



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 15, Issue, 04, pp. 68206-68215, April, 2025

<https://doi.org/10.37118/ijdr.29432.04.2025>



RESEARCH ARTICLE

OPEN ACCESS

AWARENESS, KNOWLEDGE & PRACTICE OF DISINFECTION OF IMPRESSIONS, MODEL CASTS, BITE BLOCKS, TRIAL DENTURES AND DENTAL PROSTHESIS AMONG DENTAL PROFESSIONALS IN INDIA - A CROSS SECTIONAL DESCRIPTIVE STUDY

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ARTICLE INFO

Article History:

Received 17th January, 2025

Received in revised form

21st February, 2025

Accepted 19th March, 2025

Published online 30th April, 2025

KeyWords:

Dental Impressions; Disinfection;
Infection Control.

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ABSTRACT

Aim: To assess the knowledge and practice of dental practitioners towards disinfection of dental impressions. **Methodology:** A questionnaire was sent to the general dental practitioners and dental professionals doing private clinics and at various dental colleges and universities of India. **Result:** The results of this study showed that the majority of dental health workers in India have adequate knowledge about the use of disinfecting agents, still there is need for the educational programs in this respect. Most of the participants did not have adequate knowledge regarding the methods used for the disinfection of various impression materials. The results of our survey showed that in most of the dental practices, washing the impressions under running water was a routine practice, even though the literature clearly states that this practice can leave a substantial load of microorganisms on impression surfaces. **Conclusion:** The present study showed that there was a lack of commitment to the standards of infection control practices in India. Hence, the Dental colleges in India should not only ensure that disinfection protocols are being followed routinely in each department but also train dental technicians and other dental auxiliary personnel in the proper techniques and reinforce the importance of following them.

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Citation: Dr. Narendra Sathish, M. D 2025. "Awareness, Knowledge & practice of disinfection of impressions, model casts, bite blocks, trial dentures and dental Prosthesis among Dental Professionals in India - A Cross Sectional Descriptive Study". *International Journal of Development Research*, 15, (04), 68206-68215.

INTRODUCTION

The microbial flora of the oral cavity is rich and extremely diverse. This reflects the abundant nutrients, moisture, hospitable temperature and availability of surfaces on which microbial populations can develop. The majority of these organisms pose no significant risk to dental professionals; however, a number of them cause infections that may be difficult to cure.¹ Transmissions of pathogens to Health Care Workers (HCW) is often due to their exposure to blood, tissue or other body fluids.² For Dentists' cross contamination from contaminated working atmosphere or from patients is the major risk factors.^{3,4} Blood or saliva is considered as a direct carrier of infection, whereas contaminated equipment's, surfaces and airway carry infection indirectly. Dental impressions contaminated with patient's saliva and blood may cross infect the dental casts poured from them. Contaminated impressions and casts⁵ thus become tools for the transmission of both bacteria and viruses between clinics and dental laboratories.⁶ In addition, casts poured from impressions can carry microorganisms and these may perhaps spread to other parts of the dental laboratory during trimming of the casts or dies.⁷ Today it is globally known and evidence-based that HIV viral particles have been isolated from saliva, and the latter is one of the primary screening

methods for HIV infection.⁸ Saliva is normally contaminated with blood from gingival inflammatory tissue and therefore it is possible that HIV and HBV could spread from one individual to another through saliva. The literature indicates that the pathogen of tuberculosis (*Mycobacterium tuberculosis*) remains dangerous for several weeks.^{9,10} Other studies showed that HBV could survive in dried blood at room temperature on environmental surfaces for up to one week.¹¹ Therefore, saliva must be treated as potentially infectious as blood or other body fluids with respect to HIV and other blood-borne diseases.⁸ It is known that a variety of chemical agents can be used efficiently for impression disinfection¹² provided that each type is applied to the impression according to the manufacturer's instructions. However, it has been reported that rinsing the impression with water solely does not remove contamination,¹³ therefore disinfecting of the impression and further rinsing the disinfectant off is required. In a study conducted by Marya CM et al¹⁴ the authors concluded that there is lack of commitment to high standards of infection control practice in dental colleges in India. On the other hand, a study conducted among the students and house officers in Pakistan by A. Saad et al¹⁵ reported that infection control protocols for the personal's do have knowledge regarding cross infection and are following cross infection protocols for impression disinfection.

