WEST LOS ANGELES COLLEGE
BACHELOR OF SCIENCE IN DENTAL HYGIENE PROGRAM

RISK ASSESSMENT PROJECT - SPRING SEMESTER 2022

STUDENT NAME: Airel Harte Ramirez STUDENT NUMBER: 2332

I. Personal History

- Age: 27
- Gender: Female
- Race/Ethnicity: Mexican/Hispanic
- Occupation: Part Time Tutor and Full-time student
- Marital Status: Single

II. Medical History

- Medical History (Past)
    - History of pulmonary edema which patient had at the age of 18 months old. It was treated at the time and the patient states there has been no complications due to the condition since it was treated.
    - In July 2021, patient broke the fifth metatarsal bone, or outermost metatarsal bone, in her left foot. Patient wore a cast for two months which forced her to take time off from work due to her inability to be completely mobile on her own as patient did not feel comfortable using crutches and did not have access to a wheelchair.

- Medical History (Current)
    - Patient was diagnosed with anxiety and depression in 2016 and has been treating both conditions with medications and therapy. Treatment has provided great improvement in the patient's overall mental health.

- Family Health History
    - Patient's mother has history of thyroid cancer. Her thyroid was surgically removed 8 years ago to remove and prevent the spread of cancer. Patient's mother has also been diagnosed with type II diabetes.
    - Patient's father has history of having had a stroke 15 years ago. He is pre-diabetic and is taking medication to control his high blood pressure.

- Review of systems (systemic conditions and their possible effects in the oral/periodontal health – periodontal systemic factors)
    - Neurological: Patient suffers from depression which can affect oral health due to lack of motivation or energy to maintain routine oral hygiene care.
    - Psychological: Patient suffers from anxiety which is associated with increased cortisol levels that cause a weaker immune system to be more prone to gingival inflammation.

- Functional: N/A
- Respiratory: N/A
- Cardiovascular: N/A
- Dermatological: N/A
- Gastrointestinal: Intraoral evaluation confirmed patient has xerostomia. This is likely an adverse reaction to the current medications being taken. This condition reduces salivary flow which can increase the chance of caries and periodontal disease.
- Sexual: N/A
- Hematological: Patients most recent lab work detected a high red blood cell count with a value of 5.81 million/uL. There is a correlation of high platelet count with periodontitis.
- Endocrine: N/A
- Immunological: N/A

- Current Medication(s) – Implication and Dental concerns

1. **Venlafaxine** HCL ER 75mg

   Directions: One pill every night before bed

   Pharmacologic category: antidepressant, serotonin/norepinephrine reuptake inhibitor

   Local Anesthetic/Vasoconstrictor Precautions: It has been suggested that vasoconstrictor be administered with caution and to monitor vital signs in dental patients taking antidepressants that affect norepinephrine in this way. Possible side effect: sustained increase in diastolic blood pressure and heart rate.

   Effects on Dental Treatment: Significant xerostomia (normal salivary flow resumes upon discontinuation); may contribute to oral discomfort, especially in the elderly; taste perversion.

   Effects on Bleeding: May impair platelet aggregation resulting in increased risk of bleeding events, particularly if used concomitantly with aspirin, NSAIDs, warfarin, or other anticoagulants. Bleeding related to SSRI use has been reported to range from relatively minor bruising and epistaxis to life-threatening hemorrhage.

   Adverse Reactions: Central nervous system: drowsiness (15%), Gastrointestinal: xerostomia (15%).

   Mechanism of Action: Venlafaxine and its active metabolite, O-desmethylvenlafaxine (ODV), are potent inhibitors of neuronal serotonin and norepinephrine reuptake and weak inhibitors of dopamine reuptake. Venlafaxine and ODV have no significant activity for muscarinic cholinergic, H1-histaminergic, or alpha2- adrenergic receptors. Venlafaxine and ODV do not possess MAO-inhibitory activity. Venlafaxine functions like an SSRI in low doses (37.5 mg/day) and as a dual mechanism agent affecting serotonin and norepinephrine at doses above 225 mg/day (Harvey 2000; Kelsey 1996).

2. **Bupropion** HCL XL 300mg

Directions: One pill every night before bed

Pharmacologic Category: Antidepressant, Dopamine/ Norepinephrine-Reuptake I inhibitor; Smoking Cessation Aid

Local Anesthetic/Vasoconstrictor Precautions: Because of the potential for norepinephrine elevation within CNS synapses, it is suggested that vasoconstrictor be administered with caution and to monitor vital signs in dental patients taking antidepressants.

