

Knowledge and attitudes of students of the Faculty of Dentistry of the University of Cuenca about the sterilization of dental handpieces

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Abstract

Introduction: Dentistry is a profession that, being exposed to great biological risk, requires strict compliance not only with biosafety standards but also with the disinfection and sterilization processes of the instruments used in clinical practice, including dental handpieces.

Objective: To determine the attitude and level of knowledge about the disinfection and sterilization of handpieces, by the students of the Faculty of Dentistry of the University of Cuenca.

Materials and Methods: The instrument used was a Google Forms questionnaire, based on the Likert scale, which was applied to fourth- and fifth-year students of the university establishment.

Results: 19.2% of the students mentioned that they strongly disagreed with having received training, which is why their degree of knowledge is low, and 53.3% presented a positive attitude.

Conclusion: The students have not received training on the disinfection and sterilization processes of the handpieces; however, their attitude is positive.

Keywords: Sterilization; Disinfection; Dentistry; Attitude; Knowledge; Dental handpiece

1. Introduction

Dentistry is a profession that faces highly complex activities that involve biological risk during clinical practice, such as being exposed to various microorganisms (spores, bacteria, fungi, viruses and protozoa) found in the blood and saliva of patients, being able to generate cross contamination [1].

The World Health Organization (WHO) defines biosafety as a set of standards and procedures that are applied with the aim of preventing exposure to infectious agents that could affect the dental professional, auxiliary staff and patients, protecting their integrity [2]. On the other hand, the term sterilization of handpieces refers to the elimination of all forms of living material including bacteria, viruses, fungi and resistant spores that are found on their internal and external surfaces.

The turbine and the micromotor are recognized as critical and semi-critical instruments, and when they come into contact with soft and hard tissue, it is essential that they undergo a disinfection and sterilization process to later be used

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on a new patient. Reyes et al. performed a microbiological analysis of the handpiece after use, finding bacteria and microorganisms, mainly *Lactobacillus*, *Streptococcus*, *Actinomyces*, *Enterococcus* and *Staphylococcus*. Another problem is the presence of microorganisms on the internal surfaces generated by the water system that is used for its operation, it is recommended to use unidirectional flow valves that prevent the spread of infectious agents [3,4].

The American Dental Association (ADA) indicated strict standards for patient-to-patient sterilization of handpieces [3]. To comply with it, an external cleaning of the instrument must initially be carried out, it is recommended to use 1% sodium hypochlorite or 2% glutaraldehyde for 10 minutes [4]. Subsequently, the sterilization process can be carried out using moist heat (autoclave) at 121°C and 1 atm for 20 minutes; and/or dry heat (sterilizing oven), at 180°C for 30 minutes or 160°C for 1 hour [5]. However, it is suggested to follow the manufacturer's instructions for temperature adjustment, in order not to cause damage to these highly delicate handpieces [1].

The purpose of this article is to determine the attitude and level of knowledge about the disinfection and sterilization of handpieces, by fourth and fifth year students of the Faculty of Dentistry of the University of Cuenca

2. Material and methods

The present study was descriptive, observational and cross-sectional. The population to be considered was 172 students who attended the comprehensive adult and child clinic during the year 2022. From a convenience sampling, and considering a 95% reliability and 5% margin of error, the sample was 120 students. The instrument used was a virtual questionnaire that was elaborated through the Google Forms platform, it consisted of 5 questions and its answers are based on the Likert scale, considering the options: strongly disagree, somewhat disagree, neither agree nor disagree, disagree, somewhat agree and strongly agree. Then, through digital platforms, it was sent to the students. The data collected was processed in Microsoft Office Excel. Finally, the SPSS program was used for data analysis.

3. Results

A total of 120 students were evaluated, 80 (66.7%) female and 40 (33.3%) males. Regarding the training that the students have received on high and low speed disinfection and sterilization processes for dental pieces, the fourth year students showed a strong agreement in 10.8%, somewhat in agreement 11.7%, neither agree nor disagree 10.8%, somewhat disagree 16.2%, strongly disagree 19.2%, while in the fifth year they showed strong agreement in 5.8%, somewhat agree 7.5%, neither agree nor disagree 7.5%, somewhat disagree 4.2%, strongly disagree 8.3% (Table 1).

Table 1 Training on disinfection and sterilization processes for handpieces, according to academic level

			Training on disinfection and sterilization processes for handpieces					Total
			Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	
Academic level	Fourth level	Count	13	14	13	17	23	80
		%	10.8%	11.7%	10.8%	14.2%	19.2%	
	Five level	Count	7	9	9	5	10	40
		%	5.8%	7.5%	7.5%	4.2%	8.3%	
Total		Count	20	23	22	22	33	120
		%	16.7%	19.2%	18.3%	18.3%	27.5%	100.0%

Regarding gender, the number of male students (N=40) was lower than the female group (N=80), the latter evidences to be mostly strongly disagree (17.5%) in having received training in disinfection processes and sterilization compared to the male gender (10%). (Table 2).