METHODOLOGY

A questionnaire was made which included the following: demographic details, rinsing of the impressions; disinfection of the impressions; type of disinfectant solution used for alginates and elastomeric impression materials; disinfection technique (spray, immersion or intermediate) used for alginates and elastomeric impression materials; and the various reasons for not complying with impression disinfection procedure. The questions were both open and closed ended type and no grading system was used to quantify their knowledge. For Statistical analysis, IBM SPSS 20 was used. The collected data was analysed by descriptive statistics and presented as frequency tables.

DISCUSSION

Dental Impressions, a prerequisite for all dental procedures have direct contact with saliva and blood and thus is a potential source of cross -infection. According to the British Dental Association (BDA) "infection control is a core element of dental practice".¹⁶ American dental association guidelines states that impression should be rinsed to remove saliva, blood and debris and then disinfect before being sent to the laboratory. To address these cross-contamination concerns, the American Dental Association issued guidelines for disinfecting impressions in 1988, 1991 and 1996.¹⁷⁻¹⁹ These guidelines recommend using an ADA-accepted spray or immersion disinfectant, depending on the material, for the duration suggested by the product

Table

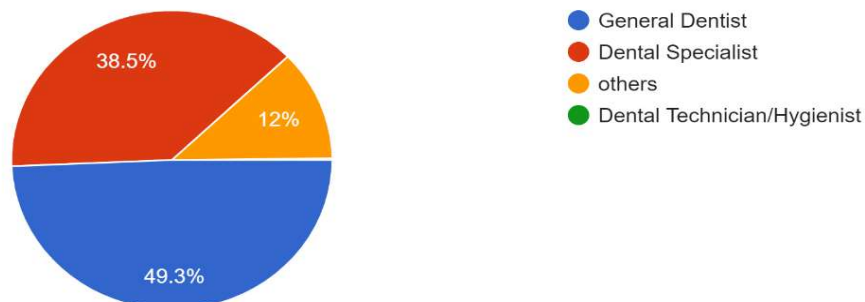
Are you a Dental Professional?	No	62	11.8
	Yes	465	88.2
Mention your profession	Dental Specialist	203	38.5
	Dental Technician/Hygienist	1	.2
	General Dentist	260	49.3
	others	63	12.0
Gender	Female	309	58.6
	Male	218	41.4
Age group you belong to	21 - 30	369	70.0
	31 - 40	107	20.3
	41 - 50	41	7.8
	Above 50 years	10	1.9
Do you disinfect your patients' impressions before sending it to Dental Lab	No	43	8.2
	Yes	484	91.8
Do you think disinfecting the impression is very much essential?	Maybe	12	2.3
	No	6	1.1
	Yes	509	96.6
Do you think disinfecting the impression will reduce the cross infection	Maybe	39	7.4
	No	6	1.1
	Yes	482	91.5
How much are you concerned about cross infection during treatment	concerned but not practical to implement	86	16.3
	Not concerned	11	2.1
	Somewhat concerned	78	14.8
	Very much concerned	352	66.8
Are you aware that Corona virus may spread via fomites to Dental Health care workers either directly or indirectly	Maybe	40	7.6
	No	15	2.8
	Yes	472	89.6
Which is your preferred Disinfectant?	Commercially available disinfectant	431	81.8
	Freshly prepared disinfectant	96	18.2
Do you think disinfecting Impressions will alter the dimensional stability and fine details?	Maybe	213	40.4
	No	209	39.7
	Yes	105	19.9
Which type of disinfection technique do you prefer	Immersion technique	252	47.8
	Others	33	6.3
	Spraying technique	242	45.9
How much time do you prefer to disinfect your impression	10 mins	156	29.6
	15 - 20 mins	24	4.6
	2 mins	246	46.7
	less than 2 mins	101	19.2
Do you disinfect your Bite blocks and Trial Dentures	Unanswered	17	3.2
	No	123	23.3
	Yes	387	73.4
If yes,	Before placing it in patients' mouth	118	22.4
	After removing it from patients	409	77.6
Do you disinfect your patients Dental Prosthesis	Unanswered	15	2.8
	No	110	20.9
	Yes	402	76.3
Do you disinfect your Dental cast	No	69	13.2
	Yes	457	86.8
Immersion of Alginate impression should be 10 mins or less	FALSE	87	16.5
	TRUE	440	83.5
Which of the following Impression disinfectants are you using in your practice?	Alcohol based	136	25.8
	Alcohol free / Quaternary ammonium compounds	61	11.6
	Glutaraldehyde based	166	31.5
	Sodium Hypochlorite solution	164	31.1
Have you used any of the following disinfectants if so then mention	Unanswered	525	99.6
	2 % Cidex	1	.2
	Bacilol 25	1	.2

