

Original Article

Stainless steel crowns reuse and decontamination techniques: A survey among Indian pediatric dentists

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ABSTRACT

Objective: To determine the pattern and extent of stainless steel crown (SSC) reuse following try-in and the methods employed for their decontamination among Indian pediatric dentists. **Study Design:** Questionnaires were delivered personally to 100 pediatric dentists selected randomly across India. Questionnaire was divided into three subsections. The first section assessed demographics to determine the sample population characteristics. The second section dealt with the pattern of SSCs use and reuse following size determination. The third section inquired into general cross infection control procedures including cleaning, sterilization, and training to assess the general level of compliance. Data analysis involved descriptive analysis using SPSS 16.0 software. **Results:** The majority of respondents (98.92%) routinely reused the crowns after they had been tried in the patient. Only one respondent (1.08%) discarded the crowns after try-in. Autoclave (25%) was the most common method employed for the decontamination of tried-in SSCs among the respondents. **Conclusion:** The majority of the participating pediatric dentists are reusing SSCs following try-in during crown selection. However, great diversity exists in the methods employed for the decontamination of the same. This demands for more research to provide guidelines into the most effective method of decontamination.

KEYWORDS: Decontamination, paediatric dentist, reuse, stainless steel crown, SSCs

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for restoration of primary teeth. They also have important selected indications for permanent teeth. The SSC is extremely durable, subject to minimal technique sensitivity during placement and offers the advantage of full coronal coverage.^[3]

SSCs are stock crown and not customized—they have to be selected and tried-in, prior to cementation. Most situations necessitate try-in of multiple SSCs. Thus there may be a common situation where many crowns remain tried-in and not cemented. As a result, the practice of reuse is widely accepted and carried out. However, these crowns would have been contaminated with blood and saliva during the try-in process,^[4] which highlights the need for decontamination of the same prior to reuse. This survey was primarily directed to understand the pediatric dentist's opinion and attitude to these selected, tried, but not cemented crowns.

The dental profession has introduced universal precautions to address the issue of cross infection control; therefore, all patients should be treated as if they are potentially infectious. Infection control in pediatric setups has become increasingly concerned with the impact of evolving treatments and the emergence and reemergence of various infectious diseases. Because of their dependency and immunological naivety, children are more prone than adults to contract infectious

Introduction

Stainless steel crown (SSC) was introduced by Engel,^[1] followed by Humphrey in 1950 and since then, it has been a significant part of the restorative armamentarium in paediatric dentistry. By definition, they are prefabricated crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent.^[2] The SSC offers an outstanding alternative to other restorative materials

diseases and to exhibit prolonged transmission.^[5] The decontamination process usually consists of three stages, which are cleaning, sterilization and return to storage. Current guidelines advocate the use of the steam autoclave as the method of choice for sterilization of all heat stable dental instruments.^[6]

Hence, the aim of the present study was to determine the pattern and extent of reuse of SSCs following try-in and the methods used for their decontamination among Indian pediatric dentists. In addition, the general infection control measures relevant to safe dental practice were also surveyed and compared with current guidelines.

Materials and Methods

A self-administered questionnaire was delivered randomly to 100 pediatric dentists including the postgraduate students of the speciality of pedodontics. A total of 92 participants replied back within a period of 4 weeks. The questionnaire formulated by El Shehaby^[7] was used in the present study. Initially, a pilot study was carried out involving six pediatric dentists to assess the acceptability of the questionnaire, which was modified following constructive suggestions. The approval for the same was then obtained from institutional review board-Ethics Committee of Terna Dental College, Navi Mumbai.

Questionnaire

Questionnaire was divided into three subsections

The first section assessed demographics to determine the sample population characteristics. It included the gender, place of clinical practice, and the years of experience in the speciality. The second section dealt with the pattern of SSCs use and reuse following size determination. It also included the reasons for reuse of SSC and the methods of their decontamination. The third section inquired into general cross infection control procedures including cleaning, sterilization and training to assess the general level of compliance.

