2020 FALL ROUNDS

EVIDENCE BASED DENTISTRY
SPECIALTY: PUBLIC HEALTH

GROUP 4B

DATE: 11/18/20

ROUNDS TEAM

- **Group Leader: Dr. Grady**
- **Specialty Leader: Dr. Okunseri**
- **Project Team Leader: Shannon Burns**
- **Project Team Participants: Kelsey Cho, Hannah Punnoose, Lauren Eskoz**

PATIENT

- 73 y/o
- Female
- Caucasian
- Chief Complaint: “I know I need a few crowns”
- Patient of record since 2018

MEDICAL HISTORY

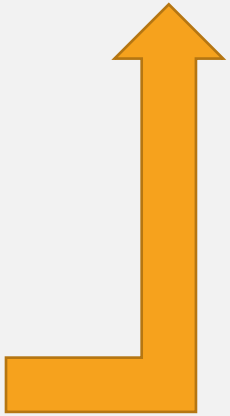
- **Medical Conditions:**
  - High blood pressure, shortness of breath, asthma, migraines, history of : Bronchitis (2018), Skin cancer, Cataract surgery (June 2019), Sepsis (2018)
  - **Medications:**
    - Flovent HFA (Fluticason) – corticosteroid for asthma
    - Sumatriptin succinate – migraines
    - Zetia (ezetimibe)- Cholesterol
    - Losartan – Blood pressure
    - Atorvastatin – Cholesterol

DENTAL HISTORY

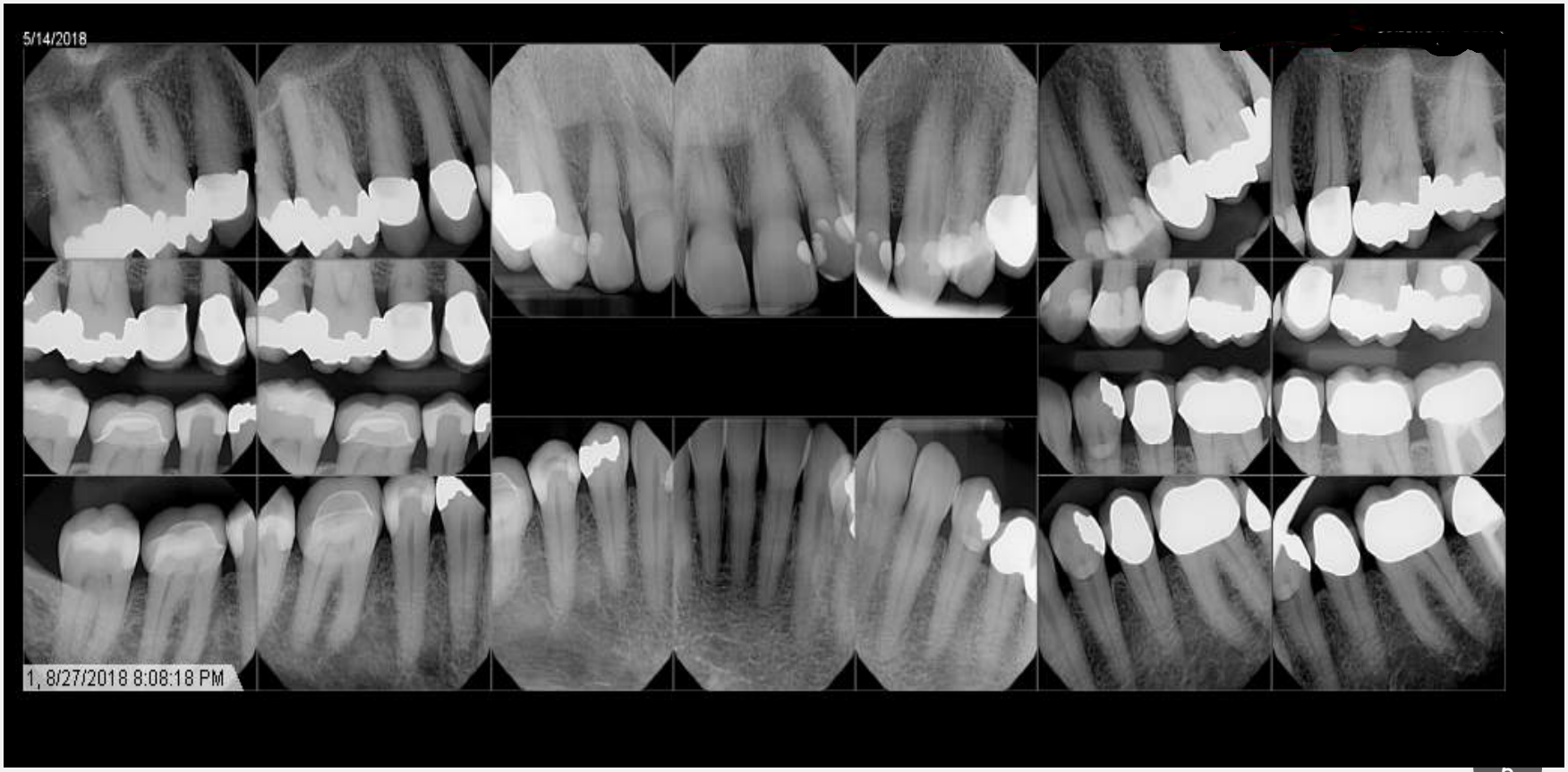
Patient Timeline:

