

A STUDY OF CROSS INFECTION CONTROL WITHIN DENTAL LABORATORIES IN MISURATA CITY

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ABSTRACT

Infection control is an essential part of dentistry. Potential pathogens can be transported to laboratory via orally soiled impressions and dental prostheses. The purpose of this study was to investigate the attitude and behavior of dental laboratories within Misurata city to cross infection control. A survey was conducted to collect data on the cross-infection procedures adopted by 40 dental laboratories within Misurata city from November 2010 to February 2011. The resultant responses to each question of the five-part questionnaire were then analyzed using (SPSS 15.0 for windows). The results of the study demonstrated that the attitudes and procedures of dental laboratories within Misurata city to infection control appeared to be very variable 20% of dental laboratories have documented procedure for infection control. Only 3% of dental laboratories used liquid disinfectants, 15% change their pumice daily and 35% have exhaust systems containing filter. In addition, most of the laboratories (77.5%) devoid running water or separate hand washing facilities. Furthermore, 10% of dental technicians attended infection control training courses and 32.5% believed in immunization against hepatitis B. Moreover, most of dental technicians (55%) were not care about the use of protective measures, during either handling new items or polishing of prostheses. There seems to be a definitive need to provide and distribute formal and obligatory standard of current infection control guidelines and manuals to the dental laboratories.

KEY WORDS: Cross infection control, dental laboratories.

INTRODUCTION

The dental healthcare professionals, including laboratory personnel, are at risk of infection transmission. Therefore, as members of the healthcare profession, it is advised that we ensure a safe working environment to prevent the risk of transmission of blood-borne infection during various stages of dental treatment. To ensure that, the maximum infection control protocols and procedures are being applied in dental operatory^(1,2). In these days, dental laboratories widely spread; increased; and they worked in a random way, and there is no care fullness with health in these laboratories that makes the infection spreads throughout these areas⁽³⁾.

As we specialized in this field we have noticed a lot of errors from dental technicians in their laboratories especially when they did not take protective precautions to prevent transmission of infection. In addition to that, we also noticed that most of dental technicians ignored the control of communicable diseases which transfer through blood from polluted impressions which move toward the laboratory from clinic without any sterilization and preventive measures in place⁽⁴⁾.

Most of dental laboratories don't have any programs to control or prevent infection may be due to losing the technical consciousness or the absentness of qualified technicians. Furthermore, the dental technicians are at risk by this infection while they are contributing in treating of patients. The fabrication of prosthesis for infectious disease carriers presents a cross contamination hazard. Dentures, crowns, bridges, impressions, casts and other saliva or blood coated items are all exposed to contamination in the patient's

mouth. Such items can spread infectious agents to similar items within the laboratory, where technicians and other patients are vulnerable to exposure^(5,6).

In view of the risk of infection of dental healthcare workers and patients, interruption of possible chains of infection, applied infectious control programs should be in demanded.

Media publicity has increased public awareness of the need for adequate and obvious cross infection control within the dental surgery. Patients now expect and demand high standards of care even though their knowledge of aspects of cross infection control is limited.

As members of the healthcare profession it is advised that we ensure a safe working environment to prevent the risk of transmission of blood-borne viruses and other infectious agents not only from patient to dentist but also from dentist to patient. To ensure a maximum infection control procedure, many of protocols were drawn up to meet standardize universal precaution. However, people always looking for more protective and efficient precautions^(7,8,9). The purpose of this study was to investigate the attitude and behavior of dental laboratories to cross infection control within Misurata city.

MATERIALS AND METHODS

A survey was conducted within Misurata city from November 2010 to February 2011 to collect data on the cross-infection procedures using questionnaire adopted by 40 dental laboratories.

Questionnaire consists of 5 sections:

- The first section collected information on the management of the laboratories. Questions regarding

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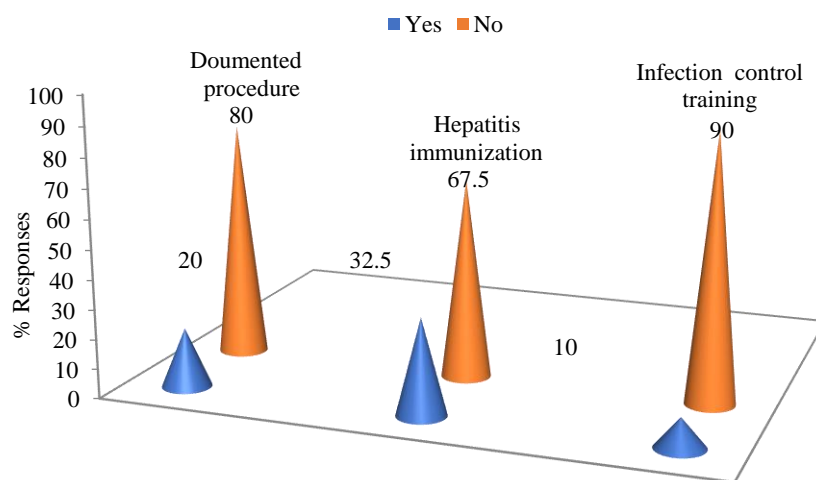
immunization and infection control training of staff were also added in this section.

