

## Handpiece asepsis among dental practitioners in Mosul City

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### ABSTRACT

**Aims:** To investigate the incidence of handpiece asepsis in general dental practice in Mosul City and to evaluate the problems associated with routine handpiece sterilization which are commonly needed by those practitioners. **Materials and Methods:** A questionnaire was designed to collect the information about handpiece asepsis techniques performed by dentists. One hundred twenty dentists in Mosul City were randomly selected and the data were analyzed. **Results:** About 55.8% of the respondents know about the importance of handpiece sterilization, but no one do ideal sterilization between each patient due to absence of sufficient number of handpiece and lack of autoclave system in clinics. No one disinfect the handpiece scientifically; 59.38% smear the handpiece between each patient by one of the antiseptic solutions. **Conclusion:** Handpiece asepsis in Mosul dental clinics is poor. Most of dentists depend on disinfection by disinfectant solution to prevent cross infection by handpieces. Most dentists, because of their poor equipment in both private and national clinics, cannot sterilize handpieces after each patient.

**Key Words:** Handpiece, sterilization, disinfection.

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### INTRODUCTION

Sterilization provides a method of instrument recycling that could be monitored and documented to show that conditions for control of disease transmission were indeed established.<sup>(1)</sup> Since most instruments contact mucosa and/or penetrate oral tissue, it is essential that reused instruments be thoroughly cleaned and sterilized by accepted methods that could be routinely tested and monitored.<sup>(2)</sup>

Oral fluid contamination problems of rotary equipment and especially the low and high speed handpiece involve contamination of handpiece external surfaces and crevices, turbine chamber contamination that enters the mouth, water spray retraction and aspiration of oral fluids into the water lines and finally exposure of personnel to spatter and aerosols generated by intraoral use of rotary equipment.<sup>(3-5)</sup> Therefore, sterilization of dental handpiece has

been recommended as an essential part of infection control means for routine dental operative procedures.<sup>(6)</sup> However, there are little data concerning the compliance of general dental practitioners (GDPs) with handpiece asepsis, and anxieties have been expressed in the past in relation to the ability of some makes of handpiece to withstand the sterilization procedures.<sup>(7)</sup>

Tunnell<sup>(8)</sup> showed that steaming is the least damaging sterilization method, while ultrasound sterilization will severely damage the plastic and rubber components.

Lloyd *et al.*<sup>(9)</sup> investigated the method of handpiece sterilization employed by a sample of GDPs in England and showed that about 41% of respondents sterilized their handpieces after every patient.

Asqalan<sup>(10)</sup> performed a study in Jordan to investigate the sterilization efficiency and the ability of dentists to treat high risk patient found that 6.5% of dentists were

used the autoclave for handpiece sterilization.

In recent years, a new chemical formulation (tetra acetyl 1 ethylene diamine in association with persalt) has been proposed as a non hazardous mean for disinfection by generating peracetic acid *in situ* in the absence of performed peracetic acid side-effect.<sup>(11)</sup>

The aim of this study was to investigate the incidence of handpiece asepsis performed by a sample of GDPs in Mosul City and to evaluate the problems associated with routine handpiece sterilization which were experienced by those practitioners.

### MATERIALS AND METHODS

A questionnaire was designed to collect information about handpiece asepsis techniques performed by dental practitioners, and difficulties associated with handpiece sterilization. One hundred twenty dental practitioners in Mosul City were selected randomly and the questionnaire distributed to them. The data were collected, analyzed and represented as percentages.

### RESULTS AND DISCUSSION

The data were collected and the percentage of each question was calculated. The total number of sample was 120 dentists.

When the respondents asked about their scientific degree, the results were

58.3% BDS, 35.8% MSc, 4.2% Diploma and 1.7% PhD. This mean that more than one third of the respondents were specialists, who are more dealing with lectures, meeting and researches (Table 1).

Twenty percent of the respondents were having an assistant in their dental clinics. The assistant facilitates the sterilization of hand pieces when the dentist has no time to perform sterilization.

Concerning the location of the dental clinics related to the respondents, it was found that 77.5% of clinics located in the city center. These data indicated that this study was performed in an area supposed to have well equipped clinics that should be supplied with modern equipment like autoclavable handpiece. The remainders (22.5%) of the respondents were working in town and sub-urban areas (Table 1).

The results revealed that 15.8% of the respondents were working in private clinics only, 8.4% work in the national hospitals and 75.8% in both (Table 1). This indicated that the problems in sterilization and disinfection of handpiece were in both private and national clinics. So two important points must be discussed: First, all dental equipments should be updated like the use of an autoclavable handpiece, handpiece supplied by antiretraction valve, and autoclave system to control cross infection; and second, the dentists in private and national clinics should try as much as possible to sterilize, or at least disinfect handpiece after each patient.