- Presents to Marquette: October 2018 :
- Comprehensive Exam/Prophy
- 10/18: #14 MODL
- 11/18: #3 MODL
- 12/18: #30 Re-cement crown
- 1/19: #2 Core Build-up
- 3/19- 5/19: #2 PFM Crown
- 7/19: Prophy/POE
- 2/20: Prophy/ POE/ Exit Exam

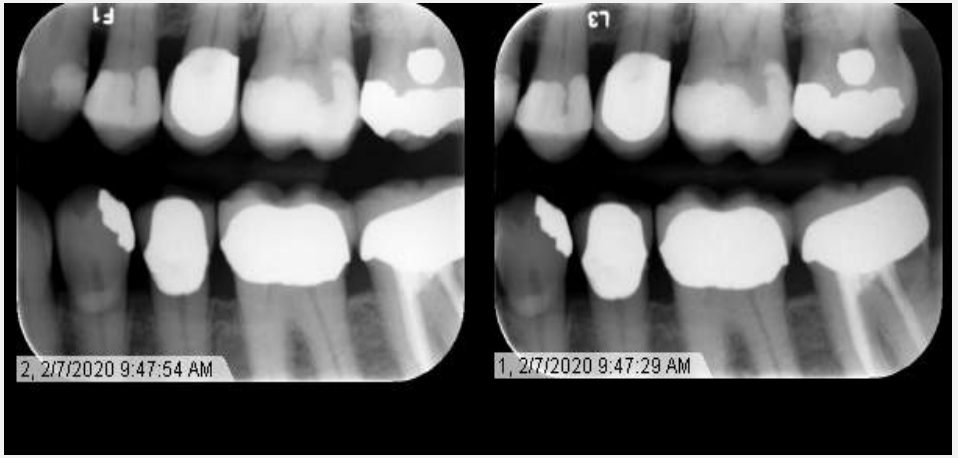
- Pt presents to me 9/25/20 : Transfer Exam, POE, Bitewings