- The second section sought information on the facilities in the laboratory.
- The third section was related to sterilization and disinfection of laboratory equipment and material like studying casts, impressions and hand pieces.
- The fourth and fifth sections were recorded information about the general environment and the use of personnel protective facilities.

Data was transferred to computer. All questionnaires were entered into the program and statistical analyses were performed by Data Statistical Consultation Services using Statistical Program for Social Science (SPSS 15.0 for windows). Simple frequencies were calculated for all variables.

RESULTS

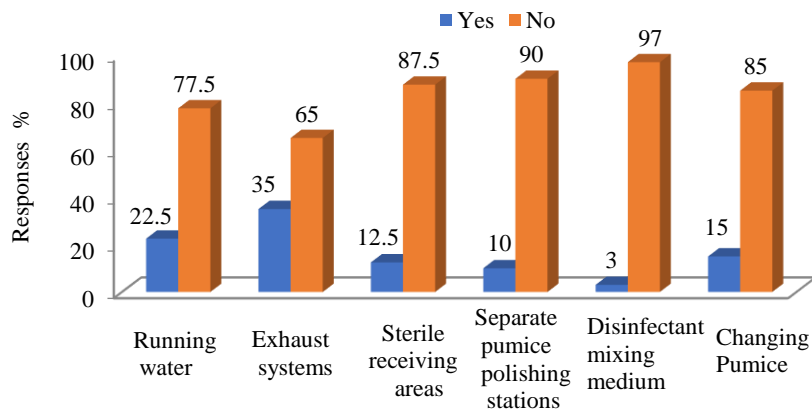
The results were reported in the following graphics: as shown in (figure 1), showed the section of the questionnaire related to management procedures of the dental laboratories. It seemed that only 20% of the dental technicians had a documented procedure for infection control, 32.5% believed that dental technicians should immunized against hepatitis B. Considering the topicality of the subject material and the need for adequate infection control training and knowledge, the response rate of 90% that had not attended any infection control training was disappointing high. However, this response rate should not necessarily be interpreted as lack of interest in cross infection control training but may reflect the lack of availability of enough infection control training programs.



(Figure 1) The management procedures of the dental laboratories.

As shown in (figure 2) a series of questions aimed to find out the facilities available in Dental laboratories within Misurata city. Almost all of the responding laboratories 77.5% had no running water and separate hand washing facilities with a low proportion of 35% having exhaust systems containing filters incorporated in their laboratories. However, this meant that there were still a large proportion of dental laboratories in Misurata city working in a harmful and contaminated environment. For the question number three that inquired if the laboratories had a sterile designated receiving production and shipping areas, with almost an 87.5% of the respondents replying that they did not

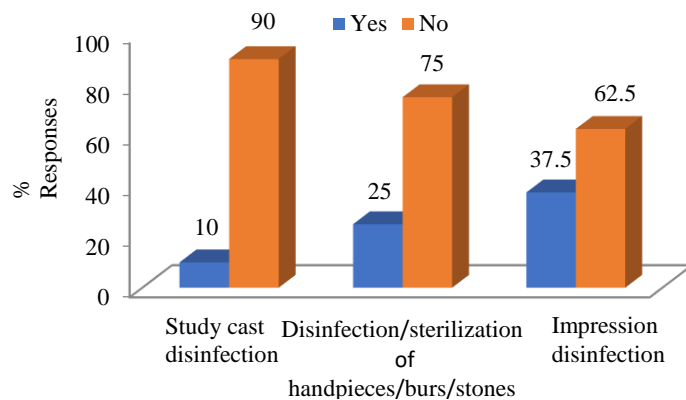
had. This meant that a risk of cross infection could occur between contaminated returned work and sterile outgoing work. However, of those responding 90% did not have separate pumice polishing stations for repairing old denture work. This may suggest that many of the dental technicians were not aware of the fact that microorganisms could be present on and below the surface of the denture work and so could be transferred to grinding/polishing equipment and also pumice waiting to be transferred again to the next denture. Moreover, 97% of the dental technicians did not use liquid disinfectant, as a mixing medium in pumice and 85% did not change their pumice daily.