Effects on Dental Treatment: Significant xerostomia (normal salivary flow resumes with discontinuation); infrequent occurrence of abnormal taste, oral mucosal ulcers; rare occurrence of stomatitis, tongue edema, gingivitis, glossitis.

Effects on Bleeding: Thrombocytopenia (<1%) has been reported; rare occurrence of gingival hemorrhage.

Adverse Reactions: Gastrointestinal: Xerostomia (10% to 28%)

Mechanism of Action: Aminoketone antidepressant structurally different from all other marketed antidepressants; like other antidepressants the mechanism of bupropion's activity is not fully understood. Bupropion is a relatively weak inhibitor of the neuronal uptake of norepinephrine and dopamine, and does not inhibit monoamine oxidase or the reuptake of serotonin. Metabolite inhibits the reuptake of norepinephrine. The primary mechanism of action is thought to be dopaminergic and/or noradrenergic.

3. **Sertraline** HCL 100mg

Directions: One pill every night before bed

Pharmacologic Category: Antidepressant, Selective Serotonin Reuptake Inhibitor

Local Anesthetic/Vasoconstrictor Precautions: Although caution should be used in patients taking tricyclic antidepressants, no interactions have been reported with vasoconstrictor and sertraline, a nontricyclic antidepressant which acts to increase serotonin; no precautions appear to be needed

Effects on Dental Treatment: Xerostomia (normal salivary flow resumes upon discontinuation)

Effects on Bleeding: May impair platelet aggregation resulting in increased risk of bleeding events, particularly if used concomitantly with aspirin, NSAIDs, warfarin, or other anticoagulants. Bleeding related to SSRI use has been reported to range from relatively minor bruising and epistaxis to life-threatening hemorrhage.

Adverse Reactions: Central nervous system: drowsiness (11%) Gastrointestinal: xerostomia (14%).

Mechanism of Action: Antidepressant with selective inhibitory effects on presynaptic serotonin (5-HT) reuptake and only very weak effects on norepinephrine and dopamine neuronal uptake.

***Adverse reactions of all medications are listed only as they pertain to patient.**

- Baseline Vital Signs
    - BP: 130/88 mm Hg
    - P: 68 bpm
    - R: 20 bpm
    - T:96.0° F
    - SpO_2: 98%

- BMI
    - Height: 5'0
      5 ft → 152.4cm → 1.524m
      Square of height: (1.524 x 1.524)m^2 = 2.323m^2
    - Weight: 180 lbs.
      180 lbs. → 81.6466kg

BMI = kg/m^2
BMI = 81.6466kg/2.323m^2
BMI = 35.15kg/m^2

    - The patient's BMI is 35.15 kg/m^2 which indicates she falls within the range of obesity. A BMI of 25.0 kg/m^2 or more is considered obese. There is a strong correlation of obesity with inflammation which can play a role in a person's periodontal condition. It may also put the patient at risk for developing diabetes as well as other medical conditions.

- Medical History correlation with ASA status
    - ASA II
    - Rationale:
        - Blood pressure reading of 130/88 mm Hg indicates the patient is stage I hypertensive.
        - Patient's current medications include Venlafaxine, Bupropion, and Sertraline which are being taken to control anxiety and depression. These are considered controlled conditions without substantive functional limitations.
        - BMI of 35.15 kg/m^2 falls within (30<BMI<40) of the obesity range.

III. Dental History

- Extra Oral Examination and Findings, not limited to occlusion, TMJ and Oral Habits.
    - Occlusal Classification
        - Right Canine: Class II
        - Left Canine: Class I
        - Right Molar: Class II
        - Left Molar: Class I with Class II tendency

- Maximum Opening: 43mm
- Overjet: 7mm
- Overbite: 3mm
- Underbite: None
- Crossbite: Left maxillary and mandibular third molars (Tooth #16 and #17)
- Open bite: N/A
- Facial profile: mesognathic

  - TMJ assessments and oral habits
    - No TMJ detected
    - No deviation or deflection detected
    - No pain or tenderness upon opening or closing jaw
    - Patient is aware of grinding and does not have a night guard
    - Patient regularly (almost daily) drinks Coca-Cola or Dr. Pepper with meals or throughout the day when thirsty. These soft drinks are high in sugar and contribute to the high risk of caries.
    - Parafunctional habit(s):
      - Nail biting
      - Bites upper lip & buccal mucosa
      - Sticks out tongue a lot (especially when concentrating)
      - Uses teeth to open foreign objects (i.e. ketchup packets, candy wrappers, etc.)
    - Mouth breathing: The patient became a mouth breather two years ago after using masks due to covid restrictions. Over the last two years, patient has noticed that mouth breathing has caused generalized redness and inflammation along the facial and buccal maxillary and mandibular gingival margin.