RADIOGRAPHS

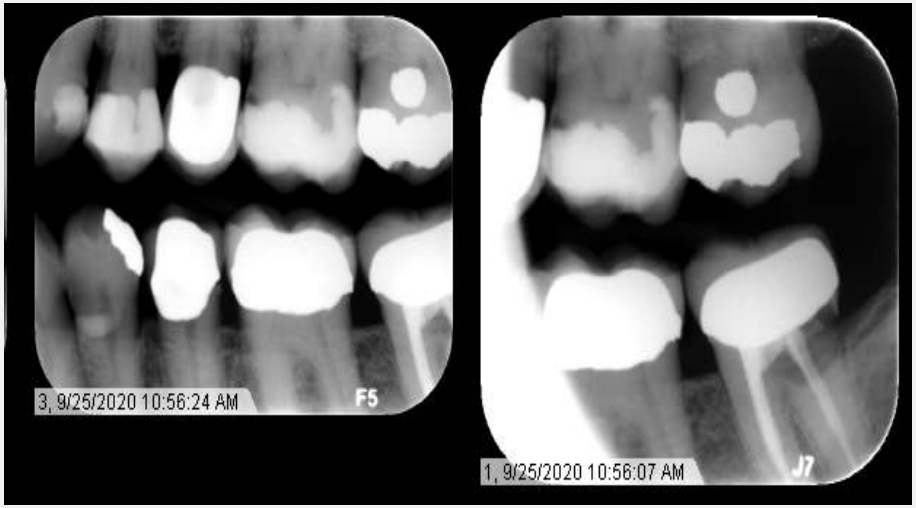


RADIOGRAPHS



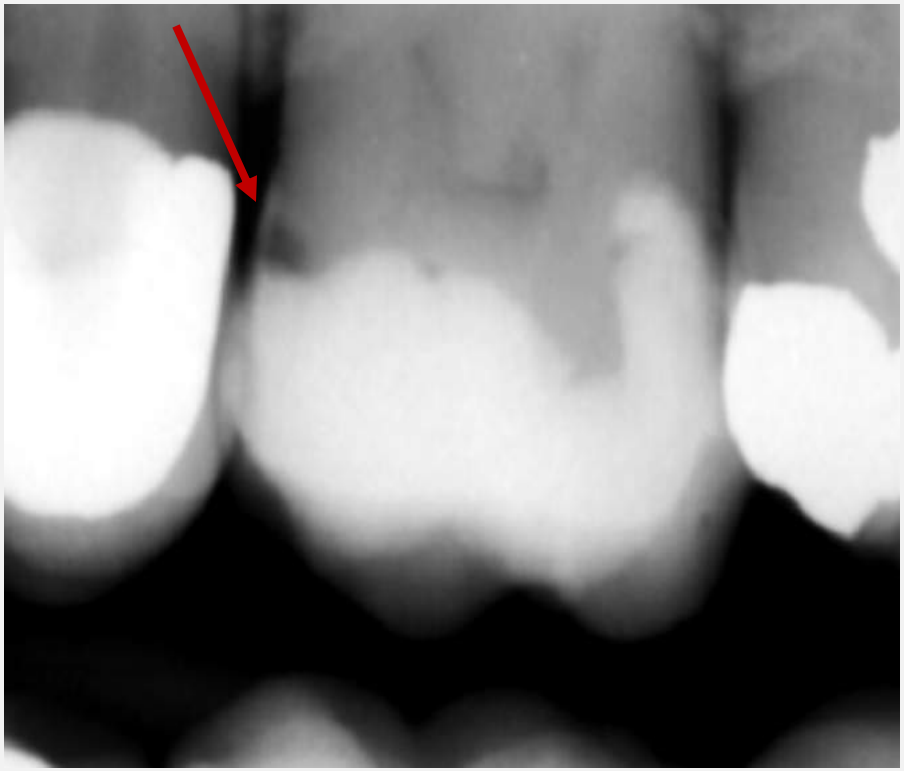
2/7/20 Bitewings at Exit Exam

RADIOGRAPHS



Radiographs taken 9/25/20 at transfer exam

RADIOGRAPHIC FINDINGS #3



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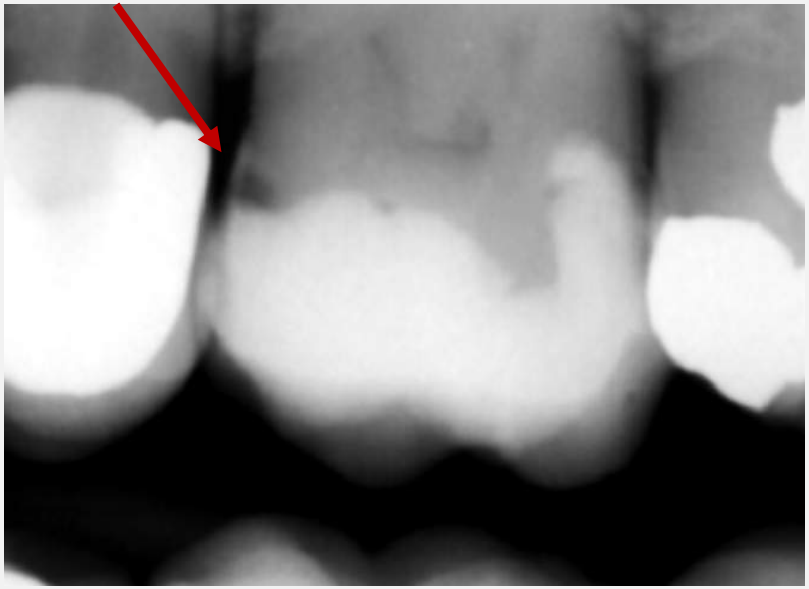
