

DENTISTS' LEVEL OF KNOWLEDGE ABOUT THE EFFECTIVENESS OF CLEANING METHODS FOR REUSABLE INSTRUMENTS

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Abstract: Decontamination of reusable medical devices is an important component of infection control in clinical settings. **The aim:** to assess the level of knowledge regarding the cleaning of the instruments among dentists from Iasi, Romania. **Material and methods:** The study included 52 general dental practitioners from Iasi, Romania. The subjects were chosen at random to complete a questionnaire about instrument cleaning methods in dental practice. Statistical analysis was performed using SPSS 20.0. **Results:** The mean age was 35.75 ± 8.18 years. 65% of the subjects have a university degree. 45% of the participants have a work experience of 0-5 years, 40% between 5-10 years and 15% over 10 years of practice. 50% of the respondents consider that the "instrument cleaning" stage is the most important. 40% chose as the answer option "all cleaning options" (manual, US cleaning, washing machine and combined) and the cleaning method frequently used is manual cleaning (60%); 58% of respondents think that the most efficient cleaning method is manual cleaning combined with the US. **Conclusions:** The level of knowledge and attitudes regarding the instrument efficiency of instrument cleaning methods in dental practice is good, with participants with postgraduate education and professional experience between 0-5 years having a better knowledge than participants with university studies and professional experience over 5 years

Keywords: cleaning, reusable instruments, decontamination.

Introduction

Reusable medical device decontamination is an important component of infection control in clinical settings. The significance of cleaning such devices as a means of preventing cross-infection has been reported in many areas of clinical practice, including ophthalmology, gastroenterology, vascular surgery, and dental surgery. (1)

The emergence of transmissible diseases through the blood, such as hepatitis (HVB, HVC), has recently highlighted the importance of thoroughly cleaning devices before steam sterilization. Thus, efficient

instrument cleaning is a critical procedure for reducing the risk of blood diseases transmission in the future. Effective cleaning is also necessary to ensure microbial inactivation.(2)

One mechanism for improving the quality of instrument decontamination is the centralization of instrument reprocessing in well-equipped sterile service departments, which are operated by well-trained staff, using validated equipment, in an accredited quality management system. The problem with this centralized model in dentistry is that the large volume of tools used by dental

surgeons offers a significant logistical challenge. Therefore, decontamination of instruments in general dental practice is likely to continue at the local level. It is important that all processes involved in decontamination are taken to a high standard, but unfortunately there has been little evidence to indicate the robustness of these procedures in dental practice, as highlighted in a systematic review. (4)

Instrument cleaning is a mandatory, permanent, and systematic preliminary step in any activity or procedure to remove dirt (organic and inorganic matter) from surfaces (including skin) or objects, using mechanical or manual operations, physical agents, and/or chemicals, performed in any type of health facility to ensure that the medical activity is carried out in optimal safety conditions.(5) **The aim of the study** was to assess the level of knowledge regarding the cleaning of the instruments among dentists from Iasi, Romania.

Material and methods

Table 1. demographic characteristics of the study group

Age	35.75 ± 8.18 years	
Level of education	University studies	65.0
	Postgraduate studies	35.0
Professional experience	0-5 years	45.0
	5-10 years	40.0
	10 years later	15.0
Dental office location	Urban	80.0
	Rural	20.0

To the question "Do you know the instrument circuit in dental practice?" 90% of the participants considered that they do. Most of those who answered positively have university studies (92,3%), with a professional experience between 0-5 years and over 10 years (100%) (tab.2).

The descriptiv study was conducted during the september 2020 – mai 2021. The study included 52 general dental practitioners from Iasi, Romania. The subjects were chosen at random to complete a questionnaire about instrument cleaning methods in dental practice.

Statistical analysis of the data collected was performed using SPSS 20.0 for Windows and Microsoft Excel.

Results

The study group consisted of 52 dentists with private practice from Iasi. The mean age was 35.75 ± 8.18 years. More than half of the participants (65%) have a university degree and 35% of them have a postgraduate degree. 45% of the participants have a work experience of 0-5 years, 40% between 5-10 years and 15% over 10 years of practice. 80% of the participating doctors have offices in urban areas (tab.1)

In case of selecting the instrument processing steps, 73% of the study participants answered correctly. The correct answer was chosen by 77.8% of the participants with professional experience between 0-5 years and those with more than 10 years of experience all chose the correct answer (tab.2).

