Application of Infection Control Rules by Iraqi Orthodontists

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Abstract

Orthodontics represent an important dental speciality which deals different situations of patients malocclusion, they use many kinds of sharps and cutting instruments, making them liable to different types of infections which could be transmitted from either the patients or the instruments if they don't follow the infection control principls. The data were collected by answering a questionnaire by 101 orthodontists, the results showed different responses of the participants to the variables used by the questionnaire leading to a conclusion that more efforts are needed to improve the application of infection control guidelines between Iraqi orthodontists.

Keywords: *orthodontics, infection control, health, patients; infection.*

Introduction

Orthodontists facing various types of microorganisms during practicing dentistry by contaminated instruments, inhalation of aerosols or through percutaneous injuries with different wires such as ligature or arch wires also banding and bonding materials and other sharp instruments(1).

Studies found that Orthodontists have the second highest occurance among dental workers concerning hepatitis–B infections (2). People reciving treatment in dental clinic could be undetected hepatitis-B carriers and patients secreting herpes simplex viruses in saliva may be asymptomatic, those patients have the potential for transmitting diseases. Diseases such as hepatitis-B, HIV and tuberculosis have long incubation period and therfore, it is very difficult to detect the origin of such infections to the dental workers and other patients (3).

Before beginning with work the orthodontist should be clear about his or her goals in infection control criteria and it is mandatory to apply the most progressed method of disinfection and sterilization to get good results(4).

Sterilization kills all types of microorganisms including viruses, bacterial and mycotic spores.

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Disinfection is the technique used for destruction or inhabition of the most pathogenic microorganisms and inactivating some viruses,therfore, reduction of microbial contamination to a safety levels.(5)

Hepatitis B virus can be spreaded by as little as 0.0004 ml blood while HIV by 0.1 ml blood(6). 1 ml of gingival crevicular fluid contains 150 billion microorganisms and 6 billion microorganisms can be found in 1 ml of saliva (7).

Many studies in literature reavels that emphasize on the effect of sterilization in orthodontics practice however there is no comprehensive research that evaluate the compliance of Iraqi orthodontist to infection control procedures.

Aim of the Study

In this study we will evaluate sterilization and disinfection methods employed in orthodontic practice in Iraq.

Material and Method

In the present study, data collection gained by an 17 items questionnaire was delivered to a total of 101 Iraqi orthodontists / general practitioners(GP) (who attended intensive orthodontic course), these question covered some infection control guide line.(8)

Statistical analysis was performed by using SPSS version which includes descriptive statistic (frequency

and percent)chi squar test was used to find association between related variables, P>0.05 was considered significant.

The questionnaire deals with the following variables:

- Educational degree
- Place of work.
- Daily patient volume
- The way in performance of instruments cleaning
- Sterilization devices used
- Soaking instruments in disinfectant solution.
- Packaging method of instruments to be sterilized.
- Method used to sterile hand piece, hand instruments and orthodontic pliers.
- Does the practitioner sterilize molar bands after purchase?
- Sterilization of molar bands after trail inside patient mouth.
- Disposal of brackets, bands and arch wires removed from the patients
- Recycling brackets or other orthodontic materials.
- Disinfectios of the impressions and orthodontic appliances delivered to the lab.
- Place of sharp objects disposal container.
- Type of gloves used during cleaning instruments, and environmental cleaning.
- Hepatitis B vaccination

Result

The result of this study shown in the frequency table explained as the following: table 1 describes the percent of GP and specialist who are alligated to the questioner, (22.8% and 77.2%)for GP &specialist respectivlly.

Table 2 showed that (45.5%,38% and 15.8 %) of the total participate work in private clinic, hospital and at university clinic, those participate have daily patients volume explained in table 3.

Table 4 show (57.4%) of orthodontist who use manual cleaning significantly higher than ultrasonic cleaner (42.6 %), while highly significant (87%) with autoclave rather than oven and glass bead sterilizer, also highly significant regarding presoaked instrumentand wraping the instrument ,while sterilization of dental hand piece in autoclave (41.6%) was significantly lower than wiping the outer surfaces with (57.4%).