RADIOGRAPHIC FINDINGS #14

2/7



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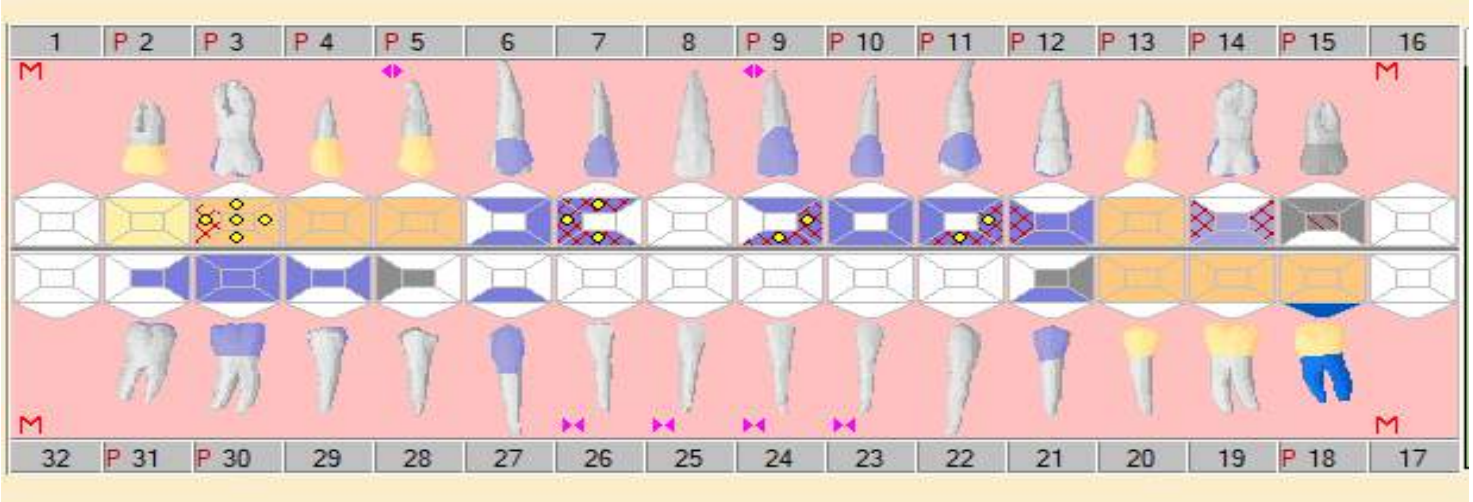
CLINICAL FINDINGS



- Crowding of mandibular anteriors
- Plaque deposits
- Recurrent decay D #7, D #9, DL #11, M #12