Statistical analysis

Data collected were entered into Microsoft Excel sheet. A total of 20 questionnaires were chosen at random and were rechecked to verify accuracy of data entry. Data analysis involved descriptive statistics using SPSS 16.0 (Statistical Package for Scientific Studies).

Results

Demographics

A total of 49 (53.2%) of the respondents were females, while rest 43 (46.8%) were males. Out of the 92 respondents, 29 (31.5%) were postgraduate students in pedodontics and preventive dentistry, while rest 63 (68.5%) were qualified pediatric dentists. Of these 63 pediatric dentists, 22 (23.9%) were practicing as a

staff in dental college hospital, 22 (23.9%) were doing solely private practice, while rest 19 (20.7%) were those who were staff as well as did private practice too [Figure 1]. As regards the years of experience, out of the 63 pediatric dentists, 13 (20.63%) had experience of 2 years or less, 18 (28.57%) of 3-5 years, 13 (20.63%) of 6-9 years, while rest 19 (30.15%) had that of 10 years or more.

SSC reuse and decontamination

The majority of respondents (98.92%) routinely reused the crowns after they had been tried-in the mouth. Only one respondent (1.08%) discarded the crowns after try-in [Figure 2].

As regards to the methods of decontamination, autoclave (25%), chemical disinfection (23.91%), ultrasonic (1.08%), chemical disinfection and autoclave (20.65%), chemical disinfection and ultrasonic (9.78%), ultrasonic and autoclave (11.95%) were commonly employed methods used by the respondents [Figure 3]. The total percentage of respondents autoclaving SSCs, either alone or with any other method of decontamination were 57.65%.

General decontamination procedures

This depicted the various methods of decontamination of other reusable stainless steel instruments (diagnostic instruments, bands, pliers, etc) in clinical setup. The reported rate of presterilization of other such instruments was only 63.04%. There were large varieties of measures used for sterilization of such instruments, mainly being autoclave (98.9%), ultrasonic (77.17%), and chemical disinfection (73.91%). [Figure 4].

Infection control learning source

Respondents of the survey were also asked about the source of their knowledge with regards to the infection control. Majority of respondents (77.17%) followed formal guidelines for the same, while other sources were professional journals (76.08%), postgraduate course (69.56%) and manufacturer's instructions (51.08%) [Figure 5].

Discussion

The majority of respondents were using and reusing crowns, after try-in. Only 1.08% reported that they discarded crowns that had been tried in the patient's mouth. This was in accordance to the study conducted by El Shehaby,^[7] who reported that 9.95% of respondents discarded the crowns after single try-in. There was no statistically significant difference in extent of reuse, as regards to the gender, place of clinical practice, and experience in the present study. The main reason for reuse of tried-in SSCs was that the crown was not distorted or damaged following adaptation (73.91%) [Figure 6].

