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تقييم مستوى بروتوكول مكافحة العدوى في معامل الاسنان بخصوص (الكوفيد-19)

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Evaluation of Knowledge and Attitude for Infection Control in The Dental Laboratory Place Regarding COVID-19.

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الملخص:

في السنوات الأخيرة، أصبحت مكافحة العدوى في معامل الأسنان مصدر قلق كبير فيما يتعلق بالمخاطر المحتملة لفنيي الأسنان حيث قد يكونونا في اتصال مع مجموعة مختلفة من الكائنات الحية الدقيقة، بما في ذلك فيروس التهاب الكبد **B (HBV)** ، وفيروس التهاب الكبد **C (HCV)**، فيروس نقص المناعة الايدز، الزائفة، الراكدة، الخناق، العصيات اللبنية، المكورات العنقودية، العقدية، المتفطرة، وكوفيد-19 لاحقًا والذي شكل تحديًا جديدًا غير متوقع لجميع احترافي الاسنان

الغرض من الدراسة: على وجه التحديد، قامت هذه الدراسة بتقييم مستوى بروتوكول مكافحة العدوى في معامل الأسنان فيما يتعلق بفيروس كورونا (كوفيد-19).

وتم إجراء مسح شامل في مدينة طرابلس، حيث تمت زيارة جميع معامل الأسنان، وطُلب من فنيين الاسنان تعبئة استبيانات تحتوي على أسئلة تتعلق بمعارفهم وممارساتهم. وتم إجراء التحليل الإحصائي للبيانات باستخدام برنامج**SPSS**

الكلمات الدالة : مكافحة العدوى ، معمل الاسنان، كوفيد-19، معامل الأسنان، فني أسنان.

Abstract

Background: Dental technicians face potential occupational exposure to infectious materials, such as bodily fluids and contaminated supplies, equipment, and surfaces in the dental setting. **Introduction**: Dental laboratory technicians may come into contact with various microorganisms, including hepatitis B

virus (HBV), hepatitis C virus (HCV), HIV, pseudomonas, Acinetobacter, Diphtheroid, Lactobacilli, Staphylococci, Streptococci, Mycobacterium, and later COVID-19 .It has posed a new, unexpected challenge for dental professionals. **Aim of Study**: This study aimed to assess the level of knowledge and attitudes regarding infection control in dental laboratories, specifically related to COVID-19. Approaches. **Samples and Methods**: A comprehensive survey was conducted in Tripoli City, where all operational dental laboratories were visited and their technicians were requested to complete questionnaires that encompassed inquiries about their knowledge and practices. The data was subjected to t-test analysis using the SPSS software. **Result**: Among the 155 questionnaires that were completed, the measurements of all items in the laboratory were recorded with a high degree of accuracy, with a mean of 2.71 and SD = 0.307. Similarly, the measurements of all items in waste management were recorded with a high degree of accuracy, with a mean of 2.660 and SD = 0.271. Additionally, this study confirmed the application of all items of prevention measures to a significant extent. **Conclusion**: Our study showed that dental laboratory personnel have a good attitude and practice towards infection control protocols.

Keywords: Infection control, dental laboratory, COVID-19, dental laboratories, dental technician.

Introduction

The dental laboratory is frequently disregarded when devising efficient infection control and exposure control protocols. Technicians in dental laboratory are highly susceptible to microbial cross-contamination when handling dental impressions obtained from dental offices and institutes. [1] everyone in Dental team has consistently been instructed to protect themselves from infectious agents. [1] Within the dental laboratory, the transmission of infection can occur in different ways such as direct contact with surfaces, hand-held instruments, dental drills, abrasive substances, airborne particles, neglect to wash hands, etc. [2]

In recent years, the coronavirus, which is linked to causing COVID-19, has primarily transmitted from one individual to another through respiratory droplets. The disease can also spread through direct contact of dirty hands with contaminated surfaces, which can then transmit the infection when touching the oral, nasal, or eye mucous membranes. Transmission of COVID-19 has been reported through direct exposure to blood, oral fluids, and other patient materials. [3] The presence of SARS-CoV-2 has been detected in the saliva of individuals who are infected, which means that dental laboratory personnel are also susceptible to contracting COVID-19. [4]

In the lab, the barrier system needs to be followed religiously. The process includes cleansing the hands using either plain or antimicrobial soap, or an alcohol-based hand rub can be used if

the hands do not appear dirty. Wearing personal protective equipment is essential when there is a possibility of being exposed to blood borne pathogens in the workplace. Examples of personal protective equipment (PPE) include gloves, masks, protective eyewear, chin-length face shields, and protective clothing such as lab coats or jackets. [5]

It is important to heat-sterilize or disinfect all brushes, rag wheels, and other laboratory tools daily. When wet rag wheels are not being used, they should be stored in a disinfectant solution. It is necessary to perform daily cleaning and disinfection of the lathe machine. Work areas must be thoroughly cleaned either at the end of the workday or whenever unintentional contamination occurs. Surface disinfection protocols in the dental laboratory are identical to those in the dental clinic, if necessary. [6] A study has found that 67% of materials sent from dental offices to laboratories were contaminated with bacteria of varying degrees of pathogenicity. [7]