PERIODONTAL CHARTING

																	MOBIL
																	FURCA
	P	P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P				PLAQU
	B	B	B	B	B		B	B	B	B B	B						BOP
5 5 5	5 5 5	4 4 4	4 4 4	4 4 4	4 4 4	6 6 6	6 6 6	6 6 6	5 5 5	5 5 5	5 5 5	5 5 5	4 4 4				MGJ
4 3 4	5 4 3	3 4 3	3 3 3	3 2 3	3 1 2	3 3 2	2 2 2	3 1 3	2 3 3	3 3 3	3 2 3	3 4 4	3 3 4				CAL
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2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
1 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 0	0 0 0				FGM
3 4 6	6 2 3	3 2 4	4 2 3	3 2 3	3 2 3	3 2 3	4 2 3	4 2 3	4 2 3	4 2 2	4 2 2	4 2 3	4 2 3				P.D.
4 4 6	6 2 3	3 2 4	4 2 3	3 2 3	3 2 3	3 2 3	4 2 3	4 2 3	4 2 3	4 2 2	4 2 2	4 3 3	4 2 3				CAL
																	MGJ
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																	PROG

																	PROG
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	P	P	P P	P	P	P	P P	P P		P	P						PLAQU
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																	FGM
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17			
																	FGM
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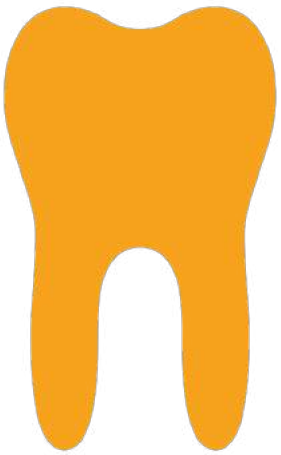
B		B	B	B B	B	B		B B	B	B	B B						BOP
	P		P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P				PLAQU
																	FURCA
																	MOBIL

DIAGNOSIS

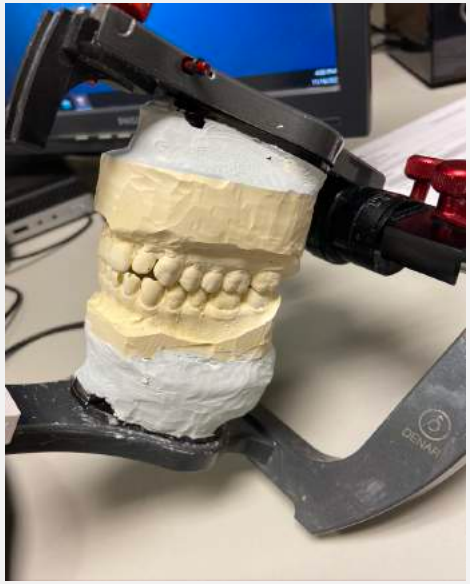
- **Caries risk : High-** based on clinical conditions:
  - 3+ new lesions in the last 36mo
  - Visible plaque
  - Numerous interproximal restorations
  - Exposed root surfaces

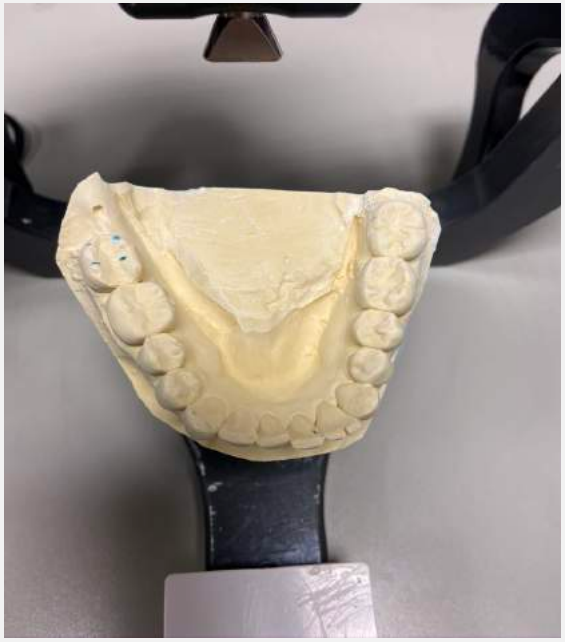
- **Perio:** Stage 1 Initial Periodontitis (1-2mm)
  - Grade A- slow rate of progression
  - Stable
  - Early Chronic Periodontitis



