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Original Research Article

Disinfection and sterilization of fixed prosthesis shade guides: A survey of dentists in Senegal

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ABSTRACT

Introduction: Shade guides, the most widely used instruments for color determination, meet mucous membranes and saliva during color measurement, and must therefore be treated. The aim of this study was to examine shade guide disinfection and sterilization techniques used by dentists in Senegal.
Materials and Methods: This was a descriptive, cross-sectional study. The survey was carried out during an international congress organized in Dakar from June 28 to 29, 2019. A self-administered questionnaire was distributed to practitioners meeting the selection criteria. Statistical analysis was performed using SPSS® version 22 software.
Results: A total of 125 questionnaires were distributed, with 113 returned. The average age was 39 ± 8 years, and 32.8% of dental surgeons were under 35 years of age. Professional experience of less than 5 years was found in 21.2% of the sample. Alcohol was used by 51.3% of practitioners. Autoclave was used by 46% of dentists under 35 years of age, and poupinel by 5.4% (p=0.008). The use of autoclave sterilization was 52.2% for practitioners with less than 5 years' experience versus 21.3% for those with more than 5 years' experience (p=0.005).
Conclusion: Despite the ban on the use of poupinel in some countries and the difficulty of using alcohol in the decontamination and sterilization chain, these two practices are still relatively common in Senegal.

1. Introduction

The discovery of new pathogens, and recent health crises, have made health care safety a major requirement.[1–3] Every day, dental surgeons carry out numerous procedures requiring reusable instruments.[4,5] The shade guide is the most used instrument for determining tooth color. During color measurement, it meets mucous membranes and oral fluids that may contain germs.[6,7] According to Spauding's classification of medical/surgical devices according to their capacity to transmit infection, the teintier is a semi-critical material, at an intermediate risk level. To avoid any risk of cross-contamination, the material must be treated.[4,8]

Shades must undergo intermediate-level disinfection, but the boundary between semi-critical and critical material is often problematic, as there may be blood in the oral fluids.[9] In addition, disinfection is carried out using chemicals that are not always appropriate.[5,9] Alcohol and aldehydes are still used, although they are not recommended.[10,11]

For the sterilization of non-thermosensitive medical devices, only the use of a type B autoclave is recommended, with a temperature of 134°C maintained for 18 minutes.[7,11]

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In fact, some countries have banned the use of sterilizers.[1,8] Other countries regularly update and disseminate guidelines for the prevention of healthcare-associated infections.[9,12]

The aim of this study was to evaluate the disinfection and sterilization techniques of shade guides after the color survey of dental surgeons practicing in Senegal.

2. Material and Methods

This was a descriptive, cross-sectional study. The survey was carried out during an international congress of dentistry organized in Dakar from June 28 to 29, 2019. A self-administered questionnaire was distributed to dental surgeons practicing in Senegal and satisfying the selection criteria.

The questionnaire included a section on socio-demographic data and a section on disinfection and sterilization.

Disinfection-related questions concerned the products used and their application techniques.

The sterilization equipment used was identified as either autoclave or poupinel. The level of disinfection and the means used to treat the shade guide were asked.

Data were entered using Epi Info version 7 software and analyzed using SPSS version 22 software. Qualitative variables were described in terms of numbers and percentages. Quantitative variables were described by mean with standard deviation, extremes and median. Statistical tests used were the Chi-square test. The difference was statistically significant when the p-value was strictly less than 0.05. The odd-ratio surrounded by its 95% confidence interval was used to determine the strength of the relationship.

3. Results

A total of 125 questionnaires were distributed to dentists meeting the selection criteria, and 113 were completed and collected.

More than half the dentists (58.4%) were male. The sex ratio was 1.4 (M/F). The average age of the dentists was 39 ± 8 years. A total of 54.0% of dental surgeons were in the public sector. The average number of years in practice was 11 ± 7.2 years, with extremes of 1 or 40 years.