.....Continue

1:10 dilution Sodium hypochlorite is universally accepted disinfectant for Dental Impressions	FALSE	94	17.8
	TRUE	433	82.2
How do you wash the impression after removing it from patients' mouth	Brushing away the debris with water	32	6.1
	Running Tap water	427	81.0
	With distilled water	25	4.7
	With soap water and brush	43	8.2
Are you aware that there are variety of commercial disinfectants available in the market	No	52	9.9
	Yes	475	90.1
Do you disinfect your Dental Cast?	Unanswered	14	2.7
	No	291	55.2
	Yes	222	42.1
According to you, which is the best disinfectant for Hydro colloid Impressions	Alcohol	46	8.7
	Glutaraldehyde	235	44.6
	Iodophor	45	8.5
	Sodium Hypochlorite	201	38.1
According to you, which is the best disinfectant for Silicone Impressions	Alcohol	60	11.4
	Glutaraldehyde	236	44.8
	Iodophor	72	13.7
	Sodium Hypochlorite	159	30.2
Which is the best disinfectant for Zinc Oxide Eugenol Impressions	Glutaraldehyde	212	40.2
	Hydrogen Peroxide	78	14.8
	Iodophor	60	11.4
	Sodium Hypochlorite	177	33.6
What protocol is followed in your practice for storage of Impressions after Disinfection	Disinfectant-soaked paper towel.	67	12.7
	Plastic container	89	16.9
	Sealed Plastic bags	340	64.5
	Tissue paper	31	5.9
Do you disinfect your patients' impressions before sending it to Dental Lab	Unanswered	1	.2
	No	84	15.9
	Yes	442	83.9

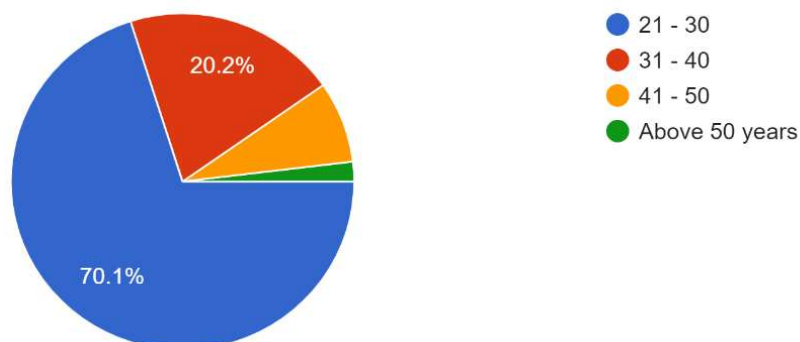
Mention your profession

527 responses



Age group you belong to

525 responses



manufacturer¹⁷⁻¹⁹. The disinfection process should be adequate but should not adversely affect the dimensional accuracy or surface detail of the impression. Several variables can affect impression materials, including the composition and concentration of the disinfectant, the exposure time and the compatibility of various disinfectants with specific impression materials. When considering methods of disinfection for impression in the current study, majority of the respondents were unaware about the appropriate method of

