Journal of Dentistry and Oral Care Medicine
Volume 8 | Issue 1
ISSN: 2454-3276

Research Article Open Access

Decontamination of Impressions: Knowledge and Attitudes of Dentists in The Dakar Region (Senegal)

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Citation: Thioune N, Fall M, Cissé B, Badji K, Kamara PI, et al, (2022) Decontamination of Impressions: Knowledge and Attitudes of Dentists in The Dakar Region (Senegal). J Dent Oral Care Med 8(1): 102.

Abstract

Introduction: The prosthetic act must obey the rules of asepsis with a certain rigour for the decontamination of impressions to reduce the risk of cross-contamination. The objective of this study was to evaluate the knowledge and attitudes of practitioners in the Dakar region (Senegal) regarding the decontamination of impressions.

Materials and Methods: This was a cross-sectional descriptive epidemiological survey of 150 dentists in the Dakar region.

Results: The sample consisted of 59,3% men and 40,7% women. Practitioners practising in private practice were 61,0% against 39% in public practice. The majority (83.3%) of dentists in the study had not received any continuing education on aseptic procedures in prosthetics and had a vague idea of the term "decontamination of impressions". Nevertheless, almost all practitioners (94,0%) systematically rinsed the impressions with water after disinsertion, 48.7% of practitioners decontaminated their impressions with a disinfectant. The most used decontamination methods were immersion at 70.3% followed by spraying at 17.1%. Sodium hypochlorite (63.9%) was the most used solution due to its effectiveness, simplicity of use and cost.

Conclusion: There is diversity in the attitude and knowledge of dentists. Disinfection protocols that are simple to implement and adapted to the impression materials should be put in place. Moreover, a rinsing as soon as the mouth is removed must be carried out, then a post-disinfection rinsing for a better dimensional stability of our impressions.

Keywords: Dental Impression, Materials, Decontamination, Prosthodontists, Fixed Prosthesis, Knowledge, Practice, Dentists, Dakar

Introduction

In dentistry, the impression is the negative recording of all or part of the oral cavity; it is one of the main vectors of infection in the prosthetic chain [1, 2]. Indeed, after their removal from the mouth, the impression trays and the materials they support are largely contaminated by the patient's blood and oral fluids, both on the surface and deep inside. Micro-organisms can be transferred from the contaminated impressions to the plaster models. They can remain viable in the plaster models for about seven days [3]. The dental practice and the dental laboratory are thus places of convergence and redistribution of micro-organisms carried by the impressions during prosthetic rehabilitation [4]. For all these reasons, the disinfection of impressions must be considered with great rigour. The British Dental Association recommends in the Health Technical Memorandum [5] those dental impressions should be disinfected and decontaminated before they are sent to dental laboratories. It states that the responsibility for ensuring that dental impressions are disinfected and labelled as such before being sent to the dental laboratory rests solely with the dentist who must inform the dental laboratory technician of the status of disinfection of the impressions. Rinsing with running water has been recommended for the decontamination of dental impressions; however, it is insufficient to reduce the risk of infection [6]. This has led to the development and popularisation of equally effective ways and methods of impression disinfection over the past decades to significantly reduce the infectious potential of impressions [7]. Thus, decontamination of dental impressions has become a common practice to protect dental office and prosthetic laboratory staff, who handle impressions or casts, from exposure to diseases caused by contact with micro-organisms such as viruses (Covid 19, hepatitis B and C, herpes and HIV), and Mycobacterium tuberculosis [8, 9]. However, the work of Gueye et al, in Senegal 2012 [10], Thiam et al, in Côte d'Ivoire in 2018 [11], and Diarra et al, in Mali in 2019 [12] revealed respectively that 46.7%, 14.95% and 42% decontaminated their impressions with a disinfectant. These results show that, in the West African practice context, disinfection is poorly practiced by dentists. In order to better understand the problem, these data should be reported on a larger scale to synthesise the different means and methods of decontamination used by dentists for the disinfection of prosthetic impressions. For this reason, the present study aimed to evaluate the knowledge and attitudes of dentists in the Dakar region regarding the decontamination of impressions.

Materials And Method

Type of Study, Target Population and Sampling

This was a descriptive cross-sectional study conducted from March 2017 to March 2018 among dentists in the Dakar region.

The study population consisted of dentists regularly registered on the Board of Dental Surgeons of Senegal and practising in facilities located in Dakar. The Dakar region has 311 dentists.

