**Critically Appraised Topic (CAT)**

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| **Project Team:** |
| **Lauren Eskoz**  **4B-2** |
| **Project Team Participants:** |
| **Shannon Burns, Lauren Eskoz, Hanna Punnoose, Kelsey Cho** |
| **Clinical Question:** |
| **Can increasing a patient’s fluoride exposure help to decrease the caries experience of a high risk patient?** |
| **PICO Format:** |
| **P:** |
| **Adult patient with high caries risk** |
| **I:** |
| **Increased fluoride preventative therapy** |
| **C:** |
| **No increase in fluoride preventative therapy** |
| **O:** |
| **Reduction in caries experience** |
| **PICO Formatted Question:** |
| **In managing adult patients with a high dental caries risk is increased fluoride exposure an effective means to reduce the patient’s dental caries experience?** |
| **Clinical Bottom Line:** |
| **The patient is an adult female with non-contributory medical history, who presented to the transfer exam with multiple new lesions and recurrent caries despite no changes to medications and diet. We would like to focus on how to prevent new lesions, via an increase in preventative care, namely fluoride.** |
| **Date(s) of Search:** |
| **10/27/20** |
| **Database(s) Used:** |
| **PubMed, ScienceDirect, SpringerLink** |
| **Search Strategy/Keywords:** |
| **Dental caries, Fluoride, Adults** |
| **MESH terms used:** |
| **Caries**  **Dentifrice**  **Adults**  **High caries risk** |
| **Article(s) Cited:** |
| **1:**  Parkinson, C. R., Hara, A. T., Nehme, M., Lippert, F., & Zero, D. T. (2018). A randomised clinical evaluation of a fluoride mouthrinse and dentifrice in an in situ caries model. *Journal of Dentistry,* *70*, 59-66. doi:10.1016/j.jdent.2017.12.015  **2:**  Chaffee, B. W., Cheng, J., & Featherstone, J. D. (2015). Non-operative anti-caries agents and dental caries increment among adults at high caries risk: A retrospective cohort study. *BMC Oral Health,* *15*(1). doi:10.1186/s12903-015-0097-4  **3:**  Cocco, F., Carta, G., Cagetti, M. G., Strohmenger, L., Lingström, P., & Campus, G. (2017). The caries preventive effect of 1-year use of low-dose xylitol chewing gum. A randomized placebo-controlled clinical trial in high-caries-risk adults. *Clinical Oral Investigations,* *21*(9), 2733-2740. doi:10.1007/s00784-017-2075-5 |
| **Study Design(s):** |
| **1: Randomized Control Trial**  **2: Retrospective Cohort Study**  **3: Randomized Control Trial** |
| **Reason for Article Selection:** |
| **1: Addressed the PICO question; Relevant to our patient; Shows advantages of using a fluoride mouthwash in addition to a fluoridated dentifrice for caries prevention**  **2: Relevant to our patient because it addresses adults with a high caries risk; Addressed the PICO question; Discussed risk assessments**  **3: Addressed the PICO question for adults with high caries risk; Relevant to our patient as it’s an option for her to try in addition to fluoride** |
| **Article(s) Synopsis:** |
| **1: In this study, the purpose was to determine if a fluoride mouthwash in addition to using a fluoridated dentifrice, versus no fluoridated dentifrice had the potential to reduce carious lesions. This was measured by %SMHR, percent surface microhardness recovery, and EFU, enamel fluoride uptake. 62 participants were selected from the Indianapolis area, with a mean age of 64.1 years old. One of the requirements was that participants must have a mandibular removable partial denture. Two partially demineralized enamel specimens were used. They were put in each participant’s removable partial denture in the buccal flange area, and also covered with a knit fabric to represent the conditions found in interproximal areas. All participants were randomly assigned to four groups: fluoride dentifrice with a fluoride rinse, fluoride dentifrice with no rinse, placebo dentifrice with a fluoride rinse, and placebo dentifrice with no rinse. Labels were concealed so participants were not aware of which dentifrice they had; however, they were aware if they were using a mouth rinse or not. Each participant was in each group for a two-week period, and was randomly assigned their order of treatment. Between each treatment period, participants used their normal dentifrice for 4 days, then used a fluoride free dentifrice for 2-3 days, and then began the next treatment period. Between each treatment period, the enamel specimens were removed and analyzed. In terms of %SMHR, results showed that all 3 fluoride groups had a statistically higher %SMHR than the placebo dentifrice with no rinse group. Further, there was no statistically significant difference with %SMHR between the 3 fluoride groups. In terms of EFU, there was also a statistically significant increase between the 3 fluoride groups and the placebo dentifrice with no rinse group. Further, a significant increase was seen between the fluoride dentifrice with a fluoride rinse group, and both the fluoride dentifrice with no rinse, and placebo dentifrice and fluoride rinse groups. No significant difference was seen between the fluoride dentifrice with no rinse, and placebo dentifrice with fluoride rinse groups. This study shows that using a fluoride mouth rinse can be beneficial, when also used with a fluoride dentifrice, in order to reduce caries experience, by showing that additional %SMHR and EFU can be achieved when using a fluoridated mouth rinse, which can lead to a decrease in caries. This is especially seen with EFU, as that had a significant increase in the fluroide dentifrice with a fluroide rinse group in comparison to the other groups.