Table (1): Distribution of the sample according to the education level of dentists, place and type of the clinics

Sample Distribution		No.	%
Dentists' Education Level	PhD	2	1.7
	MSc	43	35.8
	Diploma	5	4.2
	BDS	70	58.3
Place of the Clinic	City Center	93	77.5
	Town	20	16.7
	Sub-urban Rural	7	5.8
Type of the Clinics	Private Clinics	19	15.8
	National Hospitals	10	8.4
	Mixed	91	75.8

When the respondents asked about the presence of high speed turbine in their clinics, the results revealed that 93.3% of them used turbine, which is one of the important sources of infection, since the possibility of transmission of blood infections from patient to patient and to dental health workers is more possible.<sup>(9)</sup> Also, fluids may enter the turbine chamber, or may be retracted to water lines.<sup>(10)</sup>

From the 93.3% of the respondents who have high speed turbine in their clinics, 80.4% have one turbine, 15.2% have two turbines and 4.4% have three. These

findings explained that only 19.6% of the respondents having an alternative handpiece to be used at the time of sterilization of the contaminated handpiece (Table 2).

Concerning the low speed handpiece, the results showed that about 80% of the respondents have a low speed handpiece in their clinics (87.5% have only one handpiece and 12.5% have two handpieces and those have a chance to sterilize the handpiece after each patient). The remainder (20%) had no handpiece in their clinics (Table 2).

Table (2): Number of high and low speed handpieces in dental clinics

Type of Handpiece		No.	%
<b>High Speed Handpiece</b>	Have No Handpiece	8	6.7
	Have Handpiece	112	93.3
	One Handpiece	90	80.4
	Two Handpieces	17	15.2
	Three Handpieces	5	4.4
<b>Low Speed Handpiece</b>	Have No Handpiece	24	20
	Have Handpiece	96	80
	One Handpiece	84	87.5
	Two Handpieces	12	12.5
	Three Handpieces	0	0

When the respondents asked about the possibility of contamination of handpiece during work, 100% answered yes, and when they asked about their attitude to the risk of contamination, 55.8% of them considered the risk is high, while 38.4% considered it low, and 5.8% of them considered the risk is negligible (Figure 1). This result not agreed with that of Liloyd *et al.*<sup>(9)</sup> who found that 68.5% of dentists considered that the risk of infection via contaminated handpieces was low. Scientifically speaking, all dental health workers must be aware of sources and methods of transmission of infectious diseases and continually update their knowledge about such infections

When the respondents asked about disinfection and sterilization of handpiece, it was found that 10% performed disinfection prior to sterilization, 5.8% just sterilize the handpiece, 80% do disinfection by solution and 4.2% did not disinfect or sterilize handpiece at all (Figure 2).

Disinfection prior to sterilization, wh-

ich is the ideal method of infection control, was found to be performed by a very low percentage (10% of the respondents), and this result disagreed with that of Asqalan,<sup>(10)</sup> who found that most dentists clean their instruments manually by scrubbing either with detergents or disinfectant solutions like septicin or alcohol solution before sterilization.

Eighty percent of the respondents perform disinfection alone. The disinfectant solutions used were found to be chlorhexidine (60.19%), alcohol (12.04%), septicin (12.96%), dettol (9.25%) and sodium hypochlorite (5.56%). None of the respondents used glutaraldehyde solution which is the best solution for disinfection and sterilization if it is used with contact time of about 10 hours at room temperature.<sup>(9)</sup> Chlorhexidine was used by 60.19% of the respondents and it is very safe for disinfection and it does not cause any corrosion or damage to metal like sodium hypochlorite (Figure 3).