The sampling frame for the study was based on the list of the Board of Dental Surgeons of Senegal, the recruitment of dentists was based on an exhaustive selection. The study therefore included all dentists registered, practising in the Dakar region, who agreed to participate in the study and who practise prosthetics as part of their regular practice. All 311 dentists on the list were contacted. All the dentists who could be contacted and who agreed to participate constituted the subjects of our sample. In the end, the number of dentists was 150.

Data Collection and Analysis Procedures

The survey used a self-administered questionnaire based on the formats of the studies by Gueye et al, [10,13]. A pre-test of 15 dentists was first carried out to get a clear idea of the understanding of the survey form and to minimise information bias. It was used to improve or reformulate some of the questions on the survey form.

For the survey itself, the contact details of the consenting dentists were obtained from the list of the Board of Dental Surgeons or

from the Senegalese medical directory via its website (www.annuairemedical-senegal,com). A digital exploration of the location of the dental practice was carried out using Google Maps (https://www.google.sn/maps) in cases where this was necessary.

The first visit was used to identify the interviewer, remind them of the purpose of the survey and hand over the self-administered questionnaire. A second visit was scheduled to collect the questionnaires. During this visit, an interview was often necessary to complete the questionnaire.

The information collected during the study related to socio-professional variables, personal prevention, prosthetic practice and impression disinfection procedures. The data collected was entered anonymously and processed using SPSS® 2017, Microsoft Excel® 2013 and Sphinx® Version 5 plus. The qualitative variables were grouped into proportions and the quantitative variables into means and standard deviations. The association between categorical variables was estimated by Pearson's Chi-square test or its variant (Fisher) where appropriate. The association between quantitative and qualitative variables was estimated using the ANOVA test. Confidence intervals were calculated with a risk of error of 5%.

Ethical Considerations

Arrangements were made to preserve the anonymity of the dentists. Each participant was properly informed of the objective, the methods, the expected results and their interests in terms of good clinical practice. They therefore gave informed consent to participate in the study. The participants were informed that they were free to abstain or withdraw from participation at any time.

Discussions

Socio-Professional Characteristics

This study shows that professional demography of dentists in the Dakar region is characterised by a male predominance (59,3%) with the majority of practitioners working in the public sector [14]. however, dentists in the private sector represented more than half of our sample (61,0%). This is due to the fact that the private sector has gained momentum, and more and more dentists are opting for private practice.

The average years of experience of practitioners was 11,0± 8.6 years. In 2013, this average experience was significantly higher in Senegal with 17.5 years [13] and in Morocco with 15 years [12]. More than half of the practitioners (59,3%) had less than 10 years of experience. Diarra et al, found similar results in Mali [12]. On the other hand, Kouamé et al, in Côte d'Ivoire noted that nearly two thirds (63.3%) of dentists had at least 10 years of professional experience [15]. The rejuvenation of dentists seems to be linked to the multiplication of dental training schools.

Assessment of Prosthetic Practice

Less than half of the sample had a daily practice of fixed prosthesis. And, the average frequency of impression taking was 4 for removable prosthesis and 1 for fixed prosthesis. removable prosthesis are still widely used in our underdeveloped countries because financial constraints are a barrier to access to fixed prostheses. Globally, the rate of prostheses performed by practitioners remains low with about 18 prostheses per dentist per year [16], even if in the study of Kouamé et al, it appears that 75% of the dentists in Abidjan have a regular practice of prosthesis with at least 10 devices performed per month [15].

The majority of the dentists (97,3%) interviewed work in pairs or more. Chairside assistance is an essential point to encourage in daily practice to reduce contamination in the office.

Assessment of the Level of Knowledge on Decontamination of Impressions

The analysis of the results shows that 83,3% of the subjects had not received any continuing education programmes on aseptic procedures in prosthetics and 55,2% of the participating dentists had a rather imprecise knowledge of the term "decontamination of impressions". These results show the need to focus on the continuing education of practitioners on aseptic procedures in prosthetics. Because in the context of universal precaution it is important to consider impressions and prosthetic devices as a contamination risk.

