

“Experiences on Sterilization Efficiency of Dental Nurses in Selected Private Clinics in Riyadh Saudi Arabia”

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ABSTRACT

Sterilization is necessary for infection control during the field of dentistry, yet many private dental facilities in Riyadh, Saudi Arabia, face challenges in maintaining efficiency. This study explored ten dental nurses' lived experiences to better understand the factors, challenges, and coping methods involved with sterilization practices. A qualitative phenomenological approach was used, including purposive sampling for selecting participants who had first hand experience.

Data were acquired through semi-structured interviews and analyzed thematically using Braun and Clarke's approach. Ethical guidelines, such as informed consent and confidentiality, were strictly followed. Thematic analysis identified five significant themes: (1) adherence to standard sterilization protocols, (2) training and experience influenced compliance, (3) operational challenges amid high patient volume, (4) equipment and supply limitations and (5) feedback, supervision and institutional support. While participants indicated a thorough understanding of Ministry of Health (MOH) regulations in Saudi Arabia, challenges such as delayed equipment maintenance, time constraints and insufficient staff support hindered sterilization efficiency. Nurses used adaptive strategies like prioritization, equipment sharing and peer collaboration. The findings highlighted the importance of continuous training, adequate resources, and administrative support in maintaining high sterilization standards. Institutional deficiencies, notably in supervision and documentation, were identified as significant areas for development. A structured strategy, called the Sterilization Training and Monitoring Program (STMP), was proposed to improve compliance, accountability, and quality assurance.

INTRODUCTION AND BACKGROUND OF THE STUDY

Patient safety, guided by the concept "First, do no harm," is a primary concern in healthcare, as avoidable patient harm, such as healthcare-associated infections (HAIs), continues to pose significant challenges around the world. Sterilization is critical in dental settings for infection prevention and patient safety, yet failures continue to occur due to process complexity and compliance gaps. The World Health Organization emphasizes the importance of adequate infrastructure, strict adherence to procedures, and quality assurance systems, although the Centres for Disease Control and Prevention has reported cases of transmission connected to poor sterilization practices.

Ensuring sterilization efficiency is thus critical not only for patient safety, but also for cost-effectiveness and material quality. The Saudi Ministry of Health monitors and penalizes non-compliance; yet, inefficiencies exist in private dentistry facilities. Although the existing literature recognizes staff expertise, equipment reliability, and protocol adherence as essential concerns, relatively little research has focused on the specific challenges in Riyadh. This study addresses the gap by investigating the factors that influence sterilization efficiency in selected private dentistry clinics.

This study used a qualitative approach to explore dental nurses' experiences with sterilization efficiency in selected private clinics in Riyadh, Saudi Arabia. Personal insights were emphasized. While prior research has primarily focused on the technical aspects of sterilisation, this study examined the viewpoints of healthcare practitioners who are directly involved in the procedure. The study aimed to find factors affecting effective sterilization by investigating their life experiences. It focused on three essential areas: the nurses' experiences

with sterilization efficiency, the challenges they had in maintaining standard procedures, and the strategies that they used to overcome these difficulties and guarantee reliable and secure sterilization results.

This study on sterilization efficiency in Riyadh's private dental clinics provided valuable contributions to nursing practice, education, policy, and public health. By exploring dental nurses' experiences over the previous 12 months, it highlighted challenges in maintaining effective sterilization and the strategies used to overcome them. The findings offered evidence-based insights for improving sterilization processes, enhancing professional responsibility, and reducing infection risks. They also informed nursing education by supplementing curricula with real-world experiences, guided healthcare institutions in refining policies, monitoring systems, and training programs, and supported public health initiatives by promoting safer practices. Despite limitations such as a small purposive sample, focus on private clinics, and reliance on self-reported data, the study offered practical implications and a foundation for future research in infection control and dental healthcare.

The reviewed literature emphasized the necessity of increasing sterilization efficiency in dental services by ongoing training, rigorous procedure adherence, and compliance with international standards. Local studies identified deficiencies in formal training and consistent compliance among dental personnel, whereas worldwide guidelines from WHO, CDC, ADA, and APSIC emphasized the importance of standardized sterilisation techniques, monitoring using biological markers, and continued education. The study also highlighted challenges faced by healthcare professionals, such as extreme workloads, undervaluation, and insufficient time given to support staff, as well as increasing concerns about the environmental impact of sterilization technology. While systematic training and procedure adherence were demonstrated to be successful, several studies limited contextual adaptation to specific cultural and resource-limited settings, such as Riyadh's private clinics. This study addressed these gaps by focusing on dental nurses' lived experiences in the Dental Sterilization Service Unit (DSSU), offering localized insights and practical strategies for improving sterilization efficiency in Saudi dental care settings.

METHODOLOGY

This study utilized a phenomenological qualitative technique to look into dental nurses' lived experiences with sterilization efficiency at several private dental clinics in Riyadh, Saudi Arabia. The emphasis was on understanding participants' personal and professional perceptions of challenges, coping techniques, and practices for maintaining excellent sterilization, rather than merely recording technical procedures. Semi-structured interviews, focus group discussions, and non-participant observations have been employed to collect data and obtain rich, in-depth insights. Thematic analysis was utilized to discover recurring patterns and themes, and triangulation increased the validity of the findings. Ethical considerations such as informed consent, confidentiality, and institutional permission were strictly adhered. This approach enabled a comprehensive understanding of the contextual, organizational, and cultural factors influencing sterilization practices and aimed to provide practical recommendations for improving processes and ensuring patient safety in private dental clinics.