When it comes to the importance of the instrument processing steps, over 50% of the respondents consider that the "instrument cleaning" stage is the most important, followed by those who chose the "instrument disinfection". Of those who chose "instrument cleaning" as the answer

option, 57,1% have a postgraduate degree and experience of 0-5 years, while respondents who chose the "instrument disinfection" option "23,1% have a university degree and evenly distributed seniority between 5-10 years (tab.2).

Table 2. Participants' answers to the questions in the questionnaire

Question	Variable	Studies level		Professional experience		
		University studies	Postgraduate studies	0-5 years	5-10 years	Over 10 years
Do you know the instrument circuit in dental practice?	Yes	92.3%	85.7%	100.0%	75.0%	100.0%
	Don't know	7.7%	14.3%	.0%	25.0%	.0%
Please select the processing steps of the instruments	pre-disinfection, cleaning, disinfection, packaging, sterilization, storage	76.9%	57.1%	77.8%	50.0%	100.0%
	pre-disinfection, disinfection, sterilization	7.7%	14.3%	.0%	25.0%	.0%
	cleaning, pre-disinfection, disinfection, sterilization	15.4%	14.3%	11.1%	25.0%	.0%
	disinfection, sterilization	.0%	14.3%	11.1%	.0%	.0%
Which of the stages of the instrument circuit do you consider to be the most important?	instrument cleaning	46.2%	57.1%	66.7%	25.0%	66.7%
	Instruments disinfection	23.1%	14.3%	22.2%	25.0%	.0%
	instrument sterilization	7.7%	28.6%	11.1%	25.0%	.0%
	pre-disinfection of instruments	23.1%	.0%	.0%	25.0%	33.3%
Do you know the methods of cleaning instruments that can be used in the dental office?	manual cleaning	7.7%	28.6%	33.3%	.0%	.0%
	US bath cleaning	15.4%	14.3%	22.2%	12.5%	.0%
	all the above options	38.5%	42.9%	22.2%	62.5%	33.3%
	manual cleaning + US cleaning	38.5%	14.3%	22.2%	25.0%	66.7%
Which of the instrument cleaning methods is used in your office?	manual cleaning	69.2%	42.9%	44.4%	75.0%	66.7%
	US cleaning	7.7%	28.6%	22.2%	12.5%	.0%
	manual cleaning + US cleaning	23.1%	28.6%	33.3%	12.5%	33.3%
Which of the known cleaning methods do you consider to be the most effective?	manual cleaning	46.2%	14.3%	22.2%	37.5%	66.7%
	US cleaning	23.1%	14.3%	22.2%	25.0%	.0%
	manual cleaning + US cleaning	30.8%	71.4%	55.6%	37.5%	33.3%
What solutions do you use to clean the instrument?	plain water	15.4%	.0%	11.1%	.0%	33.3%
	detergent / disinfectant solution	61.5%	42.9%	44.4%	62.5%	66.7%
	disinfectant solution	7.7%	28.6%	44.4%	62.5%	66.7%
	Water and disinfectant solution	15.4%	28.6%	33.3%	12.5%	.0%
Who cleans the instruments?	the doctor	.0%	57.1%	22.2%	12.5%	33.3%
	dental assistant	84.6%	42.9%	77.8%	87.5%	.0%
	the doctor and dental assistant	15.4%	.0%	.0%	.0%	66.7%

To the question "Do you know the methods of cleaning instruments that can be used in the dental office?" 40% chose as the answer option "all cleaning options" (manual, US cleaning, washing machine and combined), respondents with a postgraduate degree and an experience of 5-10 years(62,5%), followed by 38,5% of respondents who have chosen as the answer option "manual cleaning + US", 28% of them having postgraduate studies and equal distribution between the groups of professional experience (33.3%) (fig.5, tab. 10.11).

The cleaning method frequently used in the dental offices of the study participants is manual cleaning (60%), 75% of them with higher education and 5-10 years of experience, followed by those who clean manually and US instruments (25%) 60% having university studies and over 10 years of experience (tab.2).