Evaluation of Attitudes and Practices for Disinfecting Impressions

Impression materials are numerous and varied. They must meet the specifications for fixed and removable prostheses [3]. Our study show that Alginates and silicones were the most commonly used by dentists (100,0% and 86,0% respectively). These results are similar to those of the study by Kouamé et al [15]. These authors reported, at the end of a survey carried out among dentists in Abidjan on the choice of impression materials in daily practice, that alginate was the material of choice for taking primary impressions in 100% of cases of removable prostheses and 93% of cases of fxed prostheses. Elastomers were mainly used in fixed prosthetics for the final impressions of crown and bridge abutments. The habit of use or the ease of application and conservation, the availability of the material from the supplier and its cost price are the most decisive criteria in the choice of the practitioners.

Almost all dentists (94,0%) systematically rinse the impressions with water after they are removed from the mouth. These results are in the line with that of Gueye et al, in Senegal and Quarumddin et al, in Pakistan where they reported that prosthodontists rinsed impressions with water who had observed respectively that 93.7% and 84.4% of practitioners [10,12]. Although in Mali, the rate of practitioners who rinse impressions with water is still quite low (42%) [12]. Rinsing is an essential act that every practitioner should do. It is the first step in the decontamination process [2]. In addition to removing fluids and other debris, it reduces germs by 40-90% in 15 seconds [8,17]. Cleaning should be done under a fairly strong and steady stream of water. However, it is not in itself a means of decontamination [18].

In the present study, 48.7% of the practitioners adequately decontaminated their impressions. These results are similar to those reported by Gueye et al, who showed that 46.7% of dentists practised decontamination [10]. In addition, Diarra et al, reported that 42.1% of practitioners always disinfected impressions compared to 8.8% who never disinfected impressions [12].

Concerning the decontamination method, immersion is practiced by 70.3% of dentists. The predominance of this method of decontamination of impressions by dentists is also found in the study by Gueye et al, in Senegal with a rate of 73% [10], and in that of Diarra et al, in Mali with a rate of 87% [12]. The frequent use of this method could be explained by the fact that immersion allows the decontamination solution to penetrate the entire depth of the impression. In order to combine bacteriological efficiency with the preservation of the impression properties, some dentists combine immersion with spraying [19]. This combination was used by 9.9% of our sample. However, the decontamination of impressions according to a rigorous protocol is ensured only by 48.7% of the dentists questioned and among them 11.3% respect the duration while 14% respect the dosage. These results show how much the decontamination protocol is used and the certain ignorance of the dentists on the risks of cross contamination if this step is badly carried out. While the risk of contamination when taking of dental impressions is real and concerns the practitioner and the patient, but also the technical staff of the dental practice and the laboratory. [20]. It is the duty of all to be rigorous in the disinfection protocol. The dimensional stability and surface porpities of the impression materials subjected to disinfection should suggest that disinfection modalities be limited to those methods that present the least distortion to the impressions depending on the chemical nature of the impression material, Immersion is safer than spraying and self-disinfecting materials are effective provided the dosage and time of action are respected [21]. Similarly, polyethers can be effectively disinfected by spraying. Although this seems to be the preferred method for disinfecting these water-friendly materials.

Sodium hypochlorite (63,9%) is the preferred solution for decontamination by practitioners. It is preferred to other solutions such as iodine products (0%) and quaternary ammonia (7,4%) because of its effectiveness (30,8%), simplicity of use (25,30%) and cost. These results are illustrated in figure 4. It has been shown that the concentration of available chlorine and the pH of the solution govern the effectiveness of NaOCl as a disinfectant [22].

However, it is essential to rinse the impression immediately after disinfection to remove residual disinfectant from the impression surface. Care should also be taken to change the decontamination bath once or twice a day as the concentration of the active ingredient decreases due to the hydrophilic properties of the material [23]. Aldehydes and quaternary ammoniums are used by some practitioners (7.4%). However, the use of quaternary ammoniums should be avoided as this product is a low-level disinfectant and therefore does not meet the disinfection standard [13]. In terms of dimensional variations, according to the study by Pal et al, sodium hypochlorite allows the greatest preservation of detail compared to glutaraldehyde [24]. On the other hand, as the concentration of sodium hypochlorite increases, the risk of surface fading may increase [24].

The findings of this study highlight an uncertainty among dentists of Dakar concerning the responsible party for impression disinfection. This study revealed that the assistant was responsible for the decontamination of the impressions in 69.3% compared to 30.7% for the dentist. Furthermore, the responsibility for preventing cross-contamination lies with the dentist, who should ensure that any substances removed from the oral cavity are adequately disinfected.

