

## Assessment of Trends in Non-Restorative and Preventative Dental Treatment Pre- and Post-COVID-19: A Health Informatics Pilot Study

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### Introduction

Non-restorative treatments and preventive dental measures have become essential in pediatric dentistry and public health research. The ADA and AAPD have established guidelines for managing and preventing dental caries in children and adolescents, emphasizing examination frequency and effective preventive treatments. Research highlights the importance of early dental visits, recommending assessments as early as six months to five years old. Regular visits improve outcomes, reducing caries, tooth loss, and extractions. Preventive measures include dental sealants, fluoride-based products, and silver diamine fluoride (SDF) for high-risk cases. The COVID-19 pandemic disrupted pediatric dental care, limiting in-person preventive treatments despite telemedicine advancements. The long-term impact on oral health and preventive care behaviors remains a focus of ongoing research. The UNLV School of Dental Medicine has long provided affordable preventive services to low-income, minority children in Las Vegas. This study aims to evaluate changes in pediatric visits and preventive services (sealants, fluoride varnish, and SDF) before and after COVID-19 to assess its impact on oral healthcare access.

### Materials and Methods

#### 2.1. Study Review and Approval

This study was approved by the Institutional Review Board (IRB) and the Office for the Protection of Research Subjects (OPRS) at UNLV under Protocol #1619329-1. As a retrospective review of anonymized data with no patient identifiers, it was classified as Exempt Research under HHS regulations (45 CFR 46). Informed consent was waived, as no patient contact or individual records were accessed. Only summary demographic data (e.g., gender, race/ethnicity, and age averages) were provided.

#### 2.2. Study Parameters

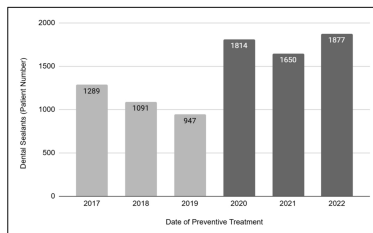
The study focused on pediatric patients (under 18) at UNLV School of Dental Medicine from March 2017 to May 2023. Exclusions included adults and non-patients of record. The study analyzed non-invasive dental sealants, fluoride varnish (5% sodium fluoride), and silver diamine fluoride (SDF, 38% fluoride ion) applied to primary teeth. Data were compared between pre-pandemic (March 2017–March 2020) and post-pandemic (May 2020–May 2023) periods. Predictor variables included treatment date, age, and sex, while outcome variables were the number of patients receiving treatments.

#### 2.3. Data Analysis

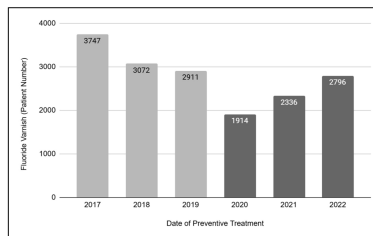
The UNLV IT department provided summary data on preventive treatments performed before and after COVID-19. Data included demographics (sex, race/ethnicity, age) and treatment details. Microsoft Excel was used for analysis, employing descriptive statistics, Chi-square tests for categorical data, Student's t-tests for age comparisons, and Fisher's exact test for treatment frequency changes.

### Results

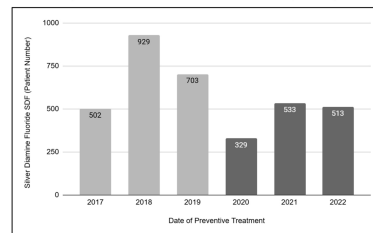
The pediatric clinic population was nearly evenly split between males (47.8%) and females (52.5%), mirroring the local demographics ( $p = 0.3251$ ). However, racial and ethnic composition differed significantly. White (22.8%) and Asian/Pacific Islander (3.4%) patients were underrepresented compared to the local population (45.4% and 10.6%, respectively). Conversely, Hispanic/Latino patients were overrepresented (59.4% vs. 29.9%,  $p = 0.0001$ ). African American (13.2%) and Other (1.2%) groups were comparable to the community (12.4% and 1.7%). The average patient age was 9.04 years.



**Figure 1.** Analysis of dental sealants in pediatric patients (2017 to 2022). A total of  $N = 8668$  dental sealants were applied among pediatric patients between 2017 and 2022. Only  $n = 3327$  sealants were applied pre-pandemic (2017, 2018, and 2019; average  $n = 1109$ ), while  $n = 5341$  sealants were applied in the three years that followed (2020, 2021, and 2022; average  $n = 1780$ )—an increase of nearly 60.5%.