PROBLEM LIST

- Home care
- Caries
- Sensitivity
- Diet





D1 BASIC SCIENCE

- **What is the mechanism of fluoride?**
  - Enamel and dentin are made up of inorganic material, organic material, and water.
  - The inorganic material (also known as the mineralized portion of teeth) is made up of **hydroxyapatite**, which is crystallized calcium phosphate.
  - **Caries** are defined as the "localized destruction of the tooth surface initiated by decalcification of the enamel, followed by enzymatic lysis of organic structures and leading to cavity formation" (NCBI, 1965-1966).
  - **Decalcificaiton/demineralization** occurs when acid producing bacteria dissolve the hydroxyapatite crystals of the mineralized portion of teeth.

Bašić K, Peroš K, Rošin-Grget K, Sutej I,. The cariostatic mechanisms of fluoride. Acta Med Acad. 2013 Nov;42(2):179-88. doi: 10.5644/ama2006-124.85. PMID: 24308397.
NCBI (National Center for Biotechnology Information). 1965-1966. Dental Caries [Internet]. [Cited 10 November 2020.] Available from https://www.ncbi.nlm.nih.gov/mesh/68003731

D1 BASIC SCIENCE

- What is the mechanism of <u>fluoride?</u>
  - **Main mechanisms:**

1. Inhibition of demineralization
   - Fluoride absorption onto tooth structure makes fluorapatite, which is **resistant** to acid dissolution.
2. Enhancement of remineralization
   - Fluoride absorption attracts calcium ions to speed up and enhance resistance against acidic degradation
3. Formation of a fluoride ion reservoir in the form of CaF2 which dissolves in acidic conditions
4. Antimicrobial properties (controversial)
   - Fluoride inhibits bacterial metabolism by cytoplasm acidification (in the form of HF)

Bašić K, Peroš K, Rošin-Grget K, Sutej I,. The cariostatic mechanisms of fluoride. Acta Med Acad. 2013 Nov;42(2):179-88. doi: 10.5644/ama2006-124.85. PMID: 24308397.

D2 PATHOLOGY

- **Background**
  - Caries Disease Process:
    - Microorgansims
    - Demineralization
    - Cavitation

- **Preventative vs Operative**
  - Caries Indicators

D2 PATHOLOGY

- **Pathology Question:** What are caries disease indicators and how do they present in the oral cavity?
  - White spot lesions
  - Previous Restorations
  - Radiographs
    - Lesions approximating enamel
    - Extent of cavitation

Austin, D., JayaKumar, H. L., Chandra, K. M., Kemparaj, V., & Prahladka, P. (2020). Cross-sectional Study on White Spot Lesions and its Association with Dental Caries Experience among School Children. International journal of clinical pediatric dentistry, 13(2), 107–112. https://doi.org/10.5005/jp-journals-10005-1716

Maheswari, S. U., Raja, J., Kumar, A., & Seelan, R. G. (2015). Caries management by risk assessment: A review on current strategies for caries prevention and management. Journal of pharmacy & bioallied sciences, 7(Suppl 2), S320–S324. https://doi.org/10.4103/0975-7406.163436

D3 PICO

- **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.

SEARCH BACKGROUND

- **Date of Search:**
  - 10/27/20
- **Database(s) Used:**
  - PubMed, ScienceDirect, SpringerLink
- **Search Strategy/Keywords:**
  - Dental caries, Fluoride, Adults

SEARCH BACKGROUND

- **MESH terms used:**
  - Caries
  - Dentifrice
  - Adults
  - High caries risk

ARTICLE 1 CITATION, INTRODUCTION

- **Citation:**
  - 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
- **Study Design:**
  - Randomized Control Trial
- **Purpose:**
  - To determine if a fluoride mouthwash in addition to using a fluoridated dentifrice, versus no fluoridated dentifrice had the potential to reduce carious lesions.