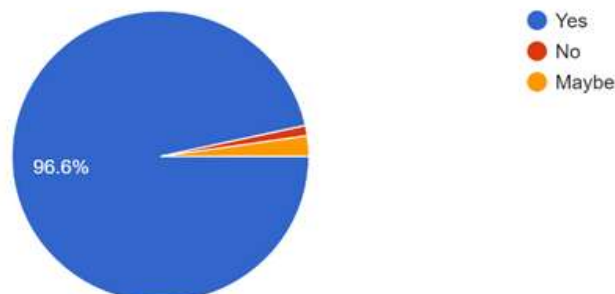
disinfection for different impression materials. In our study, most of the respondents did not know the proper method for disinfection of various impression material. Similar observations were made in another study by Almortadi N²⁰ where 42% dental health care providers knew about disinfection of dental impressions and use of different dilutions of the same product. Before disinfection only 2.6% brushed debris away where as 37.2% rinsed the impressions with water only. Similar results were reported in another study where 76%

respondents used tap water only to clean the impressions.¹⁴ Selection of the correct type of disinfectant for impressions is also very important as inappropriately selected disinfectants can induce changes in both the accuracy and details of impression.²¹

A further area for improvement suggested by this study is in the selection and application of disinfectant. Some dental technicians did not recognize that washing/ rinsing impression with water is not a sterilization procedure. To achieve impression disinfection, it is generally accepted that different chemical agents may be used.²²

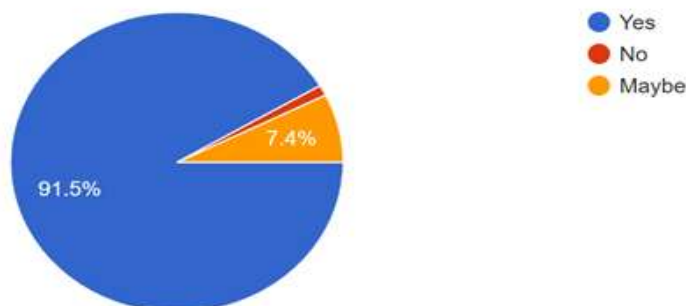
Do you think disinfecting the impression is very much essential?

527 responses



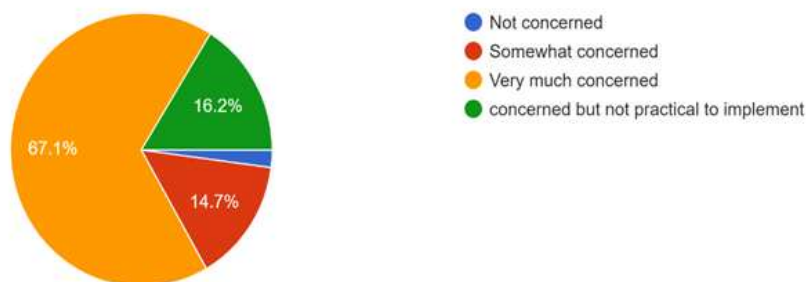
Do you think disinfecting the impression will reduce the cross infection

527 responses



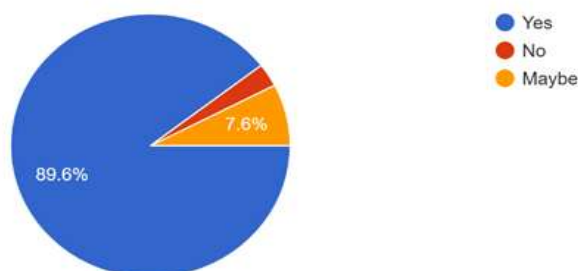
How much are you concerned about cross infection during treatment