Unless the waste produced in the dental laboratory, such as disposable trays or impression materials, is classified as regulated medical waste, it can be discarded in regular waste containers. In the dental laboratory, regulated waste is typically generated in minimal quantities. All disposable items that fall under the category of "sharps" (such as orthodontic wire, disposable blades, burs, etc.) must be discarded in designated containers specifically designed for sharps disposal or in containers that are resistant to punctures. Dental impressions, trays, occlusal records, models, mock-ups, appliances, and prostheses (prosthetic supplies) can potentially contain bacteria, viruses, and fungi, thereby becoming contaminated. [8] therefore: This study was aimed to assess level of Dental Laboratory regarding Infection Control methods (COVID-19.)

Samples and Methods

This study was a cross-sectional survey conducted among the dental laboratory staff working in dental laboratories located in Tripoli city- Libya. Following approval from the ethical committee, technicians were required to provide informed consent before initiating the survey. Data were gathered between February 2022 and November 2022 from a sample of 155 dental lab personnel working in various dental laboratories in Tripoli city- Libya.

Data collection

Data were collected by using a self-administered, structured main questionnaire with closed-ended questions (yes, no, and non-knowledge) that had different items such as 4 items of questions to assess laboratory place, 3 items of questions to assess Waste management and 4 questions to assess attitude **toward Sterilization and disinfection**

Statistically analysis:

Statistically, data was collected, and the number of answers with (yes), answers with (no), and answers with (non-knowledge) for questions was determined to assess the mean and percentage of practice of the cross-infection control program by dental technicians.

Tab 1: shows different forms of questionnaires.

i. Laboratory place measurements	Yes	No	Non-knowledge
A- Are the Laboratory areas well-ventilated? B- Is there air circulation through windows and doors? C- Are meetings held in separate rooms reserved? D- Is it allowed for everybody to enter the laboratory do all Visitors?			
ii. Waste management	Yes	No	Non-knowledge
A- Do you keep dental materials away from the patient, 's items? B- Have you attended any courses on dental waste management? C- Do you store the medical wastes of the dental laboratory in a place out of the hands of passers and visitors?			
iii. **Sterilization and disinfection**			
a- Do you disinfect the works before sending them to the clinics? b- Do you disinfect impression, and prostheses received clinic? c- Is A disinfection area separated from offices? d- Do you clean cotton wheel brushes with disinfectant after each use? e- Does pumice prepare in small amounts and renewed for each process?			

Results:

Different dental laboratories in Tripoli City participated in this study. The study questionnaire recorded items such, as 4 questions to assess Laboratory place, 3 questions to assess attitude to word waste management and 4 questions to assess attitude toward Sterilization and disinfection

According to the laboratory information, 80.6% form the sample answered yes about laboratory areas being well-ventilated; 75.5% answered yes about air circulation through windows and doors; and 72.9% of dental laboratories have separate meeting rooms reserved. Finally, 58% of the laboratory areas had been entered for all visitors. (Table 2)

About 83.9 % answered yes to keeping dental materials away from the patient's items, 66.5% of the dental laboratory has stored the medical wastes in a place out of the hands of passersby and visitors, and just 45% of technicians have attended courses for dental waste management (Table 3).

Also, about 77.4 % answered yes to disinfect the works before sending them to the clinics,86.5% disinfect impression, and prostheses received clinic, 80.6 % of A disinfection area separated from offices, 77.4% clean cotton wheel brushes with disinfectant after each use and Finally, 83.9% of pumice prepare in small amounts and renewed for each process (Table 4).

Table 2: shows the Laboratory place measurements.

I- Laboratory place measurements	Yes	Non-knowledge	No	Mean	Std. Deviation	Degree
a- Are the Laboratory areas well-ventilated?	N 125	1	9	2.80	0.417	High degree
	%80.6	0.6	18.7			
b- Is there air circulation through windows and doors?	N 117	1	37	2.75	0.45 0	High degree
	%75.5	0.6	23.9			
c- Are meetings held in separate rooms reserved?	N 113	00	42	2.73	0.445	High degree
	%72.9	00	27.1			
d- Is it allowed for everybody to enter the laboratory do all Visitors?	N 90	00	65	2.58	0.459	High degree
	%58.1	00	41.9			

The degree of Laboratory place measurements big degree				2.71	0.307	High degree

Table 3: shows waste measurements.

