

Evaluating the Effectiveness of Dental Sealants in Caries Prevention and Tooth Protection

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Abstract

Dental sealants are a proven preventive measure against dental caries, particularly on occlusal surfaces of molars and premolars, which are prone to decay. By forming a protective barrier over pits and fissures, sealants inhibit the accumulation of food particles and colonization by cariogenic bacteria. Resin-based sealants, known for their high retention and mechanical durability, are widely used, while glass ionomer sealants provide additional benefits through fluoride release, promoting remineralization and caries prevention even in areas not directly covered by the material. The effectiveness of sealants depends on factors such as the choice of material, application techniques, and environmental conditions during the procedure. Acid etching and proper isolation are critical to achieving optimal adhesion, while innovations in light-curing technologies have further enhanced sealant performance. Long-term studies highlight the importance of regular follow-up to monitor retention, address microleakage, and repair or replace worn sealants. Despite their benefits, challenges such as cost, patient compliance, and material degradation over time limit the broader application of sealants. Advances in bioactive sealants and minimally invasive application techniques hold promise for improving outcomes, especially in high-risk populations. Sealants remain a cornerstone of preventive dental care, significantly reducing the risk of caries when properly applied and maintained. Tailored strategies to enhance awareness, improve access, and optimize application protocols can expand their role in reducing the global burden of dental diseases. Future innovations in materials and techniques are expected to address existing challenges, ensuring that dental sealants continue to play a vital role in promoting oral health.

Keywords

Dental sealants, Caries prevention, Fluoride release, Resin-based sealants, Bioactive materials.