527 responses

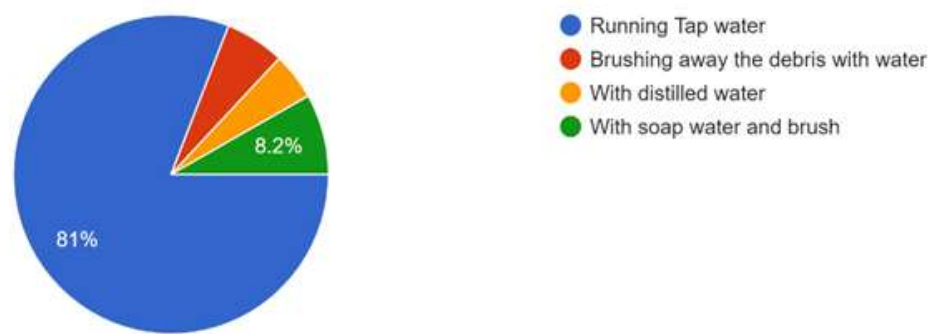


Are you aware that Corona virus may spread via fomites to Dental Health care workers either directly or indirectly

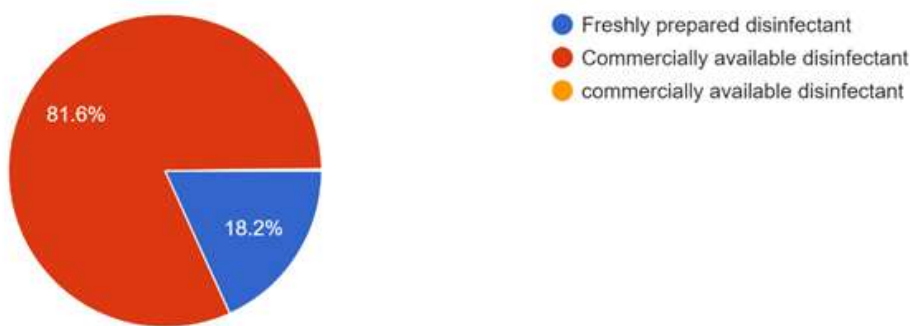
527 responses



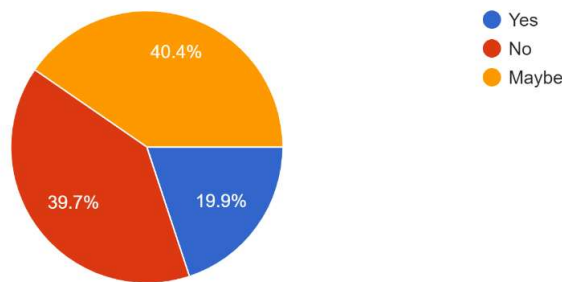
How do you wash the impression after removing it from patients mouth
525 responses



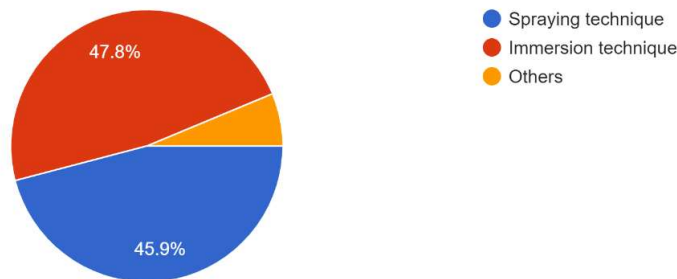
Which is your preferred Disinfectant?
527 responses



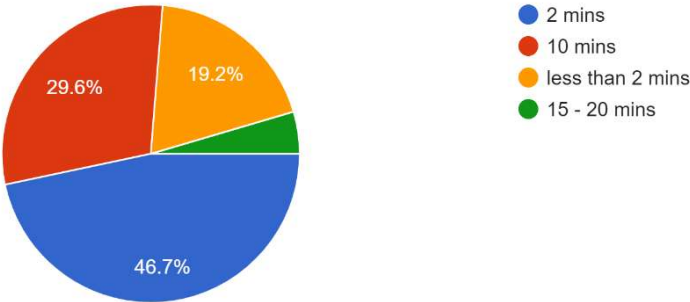
Do you think disinfecting Impressions will alter the dimensional stability and fine details?
527 responses



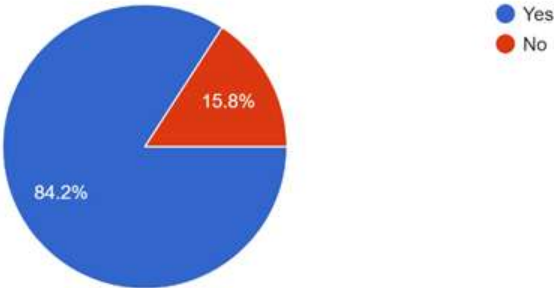
Which type of disinfection technique do you prefer
527 responses



