

# Assessment of the effect of educating dental assistants on the quality of sterilization in Karaj, Iran

## Abstract

**Introduction:** Obeying sterilization procedure is one of the most important foundations in infection control in dentistry, which is one of the most important responsibilities of dental assistants. The aim of this study was to assess the effect of educating sterilization procedure to dental assistants on the quality of sterilization in Iran.

**Material and methods:** 75 dental offices in Karaj, Iran were chosen randomly. An oral medicine specialist educated assistants theoretically (by using a brochure) and practically about sterilization procedure. Their knowledge, attitude and performance in relation to sterilization procedure were assessed by a questionnaire before and after education. Autoclave accuracy was also assessed by using a biological test. Wilcoxon and MC Nemar, non-parametrical tests were used to analyze data.

**Results:** Educating dental assistants changed assistant's performance as below: Number of centers, which used to wash equipment after dental procedures increased from 16% to 25%. Number of centers that were used to put dental equipment in disinfectants was increased from 5.33% to 55.6%. Packing dental equipment increased 24% (56.7%) and monitoring system was increased up to 65.3% after education. Failure of biologic test decreased from 9 to 1 center after education.

**Conclusion:** we concluded that educating dental assistants is effective on improvement of their performance in sterilization of dental equipment.

**Keywords:** sterilization, biological test, monitoring of sterilization

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## Introduction

Increasing transmission of epidemic disease such as Hepatitis and AIDS during dental procedures is one of the most important concerns of the society. It has been years that international associations such as CDC ([www.cdc.gov](http://www.cdc.gov)) have stated that all dental equipment which are going to be reused again have to be sterilized before dental procedures.<sup>1</sup> Nowadays sterilization procedure is one the responsibilities of dental assistants whom have not educated properly. Unfortunately 45.5% of Autoclaves show sterilization defects because of dental assistant's poor package.<sup>2</sup> Continuing of this process may lead to inevitable complications related to transmission of disease. Educating dental sterilization procedure and consequences of not obeying it to dental assistants is one of the most important ways to reduce this problem.

Recent data shows that dental assistants usually do not obey sterilization rules. Contaminated tools are not being cleaned before sterilization and the accuracy of Autoclaves is not regularly monitored.<sup>2</sup> Other studies show that errors caused by operators are more common than inaccuracy of Autoclaves.<sup>3</sup>

According to the importance of sterilization, lack of data about dental assistant's knowledge and the efficacy of their education, we have assessed the effect of educating sterilization process to dental assistants on the quality of sterilization.

## Material and methods

75 dental offices were chosen randomly. Any center that did not cooperate was excluded from the study and was replaced by another

dental center. All the procedure was demonstrated to each chosen dental clinic.

A multiple choice questionnaire (containing 25 questions in 7 sections: How to keep contaminated equipment, How to wash contaminated tools before sterilization, Drying dental equipment before sterilization, Packing dental equipment before sterilization, Sterilization procedure, Monitoring sterilization procedure, How to keep sterilized equipment) about the knowledge and attitude of dental assistants about sterilization (based on Miller's infection control)<sup>5</sup> was filled by an oral medicine specialist. This questionnaire was filled by observing and sometimes asking dental assistants about the sterilization process.

Accuracy of autoclaves was assessed by biological test using *Stearothermophilus bacilli*. (Brown Ltd. UK) Samples were taken from the tip of forceps and elevators. Dental assistants were educated practically and theoretically [by a brochure based on Millers

infection control.<sup>6</sup> Its validity was approved by 5 oral medicine professors at Shahid Beheshti University of Medical Sciences, Iran. 10 postgraduate oral medicine students also filled questionnaires 7 days after education to confirm reliability (so the correlation was 85%).

All past sterilization procedures such as Biological test and assistant's knowledge and performance was re-evaluated by filling the same questionnaire again. In order to perform biological test, *Stearothermophilus bacilli* was put among ordinary dental equipment in autoclave, after finishing sterilization cycle, vials were collected and sent to laboratory for incubation in 57°C for 48 hours.

If the results were positive (which showed the impaired cycle of sterilization) another biological test was ordered for empty autoclave and if the results were positive again, the inaccuracy of the autoclave was reported to that dental clinic.

All samples were sent to a laboratory in Karaj city and have been assessed by both EMB and Blood agar cultures. MC Nemar and Wilcoxon non-parametrical tests were used to analyze data.

### Results

75 dental offices were assessed, which was managed by 57 (76%) male and 18(24%) female dentists. All dental assistants were female.

59 (78.2%) had Diploma and 16(21.3%) others had post graduate studies, but none had studied related fields to dentistry. 3 of them had passed a course of dental assistance in Tehran university of medical sciences, however 72 others have learned their job during working in dental clinics.

Data was assessed by Mc Nemar\* and Sign\*\* test and the results were as follows: (Table 1 & Table 2). Educational intervention in relation to all assessed sterilization factors were significantly meaningful (p<0.001) except Autoclave’s microbial culture which was not significantly different after intervention (p=0.250).