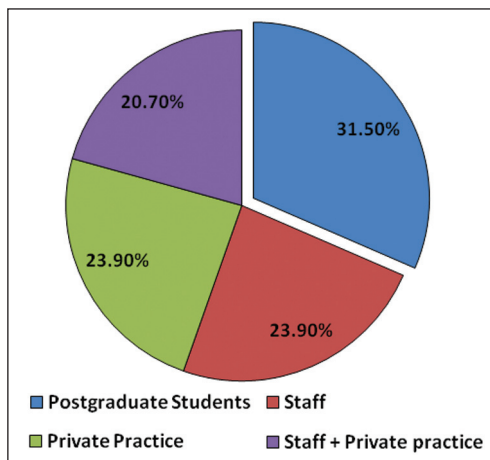


Figure 1: Demographics showing place of clinical practice of respondents

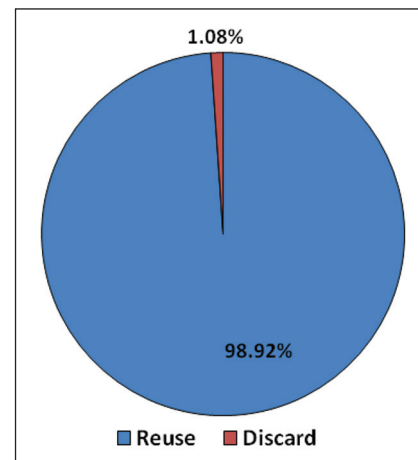


Figure 2: Extent of stainless steel crowns reuse amongst the respondents

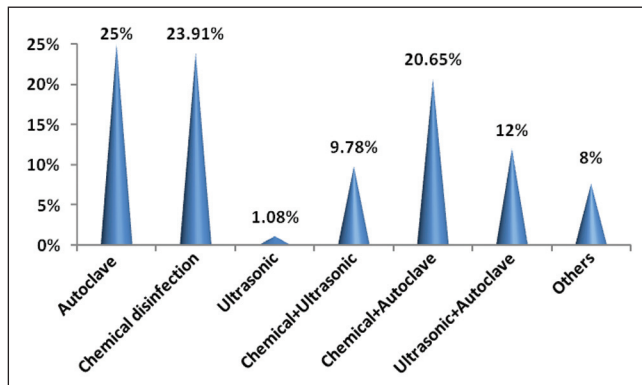


Figure 3: Methods of decontamination among the respondents

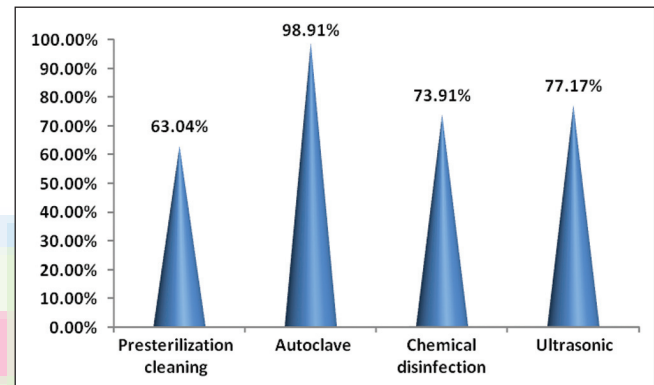


Figure 4: Methods of decontamination of other reusable stainless steel instruments

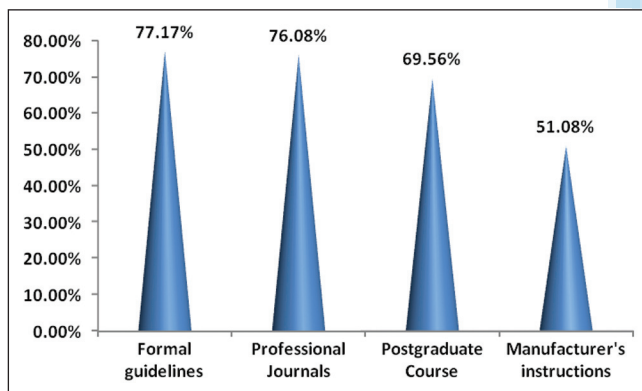


Figure 5: Infection control learning source among respondents

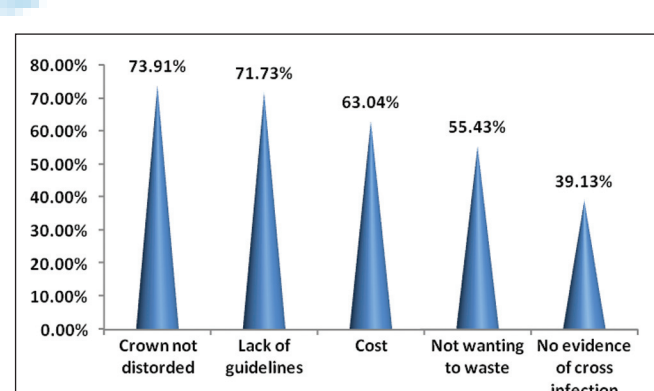


Figure 6: Reasons for reuse of stainless steel crowns

The situation of reusing tried-in SSCs is complicated by the fact that they are marked for single use only. The Medical Devices Agency defines reuse as "repeated episodes of use of a device in circumstances that make some form of reprocessing necessary."^[8] Manufacturers mark crowns with the CE mark. The initials "CE" do not stand for anything, but are a declaration by the manufacturer that the product meets all the appropriate provisions of the relevant legislation implementing the European Directive specific to that product. In the case