Table 5 show highly significant rate of sterilize pliers (80.2%) than dry heat, while non-significant sterilize band after purchase in comper with highly significant (67.3%) for band after trial in patient's mouth .The disposing of band, bracket and arch wire was highly significant with (49.5%) regarding waste basket .

Table 6 show high rate of significantly for orthodontist who don't recycled bracket while non-significant difference between orthodontist who disinfect impression or appliances . The rate for placing sharp bins at clinic was significant (74.3%) and (21.8%) for placing sharp bins in sterilization room. Highly significant rate for orthodontists who use examination gloves during cleaning of the instrument, and how recive hepatitis B vaccine.

Table 1 Gp or Specialist

Frequency		**Percent**
GP	23	22.8
Specialist	78	77.2
Total	101	100.0

Working place Table 2

Frequency		Percent
Private dental clinic	46	45.5
Specielized dental centers / state hospital	39	38.6
University clinic	16	15.8
Total	101	100.0

Table 3: Number of patient

Frequency		Percent
0-5	40	39.6
6-10	18	17.8
11-15	14	14.9
16-20	15	14.9
> 20	13	12.9
Total	100	99.0
	101	100.0

Table 4: Percentage of cleaning and sterilization of the instrument

Question	Choice	Frequency	%	P-value¥
Cleaning performance	Manually	58	57.4	0.033
	Mechanically (Ultrasonic cleaner	43	42.6	
Sterilization devices used	Autoclave	88	87.1	0.001
	Dry heat (oven)	12	11.9	
	Glass bead sterilizer	0	0.0	
	none	1	1.0	
Theinstruments are presoaked in disinfectant solution	Yes	86	85.1	0.001
	No	15	14.9	

Cont.... **Table 4: Percentage of cleaning and sterilization of the instrument**

Instruments Packing during sterilization	Metal tray	38	37.6	0.021
	Wrpa (Pouching)	41	40.6	
	I do not pack	20	19.8	
Sterilization of dental hand pieces	In the autoclave	42	41.6	0.022
	Wiping the outer surface with disinfection solution	58	57.4	

Table 5: percentage of sterilization of orthodontic pliers, bands and disposed method

Question	**Choice**	**Frequency**	**%**	**P-value¥**
Sterilization of hand instruments / or orthodontic pliers	Dry heat (oven)	12	11.9	0.001
	Autoclave	81	80.2	
	Glass bead sterilizer	1	1.0	
	Wiping with a disinfictant solution	6	5.9	
Sterilization of molar bands after purchase	Yes	48	47.5	0.617
	No	53	52.5	
Steriliztion of molar bands after check in the patient mouth	Dry heat (oven)	10	9.9	0.001
	Autoclave	68	67.3	
	glass bead sterilizer	2	2.0	
	Sitting in disinfectant solution	17	16.8	
Where do you dispose the bands , brackets, and arch wires you remove from patient during or after treatment	Waste basket	50	49.5	0.001
	Sharp bin	27	26.7	
	Metal waste bin	6	5.9	
	Infected waste bin	17	16.8	

Table 6: the response to different question related to infection control roles

Question	Choice	Frequency	%	P-value¥
Recycled brackets or other orthodontic materials	Yes	9	8.9	0.001
	No	91	90.1	
Disinfection of impressions or other orthodontic appliances to be delivered to lab	Yes	48	47.5	0.670
	No	51	50.5	
Where do you place sharp bins	at the clinic	75	74.3	0.001
	In the sterilization room	22	21.8	
Type of gloves used during cleaning of instruments and environmental cleaning	Examination gloves	97	96.0	0.001
	Kitchen - type gloves	3	3.0	
Have you had hepatitis B vaccine	Yes	83	82.2	0.001
	No	16	15.8	

Discussion

Spaulding system classifies instrument into three categories which are critical, semicritical and least critical[9] , the semicritical considered the most important one that should be highlighted in order to prevent disease transmission [10].Orthodontic instruments,orthodontic supplies and accessories considered as the semicritical since they touch mucous membrane and non-intact skin [11,12].