Conclusion

The elaboration of a fixed prosthesis involves several participants and is often carried out in different sites. The implementation of decontamination methods is then necessary for lower risk treatments. Although the majority of practitioners are sensitive to the risks of high contamination in our dental practices, they must be aware that the respect of hygiene and asepsis in a prosthetic act is a behaviour and a state of mind of every moment. The protection of the patients and the staff of the dental practice and the prosthetic laboratory from any risk of cross-contamination is at this price.

Results

Of the one hundred and seventy-six dentists contacted, one hundred and fifty agreed to participate in the survey and actually completed the questionnaires, giving a participation rate of 85.2%.

Socio-Professional Characteristics of the Sample

Gender: Of the 150 dentists surveyed in the Dakar region, 89 (59%) were men and 61 (41%) were women, giving a sex ratio of 1.46.

Place of Practice and Professional Experience: Practitioners working in the liberal sector represented 61% and those in the public sector were 39%. The average years of experience of the practitioners is 11,0± 8.6 years. Dentists with experience between [1-5] represent 27.3%; those between [5-10] are 32% (Table 1).

Year of experience	Number (n)	Percentage (%)
[1 – 5]	41	27.3
[5 – 10]	48	32.0
[10 - 20]	38	25.3
[20 et plus]	23	15.3
Total	150	100.0

Table 1: Distribution of study population according to years of experience

1-3 Number of auxiliary staff

Almost all practitioners (97.3%) work with at least one auxiliary (either an assistant or a senior dental technician or both). 2.7% of the study population do not have an assistant. (Figure 1).