**Table 1** Sterilization attitude of dental assistants before and after sterilization

Variables		Before Intervention		After Intervention		P value
		Number	Percent	Number	Percent	
How to keep used dental equipment before washing	Water and dish washing liquid	6	8.4	24	33.3	P<0.001*
	Disinfectant	37	51.3	24	33.3	
	Empty container	17	23.6	6	8.4	
	Immediate wash	12	16.7	18	25	
How to Wet equipment in disinfectant	Soaked in	25	34.7	37	51.4	P<0.001*
	Being wet	35	48.6	17	23.6	
	Immediate wash	12	16.7	18	25	
	Once a day	4	5.5	40	55.6	
Frequency of replacing disinfectant	Once a week	20	26.9	4	5.6	P<0.001*
	Twice a week	17	23.6	1	1.4	
	Three times a week	12	16.7	10	13.8	
	Every other week	2	2.7	-	-	
Using thick glove	Immediate wash	17	23.6	17	23.6	P<0.001**
	Yes	32	42.9	63	87.5	
	No	40	57.1	9	12.5	
Packing equipment before sterilization	Packing all dental equipment	3	4.2	22	30.6	P<0.001*
	Packing surgical equipment	21	29.2	21	29.2	
	No package before sterilization	48	66.6	29	40.3	

**Table 2** Sterilization opinion of dental assistants before and after sterilization

Variables		Before Intervention		After Intervention		P value
		Number	Percent	Number	Percent	
Opinion about packing dental equipment before sterilization	Necessary for all equipment	6	8.4	54	75	P<0.001*
	Necessary for surgical equipment	35	48.6	16	22.2	
	Not necessary	31	43	2	2.8	
Adjusting time and temperature	Accurate	69	95.9	72	100	P<0.001**
	Inaccurate	3	4.1	-	-	

Table Continued...

Variables		Before Intervention		After Intervention		P value
		Number	Percent	Number	Percent	
Autoclave's accuracy	Never	47	65.2	25	34.7	P<0.001*
	After every cycle	17	23.7	37	51.4	
	Once a week	2	2.7	7	9.7	
	Twice a week	6	8.4	3	4.2	
How to cool sterilized equipment	Keeping Autoclaves door opened	63	87.5	72	100	P<0.001**
	By using water or air- pour	9	12.5	-	-	
Microbial culture	Positive	5	6.9	2	2.8	P=0.250**
	Negative	67	93.1	70	97.2	

## Discussion

We have concluded that educating dental assistants has a great effect on improving their Knowledge, attitude and performance on the quality of sterilization.

A recent paper about systematic review of available literature on the adherence of South African oral health care professionals to infection control recommendations which had focused on Nine important aspects (knowledge of infectious occupational hazards, personal hygiene and care of hands, correct application of personal protective equipment, use of environmental barriers and disposable items, sterilization (recirculation) of instruments and hand pieces, disinfection (surfaces) and sound housekeeping; management of waste disposal, quality control of dental unit waterlines, biofilms and water) showed that there is a huge improvement in infection control in south Africa; however it seems that there is much more need for future research about how to improve infection control . It also showed that educating oral health care staff might have a great role in infection control and sterilization procedure.<sup>5</sup>

Podgórska et al.<sup>6</sup> research showed that three most important failures of instruments disinfections are: multiple use of disinfectant, adding disinfectant, adding new instruments. They also mentioned that there is still need for improvement in disinfection and sterilization in dental practice, especially in monitoring and documentation of sterilization process, proper use of disinfectants according to manufactures instructions, frequent disinfection of surfaces which contact with patients. Dental staff should take part in advanced training courses about disinfection and sterilization.<sup>6</sup>

Yuzbasioglu et al.<sup>7</sup> study (2009) showed that improved compliance with recommended infection control procedures is required for all dentists and continuing education programs and short-time courses about cross-infection and infection control procedures are suitable to improve the knowledge of them.<sup>7</sup>

Al-Omari's.<sup>8</sup> paper about Compliance with infection control programs in private dental clinics in Jordan showed that approximately 14 percent of general dentists in this sample were considered to be compliant with an inventory of recommended infection control measures he also mentioned there is a great need to provide formal

and obligatory infection control courses and guidelines for private dentists.<sup>8</sup>

Elkarim et al.<sup>9</sup> have assessed 150 dental practitioners. They concluded that educating dental practitioners has a great effect on obeying sterilization procedure and infection control. They also emphasized that there is a clear need to improve the existing situation particularly with regard to immunization of dentists against Hepatitis B, safe disposal of clinical waste and instrument sterilization in Khartoum.<sup>9</sup>

Most studies about this field are limited to the recent situation of infection control in dentistry and have emphasized on the inaccuracy of sterilization in different levels, which were relevant with this study. This study was one of the first studies which evaluated the efficacy of educating dental assistants on quality of sterilization.

## Conclusion

Sterilizing dental equipment is one of the most important responsibilities of dental assistants, which unfortunately does not complete properly most of the times and there is no good control on the accuracy of assistant's performance; so educating dental assistants increases the quality of sterilization. The most important reason of failure in sterilization was incomplete knowledge of dental assistants about sterilization procedure and its consequences. Biological test seems to be the best way to check autoclaves regularly. Packing dental equipment is a simple and reliable way of keeping sterilized equipment and leads to a more positive opinion about health care in patients. Thus, educating dental assistants is the most effective way to improve their performance in sterilization of dental equipment.

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## Conflicts of interest

Authors declare that there is no conflict of interest.

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