- Intra Oral Examination and Findings
  - Lips, cheeks, and pharynx are WNL
  - Visible supragingival plaque accumulation
  - Tooth #10 is out of alignment
  - Teeth #7 and #9 appear to have enamel chipped off at the cervical third of the tooth along the gingival margin.
  - Bilateral lineal alba on buccal mucosa
  - Xerostomia, which may be due to current medications.

- Identification of findings on hard tissues:
  - Teeth #6-11 & #28 present with decalcification along the cervical margin.
  - Cusps of maxillary and mandibular posterior teeth appear worn down due to grinding and parafunctional habits.

- Possible cultural/ethnic influencing factor(s)
    - Patient follows an unhealthy diet. Patient does not prepare her own meals and relies on delivery services to deliver fast food meals and soft drinks.

- Current medications cause fatigue most of the time which causes the patient to sleep in more than desired.
- Patient does not follow a regular oral hygiene routine.

- Dental Exam:
  - Possible Carious lesion/fractures present
    - Class I caries on tooth #2, #16, #17, and #32
    - Class V caries on DF of tooth #9 with clinical signs of early decay and sensitivity to metal
  - Metallic restorations: N/A
  - Synthetic (composite) restorations: The date of composite restorations is unknown.
  - Inlays: N/A
  - Onlays: N/A
  - PFM's: N/A
  - Bridge(s): N/A
  - Dental Implants: N/A

- Restorations and quality of restorations:
  - The margins on #2 DO and #18 O composite restorations are stained and showing clinical signs of secondary caries. Restorations should be replaced.
  - #16 had a DO composite restoration that partly chipped away at the distal surface and should be replaced in its entirety.

Right (Buccal view)

Anterior view

Left (Buccal view)

Palatal view

Right maxillary lingual view

Palatal view

Left maxillary lingual view

Right mandibular lingual view

Lingual view

Left mandibular lingual view

Lingual view

IV. Pre-Treatment Examination

- Past history of dental exams and treatment
  - Frequency of dental hygiene visits: Patient does not make routine visits to the dental office and may often schedule a hygiene appointment once a year.
  - Hx of SRP: N/A
  - Hx of Periodontal Surgery: N/A
  - Patient data records:
    - Last dental visit: May 2020
    - Last dental exam: May 2020
    - Last dental x-rays: A Full Mouth Series (FMX) was taken on November 18, 2020.
    - Hygiene: Prophylaxis treatment, May 2020 (no polish due to recent covid regulations).

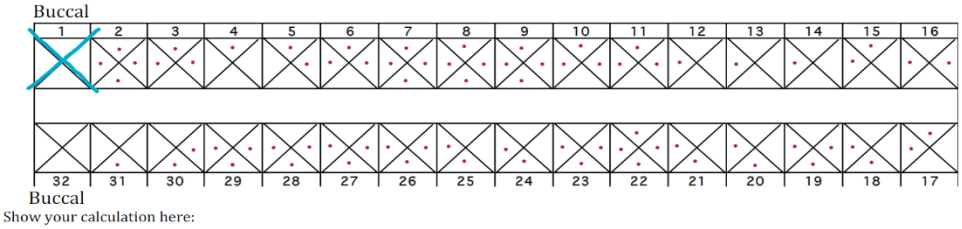
- Extraction: Tooth #1 was extracted on August 2018 due to severe decay.
- Fillings: #2 DO composite restoration, #4 DO composite restoration, #5 O composite restoration, #16 DO composite restoration, #18 O composite restoration, #31 O composite restoration. The date of these composite restorations is unknown. Patient does not remember approximate dates of when these restorations were placed and simply stated they were done several years ago.