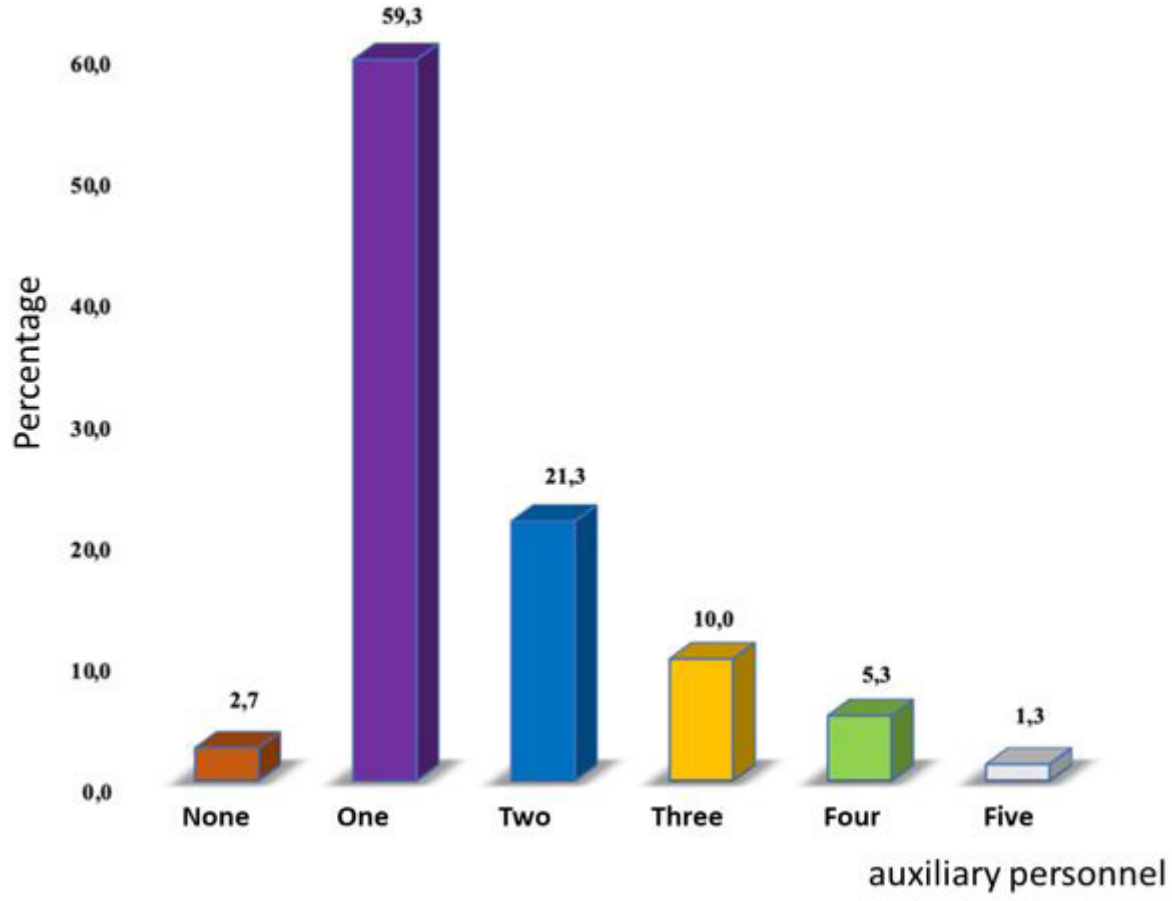

Figure 1: Distribution of auxiliary personnel / dentists

Characteristics of Variables Related to The Practice of Prosthetics

Prosthetic Practice: Of the 150 dentists surveyed, 48.7% performed fixed prostheses in their daily practice.

Average Frequency of Impression Taking: The average frequency of impressions taken per week is 4 impressions for removable prostheses with a standard deviation of 2.44 and 1 impression for fixed prostheses with a standard deviation of 1.9.

Impression Materials Used: Alginates were used by all the dentists surveyed and silicone elastomers by 86%. Zinc oxide-based impression materials and polysulphides were used by 29.3% and 10.7% of dentists respectively (Figure 2).

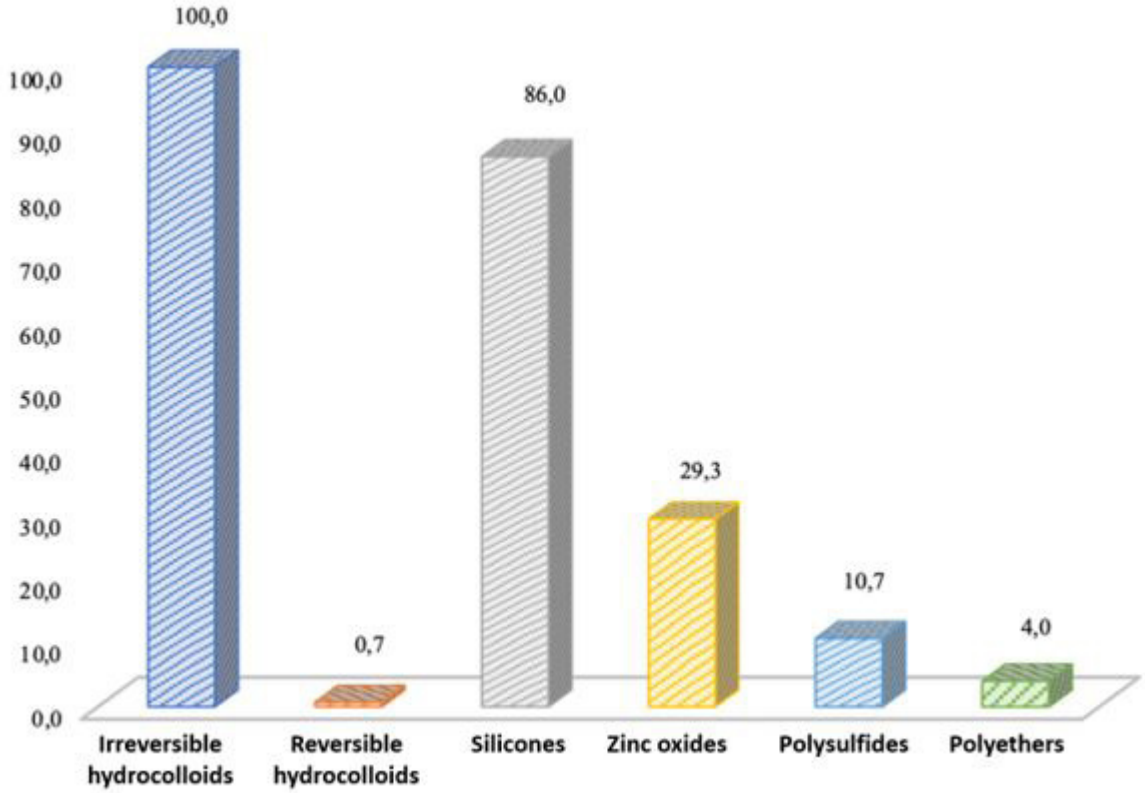

Figure 2: Distribution of the population according to the use of impression materials

Assessment of the Level of Knowledge on Asepsis Procedures

Training on Asepsis Procedures: The majority of the dentists interviewed, 83.3%, stated that they had not received any continuing education on asepsis procedures in prosthetics and 16.7% stated that they had.