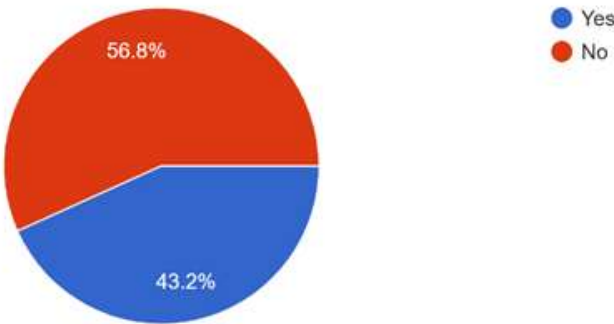
How much time do you prefer to disinfect your impression
527 responses



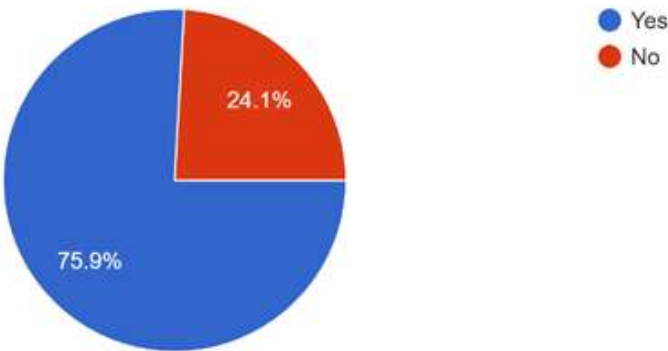
Do you disinfect your patients impressions before sending it to Dental Lab
524 responses



Do you disinfect your Dental Cast?
511 responses

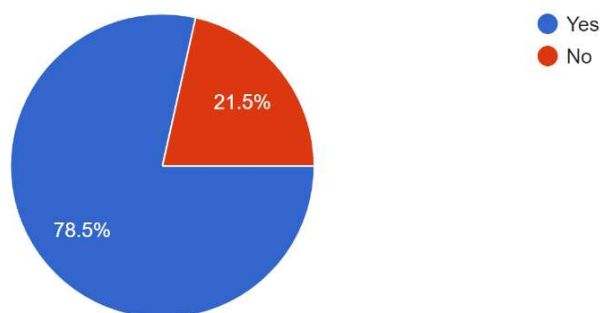


Do you disinfect your Bite blocks and Trial Dentures
510 responses



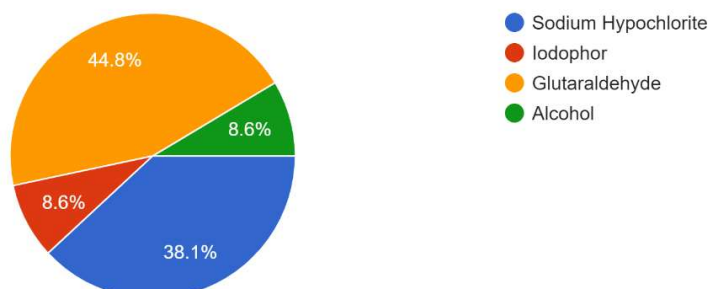
Do you disinfect your patients Dental Prosthesis

512 responses



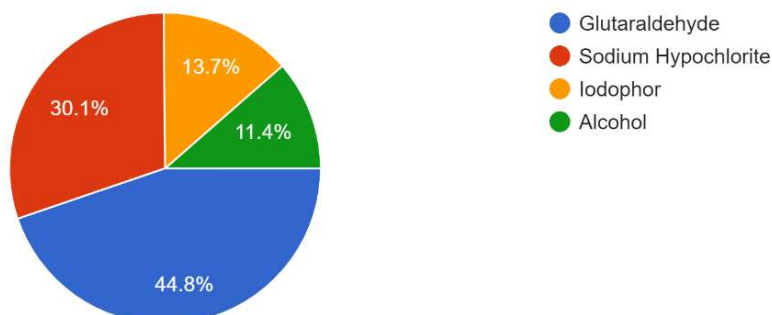
According to you, which is the best disinfectant for Hydro colloid Impressions