**  **2: In this study, the purpose was to determine if preventative agents used could reduce the number of carious lesions in adults with a high caries risk, using a DFT increment. The study collected data from patients at the University of California San Francisco’s Dental School. The patients selected were seen by third- and fourth-year dental students, between the years 2007-2012. The criteria included being in a high caries risk category, over the age of 18, and needing to have completed at least one follow-up examination. This deemed 2,724 patients eligible for the study. At initial visits, participants were classified into 3 different groups. The first group had 1,501 participants receiving no anti-caries agents, the second group had 900 participants receiving anti-caries agents just one time, and the third group had 323 participants receiving anti-caries agents at 2 or more times at least 4 weeks apart. A combination of anti-caries agents was used, including a topical fluoride, chlorohexidine rinse, and/or xylitol products. At the initial visits, a baseline DFT increment was recorded. After initial treatment, the participants had a follow-up examination at least 180 days later, in which another DFT increment was taken. This study defined their DFT increment as the number of teeth that had new carious decay, or new restorations placed. Care was taken to make sure the teeth included in the study mainly had carious lesions and no other issues. After 18 months, results showed that the DFT increment for patients who received anti-caries agents at multiple appointments was 1.47 affected teeth. For patients who did not receive any anti-caries agent, the average DFT increment was 1.82 affected teeth. This is about a 19% reduction. However, there was no statistical difference in DFT increments between the group that received no anti-caries agents, and the group that received anti-caries agents only one time. Therefore, this study shows that in individuals with a high caries risk, because of the decrease in DFT increment, non-operative anti-caries agents are useful in decreasing the severity of the disease, but only if applied multiple times.**  **3: In this study, the purpose was to determine if the use of a xylitol chewing gum could help to prevent caries in high risk adults. The participants were from Sassari, Italy and between the ages of 30-45 years old. In order to be included in the study, various criteria had to be met, some of which were having between one to three cavitated caries lesions, and no signs of periodontitis present. At the end of the trial, a total of 130 participants fully completed the study. Participants were split into two groups: the first group used a chewing gum that contained polyols but no xylitol, and the second group used a chewing gum that contained those same polyols in addition to xylitol. In the first year, the participants chewed the gum each day, for a total intake of 2.5g/day of xylitol (if in the group with the chewing gum containing xylitol). All the participants had various assessments four different times throughout the study. Measurements taken included carious lesions, plaque pH, and Streptococcus mutans concentration in saliva. In the first 12 months, participants chewed gum daily. They were measured at baseline, 6 months, and 12 months. Then, for the next 12 months, no gum was chewed. Participants were then measured again at the end of that second year. In terms of the total caries experience after the full 2 years, the polyol group was 1.80 +/- 2.33 and the xylitol group was 1.25 +/- 1.26. For plaque pH, it was calculated using AUC, area under the curve, of the reference pH and pH curve for both enamel and dentin. It showed that participants in the xylitol group had a less pronounced area under the curve for enamel dissolution. Additionally, only the xylitol group had a statistically significant decrease in S. mutans concentration. For the polyol group, at baseline there was a mean concentration of 5.32 +/- 0.43, and at the end of 2 years, it was 5.33 +/- 0.46. For the xylitol group, at baseline the concentration was 5.41 +/- 0.35, and at the end of 2 years, it was 5.15 +/- 0.64. Overall, this study shows that chewing gum containing xylitol could not only help to decrease the amount of caries experienced in high risk adults, but it could also help to have a prolonged effect on the mouth by helping to reduce the bacterial concentration of S. mutans.** |
| **Levels of Evidence:** (For Therapy/Prevention, Etiology/Harm)  See <http://www.cebm.net/index.aspx?o=1025>  **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)  **1b** – Individual RCT  **2a** – Systematic Review of Cohort Studies  **2b** – Individual Cohort Study  **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research  **4a** – Systematic Review of Case Control Studies  **4b** – Individual Case Control Study  **5** – Case Series, Case Reports  **6** – Expert Opinion without explicit critical appraisal, Narrative Review  **7** – Animal Research  **8** – In Vitro Research |
| **Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews**  See article **J Evid Base Dent Pract 2007;147-150**  **A** – Consistent, good quality patient oriented evidence  **B** – Inconsistent or limited quality patient oriented evidence  **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening |
| **Conclusion(s):** |
| **Overall, it can be seen that adult patients with a high caries risk can benefit from an increase in fluoride preventative therapy and other preventative therapies as well. For instance, a fluoride mouthwash could be a beneficial adjunct to fluoridated toothpaste, as it can help to increase the surface microhardness of enamel, therefore decreasing its susceptibility to caries. Further, chewing gum with xylitol can be another adjunct therapy to help decrease the number of caries and amount of S. mutans. However, although preventative measures are useful, studies show they must be utlitized on an ongoing frequency, and not just one time. More studies should be done for adult patients with a high caries risk, as more of the research is focused on children with a high caries risk.** |