This study mainly depended on experience, place of work as well as, daily patient capacity of the GP and orthodontist. The sterilization process is important to orthodontists as well as, dentists, even though they do not perform surgical procedures [13-14] .

On the other hand Starnbach & Akçam [15-16] indicate, sterilization is less abidance to orthodontists than dentists since they usually deal with children, with loss of time , money and the corrosion of orthodontic instruments in addition they did not deal sustitute the word (with) by (may lead to) deep tissues.[8]

Professional agencies like Center of Disease Control (CDC) and Occupational Safety and Health Administration (OSHA), have a specific recommendations representing standard infection control which considered as keywords to be followed in order to prevent cross infection [17].

Despite of these rules, this study showed that (57.4%) of participate orthodontists depends on the manual cleaning procedure more significantly than the ultra-sonic devises. This may be due to the lack of knowledge about advantage of ultra-sonic devises in the granting the proper removing of debris from the orthodontic instrument [18-19], the manual cleaning is also an important step in ensuring the debris removal after mechanical cleaning and before autoclaving [20].

In this study (85.1%) of participated presoaked the instrument in disinfected solution before starting the sterilization process. This prevents the dryness and adherence of bioburden to instruments that protect microorganism from sterilization [21].

In addition to that it begins to dissolve organic debris and in some instances begin microbial kill.This solution should discard at least once a day [17].

This study showed high percentage of participates who used autoclave whether used for orthodontic pliers , band purches and molar bands after trying in patient mouth [22]. This concurred with the significant findings of participates who pouch their instruments.

This could be explained by the high education level and interest in sterilization of orthodontists and according to recommendations of Iraqi Dental Association (IDA).

Although most of orthodontist (87%) using autoclave but the result showed that high percentage of them only wipes the hand piece which is not recommended as the hand piece represents a hallow instrument that may contain blood drops contamination inside the internal lumen and this can be only sterilize by using autoclave class B [23, 24-25-26] .This could be the result of old believes that heat could ruin the hand piece leading to a financial lost.

As a matter of fact the hand piece sterilization is obligatory according to the CDC guidelines. This can be achieved either by providing clinics with an enough number of hand piece in order to match the number of patients who daily visit the clinics, or by applying advanced sterilization programs [27]. Since hand pieces are available in the Iraqi market with an affordable cost.

Bracket, wire and bands represents a dangerous source since they are removed from oral cavity in which they had been contaminated with body fluid (saliva and blood) also wire's end considered as a sharp end that may prick the orthodontist, so the sharp pin represent the better choice for disposing [28,29] .

This study showed that (74.3%) of participant have sharp bin in their clinics, despite of the importance value of having it in the clinics, only (26.7%) who are really using it while (49.5%) of the participant use waste basket. This approved a week point in disposal.

This study showed a highly significant percentage (90.1%) of the participant who do not use recycle brackets and orthodontic materials since the process of recycling altars the mechanical and physical properties also it is nor granted that they are not contaminated[30,31] also, the brackets and orthodontic materials are available in the Iraqi market with a reasonable cost.

In this study, a non-significant value (50.5% -47.5%) have been shown between the participates who disinfected their impression or appliances to be delivered to an outer laboratory. Standers showed that all impression and model must be disinfected before delivering to the laboratory and vice versa [32].Now a day, this complicated issue has been solved by introducing the digital scan in the dental filed [33].

Kitchen gloves considered as a heavy duty gloves that protect the operator from accidental puncher by sharp dental tools and cross infection [17]. Unfortunately,this study showed a high rating of (96%) who use examination gloves which considered a thinner and easy tearing gloves as compared to the kitchen gloves [8].

Dentists and assistances are always mandatory to be vaccinated against hepatitis B virus [34], this coincide with the result of this study which revealed the highly significant rating (82.2%) who had been vaccinated.

Conclusion

The result of this study reveals good behaviours by Iraqi orthodontist for most of infection control steps although some behaviors need to be improved following world wide infection control guide lines.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None.

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