



Infection Prevention Behavior Level of Dental Technicians in Dental Laboratories Yogyakarta

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Abstract

Working in a dental laboratory risks exposure to chemicals or infectious materials. One of the activities in the dental laboratory is denture manufacturing. Dental impressions, prostheses, or improper handling of clinical materials in the dental laboratory might contaminate dental technicians with pathogenic microorganisms. Dental technicians should have basic knowledge of the transmission of infection through the dental laboratory to prevent the transmission of infectious agents from dental impressions. This research aimed to discover the level of infection prevention behavior of dental technicians in dental laboratories in Yogyakarta. This research is observational descriptive research that employs a cross-sectional design. The samples were 55 dental technicians working in the three Dental laboratories in Yogyakarta. The instrument was a questionnaire used to measure the level of knowledge. The data were analyzed using univariate (descriptive). According to the findings, almost half of the respondents (42%) had a low infection-prevention behavior level. The conclusion of level infection prevention behavior among dental technicians in Yogyakarta's dental laboratories was common.

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Introduction

Working in a laboratory has a risk of being exposed to infectious chemicals or materials and at high risk of being infected with dangerous diseases (Perwitasari et al., 2006). One of the laboratories with such risks is a dental laboratory. A dental laboratory is a place for producing, processing, and mixing chemicals alteration to support the provision of dental and oral health care through certified dentists. One of the activities in the dental laboratory is the manufacture of dentures (Corcoran et al., 2007).

Denture manufacture, orthodontic appliances, and dental restorations begin with jaw-moulding by producing a harmful mould of the oral cavity by embedding alginate into the oral cavity until the material hardens (Budiono et al., 2016). The oral cavity is an ideal environment for the growth of microorganisms, such as bacteria, fungi, and viruses (Sastrodihardjo, S., 2016).

Saliva and blood will stick to the dental mould, which allows various pathogenic microorganisms from the cavity to grow (Ongo, at al., 2014). The dental mould and prostheses resulting from improper handling of clinical materials sent to the dental laboratory may contaminate dental technicians with pathogenic microorganisms. The possibility of transmission of infection is through moulding materials, including blood and saliva (Gupta et al., 2017).

Data from the World Health Organization (WHO) shows that approximately 3.000.000 health workers expose to viruses originating from blood each year (Sahara. et al., 2014). Studies revealed that 67%

of dental mould sent to dental laboratories is contaminated with bacteria such as *Enterobacter cloacae*, *Escherichia coli*, and *Klebsiella oxytoca* (Powell et al., 1990).

The Centre for Disease Control and Prevention (CDC) developed universal precautions to protect healthcare workers and patients from infection with pathogens. Health workers attempt to protect themselves and patients from disease transmission by using personal protective equipment (PPE) to avoid infection (Potter et al., 2005). The Ministry of Health (2017) stated that PPE is special equipment for health workers to protect themselves from physical, chemical, biological, or infectious hazardous material (MoH, 2017).

According to the result of research conducted by Herawati et al. (2018), knowledge about the potential dangers of infection found in health services is one factor that influences adherence to the use of PPE.11 The World Dental Federation (FDI) recommends that all dental and oral health workers maintain their knowledge and skills (Bobu et al., 2019). Every health worker needs to be knowledgeable and adhere to the basic principles of infection prevention (MoH, 2007).

Furthermore, the research conducted by Gupta et al. (2017) revealed that the awareness of most dental technicians about infection prevention could be higher; only 25% of dental technicians stated that they were aware of infection control. It is also supported by a study conducted by Al-Dwairi (2007), demonstrating the need for more adherence of dental technicians regarding infection prevention in commercial dental laboratories in Jordan; only five out of 200 dental technicians complied with all infection control procedures (Al-Dwairi, 2007). Dental technicians must have a basic knowledge of the transmission of infection in the dental laboratory and an understanding of how to avoid transmission of infectious agents from dental mould (Bhat, 2007).

Based on the background, this study aimed to determine the level of infection prevention behavior of dental technicians in dental laboratories in Yogyakarta.

Methods

This research is a descriptive observational study with a cross-sectional design. The study aimed to describe the level of knowledge of dental technicians about infection control in dental laboratories in Yogyakarta. This research utilized a questionnaire for collecting data.

The population was 55 dental technicians who worked in the Yogyakarta Municipal dental laboratory-using the total sampling technique. The questionnaire survey used to measure the knowledge level consists of 9 questions regarding knowledge of infection control. Data were categorized as 1 for the 'yes' answer and 0 for the 'no' answer.

Results

1. Characteristics of Respondents

Table 1 shows that most respondents were male, with 40 respondents or 72.7%. Meanwhile, the fewest respondents were female, with 15 respondents or 27.3%. The age characteristics of the respondents were mostly aged 26-35 years, with a total of 34 people or 61.9%, and the lowest aged 46-55 years, with a total of 1 person or 1.8%.