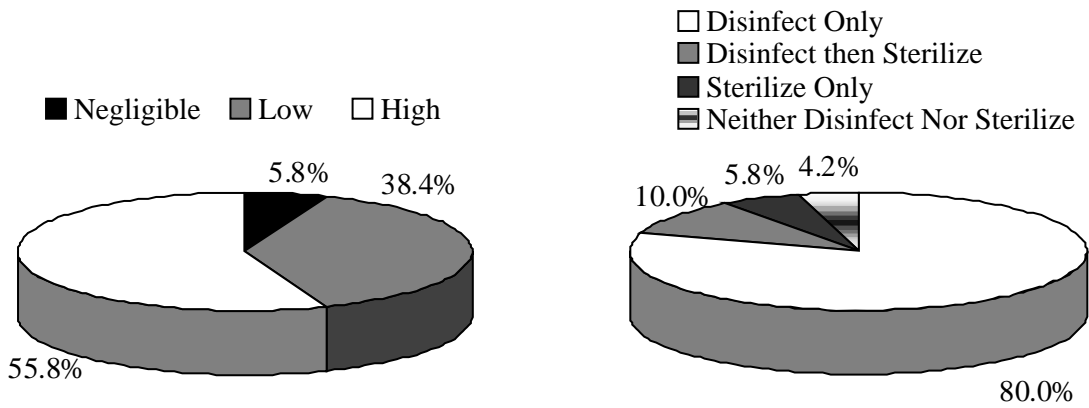


Figure (1): The risk percentages of handpiece contamination

Figure (2): Steps of infection control

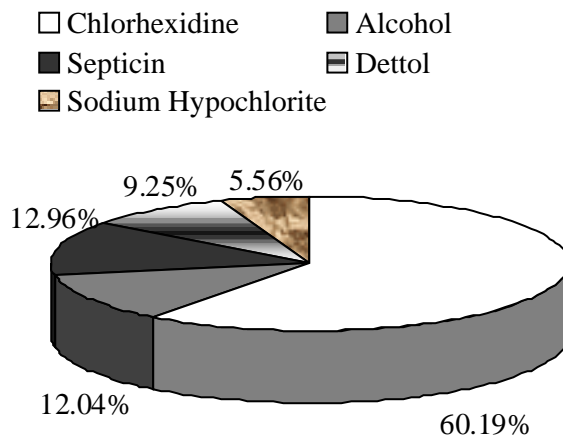


Figure (3): Types and percentage of disinfectant solutions

Concerning the frequency of disinfection, the results revealed that about 59.38% perform disinfection after each patient, 16.67% disinfect several times per day, and 23.95% disinfect once a day (Table 3). From these results, about half of the respondents (who perform disinfection only) do not disinfect handpiece after each patient and this probably due to either carelessness of dentist, insufficient number of handpieces, absence of assistant or crowding of patients.

None of the respondents do presterilization cleaning before either disinfection or sterilization. However, the American Dental Association states that debris and body fluids must be removed from the instruments and surfaces before sterilization or disinfection.<sup>(12)</sup>

The total percentage of dentists who sterilize the handpiece were 15.8%, (from them, 26.32% use autoclave and 73.68%

use hot air oven) (Table 3). This possibly due to autoclave deficiency in the market and its prices comparing to hot air oven (which is unsuitable of handpiece sterilization). From those 15.8%, it was found that 32% of the dentists sterilize handpiece after each patient, 23% sterilize several times per day and 45% sterilize the handpiece at the end of work in the day (Table 3). These results not coincided with the results of Clinical Research Association Newsletter in England which found that 53.8% sterilize after certain procedure, and 42.3% after each session.<sup>(2)</sup>

When the respondents asked about the causes which prevent the dentist to sterilize handpiece, the results showed that 34.17% due to having insufficient number of handpiece; while 68.33% because they did not have autoclavable handpiece, 55.83% having no autoclaves in their clinics. These are three basic points for scienti-

fic sterilization of handpiece after each patient. Each dental clinic should supplied by an autoclave and at least two autoclavable handpieces and more. About 34.17% of respondents were worried that handpiece may damage during sterilization; this not agreed with results of Lioyd *et al.*<sup>(9)</sup> who found that 56.2% of respondents fear from handpiece damage. When the autoclaving system and the sterilizable handpieces are not available or even the dentist fear from handpiece damage during sterilization, the dentist can use 2% glutaraldehyde as a simple and minimum method for cross infection control. About 11.67% of respondents does not sterilize handpiece because they think that it is time consum-

ing! and only 2.5% of respondents think that sterilization is not necessary!! (Table 4) These two percentages are relatively low but give an idea about the poor knowledge of those practitioners about the risk of transmission of infectious diseases via contaminated handpieces. Continued education programs should focus on this problem and try to update the background knowledge of practitioners about sterilization and disinfection. Iraqi Dental Association may participate through its control on the private and national clinics by periodic monitoring about the equipment, supplies of the clinics and the interest of dental practitioners in cross infection control.

Table (3): The method and frequency of handpiece sterilization and disinfection

		No.	%
<b>Method of Sterilization</b>	By Autoclave	5	26.32
	By Hot Air Oven	14	73.68
<b>Frequency of Handpiece Sterilization</b>	After Each Patient	6	32
	Several Times/Day	4	23
	Once /Day	9	45
<b>Frequency of Handpiece Disinfection</b>	After Each Patient	57	59.38
	Several Times/Day	16	16.67
	Once /Day	23	23.95

Table (4): Causes preventing dentists to sterilize handpieces

Causes	No.	%
Have No Sufficient Number of Handpiece	41	34.17
Have No Autoclavable Handpiece	82	68.33
Have No Autoclave	67	55.83
Worried that Handpiece may be Damaged	41	34.17
Prohibitive Cost	10	8.33
Too Time Consuming	14	11.67
Think that Sterilization is not Necessary	3	2.5

### CONCLUSIONS

According to the results of the present study, handpiece asepsis in Mosul dental clinics is poor. Most of dentists depend on disinfection by disinfectant solution to prevent cross infection by handpieces.

Handpiece asepsis is an important procedure, but at the same time it is a complicated technically, biologically and econo-

mically. Most dentists because of their poor equipment (in quantity and quality) in both private and national clinics cannot sterilize handpieces after each patient.

The dentists should know the correct scientific methods of disinfection since it is the most common technique used in clinics for cross infection control till now.

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