**Figure 2.** Analysis of fluoride varnish in pediatric patients (2017 to 2022). A total of  $N = 16,776$  fluoride varnish treatments were performed between 2017 and 2022. More treatments were performed in the three years prior to COVID-19,  $n = 9730$  (2017, 2018, and 2019; three-year average  $n = 3243.3$ ) than in the three years that followed,  $n = 7046$  (2020, 2021, and 2022; three-year average  $n = 2348.7$ ).



**Figure 3.** Analysis of silver diamine fluoride (SDF) treatments among pediatric patients (2017 to 2022). A total of  $N = 3509$  pediatric SDF treatments were administered between 2017 and 2022. More SDF treatments were performed during the three years prior to the SARS-CoV-2 outbreak,  $n = 2134$  (2017, 2018, and 2019; three-year average  $n = 711.3$ ), with many fewer treatments in the three years that followed,  $n = 1375$  (2020, 2021, and 2022; three-year average  $n = 458.3$ ).

### Results Continued

- Dental Sealants: From 2017–2022, 8,668 sealants were applied. Pre-pandemic (2017–2019), 3,327 sealants were placed (yearly avg. 1,109), increasing 60.5% post-pandemic (2020–2022) to 5,341 (yearly avg. 1,780).
- Fluoride Varnish: A total of 16,776 treatments were performed. Pre-pandemic, 9,730 applications were done (yearly avg. 3,242.3), decreasing 37.6% post-pandemic to 7,046 (yearly avg. 2,348.7).
- Silver Diamine Fluoride (SDF): Of 3,509 treatments, 2,134 were pre-pandemic (yearly avg. 711.3), dropping 35.6% post-pandemic to 1,375 (yearly avg. 458.3).

#### Statistical Analysis of Preventive Treatments

- Sealants: No significant differences in age (10.51 vs. 10.96 years,  $p = 0.9224$ ) or gender distribution ( $p = 0.5093$ ). However, treatments significantly increased post-pandemic (6,596 vs. 8,913,  $p = 0.012$ ).
- Fluoride Varnish: Average patient age remained stable (8.55 vs. 8.97 years,  $p = 0.231$ ), with no gender differences ( $p = 0.4911$ ). A significant 37.6% decline was observed (9,730 vs. 7,046,  $p = 0.011$ ).

SDF: Average patient age remained unchanged (6.76 vs. 6.34 years,  $p = 0.266$ ), with no gender differences ( $p = 0.511$ ). Treatments declined 24.0% (1,809 vs. 1,375,  $p = 0.032$ ).

Overall, sealant use increased post-pandemic, while fluoride varnish and SDF treatments saw significant declines.

### Discussion

This study used data analytics and health informatics to assess the impact of COVID-19 on pediatric visits for preventive dental services (sealants, fluoride varnish, and SDF). The findings revealed significant shifts in patient visits, consistent with broader post-pandemic changes in dental care. Notably, the use of dental sealants increased, possibly due to their long-lasting protection and newer antimicrobial properties, making them appealing to parents seeking cost-effective solutions.

Conversely, fluoride varnish treatments declined, likely because they require frequent reapplication and ongoing parental concerns about fluoride's safety. Similarly, SDF treatments decreased, despite their effectiveness and affordability, due to concerns over the black staining they leave on teeth, which may deter parents, particularly for older children.

While these findings offer valuable insights, the study has limitations. It focused on a low-income, minority population at a public dental clinic, which may not reflect broader trends. Factors such as health literacy, socioeconomic status, language barriers, and underlying health conditions were not analyzed but could influence dental care decisions. Future studies could explore additional influences like mental health, dental anxiety, and social media's role in shaping healthcare choices.

### Conclusion

This study utilized health informatics to identify significant shifts in pediatric preventive dental services following the COVID-19 pandemic. Notably, there was an increase in the use of long-lasting treatments like dental sealants, while the application of fluoride varnish and silver diamine fluoride (SDF) declined. Understanding these behavioral changes can aid public and oral health professionals in planning and outreach to better meet the evolving needs of pediatric patients and their families.

### References

Available upon request