525 responses



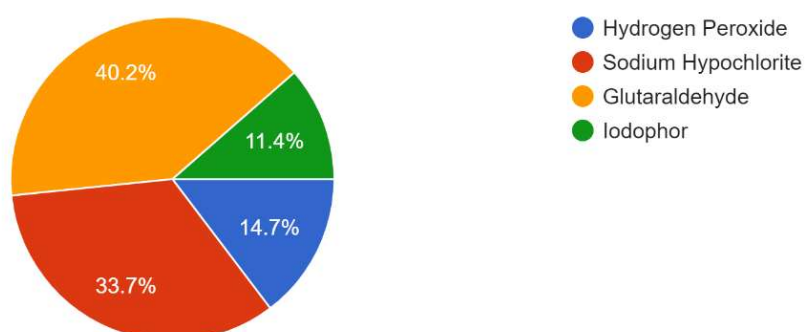
According to you, which is the best disinfectant for Silicone Impressions

525 responses



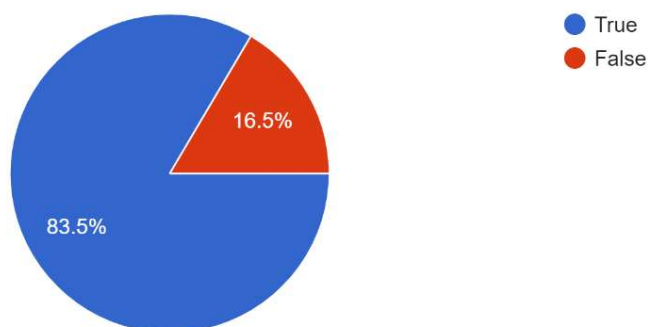
Which is the best disinfectant for Zinc Oxide Eugenol Impressions

525 responses



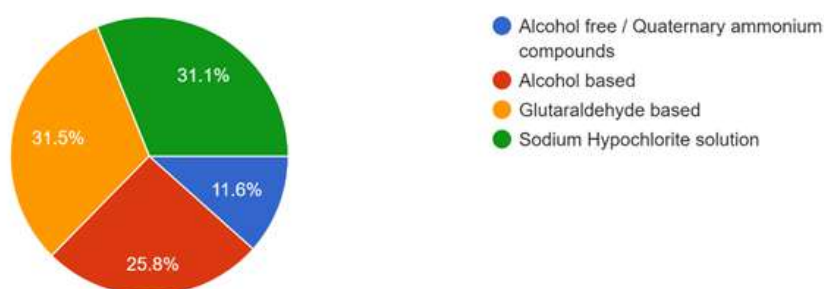
Immersion of Alginate impression should be 10 mins or less

527 responses



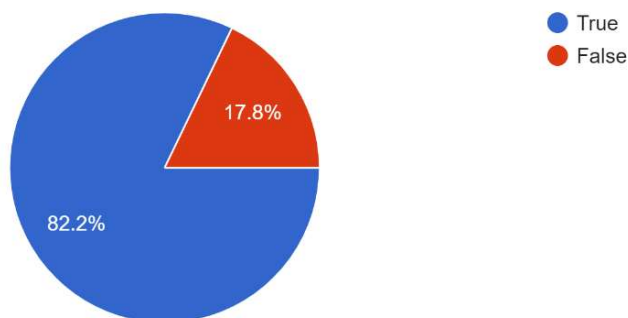
Which of the following Impression disinfectants are you using in your practice?

