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Reuse and Decontamination Practices of Stainless Steel Crowns among Indian Pediatric Dentists: A Cross-Sectional Survey

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Abstract

Stainless steel crowns (SSCs) are considered the gold standard for restoring extensively carious primary teeth due to their durability, longevity and ability to provide full coronal coverage. During routine clinical procedures, SSCs are often tried intraorally for size selection, which may result in contamination. In certain clinical settings, these crowns are reused following try-in; however, inadequate decontamination raises concerns regarding cross-infection. The present study aimed to evaluate the pattern of SSC reuse and the associated cleaning and sterilization practices among pediatric dentists.

A cross-sectional questionnaire-based survey was conducted among 80 pediatric dentists and postgraduate students. The questionnaire assessed demographic details, frequency and reasons for SSC reuse, methods of cleaning and sterilization, perception of cross-infection risk and awareness of existing guidelines. Data were analyzed using descriptive statistics and expressed as frequencies and percentages.

The findings revealed that more than 90% of participants were aware of SSC reuse, while approximately 70% reported reusing crowns in clinical practice. The most common reasons included minimizing wastage, cost-effectiveness and limited availability of crown sizes. Although the majority of respondents reported cleaning and sterilizing crowns prior to reuse, with autoclaving being the predominant method, variations in sterilization duration were observed. Most participants did not report significant changes in crown properties following sterilization. Despite moderate awareness of cross-infection risk, reuse was considered acceptable by a majority when proper sterilization protocols were followed. Awareness of formal guidelines was limited; however, there was strong support for the development of standardized national protocols.

The study highlights a gap between knowledge and clinical practice and underscores the need for uniform, evidence-based guidelines and continued professional

education to ensure safe and consistent infection control practices.

Keywords: Stainless steel crowns, Decontamination, Sterilization, Infection control practices.

Introduction

Stainless steel crowns (SSCs) are preformed full-coverage restorations widely used in pediatric dentistry for the management of extensively decayed, pulp-treated and developmentally compromised primary teeth. Since their introduction, SSCs have demonstrated superior durability, longevity and clinical success compared to intracoronal restorations, particularly in multisurface lesions of primary molars.[1,2] Their use is strongly recommended following pulp therapy and in children at high caries risk due to their ability to provide complete coronal coverage and reduce restoration failure.[6,7]

Numerous studies have highlighted the long-term clinical effectiveness and cost-efficiency of SSCs in pediatric patients.[1,2,9] In addition, systematic reviews have evaluated the biological and periodontal response associated with SSC placement, supporting their overall safety and effectiveness when properly adapted and maintained.[11,13] Recent comparative studies have also examined SSC performance relative to zirconia crowns, reinforcing their durability and continued relevance in clinical practice.[14]

During routine clinical procedures, SSCs are frequently tried intraorally to assess size and fit before final cementation. This process inevitably exposes crowns to saliva, blood and oral microorganisms. Reuse of SSCs after try-in or failed cementation is sometimes practiced, particularly due to cost considerations or limited availability of sizes.[3] However, improper cleaning and sterilization may result in cross-infection, raising concerns regarding patient safety.

Standard infection control guidelines from the Centers for Disease Control and Prevention and the World Health Organization recommend thorough cleaning followed by steam sterilization for heat-stable dental instruments.[4,5] Despite these recommendations, variations in sterilization practices have been reported in clinical settings.[3,12] Therefore, assessing current reuse and decontamination practices of SSCs is essential to ensure adherence to evidence-based infection control standards.

The present study aimed to evaluate the pattern of reuse of stainless steel crowns and the decontamination practices followed by pediatric dentists.

Materials and Methods

A cross-sectional questionnaire-based survey was conducted among pediatric dentists and postgraduate students in pediatric dentistry.

A structured, self-administered questionnaire was designed based on previously published literature and infection control guidelines.[3,5] The questionnaire consisted of two sections: demographic details (age, gender, qualification, years of experience and type of practice) and questions related to SSC reuse practices, cleaning methods, sterilization techniques, duration of sterilization, awareness of cross-infection risks and presence of institutional guidelines.

The questionnaire was distributed electronically using an online platform. Participation was voluntary and informed consent was obtained from all respondents. Incomplete responses were excluded from analysis.

The collected data were entered into Microsoft Excel and analyzed using descriptive statistics. Frequencies and percentages were calculated and presented in tabular and graphical form.

Results

Demographic Distribution

A total of 80 participants were included in the study. The majority of respondents belonged to the 25–35 years age group (87.5%), while less than 10% were below 25 years of age. Females constituted 79.2% of the study population.

Regarding professional qualifications, 66.7% of participants held an MDS degree in pediatric dentistry, whereas 29.2% were postgraduate students. Most respondents (79.2%) had less than 5 years of clinical experience. More than half of the participants (54.2%) were affiliated with academic institutions, while only 8.3% were involved in hospital-based practice.

Reuse Practices of Stainless Steel Crowns

Awareness regarding the reuse of stainless steel crowns (SSCs) following try-in or failed cementation was reported by more than 90% of participants. Despite this, approximately 70% reported reusing SSCs in clinical practice.

Among those who practiced reuse, 45.5% reported occasional reuse, 36.2% reported rare reuse, and 18.2% reported frequent reuse. The primary reasons for reuse included minimizing wastage (40.9%), cost-effectiveness (27.3%) and limited availability of appropriate crown sizes (22.7%).