II-Waste management	Yes	Non Knowledge	No	Mean	Std. Deviation	Agree
a- Do you keep dental materials away from the patient's items?	N 130	0	65	2.84	0.368	High degree
	% 83.9	0	16.1			
b- Do you store the medical wastes of the dental laboratory in a place out of the hands of passers and visitors?	N 103	1	51	2.68	0.507	High degree
	% 66.5	0.6	32.9			
c- Have you attended any courses on dental waste management?	N 70	0	85	2.45	0.499	High degree
	% 45.2	0	54.8			
The degree of waste management				2.66	0.271	High degree

Tab 4: show **Sterilization and disinfection** in dental laboratory

Iii- Sterilization and disinfection	Yes	Non Knowledge	No	Mean	Std. Deviation	Agree
a. Do you disinfect the works before sending them to the clinics?	N 120	1	34	2.77	0.438	High degree
	% 77,4	0,6	21,9			

b- Do you disinfect impression, and prostheses received clinic?	N	134	0	21	2.86	0.343	High degree
	% 86.5		0	13,5			
c- Is A disinfection area separated from offices?	N	125	0	30	2.81	0.396	High degree
	% 80.6		0	19.4			
d- Do you clean cotton wheel brushes with disinfectant after each use?	N	120	0	35	2.77	0.419	High degree
	%77.4		0	22.6			
e- Does pumice prepare in small amounts and renewed for each process??	NN	1300	0	25	2.84	0.368	High degree
	%83.9		0	16.1			
The degree of sterilization and disinfection					2.81	0.271	High degree

Discussion:

The use of effective infection control procedures in the dental laboratory will prevent cross-contamination that extends to all dentist staff, dental technicians, and patients [9]. Successful practice of infection control depends on the ability to understand the need for this dynamic concept with the proper implication of method and knowledge [10].

In Section (I), the technicians were asked about laboratory place measurements, the importance of ventilation and air conditioning systems may be attitude to avoid the spreader virus between dental laboratory technician. the Laboratory areas should be well-ventilated by allowing clean air circulation through windows and doors open to fresh air [11]

In Section (II), there were waste management questions. Although any item that comes in contact with blood or other body fluids may be infective, it is not necessary to treat all these items as infective waste and should have waste management. [11,12]

In the present study, all items of laboratory place measurements have a high degree knowledge of infection control protocol, with a mean of 2.71, SD of 0.307. More than 80.6% answered yes to the Laboratory areas have well-ventilated, 75.5% answered yes to having separate rooms,58.1% answered yes to the dental laboratory that has allowed everybody to enter the laboratory and 72.9% meetings held in separate rooms.

The result of the present study agreed with Rabenau et al.'s [13] study, in which he said that, during the COVID-19 pandemic, it is not economical to refurbish the practice, but some modifications can be made to prevent cross-contamination and transmission of infectious material. High-efficiency particulate air (HEPA) filters and UV chambers in the ventilation system can reduce aerosol-related contamination

The research results of the current investigation align with those of Basmachi et al ([14])., who concluded that laboratory access should be restricted to dentists exclusively to report work-related information. Conduct meetings in designated rooms exclusively for that purpose, while adhering to social distancing protocols.

The present study demonstrated that 66.5% answered yes about the storage of waste in dental laboratories placed out of handles, 32.9% answered no, and 0.6% answered with no knowledge. The presence of elevated results suggests a correlation between a strong understanding of waste management and a potential source of infection in the dental laboratory. This finding is lower than the finding reported by Puttaiah et al., [15] who observed a prevalence of 98% among American dentists, and significantly higher than the prevalence reported among Asian dentists, which was 38%. A significant proportion of respondents, specifically 54.8%, answered affirmatively. The respondents had not received any recent refresher courses or training on dental waste management within the past year. Just 45.2% reported that they had received such training. There may have been a lack of refresher courses on waste management at that time, or the existing courses may have been expensive. Additionally, a shortage of time to enroll in a course could+ have contributed to the low number of technicians who had taken refresher courses.

The results of this study were in contrast with Sammy's study [16], so this current study exhibited a higher percentage than. Specifically, approximately 45.2% of participants in the current study underwent a refresher course but in the other study, many (93.3%) of the respondents had not undergone any refresher course/training on infection control the previous year. Only one respondent (6.7%) indicated that he had undergone such training

Regarding disinfection of prostheses/denture before sending them to the clinic was 77,4% of participants answered with yes higher than no , this result was similar to Gupta et,al[17] study

The result of our study also, demonstrated that, 80.6% answered with yes of responded had disinfection area separated from offices this finding also, was similar to Gupta et,al[17] study who reported that 61.53% of the dental technician responded that they have separate receiving areas in their laboratories .

77,4 % of participant's clean cotton wheel brushes with disinfectant after each use All brushes special including cotton wheel, should be kept in disinfectant after each use in accordance with the manufacturer's recommendation. UV sterilizers or autoclaves are recommended for sterilization as reported by Sivaramakrishnan et,al study[18]

Also, 83.9 of participants prepared the pumice in small amounts and renewed for each process this. It is also recommended to add disinfectant to polishing pumice and use vacuum aspiration systems in order to prevent infections as reported by Sivaramakrishnan et,al study.[18]

Conclusion: the current study showed that dental laboratory place has better level for protocol and methods towards infection control regarding COVID-19

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