Dentists' Perception of the Definition of Decontamination: The table 2 shows that 44.8% of dentists answered correctly to the question on the definition of decontamination of impression.

Definition of decontamination of impressions or prosthetic devices	Percentages (%)
Operation with a momentary result allowing the elimination or killing of micro-organisms or the inactivation of viruses present according to the objectives set	23.6%
An operation designed to eliminate microbes, or to reduce their number to levels considered safe	44.8%
Process by which dirt is detached from its substrate and put into solution or dispersion	5.6%
Operation to eliminate or kill all micro-organisms present	26%

Table 2: Distribution of the different answers on the knowledge of decontamination of impressions or prosthetic

Characteristics of Aseptic Procedure Variables

Rinsing of Impressions: Systematic rinsing of impressions with water is carried out by 94% of dentists after their removal from the mouth.

Decontamination Practice: Among the dentists questioned, 48.7% carry out a decontamination process of their impressions with a rigorous protocol; 26% do not carry out any treatment after the removal of the impressions and 25.3% carry out a decontamination without respecting the dosage of the solutions or the duration of the decontamination. Of the latter, 11.3% respect the duration only and 14% respect the dosage (Table 3).

Decontamination of impressions			Number (n)	Percentage (%)
Yes			73	48.7
No			39	26
Non-compliance	With duration		21	14
	With the dosage		17	11.3

Table 3: Distribution of dentists according to the performance of the decontamination of the impressions

Decontamination Methods : Immersion is the decontamination method used by 70,3 % of the dentists surveyed and 17,1% % use spraying. Self-disinfecting impression products were used by 2,7% of the dentists in the sample (Figure 3).

