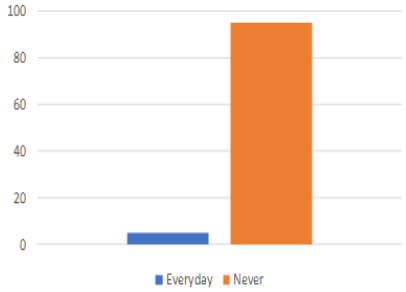

Figure 3. Disinfection of spesific area in dental laboratories

Similar results for the statement of how many times disinfection in the laboratory, 95% of dental laboratories did not disinfect and 5% of dental laboratories did every day (Fig. 4).

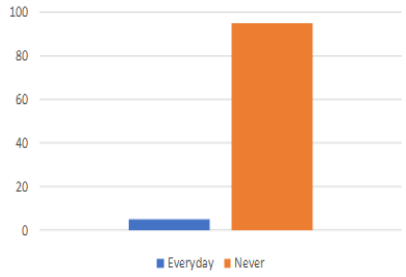

Figure 4. Frequencies of disinfecting the dental laboratories

Regarding Personal Protective Equipment (PPE) can be contaminated through orders received, 95% of dental laboratories said they believed that PPE could be contaminated while 5% of dental laboratories said that PPE would not be contaminated (Fig. 5).

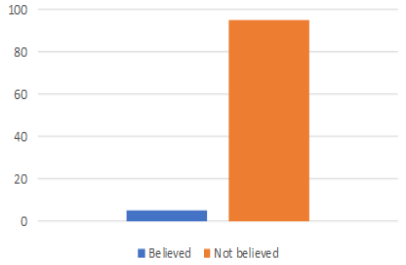

Figure 5. Response regarding Personal Protective Equiptment could be infected in dental laboratories

Regarding the dental technicians who got training about disinfection, 90% dental technicians never got a training about disinfection and 10% dental technicians ever joined a training (Fig. 6).

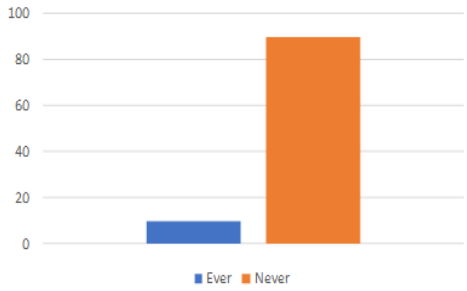

Figure 6. Dental technicians joined a training about disinfection

Regarding the frequencies using Personal Protective Equipment, 50% dental laboratories always use, 30% seldom and 20% usually use PPE (Fig. 7).

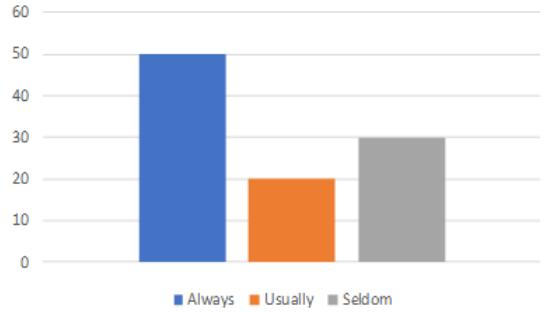

Figure 7. Frequencies using PPE provided by dental laboratories

Regarding the Personal Protective Equipment provided to dental technicians, the percentage were 100% provide masks, 95% provide lab coats, gloves and goggles. Only 20% dental laboratories has Standart Operational Procedure (Fig. 8).

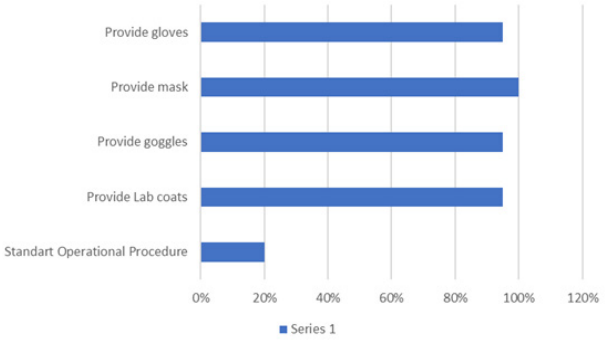

Figure 8. PPE provided by dental laboratories

Last, regarding the responsibility of owner if their dental laboratories get an contamination, 100% answered that they are responsible.

DISCUSSION

Efforts to prevent and control cross infection in the dental laboratory need to be done considering that the dental laboratory can be a source of transmission of infectious diseases originating from oral pathogens and respiratory tract microorganisms. Pathogenic microorganisms such as hepatitis B virus, hepatitis C virus, HIV / AIDS, herpes simplex virus, cytomegalovirus (CMV), Mycobacterium tuberculosis, staphylococci, streptococci and other viruses and bacteria (Baseer et al., 2013).

The dental laboratory accepts the work of fabricating fixed tooth restorations, partial or full dentures, removable orthodontic appliances, or its reparation from the clinic. Clinicians can send their orders to the dental laboratory in the form of dental impression, dental models or removable denture prostheses as well as plates of removable orthodontic devices that require reparation. If the material has not been disinfected by the clinician, it may contain pathogenic microorganisms that can cause cross-infection in the dental technician who is working on it, as well as dentists and other patients. Dentists as personnel who provide health services should conduct infection prevention and control (Kemenkes RI,2012; Kemenkes RI,2017). In the perspective of universal precautions, dental molds and stones are considered as a risk of extraordinary contamination (Gupta et al., 2017).