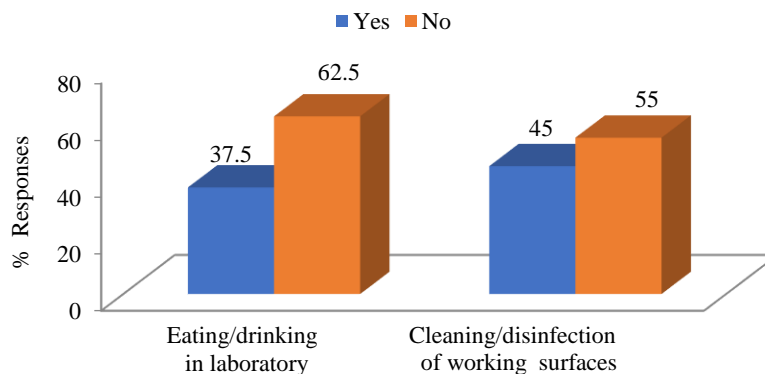
(Figure 2) The facilities available in dental laboratories.

As shown in (figure 3). This part of the questionnaire demonstrated that 90% of the respondents did not routinely disinfect study casts after receiving them from the clinic. With regards to disinfection and sterilization, headpieces, burs and stone equipment appeared to be the least popular whereas, greater efforts were made by the respondents in the routine infection control of impressions. Due to the fact that many of dental technicians require impressions to be previously disinfected at the dental practice, 62.5% of the respondents did not disinfect impressions upon arrival at the laboratory. In relation to laboratory hygiene, 37.5% of the laboratory personnel eat or drink in the dental laboratory, whereas, eating,

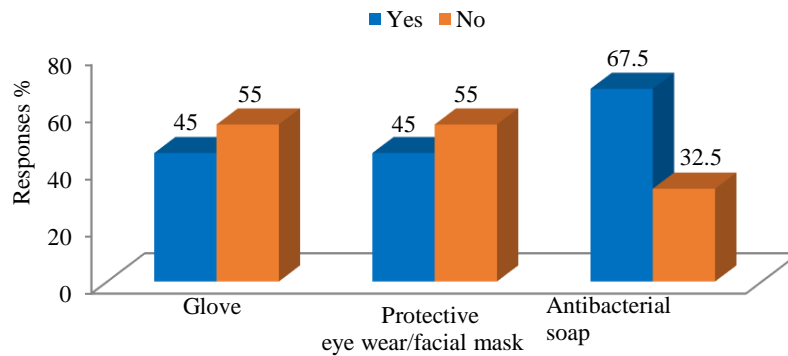
drinking or smoking should be prohibited in the laboratory work area. 45% of dental technicians have cleaning and disinfecting of the work surface areas as shown in (figure 4). Regarding personnel protective equipment, glove wearing when handling new items received in the laboratory was practiced by 45% of the respondents. It is known that 45% of the dental technicians surveyed wore protective eyewear and facemasks in situations where spatter and aerosols were generated. It appeared that most the dental surveyed practiced personal hygiene by routinely hand washing using antibacterial soap as shown in (figure 5).



(Figure 3) Sterilization and disinfection of laboratory equipment and materials.



(Figure 4) The general environment.



(Figure 5) The personnel protective facilities.

DISCUSSION

Around 25 million items of service claims had been reported from general dental practitioners each year and of these, approximately 4.5 million claims involved work by dental technicians. Therefore, the spread of infections through the dental laboratory is a matter of concern and the safety of the dentist, technician and patient is only ensured through confidence that both professionals use proper procedures in a correct manner⁽¹⁰⁾. Various authoritative bodies such as the British Dental Association and the Dental Laboratory Association to clarify procedures to ensure the safety of patient and dental technicians have issued guidelines. This study was designed to evaluate the attitude and behavior of commercial dental laboratory workers in Misurata city about cross infection control hazards.

Management:

Employers have the legal responsibility to reduce the spread of infection within the dental laboratory. Therefore, having a documented procedure for infection control will provide proper education and training as well as to aid compliance of all employees to routine cross infection control procedures. This survey demonstrated that only 20% of the dental laboratories in Misurata city were adhering to the stated recommendations from meeting. According to the Dental Laboratory Association guidelines, all dental laboratories and healthcare workers must have a documented procedure for infection control that entitles all staff to be immunized against hepatitis B and receive appropriate training in all aspects of infection control. This survey demonstrated that only 20% of the dental laboratories in Misurata had a staff policy, along with 38.5% immunized against hepatitis B and only a small proportion (10%) had received education and training regarding infection control.