of certain aspect of medical equipments, this stipulates that it is for single use only. Trying-in of SSCs for sizing purposes may constitute as its use and hence the subsequent sterilization and reuse may invalidate the CE mark.

As regard to the methods employed for the decontamination of the reused crowns, the majority of the respondents to this survey sterilized these

reused crowns using autoclave (57.65%). Out of this, 32.65% respondents had presterilized the crowns before autoclaving it. The method of cleaning the crown before sterilization is important for thorough debridement of contaminants like blood, saliva and other impurities before undergoing sterilization. This is because retention of these debris and contaminants may shield the microorganisms from being destroyed, thus preventing effective sterilization.

Another interesting fact highlighted through this survey was that 98.9% respondents sterilized reusable stainless steel instruments using autoclave. Whereas when it came to sterilize SSCs, only 57.65% of these respondents used autoclave. This signifies the lack of knowledge and appropriate guidelines among pediatric dentists for sterilizing SSCs.

The American Academy of Pediatric Dentistry acknowledges Guidelines for Infection Control in the Dental Health-Care Setting-2003 and Guidelines for Disinfection and Sterilization in Healthcare Facilities-2008 as in-depth reviews of infection control measures for dental settings and supports the strategies therein.^[9,10] According to these guidelines, a critical instrument is one which penetrates soft tissue or bone, contacts blood stream or other sterile tissue. SSC falls in the category of critical instrument and for all critical dental instruments that are heat stable, sterilization by steam under pressure, that is, autoclave is advocated.

Although there is much information on decontamination of dental prostheses,^[11,12] and preformed orthodontic bands,^[13,14] there are very few studies related to the same of preformed SSC. Also, the studies done in this aspect are for preveneered SSCs, not for conventional preformed SSCs.^[15,16]

With our clinical experience and the review of literature, we would like to suggest some measures in this regard. The number of try-in can be reduced by prior measuring of mesiodistal width of the concerned tooth and selecting a crown of corresponding size by correlating it with the conversion chart provided by the manufacturer. For measuring of mesiodistal width of the crown, a Calliper, Boley's Gauge, or Miltex's micro boley gauge can be used.^[17] Also regarding decontamination, we would like to recommend three-step process which has been routinely followed for orthodontic bands, without any known complications. Initially, wiping and immersion of SSC in 3% sodium hypochlorite or 2% glutaraldehyde solution for 10 min, which will dissolve the organic contaminants like saliva and blood, followed by ultrasonic cleaning of SSC for 15 min.^[18] The chemical disinfection is necessary as ultrasonic cleaning does not completely eliminate the organic contaminants from the tried-in SSCs.^[13] Finally, autoclaving the SSC would provide complete decontamination of SSC prior to its reuse.

With respect to source of knowledge regarding infection control, majority of pediatric dentists responded with formal guidelines, professional journals, post graduate courses, and manufacturer's instructions. This throws light to the areas of focus in our pedodontic society, where maximum knowledge can be imparted for better and efficient clinical practice.

Conclusion

On the basis of the results obtained through this survey, following conclusions can be drawn:

- Majority of the respondents are routinely reusing the SSC following try-in for size determination.
- Great diversity exists in the methods of decontamination employed for SSCs. This demands for more research to provide guidelines for the most effective method of decontamination of SSC.

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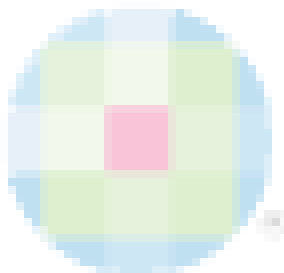
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