ARTICLE 1 SYNOPSIS

- Used **%SMHR**, percent surface microhardness recovery, and **EFU,** enamel fluoride uptake.
- Included 62 participants that each had a mandibular RPD and were placed into **4 groups**:
  - **Fluoride dentifrice with a fluoride rinse**
  - **Fluoride dentifrice with no rinse**
  - **Placebo dentifrice with a fluoride rinse**
  - **Placebo dentifrice with no rinse**
- Two partially demineralized enamel specimens were used and placed in the buccal flange of the RPD.
- Each participant was in each group for a two-week period and between treatment groups used their normal toothpaste for 4 days.

ARTICLE 1 SYNOPSIS

- **%SMHR:**
  - All 3 fluoride groups had a statistically higher %SMHR than the placebo dentifrice with no rinse group.
  - No statistically significant difference with %SMHR between the 3 fluoride groups.
- **EFU:**
  - There was an increase between the 3 fluoride groups and the placebo dentifrice with no rinse group.
  - 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.
- This study shows that using a fluoride mouth rinse can be beneficial, when also used with a fluoride dentifrice, since additional %SMHR and EFU can be achieved when using a fluoridated mouth rinse, which can lead to a decrease in caries.
  - Especially seen with EFU, as that had a significant increase in the fluoride dentifrice with a fluoride rinse group in comparison to the other groups.

ARTICLE 1 SYNOPSIS

- **Limitations:**
  - Used participants that were already missing some teeth and these oral environments could be different than those in fully dentate individuals.
  - Participants were only blinded to what dentifrice they were using, and not if they were using a mouth rinse or not.

ARTICLE 1 SELECTION

- Addressed the PICO question
- Relevant to our patient
- Shows advantages of using a fluoride mouthwash in addition to a fluoridated toothpaste for caries prevention

ARTICLE 2 CITATION, INTRODUCTION

- **Citation:**
  - 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
- **Study Design:**
  - Retrospective Cohort Study
- **Purpose:**
  - To determine if preventative agents used could reduce the number of carious lesions in adults with a high caries risk, using a DFT increment.

ARTICLE 2 SYNOPSIS

- Data was collected from 2,724 patients at UCSF
  - Needed to be in a high-risk category, over 18 years old, and have done a follow-up exam
- **Classified into 3 different groups:**
  - Received no anti-caries agents
  - Received anti-caries agents just one time
  - Received 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.
- A baseline DFT was recorded at initial visits and another DFT increment was recorded at follow-up exams that were at least 180 days later
  - These authors defined a **DFT increment as the number of teeth that had new carious decay, or new restorations placed.**

ARTICLE 2 SYNOPSIS

- After 18 months, results showed:
  - **<u>Patients who did not receive any anti-caries agent:</u>**
    - Average DFT increment was **1.82 affected teeth**
  - **<u>Patients who received anti-caries agents at multiple appointments:</u>**
    - Average DFT increment was **1.47 affected teeth**
- *This is about a 19% reduction*
- 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
- 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.

ARTICLE 2 SYNOPSIS

- **Limitations:**
  - Patients might not be representative of the entire population, since the sample was from one dental clinic
  - The initial classification of deeming if a patient was in a high caries risk category or not was not standardized
    - Determined by the providing student and dentist to that specific patient

ARTICLE 2 SELECTION

- Addressed the PICO question
- Relevant to our patient because it addresses adults with a high caries risk

ARTICLE 3 CITATION, INTRODUCTION

- **Citation:**
  - 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:**
  - Randomized Control Trial
- **Purpose:**
  - To determine if the use of a xylitol chewing gum could help to prevent caries in high-risk adults.