The latest educational background of the respondents included Senior High school, Vocational School in Dental Engineering, and a bachelor's degree. Most respondents graduated from high school or Vocational School, namely 45 respondents or 81.8%. Meanwhile, the fewest were respondents with bachelor's degrees (S1), namely three respondents or 5.5%. Most respondents had a working experience of ≤ 5 years, namely 27 respondents or 49.1%, and the lowest with ≥ 11 years of working experience was nine respondents or 16.4%.

The highest number of respondents was 25 (45.5%), who could create dental mould or prostheses within a week with 21-40 dental/prosthetic moulds. Meanwhile, the least number of respondents was 13 (23.6%), who could produce ≤ 20 dental moulds or prostheses within a week. Thirty-one respondents, or 56.4%, had not received the hepatitis vaccine, and 24 respondents, or 43.6%, had received the hepatitis vaccine.

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics of Respondents	n(%)
Gender	
Male	40 (72.7%)
Female	15 (27.3%)
Age	
17-25 years	11 (20.0%)

Characteristics of Respondents	n(%)
26-35 years	34 (61.9%)
36-45 years	7 (12.7%)
46-55 years	1 (1.8%)
56-65 years	2 (3.6%)
Latest educational background	
Senior high school	45 (81.8%)
Vocational school in Dental Engineering	7 (12.7%)
Bachelor degree	3 (5.5%)
Length of working experience	
≤ 5 years	27 (49.1%)
6-10 years	19 (34.5%)
≥ 11 years	9 (16.4%)
Number of dental moulds or prostheses produced in a week	
≤ 20 dental moulds or prostheses	13 (23.6%)
21-40 dental moulds or prostheses	25 (45.5%)
≥ 41 dental moulds or prostheses	17 (30.9%)
Hepatitis Vaccine	
Yes	24 (43.6%)
No	31 (56.4%)
Total	55 (100%)

2. Level of infection prevention behavior Respondents

Table 2 demonstrates that questions with the highest number of yes answers in point 2 are 54 respondents or 98.2%, while the questions with the fewest yes answers in point 1 are 13 respondents or 23%.

Table 2. Level of Infection Prevention Behavior

Question	Number of respondents with a 'yes' answer	Percentage
Do you wear a hand-scone when working in the laboratory?	13	23.0%
Do you wear a face shield (mask) when working in the laboratory?	54	98.2%
Do you wear eye protection when working in the laboratory?	32	58.2%
Do you wear protective equipment when working in the laboratory?	20	36.4%
Do you wear protective hats when working in the laboratory?	17	30.9%
Do you wear protective shoes when working in the laboratory?	14	25.5%
Do you wear a hand-scone when touching dental moulds or prostheses in the laboratory?	34	61.8%
Do you use plastic bags to carry dental moulds from the dental clinic to the dental laboratory?	53	96.4%
Do you use containers to carry dental moulds from the dental clinic to the laboratory?	39	70.9%

3. Respondent's infection prevention behavior level

The prevention behavior about infection control of 10 respondents (18,%) is in a good category, 22 respondents (40%), in the moderate category, and 23 respondents (42%), in the low sort. The result indicated that almost half of the respondents needed more knowledge about infection control.

Table 3. Frequency Distribution of Infection Prevention Behavior Level

Knowledge Category	Frequency	Percentage (%)
Good	10	18
Moderate	22	40
Low	23	42
Total	55	100

4. Characteristics of Respondents based on Gender and Average Score

Table 4 shows that most respondents were male, with 40 (72.7%) respondents and an average score is 57.8%. Meanwhile, the fewest respondents were female, with 15 (27.3%) respondents and an average score is 52.2%. The age characteristics of the respondents were mostly aged 26-35 years, with a total of 34 (61.9%) people and an average score is 53.3%. Meanwhile, the most aged is 26-35 years, with a total of 34 (53.3%) person and an average score is 55.6%. The latest educational background of the respondents included senior high school, a vocational school in Dental Engineering, and a bachelor's degree. Most respondents had the last education from high school or vocational school, 45 respondents (81.8%), with an average score of 55.6%. Meanwhile, the fewest were respondents with the latest educational background of a bachelor's degree, namely three respondents or 5.5%, with an average score of 52.2%.

Most respondents had worked for ≤ 5 years, 27 (49.1%) respondents with an average score of 57.8%, and the fewest respondents had worked for ≥ 11 years with a total of 9 (16.4%) respondents and an average score of 54.4%. Most respondents can produce 21-40 dental moulds or prostheses within a week, 25 respondents (45.5%) and an average score of 53.3%. Meanwhile, the least respondents can produce ≤ 20 dental moulds or prostheses within a week, with 13 (23.6%) respondents and an average score of 60%. There were 31 (56.4%) respondents, with an average score of 54.4%, who had not received the hepatitis vaccine, and 24 (43.6%) respondents, with an average score of 57.8%, had received the hepatitis vaccine.