Table 2 Training on the disinfection and sterilization processes of handpieces, according to gender

			Training on disinfection and sterilization processes for handpieces					Total
			Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	
Gender	Female	Count	11	14	17	17	21	80
		%	9.2%	11.7%	14.2%	14.2%	17.5%	
	Male	Count	9	9	5	5	12	40
		%	7.5%	7.5%	4.2%	4.2%	10.0%	
Total		Count	20	23	22	22	33	120
		%	16.7%	19.2%	18.3%	18.3%	27.5%	

Another piece of information that was decided to investigate was whether the students sterilize their handpieces prior to patient care, finding that in the fourth year 14.2% strongly agree, falling below the fifth-year students who represent 15%. On the other hand, the two academic levels showed 4.2% to be in strong disagreement. (Table 3). Analyzing the female and male gender, it is shown to strongly agree with a percentage of 14.2% and 15% respectively, while strongly disagree represents 4.2% for both genders. (Table 4). These results conclude in a positive attitude of the students towards the importance of the sterilization processes.

Table 3 Attitude towards the disinfection and sterilization of handpieces, according to academic level

			Do you disinfect and sterilize the handpiece prior to patient care?					Total
			Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	
Academic level	Fourth level	Count	17	21	21	16	5	80
		%	14.2%	17.5%	17.5%	13.3%	4.2%	
	Five level	Count	18	10	6	1	5	40
		%	15.0%	8.3%	5.0%	0.8%	4.2%	
Total		Count	35	31	27	17	10	120
		%	29.2%	25.8%	22.5%	14.2%	8.3%	

Table 4 Attitude towards the disinfection and sterilization of handpieces, according to gender

			Do you disinfect and sterilize the handpiece prior to patient care?					Total
			Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	
Gender	Female	Count	22	27	18	8	5	80
		%	18.3%	22.5%	15.0%	6.7%	4.2%	
	Male	Count	13	4	9	9	5	40
		%	10.8%	3.3%	7.5%	7.5%	4.2%	
Total		Count	35	31	27	17	10	120
		%	29.2%	25.8%	22.5%	14.2%	8.3%	

Table 5 Importance of handpiece disinfection and sterilization, according to academic level

			Regarding the equipment and instruments that are taken to the patient's mouth. Do you think they should be disinfected without organic materials and sterilized?					Total
			Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	
Academic level	Fourth level	Count	64	8	1	3	4	80
		%	53.3%	6.7%	0.8%	2.5%	3.3%	66.7%
	Five level	Count	33	2	1	3	1	40
		%	27.5%	1.7%	0.8%	2.5%	0.8%	33.3%
Total		Count	97	10	2	6	5	120
		%	80.8%	8.3%	1.7%	5.0%	4.2%	100.0%

Through the applied instrument, it also sought to investigate if the students had knowledge about the objective of decontamination and sterilization of handpieces, in both academic levels high percentages were evidenced with 53.3% and 30% for fourth and fifth year respectively. which leads to the conclusion that a large number of students know about the subject (Table 6).

Table 6 Objective of disinfection and sterilization, according to academic level

			Is the goal of decontamination and sterilization of handpieces the elimination of all forms of living material?					Total
			Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	
Academic level	Fourth level	Count	64	11	2	2	1	80
		%	53.3%	9.2%	1.7%	1.7%	0.8%	66.7%
	Five level	Count	36	2	1	1	0	40
		%	30.0%	1.7%	0.8%	0.8%	0.0%	33.3%
Total		Count	100	13	3	3	1	120
		%	83.3%	10.8%	2.5%	2.5%	0.8%	100.0%

4. Discussion

Through this study it was evidenced that fourth and fifth year students have low knowledge because they have not received adequate training regarding the sterilization of handpieces. In the same way, in the research carried out by Núñez et al., the students of these academic levels showed low levels of knowledge [6]. Additionally, a study conducted by Licea et al., revealed that stomatologists have a lower level of knowledge during undergraduate studies. However, they developed these concepts during their postgraduate studies [7]. According to gender, it was observed that the level of knowledge is low for both females and males, which is related to the study by Ruiz et al., which shows poor knowledge of biosafety for both genders [8].

The attitude of the students was evaluated, a large percentage showed a positive attitude towards the importance of sterilization processes. On the other hand, a low percentage represented a negative attitude. A contradictory result was

found in the study by Sáenz et al., in which the Air Force dental interns did not have a positive attitude, showing that the vast majority had an indifferent attitude to the subject [9].

According to the knowledge of the objective in the disinfection and sterilization processes, favorable results were exhibited, because the percentages showed a high knowledge on the part of the two academic levels studied. However, the fourth year shows a higher degree of knowledge compared to the fifth year, emphasizing that the latter represents a lower percentage of the population studied. This is refuted by Jiménez et al., who in a study conducted at a Cuban university found that the higher the academic level, the greater the knowledge [10]. Similarly, Díaz et al., showed that the students of the University of Cali knew the concept of biological risk. However, despite being clear about this concept, most do not apply biosafety measures; results that are disappointing because they show that the dental professional during his clinical practice is more technical than scientific [11].

5. Conclusion

In conclusion, dental students have a medium level of knowledge, despite not having received training on the disinfection and sterilization processes of handpieces during their student life, which leads us to think that their positive attitude is mostly related to practice time.

It is recommended to incorporate biosafety issues and sterilization processes as part of the syllabus of the microbiology chair. Additionally, it is important to provide continuous training to the student community in order to counteract the knowledge deficit and thus encourage strict compliance with biosafety regulations.

Conflicts of interests

There are not conflicts of interests in this work

Compliance with ethical standards

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Disclosure of conflict of interest

All authors declare that they have no conflict of interests with respect to the research, authorship, and/or publication of this article.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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