Regarding "Which of the known cleaning methods do you consider to be the most effective?", 58% of respondents think that the most efficient cleaning method is manual cleaning combined with the US, 71% having postgraduate studies and a professional experience between 0-5 years(55,6%) (tab.2).

Another important element in cleaning the instruments is the detergent / disinfectant solution used. The instruments are physically cleaned under running water after being previously kept in antiseptic solution for 15 minutes. Over 50% of the respondents chose the detergent / disinfectant solution, followed by those who use water + detergent / disinfectant solution, 61,5% of respondents with higher education, and over 10 years of professional experience (66,7%) (tab.2).

To the question "Who is cleaning the instruments?" 70% of the participants declare that the dental assistant is the one who performs the cleaning of the

instruments, 84,6% of respondents with university studies and 5-10 years in terms of professional experience (87,5%).

Discussions

The removal of visible dirt, organic and inorganic material from objects and surfaces is referred to as cleaning. This is done either manually or mechanically with water and detergents or enzymatic products. Thorough cleaning is required prior to high-level disinfection and sterilization, as residual inorganic and organic materials on the instrument surfaces interfere with the effectiveness of these processes. (6)

Cleaning is possibly the most important stage in the processing of medical instruments because any errors made during this stage can result in the retention of contaminated biological material on the instruments. Instruments that are then sterilized, most commonly in an autoclave, may have prion proteins on their surface that are resistant to conventional chemical and thermal decontamination methods. Drying may cause residual material to adhere to the instrument, making prions removal even more difficult. Furthermore, prions cling to stainless steel surfaces and remain infectious for extended periods of time. There is no relevant information on Ni-Ti surfaces. The World Health Organization (WHO) has recommended that all dental instruments be sterilized to reduce the theoretical risk of iatrogenic transmission of CJD during root canal treatment.(7, 8)

Ultrasonic cleaners, washer-decontaminators, washer-disinfectors, and washer-sterilizers are the most common

types of mechanical or automatic cleaners. Ultrasonic cleaning removes soil through cavitation and implosion, which involve propagating waves of acoustic energy in aqueous solutions to disrupt the bonds that hold particulate matter to surfaces. Bacterial contamination can exist in used ultrasonic cleaning solutions (as well as other used detergent solutions) because these solutions do not generally make antibacterial label claims. Even though ultrasound alone does not significantly inactivate bacteria, it can act synergistically to increase a disinfectant's cidal efficacy. Users of ultrasonic cleaners should be aware that the cleaning fluid could contaminate surgical instruments with endotoxin, causing severe inflammatory reactions.(9)

Endodontic needle cleaning is a difficult task due to their complex geometry. Most of the chemical methods recommended by the WHO for this purpose (World Health Organization 2000) are potentially hazardous to metal surfaces, and corrosion of Ni-Ti alloys in particular has been reported (10). Furthermore, they are unable to completely remove organic debris from used Ni-Ti rotary files. Dentists commonly use ultrasonic baths in conjunction with milder disinfectants for this purpose, and while they are unable to consistently remove all residual biological materials, they are thought to be more effective than other available methods, such as hand washing and disinfection machines. Previous studies' findings are similar to ours, indicating that ultrasonic cleaning is

more efficient than manual cleaning.(11,12)

Instrument cleaning has been improved by combining manual cleaning with brushes, pre-disinfection in an enzymatic solution, and ultrasounds. This has yielded promising results in both laboratory and clinical settings, but it necessitates time-consuming manual actions, and some reprocessed needles may still contain residual biological material. Further optimization of the ultrasonic cleaning procedure could improve the results, speed up the procedure, and reduce the number of interventions required, as well as the risk of percutaneous injury.(13)

Currently available ultrasonic baths dissipate acoustic energy throughout the entire volume of the liquid. Furthermore, cavitation bubble formation is highly unpredictable in both space and time. A new cleaning method for root canal needles could be implemented. (14)

Conclusions

The level of knowledge and attitudes regarding the instrument efficiency of instrument cleaning methods in dental practice is good, with participants with postgraduate education and professional experience between 0-5 years having a better knowledge than participants with university studies and professional experience over 5 years; it is necessary to carry out training courses in order to improve the level of knowledge on the correct processing of medical instruments, so that the safety of the medical aetiology is not jeopardized.

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