Cleaning and Sterilization Practices

More than 70% of respondents reported using disinfectants for cleaning SSCs, while the remaining participants preferred ultrasonic cleaning. A high proportion (>90%) reported sterilizing crowns after cleaning.

Autoclaving was the most commonly used sterilization method (83%). Among these, 41.7% sterilized crowns for 10–20 minutes, 29.2% for more than 20 minutes and 20.8% for less than 10 minutes.

Changes in Crown Properties after Sterilization

A majority of respondents (83.3%) did not observe any changes in crown fit, color, or surface characteristics following sterilization. However, some participants reported alterations, including surface dullness (n=7), marginal distortion (n=3) and loss of lustre (n=2).

Attitude toward Reuse and Infection Control

Approximately 50% of participants believed that reuse of SSCs poses a risk of cross-infection. However, more than 60% considered reuse acceptable when appropriate sterilization protocols were followed.

Half of the respondents were uncertain about the presence of written institutional or departmental guidelines regarding SSC reuse and sterilization. Notably, 70% preferred using new SSCs if cost and availability were not limiting factors.

Awareness of existing studies or guidelines related to SSC reuse safety was limited, with less than 40% of participants reporting familiarity.

Need for Guidelines and Educational Measures

A considerable proportion of participants supported the development of standardized national guidelines, with 40% agreeing and 33% strongly agreeing.

Regarding methods to improve sterilization practices, institutional seminars (33.3%) and online courses (29.2%) were the most preferred, followed by printed educational materials (20.8%) and hands-on workshops (16.7%).

Discussion

Stainless steel crowns (SSCs) remain a cornerstone in pediatric restorative dentistry due to their proven durability, full coronal coverage and long-term clinical success, particularly in multi surface carious lesions and following pulp therapy.[1,2,6,7] Despite their well-established clinical advantages, concerns arise regarding

their reuse after intraoral try-in, primarily due to the risk of cross-contamination.

The present study demonstrated a high level of awareness (>90%) among participants regarding the reuse of SSCs following try-in or failed cementation. However, nearly 70% of respondents reported reusing SSCs in clinical practice, indicating a notable discrepancy between knowledge and clinical behavior. This finding is consistent with the observations of Katge et al.[3] who reported widespread reuse practices among Indian pediatric dentists, largely influenced by practical considerations.

In the current study, minimizing wastage, cost-effectiveness and limited availability of crown sizes were identified as the primary factors driving reuse, further supporting the influence of economic and logistical constraints.

With respect to decontamination practices, the majority of participants reported cleaning and sterilizing SSCs prior to reuse, with autoclaving being the predominant method (83%). This aligns with established infection control recommendations by the Centers for Disease Control and Prevention and the World Health Organization, which advocate steam sterilization for all heat-stable dental instruments.[4,5] Similar trends have been reported in recent surveys assessing dentists' knowledge and practices related to SSC use, where autoclaving was identified as the preferred sterilization technique.[12] However, the variability observed in sterilization duration (<10 minutes to >20 minutes) in the present study suggests inconsistency in adherence to standardized protocols.

Interestingly, the majority of respondents (83.3%) did not observe any significant changes in crown properties following sterilization. Nevertheless, a subset reported surface dullness, marginal distortion, and loss of lustre. While SSCs are known for their mechanical resilience and clinical longevity,[1,9] repeated sterilization cycles may potentially affect surface characteristics and marginal adaptation. Although existing literature supports acceptable biological and periodontal responses to SSCs,.[11,13] the long-term effects of repeated sterilization on crown integrity warrant further investigation.

The perception of cross-infection risk among participants was variable, with only half of the respondents recognizing reuse as a potential risk. Despite this, more than 60% considered reuse acceptable after proper sterilization, indicating a divergence between perceived risk and clinical acceptability. This paradox highlights a critical gap between theoretical knowledge and practical decision-making, which has also been emphasized in previous studies.[3]

A noteworthy finding of the present study was the lack of clarity regarding institutional guidelines, with 50% of participants being uncertain about the existence of written protocols for SSC reuse and sterilization. This reflects a lack of standardized practices across clinical settings. Encouragingly, a significant proportion of participants expressed the need for national guidelines, with over 70% supporting their development. This is in line with the increasing emphasis on infection control and patient safety in contemporary dental practice.

Furthermore, the preference for using new SSCs by 70% of participants, if cost and availability were not constraints, underscores the influence of external factors on clinical decision-making. Limited awareness of existing literature and guidelines (<40%) further indicates the need for improved dissemination of evidence-based practices.

Educational interventions such as institutional seminars and online courses were identified as the most effective strategies to enhance sterilization practices. This suggests

that continuous dental education programs may play a crucial role in bridging the gap between knowledge and implementation.

The findings of the present study must be interpreted in light of certain limitations. The sample size was relatively small, and the data were self-reported, which may introduce response bias. Additionally, the study did not include microbiological assessment of sterilization efficacy. Future research with larger sample sizes and objective evaluation methods is recommended.

Overall, while SSCs continue to be a reliable and effective restorative option in pediatric dentistry, the reuse of crowns remains a common practice influenced by practical constraints. The study highlights the urgent need for standardized, evidence-based guidelines to ensure safe decontamination practices and minimize the risk of cross-infection.

Conclusion

The study highlights that despite high awareness, reuse of stainless steel crowns remains common among pediatric dentists, mainly due to cost and availability constraints. Although most practitioners follow sterilization protocols, inconsistencies in methods and a gap between knowledge and practice persist. The findings emphasize the need for standardized national guidelines and enhanced educational initiatives to ensure safe and uniform clinical practices.

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