Respondents in this study were dental laboratories located in the area of East Java Province which had been operating at least 1 - 5 years (20%), 16 - 20 years (35%) and more than 20 years (25%). This shows that respondents have had enough time or experience to carry out their functions. During dental laboratory operational, it turned out that 90% of respondents did not disinfect the workspace, equipment or materials received from the dental clinic and only 10% did it. Of the 10% who disinfected there was only 1 respondent who did it every day. This result is similar to the results of a survey of infection control practices in a private dental laboratory in Riyadh and found that 87.5% of respondents were unaware and did not follow infection control procedures (Al-kheraif,2008).

Specific areas need to get serious attention too, evaluating that the use of strict zoning areas in dental laboratories is very important (Kaul et al,2012). One example of this specific area, for example, the polishing room needs to be disinfected because when polishing a denture or a plate of orthodontic appliance, the polishing material (pumice) can splash into the surrounding area so that it can contaminate dental technicians or other staff working in that area. Pumice that has been used if it is not discarded and left exposed to air can not only be contaminated from airborne organisms, but also water microbes from tap water used for mixing pumice and from the skin of staff in the dental laboratory that handles prostheses (Gali and Souza,2014). Pumice used in polishing prostheses can be a potential source of contamination for dental laboratory technicians given the presence of various types of microorganisms in the saliva and blood of the patient (Ferreira et al, 2010). The Center for Disease Control and Prevention (CDC) suggests that work surfaces and equipment must be cleaned and decontaminated with suitable liquid chemical germicide following accomplishment of work activities (Kohn et al.,2003).

In addition to disinfection, other efforts to prevent and control cross infection in dental laboratories are: the use of Personal Protective Equipment (PPE) and vaccinations for dental technicians or other staff in the dental laboratory. Regarding PPE can be contaminated through working orders received from the dentist, 95% of dental laboratories claimed to believe that PPE can be contaminated, but when asked about the frequencies using Personal Protective Equipment, 50% of dental laboratories always use, 30% seldom and 20% usually use PPE. This is interesting because there are differences between knowledge and compliance in the use of PPE (Sharifzadeh et al.,2017). Someone who perceives that PPE can provide benefits to prevent health problems, is safe to use during work, and is easy to use will be more willing to use PPE. Whereas someone who perceives that PPE is not very useful, as opposed to unwillingness to use (Tsakakirakis et al,2010). Chemical contamination in PPE can occur because of 2 things, the first one is evaporation from the chemical itself and the second is the material from PPE that absorbs the material (Oudejans et al,2016). The use of PPE can minimize exposure to infectious patogens. So that with a lot of training, evidence-based, and motivation can fill in the gap between knowledge and its application (actual practice) (Sharifzadeh et al.,2017; Kang et al,2017).

We recommend that when recruiting dental technicians and other staff to work in the dental laboratory, a medical history is conducted to find out their medical history. Then vaccination is carried out to prevent the spread of viral infections such as hepatitis B, hepatitis C and so on. It is not possible if a dental technician or laboratory dental staff must carry out various vaccinations because of high costs. In this study the dental laboratory owner is responsible if there is a dental technician or laboratory dental staff infected with the disease related to his work in the dental laboratory (Sharifzadeh et al.,2017; Kang et al,2017).

The results of this study indicate that the awareness of the dental laboratory owner or dental technicians about infection prevention and control efforts are still very low. The same thing was also obtained from previous studies (Khanghahi et al.,2013; Sammy and Benjamin, 2016). This may be very related to the low understanding of dental technicians or dental laboratory owners considering that those who have never participated in training on prevention of cross-infection are quite large at 90%. These results are in accordance with the results of previous studies that found the fact that only 6.7% of respondents received training, while

93.7% did not receive training on infection control (Sammy and Benjamin, 2016). This is because at that time there was no training or training costs were very expensive, so the dental technicians who contributed to the training were very few. Training on this matter is very important and has been published in the Guidelines for the Prevention and Control of Infection in Health Care Facilities (Kemenkes RI,2012; Kemenkes RI, 2017). Although the guidelines are intended for health care facilities in this case hospitals, health centers, clinics, and independent practice of health workers, while for dental laboratories as a supporting health services are not mentioned. But it would be better if the dental laboratory owner or dental technician can follow these guidelines.

It would be necessary if the Ministry of Health of the Republic of Indonesia also provides guidelines for prevention and control of infection in health care supporting facilities such as dental laboratories and other places. In the Dental Technician Professional Standards (Kemenkes RI,2007) it is not explicitly stated about the dental laboratory or dental technician's obligation to disinfect his office in the dental laboratory, equipment and materials received from the dental clinic. The regulation states that in addition to the main duties, dental technicians have the obligation, among others, to intervent in the knowledge, attitudes and behavior of the community that are not in accordance with health principles. From this it can be understood that efforts to prevent and control cross infection are one of the obligations carried out by dental technicians and dental laboratory owners who employ dental technicians. It is important that an outline of the infection control policy in the laboratory that can be implemented must be implemented (Gupta et al.,2017).

The dental technicians who participated in this study were mostly alumni from the dental engineering study program in Indonesia, for this problem the prevention and control of infection needed to be included in the education curriculum. The role of the professional dental technician organization (Indonesian Dental Technicians Association) in conducting guidance on dental laboratories and dental technicians is very important, of course in collaboration with the Indonesian Ministry of Health. This is in accordance with what is stated in the Decree of the Minister of Health where it has been determined that the Head of the Provincial Health Service and the Head of the District / City Health Service conducts guidance and supervision of the implementation of this decision by involving relevant professional organizations, according to their respective duties and functions (Kemenkes RI,2007).

CONCLUSION

Prevention and control of cross infection procedure in dental laboratories in East Java Province is still low. Guidance and supervision of the operation of the dental laboratory by the Indonesian government and professional organizations needs to be improved. Education regarding infection control needs to be done through trainings and incorporating material on infection control in the dental technician study program curriculum in Indonesia.

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