Alcohol was used to disinfect stains by 51.3% of dental surgeons (Figure 1).

8% of dentists said they used soaking to disinfect stains (Table 1)

Among dentists, 88.9% used the autoclave and 11.2% the Poupinel.

There was no statistically significant relationship between socio-demographic characteristics and the use of disinfectants for shade guides (Table 2).

Chemical disinfection by immersion was the most widely used. No statistically significant differences were noted (Table 3).

Among dentists, 31.9% claimed to sterilize shade guides (Table 4).

There was no statistically significant difference in the distribution of shade guide sterilization technique according to gender p value = 0.177(table IV). The use of autoclave sterilization was 52.2% for dentists with less than 5 years' experience versus 21.3% for those with more than 5 years' experience, with a p value = 0.005 (table IV).

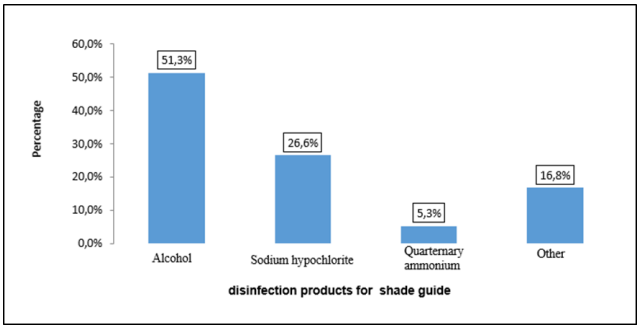

Fig. 1: Distribution of dental surgeons according to disinfection products used on shade guides.

4. Discussion

During visual color measurement, the shade guide meets mucous membranes and saliva. To avoid any risk of cross-contamination, they must be treated before re-use.[7,8,13] Equipment can be treated by chemical and/or thermal means.

This study showed that alcohol was the main disinfectant used, unlike the one carried out in Ireland, which showed glutaraldehyde as the main disinfectant.[14] However, as in that study, alcohol is one of the products used in Saudi Arabia for disinfecting stains.[15]

The shade guides are made of ceramic with a stainless-steel handle. During color measurement, the shade guide meets saliva, which is a biological liquid containing proteins. Alcohol binds proteins to stainless steel, which raises the question of its effectiveness as a disinfectant. It is inactivated by organic matter and tends to cause organic debris to stick to surfaces. In addition to its ineffectiveness on spores, it has little effect on viruses and complicates the sterilization chain because it is a fixative.[6,10]

However, more than half of all dental surgeons soak stains for disinfection. Compared with the spray technique, there is better contact between the chemical and the medical device during soaking. So, for chemical disinfection, the immersion technique is the most recommended.[1,8]

Although banned in other countries, the study shows that dry heat sterilization is still used in Senegal. It does not guarantee prion destruction. Autoclaving is the preferred method of sterilization. Sterilizing all medical devices that

Table 1: Distribution of dental surgeons according to disinfection methods for shade guides

Method for disinfecting shade guides	Frequency	Percentage
Spray	36	31,9
Immersion	71	62,8
Do not know	6	5,3
Total	113	100,0

Table 2: Disinfection products by socio-demographic and professional characteristics

Characteristics	Shade guide disinfection products					P value
	Alcohol N(%)	Sodium hypochlorite N(%)	Quaternary ammonium N(%)	Other N(%)	Total	
Age						0,065
<35 ans	24(64,9)	6(16,2)	0(0,0)	7(18,9)	37	
≥35 ans	34(44,7)	24(21,6)	6(7,9)	12(15,8)	76	
Gender						0,071
Female	20(42,5)	12(25,5)	2(4,3)	13(27,7)	47	
Male	38(57,6)	18(27,3)	4(6,1)	6(9,1)	66	
Sector of activity						0,569
Public	30(49,2)	14(23,0)	3(4,9)	14(23,0)	61	
Private	21(56,8)	10(27,0)	2(5,4)	4(10,8)	37	
Parapublic	7(46,7)	6(40,0)	1(6,7)	1(6,7)	15	
Years of Exercise						0,292
< 5 years	16(66,7)	5(20,8)	0(0,0)	3(12,5)	24	
≥ 5 years	42(47,2)	25(28,1)	6(6,7)	16(18,0)	89	
Speciality						0,118
Yes	24(53,3)	10(22,2)	5(11,1)	6(13,3)	45	
No	34(50,0)	20(29,4)	1(1,5)	13(19,1)	68	