Table 4. Characteristics of Respondents based on Gender and Average Score

Variable	Category	n(%)	Average Score
Gender	Male	40 (72.7%)	57.8%
	Female	15 (27.3%)	52.2%
Age	17-25 years	11 (20.0%)	66.7%
	26-35 years	34 (61.9%)	53.3%
	36-45 years	7 (12.7%)	48.9%
	46-55 years	1 (1.8%)	55.6%
	56-65 years	2 (3.6%)	44.4%
Educational Background	Senior High School	45 (81.8%)	55.6%
	Vocational School	7 (12.7%)	62.2%
	Bachelor degree	3 (5.5%)	52.2%
Working experience	≤ 5 years	27 (49.1%)	57.8%
	6-10 years	19 (34.5%)	53.3%
	≥ 11 years	9 (16.4%)	54.4%
Number of prostheses produced in a week	≤ 20 dental moulds/prostheses	13 (23.6%)	60%
	21-40 dental moulds/prostheses	25 (45.5%)	53.3%
	≥ 41 dental moulds/prostheses	17 (30.9%)	55.6%
Hepatitis Vaccine	Yes	24 (43.6%)	57.8%
	No	31 (56.4%)	54.4%

Discussion

Dental technicians with the latest educational background in Vocational School in Dental Engineering had the highest average score compared to the other groups. It indicated that the academic level plays a role in the knowledge of dental technicians about infection control. A vocational School in Dental Engineering is a good education level in increasing the compliance of dental technicians when carrying out their profession. Since dental technicians must comply with professional standards, service standards, and standard operating procedures (MoH, 2012).

Education plays a role in using personal protective equipment (PPE) to control infection. The higher the level of education is, the higher the skills and good attitudes toward using PPE will be when working in laboratories. It will also increase compliance for people to implement the Standard Operating Procedures (Primanadini, 2016). Furthermore, the higher the education level is, the more likely a person is to access information. The more the person receives information, the greater their knowledge will be. The higher the level of education, the better the understanding will be (Notoatmodjo, 2012). However, this study showed that the highest educational level, a bachelor's degree, had the lowest score because the respondents with a Bachelor's degree were not specialized in Dental Engineering.

The results showed that the average scores of respondents who had worked for ≤ 5 years, 6-10 years, and ≥ 11 years were not much different. The length of working experience did not affect knowledge about infection control as it was not the primary aspect of respondents' knowledge level. The command can be through education, literature, research, and others (Sudarmo, 2016).

Working experience of ≤ 5 years had a higher score than a longer working period. It indicated that a person with a shorter working period still has high enthusiasm and is unlikely to feel weary at work (Samsualam, 2008). In contrast, someone with a longer working period sometimes has decreased productivity due to boredom (Mulyaningsih, 2013). Another factor is that the longer a person works, the older a person will be, which can cause a decrease in one's skill, speed, intelligence, and coordination from time to time (Herawati, Y. (2019).

Dental technicians who wore hand-scone while working in the laboratory had the lowest percentage compared to those who wore other PPEs. It is because of the low awareness of hand-scone usage, discomfort at work, and the unavailability of hand-scone in the laboratory. The availability of hand-scone may influence dental technician compliance with wearing hand-scone. All required PPEs for health workers, including dental technicians, must be available due to the risks of hazards in the workplace. Complete PPE facilities can increase good behavior in carrying out infection control procedures (Aprinitia et al., 2017). Unavailability of hand-scone indicated low support from the directors for the dental technician's protection. It is supported by research conducted by Perwitasari et al. (2006) demonstrating that the cause of unavailability of PPE, including hand-scone, in most laboratories is lack of attention from the director in providing PPE.1

Moreover, most respondents wore masks while working in the dental laboratory. The policy regarding the use of masks shows encouraged respondents to accept the rule positively. In this case, the respondents feel that wearing masks is necessary while working (Mallapiang at al., 2019).

Most dental technicians still need to learn more about infection control in the dental laboratory. Research conducted by Al-Kheraif and Mobarak (2008) revealed that 87.5% of dental technicians should be aware of compliance with infection control procedures. The main factor is that dental technicians lack knowledge about infection control. Hence they need to understand that infection can arise from dangerous clinical materials. Another factor is that PPE is unavailable in the workplace, including in the dental laboratory. Besides that, disobedience, negligence, and being unaccustomed are also factors that are strongly related to the dental technician's awareness level of using PPE.1

Conclusion

The results observed allowed the following conclusions: the level of infection prevention behavior of dental technicians in dental laboratories in Yogyakarta was a low category. It needs awareness for dental technicians to use personal protective equipment (PPE) while in the laboratory.

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