The population of choice for the research was dental nurses who worked in selected private dental clinics in Riyadh, Saudi Arabia, and were directly involved in sterilization and infection control procedures. Purposive sampling was used to identify a set of 10-15 participants, ensuring that only individuals with relevant professional expertise, at least six months of hands-on experience, and English or Arabic competency were included. Clinic management assisted in finding eligible individuals, who then supplied informed consent. The sample size was calculated using qualitative research guidelines and the principle of data saturation, with 10-15 people considered acceptable to gather rich, context-specific insights. This approach ensured that the study focused on individuals most knowledgeable about sterilization practices, enabling a comprehensive understanding of the challenges, strategies, and experiences associated with maintaining sterilization efficiency in private dental clinics.

The study used a systematic and ethical approach to ensure comprehensive data gathering and analysis. The researcher acquired proposal approval and ethical clearance from the IRB and collaborating clinics, obtained participants' informed consent, and then developed a validated semi-structured interview guide through expert review and pilot testing. Using purposive sampling, 10-15 dental nurses were selected and interviewed in private

settings, with audio recordings and field notes augmenting the interviews. Data were transcribed verbatim, securely kept, and thematically analysed to discover important codes, themes, and patterns associated with sterilization efficiency. The findings were validated through member verification with participants, and the results were conveyed using illustrative quotes while retaining confidentiality. This systematic strategy ensured that the study acquired comprehensive, accurate, and contextually meaningful findings concerning dental nurses' experiences.

The study used Braun and Clarke's six-phase Thematic Analysis to comprehensively investigate dental nurses' experiences with sterilization efficiency. The technique entailed getting familiar with the data, producing initial codes, and categorizing related codes into stronger themes that reflected common patterns. Themes were assessed for coherence, given descriptive names, and organized into a cohesive narrative supported by statements from participants. This rigorous approach provided transparency and validity while capturing the subjective perceptions, challenges, techniques, and factors that influence sterilization procedures in Riyadh's private dentistry clinics. Thematic Analysis provides the flexibility and depth required to investigate the dental nurses' lived experiences in the study.

The study ensured the reliability and validity of its qualitative findings by addressing confirmability, transferability, credibility, and dependability. Confirmability was achieved through audit trails, reflexivity, and the use of participants' verbatim statements to minimize researcher bias. Transferability was supported by detailed descriptions of the research context, participants, and procedures, allowing applicability to similar settings. Credibility was enhanced through member checking, prolonged engagement, and triangulation of data sources. Dependability was maintained by following a systematic research process, documenting methodological changes, and conducting peer debriefing. Collectively, these measures ensured that the findings accurately reflected dental nurses' experiences with sterilization efficiency and provided trustworthy, context-specific insights.

The study adhered to strict ethical principles to protect participants' rights, well-being, and privacy. It emphasized community value by addressing sterilization efficiency in dental clinics to improve infection control and patient safety. Participants' confidentiality was ensured through anonymization and secure data storage, while informed consent guaranteed voluntary participation and the right to withdraw at any time. Minimal risks were mitigated through a supportive interview environment, and the study offered benefits such as professional development and improved workplace practices. Transparency and justice were upheld by keeping participants informed throughout the research process, disclosing potential conflicts of interest, and ensuring equal treatment and opportunities for all participants.

RESULTS AND DISCUSSIONS

This study presented a thematic analysis of dental nurses' experiences with sterilization efficiency in selected private clinics in Riyadh, based on Braun and Clarke's six-phase framework. Ten participants with varying experience levels, clinic types, and infection control certifications provided insights into their practices. Five major themes emerged: adherence to standard sterilization protocols, where nurses demonstrated strong compliance with MOH guidelines despite minor documentation gaps; the influence of training and experience on compliance, showing that formal education, continuous training, and clinical exposure improved protocol adherence; operational challenges amid high patient volume, which often delayed sterilization cycles and increased risks; equipment and supply limitations, including shortages and maintenance issues that required adaptive strategies like instrument rotation and prioritization; and feedback, supervision, and institutional support, highlighting the importance of constructive feedback, consistent supervision, and clearly defined roles for maintaining efficiency. Despite general knowledge and protocol adherence, nurses faced obstacles such as workload pressures, limited resources, inconsistent training, and inadequate supervision.

To address these challenges, the Sterilization Training and Monitoring Program (STMP) was proposed, integrating orientation modules, monthly refresher training, monitoring tools, designated focal nurses, and structured feedback loops to standardize practices, enhance staff competency, and ensure compliance, thereby improving patient safety and overall quality of care in private dental clinics.

This qualitative study employed semi-structured interviews analyzed thematically to investigate the perspectives of ten dental nurses working in Riyadh's general dentistry, orthodontics, and surgical clinics. Participants indicated thorough understanding and adherence to MOH sterilization methods, with efficiency influenced by education, licensure, and clinical experience. High patient volumes, tight deadlines, limited instrument availability, delays in equipment maintenance, and supply shortages were all frequently experienced. To address these issues, nurses utilized adaptive techniques such as task delegation, rescheduling, mentoring new employees, and borrowing equipment. Feedback from management and coworkers, as well as ongoing learning through seminars and audits, were viewed as crucial for maintaining standards.

The study concluded that while dental nurses exhibited dedication and competence, operational and resource-related factors affected sterilization efficiency. Maintaining safe and consistent sterilization required institutional support, ongoing training, adherence to standardized protocols, and a culture of collaboration and feedback.

Recommendations included investing in equipment maintenance, ensuring sufficient supplies, providing regular training, designating specialized sterilization staff, and fostering communication and feedback systems. Nurses were encouraged to pursue professional development, mentor new employees, and actively address operational challenges. Future research should expand to government clinics, include observational studies, and assess patient perspectives. Overall, the study highlighted that with institutional support and continued professional growth, dental nurses could maintain high sterilization standards, improving patient safety and clinic efficiency.

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