Table 3: Chemical disinfection techniques by socio-demographic and occupational characteristics

Socio-demographic characteristics	Disinfection by				P value
	Spray N(%)	Immersion N(%)	Do not know N(%)	Total	
Age					0,275
<35 years	9(24,3)	27(73,0)	1(2,7)	37	
≥35 years	27(35,5)	44(57,9)	5(6,6)	76	
Gender					0,863
Female	14(29,8)	30(63,8)	3(6,4)	47	
Male	22(33,3)	41(62,1)	3(4,6)	66	
Sector of activity					0,389
Public	19(31,2)	37(60,7)	5(8,2)	61	
Private	10(27,0)	26(70,3)	1(2,7)	37	
Parapublic	7(46,7)	8(53,3)	0(0,0)	15	
Years of Exercise					0,659
< 5 years	6(25,0)	17(70,8)	1(4,2)	24	
≥ 5 years	30(33,7)	54(60,7)	5(5,6)	89	
Speciality					0,770
Yes	16(35,7)	27(60,0)	2(4,4)	45	
No	20(29,4)	44(64,7)	4(5,9)	68	

Table 4: Sterilization by socio-demographic characteristics

Socio-demographic characteristics	Sterilization materials				P value
	Poupinel N(%)	Autoclave N(%)	No sterilization N(%)	Total	
Age					0,008
<35 years	2(5,4)	17(46,0)	18(48,6)	37	
≥35 years	2(2,6)	15(19,7)	59(77,6)	76	
Sexe					0,177
Female	3(6,4)	10(21,3)	34(72,3)	47	
Male	1(1,5)	22(33,3)	43(65,1)	66	
Secteur of activity					0,620
Public	3(4,9)	14(23,0)	44(72,1)	61	
Private	1(2,7)	13(35,1)	23(62,2)	37	
Parapublic	0(0,0)	5(33,3)	10(66,7)	15	
Years of Exercise					0,005
< 5 years	1(4,2)	13(54,2)	10(41,7)	24	
≥ 5 years	3(3,4)	19(21,3)	67(75,3)	89	
Spécialité					0,765
Oui	1(2,2)	12(26,7)	32(71,1)	45	
Non	3(4,4)	20(29,4)	45(66,2)	68	

can withstand this treatment is a simple gesture that provides the highest degree of safety. Having just one channel for processing medical devices - sterilization - simplifies the work of the practice's staff and streamlines the control stages. [1,8]

Nevertheless, among those who sterilize shade guide, it is interesting to note the widespread use of the autoclave (88.9%). Autoclave sterilization is significantly correlated with the age of the practitioner, with just under half of dentists aged under 35 using it (p value=0.008%). Professional experience also has an impact on autoclave use, with more than half of dentists with less than 5 years' experience using it, with a statistically significant difference (p value=0.005). Young dentists may have benefited from the new recommendations during their training. As continuing education is not compulsory in Senegal, former graduates may not always update their knowledge.

5. Conclusion

The recent and ongoing health crisis is a reminder of the importance of infectious risk management. Senegalese dental surgeons use disinfection rather than sterilization following the contamination of teintiers. Despite the ban on the use of poupinel in some countries, and the difficulty of using alcohol in the decontamination and sterilization chain, these two practices are still relatively common in Senegal.

This study has shown that more needs to be done to limit cross-contamination.

6. Conflict of Interest

None.

7. Source of Funding

None.

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