# Effectiveness of Second Molar Sealants in Preventing Cavities in High-Risk Adolescents

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#### Abstract

Purpose: The assessment of caries risk considers multiple factors including diet, fluoride exposure, and oral microbiome. The American Academy of Pediatric Dentistry recommends sealants to prevent pitand-fissure caries on permanent molars in children and adolescents. This retrospective cohort study seeks to evaluate whether the presence of second molar sealants prevents caries in high-risk adolescents in Rochester, NY who received treatment at the Eastman Institute for Oral Health (EIOH)

Methods: Patient records from EIOH's department of pediatric dentistry, spanning from January 1, 2014, to December 31, 2018, were reviewed. Patients aged 11 to 15 years were included in the study. The patients were divided into two groups: those who received dental sealants on their second molars and those who did not. Patient records were examined to determine whether they required occlusal, buccal, or lingual restorations, endodontic treatment, and/or extractions on any of their second molars. Demographic data, including sex, race, ethnicity, and insurance type, were also collected. Statistical analyses, including chi-squared tests and logistic regression, were conducted to compare the groups and adjust for confounding variables such as age, gender, race, and ethnicity.

Results: A total of 7,570 individuals met the inclusion criteria for this study, with 2,246 individuals receiving sealants and/or treatment on one or more of their second molars. 70.3% of individuals did not receive a sealant, and did not develop a cavity. 10.4% of individuals never received a sealant and had a cavity on one or more of their second molars. 19.3% of individuals received second molar sealants, and 41.5% of those individuals ended up developing a cavity after sealant placement. Chi-square tests conducted on the entire sample revealed a significant association between sealant application and the occurrence of cavities. The Chi-Square test (2542.36, P < .0001), Likelihood Ratio Chi-Square (2164.52) P < .0001), and Mantel-Haenszel Chi-Square (2542.36, P < .0001) all showed strong significance, indicating that sealant use is associated with a reduced likelihood of cavities. Additionally, Fisher's Exact Test (both two-sided and left-sided) confirmed these results with P < .0001, while the right-sided Fisher's Exact Test showed a *P*-value of 1.000, suggesting no significant association for this specific test. Overall, these results strongly suggest that sealants are significantly associated with a lower risk of cavities.

Conclusion: This study highlights the effectiveness of second molar sealants in reducing caries risk among high-risk adolescents in Rochester, NY. Of the 7,570 individuals analyzed, 58.5% of those with sealants remained cavity-free, compared to 87% of those without sealants. Despite the positive impact of sealants, 41.5% of individuals with sealants still developed cavities, suggesting that other factors like diet and oral hygiene may also influence caries development. Statistical analysis confirmed a significant association between sealant use and reduced cavity risk. While sealants are effective, they are not a complete solution, and further research is needed to explore additional preventive measures.

#### Background

Dental caries is the most prevalent chronic disease among both children and adults living in the US. The average age that a child has a complete set of permanent dentition is twelve to fourteen years old. Current data shows that approximately 57% of adolescents between the ages of twelve and nineteen years old have caries in their permanent dentition, 17% of which is untreated [4].

After the introduction of fluoride into many cities' water supplies in the 1940's, there was a decrease in smooth surface caries, and thus an increase in pit and fissure caries. Dental sealants were introduced in the 1960's, which provided a physical barrier on the tooth [1]. Over the past five decades, sealants have been found to prevent pit and fissure caries and arrest non-cavitated lesions [5].

Dental caries is a multifactorial disease, meaning that there are numerous factors that play a role in their development and progression. These include one's diet, oral microbiome, fluoride exposure, time, and an individual's behavior. Lower SES has been found to be correlated with higher rates of dental caries and poorer oral health-related quality of life [2]. The New York State Medicaid program covers sealants on non-restored primary and permanent first and second molars for children between the ages of five and fifteen (inclusive) years old. Re-application is allowed once every five years as necessary.

There have been numerous studies that have looked at the effectiveness of sealants, but none that have specifically looked at second molars only in high-risk individuals. Adolescents are old enough that they should be partaking in unsupervised brushing, and they should have the dexterity to adequately brush and floss their teeth.

# **Time Between Sealant Placement and Treatment**





Results

# Frequency of Sealants and Cavities



### Conclusions

- There is a statistically significant association between second molar sealants and a reduced likelihood of cavities in high-risk adolescents, but 41.5% of individuals still developed cavities after receiving sealants, suggesting that sealants alone are not sufficient for caries prevention.
- Even with preventive measures like sealants, continued education and interventions are necessary to address other contributing factors to caries development.
- The average time between sealant placement and other treatment was 2.8 years for restorations, 3.5 years for extractions, and 4.2 years for pulpectomies.
- Medicaid coverage of sealants supports their use in prevention strategies, especially among vulnerable populations, but additional support may be needed to address gaps in effectiveness.
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