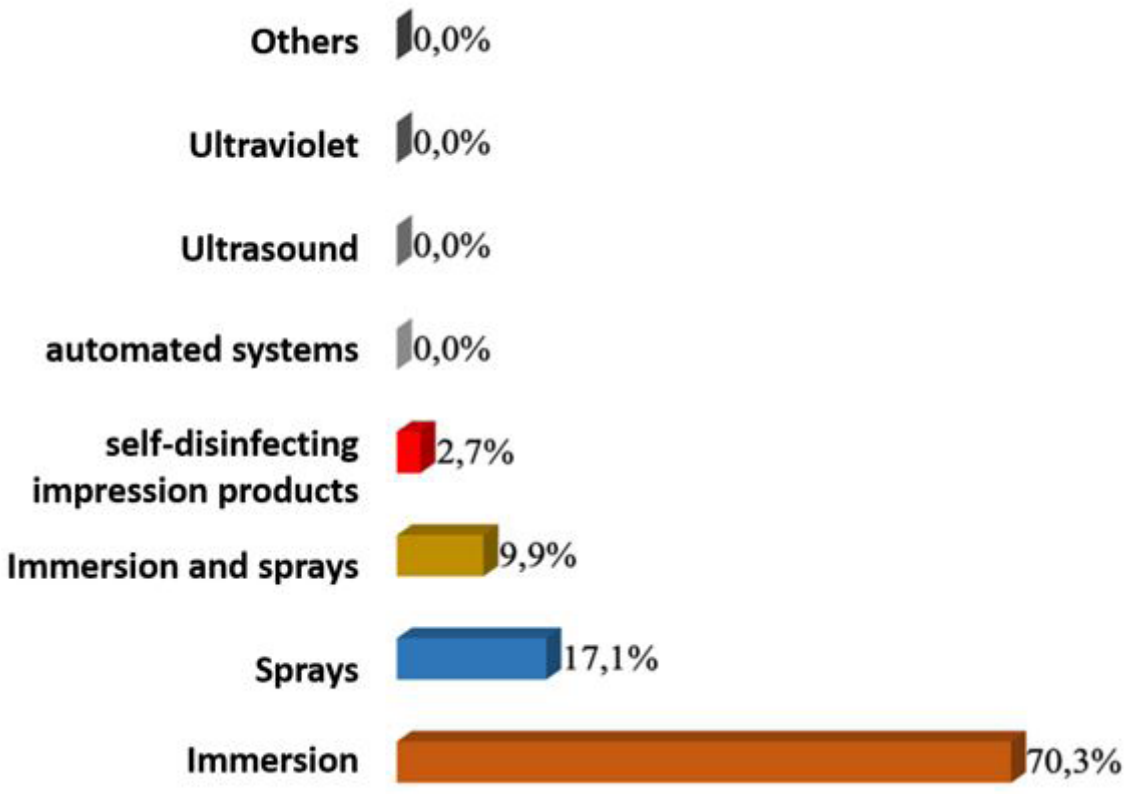

Figure 3: Distribution of the methods of decontamination of impressions

Decontamination solutions: Distribution of the decontamination solutions for impressions where noticed. Most of the dentists (63.9%) used sodium hypochlorite whereas 4.9% used alcohol (Table 4).

	Immersion	Spraying	Self-disinfecting impression products	Percentage (%)
Chlorhexidine	13	5	2	16.4
Chlorine compounds	62	15	1	63.9
Aldehydes	7	2	0	7.4
Quaternary ammoniums	4	5	0	7.4
Alcohol	3	3	0	4,9
Phenolic compounds	0	0	0	0
Iodine products	0	0	0	0

Table 4: Distribution of decontamination solutions for impressions

Choice of Decontamination Solutions: The figure 4 shows that the efficiency (30,8%) and the simplicity (25,3%) were ranked respectively as the most and second most important factor for the dentists to choose the disinfectant (Figure 4).

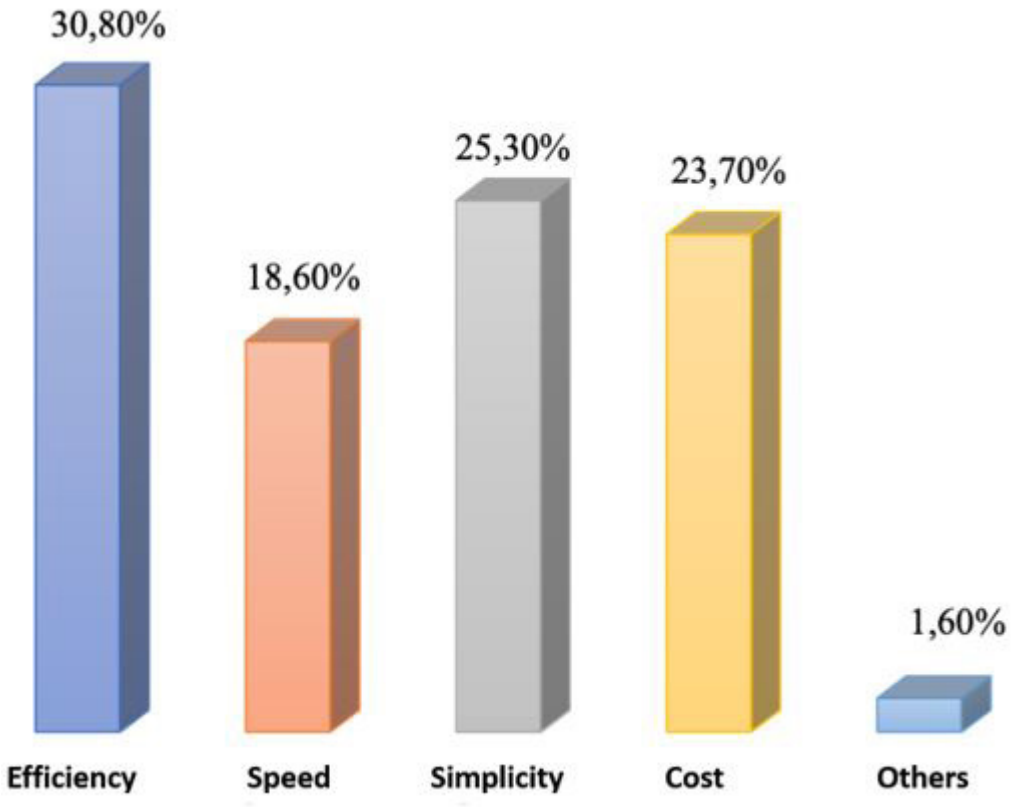

Figure 4: Distribution of criteria for choosing decontamination solutions

Responsibility for Decontamination: The assistant was responsible for the decontamination of the impressions in 69.3% compared to 30.7% for the dentist.

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