- Caries Index (DMFT)
  - D – 8 teeth with clinically visible caries
  - M – 1 missing tooth (extracted) due to severe decay
  - F – 0

    DMFT = 9

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
M	D							D							D
D			D										D	D	D
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

- Gingival description:
  - Maxillary Free gingiva appears pink, firm, smooth, and scalloped.
  - Maxillary attached gingiva appears pink, firm, and smooth.
  - Mandibular free gingiva appears pink, firm, smooth, and scalloped.
  - Mandibular attached gingiva appears pink, firm, and smooth.
- Marginal Bleeding Index: 6%
- Plaque Index (PCR) evaluation and correlation with assessments described:



Show your calculation here:

Calculation: Plaque Index = $\frac{\text{\# of teeth surfaces recorded with plaque}}{\text{\# of teeth x 4}} \times 100$

Plaque Index = $\frac{75}{124} \times 100$

Plaque Index = 60%

The plaque index calculation demonstrates the amount of bacteria, or plaque accumulation, on the surface of the patients teeth. There is a strong correlation of bacteria accumulation with periodontal conditions. The longer plaque accumulates on the surface of teeth, the more harmful it can become to the gingiva and surrounding dentition by

causing an increased risk of caries or eventually spreading subgingival and leading to infection. The patient is affected by the increased risk of caries but is still able to effectively manage and treat the periodontal condition to avoid progression to moderate or advanced periodontitis.

Right Side (Buccal view)

Anterior view

Left Side (Buccal view)