Facilities:

To prevent contaminated material from being recirculated in the laboratory or carried to patient areas, dental personnel should make sure that all lathes, grinders and lab hand pieces are connected to or used near a dust chip evacuation system. Within the dental laboratory there is evidence to indicate that material such as pumice is frequently contaminated with oral and non-oral bacteria including (*streptococci*, *staphylococci* and *enterics/coliforms* for

example *Pseudomonas species* and *Actineobacter species*). These organisms can theoretically cause infection, particularly in immunocompromised patients.

From our study it appeared that the majority of the laboratories did not clean or disinfect pumice daily even though the Dental Laboratory Association recommend the change of pumice and the disinfecting of the pan as well as the use of a liquid disinfectant as a mixing medium (5 parts sodium hypochlorite to 100 parts distilled water)^(11,12).

Equipment:

Instruments and equipment used in the dental laboratory should be disinfected and sterilized on a regular basis. This will place more barrier in the path of possible cross contamination and provide less chance of introducing laboratory cross contamination during the production cycle. However, the vast majority of the laboratories did not accomplish this and this may reflect the lack of such recommendations in the Dental Laboratory Association policy. The findings of literature review revealed that all study casts examined could be a potential source of microbial contamination (even from the environment or air). Therefore, it could be a risk to the laboratory workers and as a consequence the dental staff or the patient either from direct or indirect methods. Following our literature review, the possible methods of disinfecting study casts include:

- 1- Clear slurry water (saturated calcium sulphate) with disinfectant causes no damage to surface detail.
- 2- Spraying the cast with iodophor or chlorine products.
- 3- placing the casts in a microwave.

Environment:

Although it is apparent knowledge not to eat, drink or smoke in the laboratory, the occupational healthcare and safety organizations including the Dental Laboratory Association permit eating, drinking or smoking in the working areas. Most of the laboratories in Misurata did not comply with this Recommendation.

Personnel:

In the laboratory, contaminated items are received and dealt with using equipment, which generate aerosols and spatter. There is therefore a need to wear protective clothing. In this section of the questionnaire

we found that most of the laboratories 45-67.5% practiced a healthy attitude when concerning only on safety precautions. Even though there are areas of concern in the breakthrough of the infection control cycle within the laboratory, the knowledge of the need and advantages of wearing personnel protective equipment as well as hand washing with soap routinely throughout the day were never the less understood by the majority.

CONCLUSION

There seems to be a definitive need to provide and distribute formal and obligatory standard of current infection control guidelines and manuals to the dental laboratories.

REFERENCES

- 1- Department of Labor, Occupational Safety, and Health Administration. Occupational exposure to bloodborne pathogens; final rule. Fed Reg. 1991; 56:64004-64182.
- 2- Centers for Disease Control and Prevention. Guidelines for infection control in dental health-care settings, 2003. MMWR. 2003;52(RR-17):1-66.
- 3- Pius M. Kimondollo (1992) Guidelines for Developing A Dental Laboratory Infection-Control Protocol International Journal of Prosthodontics 5 452-456
- 4- Lakshman Samaranayke (1993) Rules of Infection Control International Dental Journal 43 578-584
- 5- Centre's For Disease Control (1993) Recommended Infection Control Practices for Dentistry MMUR 411-12
- 6- Clare Connor (1991) Cross Contamination Control in Prosthodontic Practice International Journal of Prosthodontics 4 337-344
- 7- Donald L. Mitchell, Nadjeh M. Hariri, Manville G. Duncanson, Nancy L. Jacobsen and Rodericck E. McCallum (1997) Quantitative Study of Bacterial Colonization of Dental Casts Journal Of Prosthetic Dentistry 78 518-521
- 8- Leung RL, Schonfeld (1983) Gypsum Casts as A Potential Source of Microbial Cross Contamination Journal of Prosthetic Dentistry 49 210-211
- 9- Charles W. Wakefield (1980) Laboratory Contamination of Dental Prostheses Journal of Prosthetic Dentistry 44 143-146
- 10- Mcdermott J (1996) Combating Cross Contamination Dentistry Today 15 94-95
- 11- G. Lynn Powell, Robert D. Runnells, Barbara A. Saxon (1990) The Presence An Identification Of Organisms Transmitted to Dental Laboratories Journal of Prosthetic Dentistry 64 235-237 12- D.C Jagger, R. Huggett, A Harrison (1995) Cross Infection Control in Dental Lab-British Dental Journal 179 93-96.