ARTICLE 3 SYNOPSIS

- 130 participants between 30-45 years old
  - Needed to have between one to three cavitated carious lesions, and no signs of periodontitis present
- **Participants were split into 2 groups:**
  - Group 1 used a chewing gum that contained polyols but no xylitol
  - Group 2 used a chewing gum that contained those same polyols in addition to xylitol
- **Year 1:** participants chewed the gum each day, for a total intake of 2.5g/day of xylitol (if in experimental group)
- **Year 2:** participants did not chew any gum
- In the first year, measurements were taken at baseline, 6 months, and 12 months. Then again at the end of the second year.
  - Measurements taken were **carious lesions, plaque pH, and Streptococcus mutans concentration in saliva.**

ARTICLE 3 SYNOPSIS

- Total caries experience after 2 years:
  - The **polyol group was 1.80 +/- 2.33** and the **xylitol group was 1.25 +/- 1.26.**
- Plaque pH was calculated using AUC, area under the curve, of the reference pH and pH curve for both enamel and dentin:
  - Participants in the **xylitol group had a less pronounced area under the curve for enamel dissolution.**
- 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.**

ARTICLE 3 SYNOPSIS

- 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.

- **Limitations:**
  - This study only included participants who were 30-45 years old. Therefore, it might be harder to generalize these results.
  - Doesn't show if it's the frequency of the xylitol chewing gum or the dosage of the xylitol chewing gum that's beneficial, therefore further research needs to be done.

ARTICLE 3 SELECTION

- Addressed the PICO question for adults with high caries risk
- Relevant to our patient as its an option for her to try in addition to fluoride

LEVELS OF EVIDENCE

☐ **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)

☒	**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

CONCLUSIONS: D3

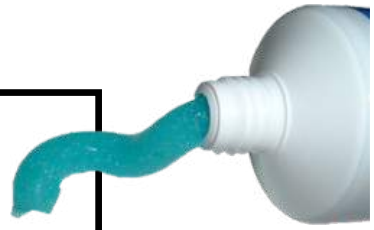
- Patients with a high caries risk can benefit from an increase in fluoride preventative therapy and other preventative therapies.
  - A fluoride mouthwash could be a beneficial adjunct to fluoridated toothpaste, as it can help to increase the surface microhardness of enamel, therefore decreasing its susceptibility to caries.
  - Chewing gum with xylitol can be another adjunct therapy to help decrease the number of caries and amount of S. mutans.
- Although preventative measures are useful, studies show they must be utilized on an ongoing frequency, and not just at one time.

- **For our patient, I would suggest starting a treatment plan where topical fluoride is placed at multiple appointments. Further, we should advise our patient to use a fluoridated mouth rinse with a fluoridated toothpaste, and to chew gum with xylitol. All of these measures can help to prevent caries forming in the future.**

CONCLUSIONS: D4

- We believe fluoride exposure will benefit this patient's overall oral health in addition to necessary restorative measures
- **Treatment Goals:**
  - 1st- reassess Caries Risk Assessment - discover any new changes. & tailor tx plan accordingly
  - Treat existing lesions while preventing new from occurring
  - Increased Recall Interval (4 month) w/ topical Fl Varnish application
  - Focus on home care and dietary changes
  - Prevident toothpaste
  - Xlyitol Gum
  - Monitor changes over 2-year-period

DISCUSSION QUESTIONS



- What general concerns, if any, do patients have when it comes to increasing fluoride exposure to address caries risk?
- Are there any systemic concerns that arise with increasing fluoride dosage to address high caries risk?
- What restorative options are there for patients with fluorosis?
- When increasing the amount of fluoride exposure, what measures would be used to ensure that the exposure isn't too high, such that it would cause fluorosis?
- What age is one considered too young to increase their exposure level?
- At what point in the treatment plan should the dental team consider increasing the amount of fluoride exposure to reduce caries risk compared to other preventive options?
- How did the patient's source of caries influence the treatment plan?
- Why are patients apprehensive about receiving fluoride treatments?

DISCUSSION QUESTIONS CONT.

- Is a fluoride varnish or Silver Diamine Fluoride more effective at arresting caries progression?
- What are the initial signs of fluorosis and should fluoride treatment be terminated if these signs become present?
- What can we recommend to patients who worry about their kids intaking too much fluoride?
- At what level, if ever, does increasing fluoride start to have negative results on the patient's oral health?

THANK YOU