527 responses



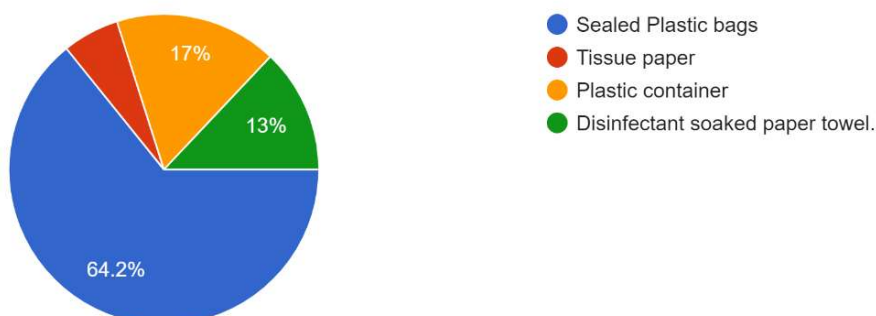
1:10 dilution Sodium hypochlorite is universally accepted disinfectant for Dental Impressions

527 responses



What protocol is followed in your practice for storage of Impressions after Disinfection

525 responses



Clearly these should be applied as recommended by the manufacturer of the product. Within the literature however there is variation in the method of application of such agents (spraying or immersion).²²⁻²⁴ Spraying is however not a preferred method of the British Dental Association²⁵ and, in their most recent guidance, they recommend only either immersion or dipping, preferring the latter so as to avoid distortion of hydrocolloid and polyether impression materials.²⁶ Although many have recommended both rinsing and brushing away debris from an impression before disinfection.²⁶⁻²⁸ Most dentists immersed the impressions in the disinfectant solutions whereas, in the present work, some preferred spraying the impressions. These results agree with the trends found by Muller-Bolla et al.²⁴ who reported that 73% of dentists used immersion to disinfect silicones and 65% for irreversible hydrocolloids. However, these results disagree with Blair and Wassell²² who concluded that 23.3% of dentists used immersion and 83.3% sprayed. In the current study similar results were found that despite the fact that alginate is most commonly used material, many health care workers did not know exactly which disinfectants can be used to disinfect alginate impression material. ADA recommends disinfectants are chlorine compounds such as sodium hypochlorite solutions (1:10 dilution). One concern, supported by the results of this study, is that dentists and laboratories disinfect impressions for longer or shorter than recommended durations. For instance, it is well-known that polyether and other newer hydrophilic materials tend to absorb liquid, and some authors have noted distorted characteristics after these materials are disinfected for prolonged periods.^{29,30} In addition, many studies on the effect of various disinfection variables on specific impression materials have used immersion durations of as brief as five to 10 minutes and as long as 30 to 60 minutes, with good results in terms of such factor as accuracy and surface detail.^{31,32} The ADA recommends the use of ADA-accepted disinfectants- that require no more than 30 minutes for disinfection.¹⁸ Disinfection for long periods may be responsible, at least in part, for margin inaccuracy and distortions of impressions, which were the most frequent problems reported by respondents. However, studies must be undertaken to specifically address this possibility. In addition, manufacturers of impression materials should provide specific advice about disinfectant solutions and techniques that are compatible with their products. Where no such guidance exists, laboratories and clinicians should follow the ADA recommendations.¹⁷⁻¹⁹ It is clear from these results that compliance with good practice is less than ideal and education in impression disinfection of both dentists and dental technicians is required. This study therefore strongly recommends that there is need to raise awareness and implement disinfection of impression materials in dental settings, which needs to be incorporated in the curriculum of universities and Dental schools.

CONCLUSION

The results of this study showed that the majority of dental health workers in India have adequate knowledge about the use of disinfecting agents, still there is need for the educational programs in this respect. Most of the participants did not have adequate knowledge regarding the methods used for the disinfection of various impression materials. Although awareness of cross-infection among the dental health workers was high in India, this study showed a lack of commitment in following essential procedures to prevent cross-contamination. The results of our survey showed that in most of the dental practices, washing the impressions under running water was a routine practice, even though the literature clearly states that this practice can leave a substantial load of microorganisms on impression surfaces. The present study showed that there was a lack of commitment to the standards of infection control practices in India. Hence, the Dental colleges in India should not only ensure that disinfection protocols are being followed routinely in each department but also train dental technicians and other dental auxiliary personnel in the proper techniques and reinforce the importance of following them.

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