Palatal View

Right maxillary lingual view

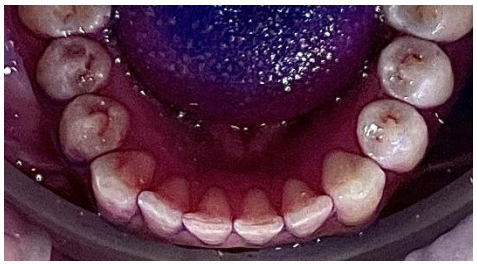
Palatal view

Left maxillary lingual view

Right mandibular lingual view

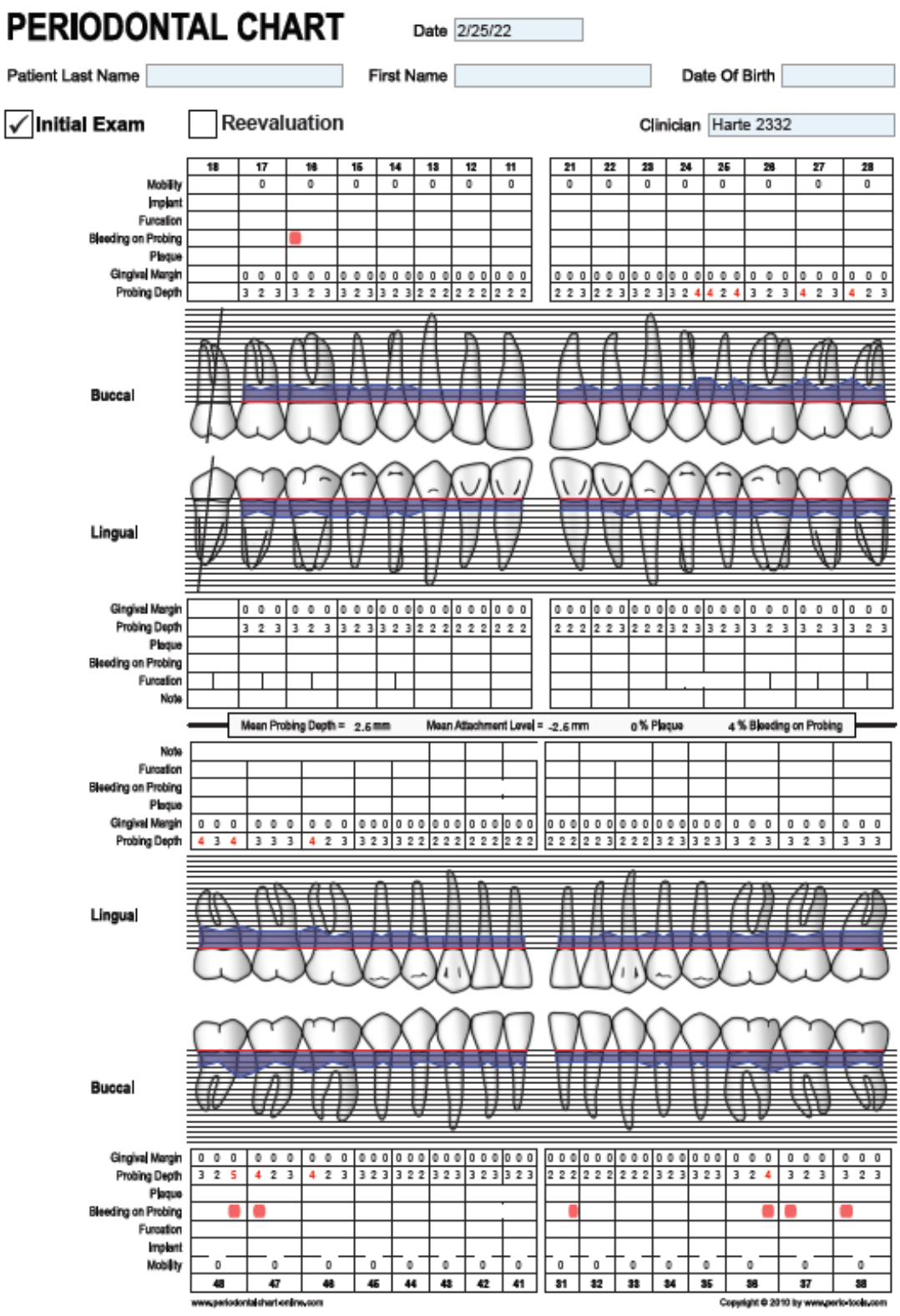
Lingual view

Left mandibular lingual view



Lingual view

- Probing Depth: Generalized pocket measurements of 2-3mm, localized 4mm pockets on the buccal aspect of the left maxillary posterior teeth and left mandibular first molar and localized 4-5mm pockets on the buccal and lingual aspect of the right mandibular molars.
- BOP: 4%, minimal bleeding upon probing
  Calculation: BOP = Number of bleeding sites/Sites evaluated x 100
  BOP = 7/186 x 100
  BOP = 3.76%, or 4%
- Recession: N/A
- CAL: Generalized 1-2mm with localized 3-4mm on the left maxillary posterior teeth, the left mandibular first molar, and the right mandibular molars.
- Furcation: N/A
- Mobility: N/A
- Possible genetic components related to periodontal status: N/A
- WLAC Calculus code: Light-2



- Periodontal disease etiology: Plaque accumulation
- Periodontal Perpetuating (Contributing or local) factors identified and record

- Plaque control record index recorded and evaluated: The patient's plaque indices is 60%. This is a contributing local factor as plaque has led to calculus, inflammation, and Stage I Periodontitis. The plaque accumulation has also led to caries on multiple teeth.
- Possible carious lesions: #2 DO, #9 DF, #16 DO, #18 O
- Faulty restorations: #2 DO composite restoration is missing, #18 O composite restoration has secondary caries. Both restorations are considered local factors and need to be replaced.
- Anatomical factors: #9 DF presents with clinical signs of early decay and sensitivity to metal
- Malocclusion: Yes. Tooth #10 is out of alignment and left maxillary and mandibular third molars have a cross bite relationship.
- Missing/shifted teeth: missing tooth #1
- Other(s): N/A

V. Radiographic Interpretation

- Radiographic Interpretation for periodontium and oral pathology (if available)
  - Pulp cavity: Radiographic interpretation indicates the pulp cavity appears radiolucent and in healthy conditions.
  - Alveolar bone: Generalized thick cortical bone extends apically and runs horizontal to the cementoenamel junction. Alveolar bone radiographically presents in generalized healthy condition. Active bone loss is indicated in the interproximal spaces of the maxillary right molars.
  - Lamina dura: The lamina dura appears radiopaque and perfectly lines the dental alveoli. The mesial of mandibular molars appear to have an increase in lamina dura indicative of occlusal trauma, very likely from grinding.
  - Alveolar crest: There is radiographic evidence of active bone loss on interproximal spaced of maxillary right molars. No significant horizontal or vertical bone loss.
  - Periodontal ligament space: Generalized widened PDL on the cervical third of the roots of anterior maxillary and mandibular teeth as well as first mandibular premolars and mandibular molars.
  - Confirmation of contributing factors

        - Overhangs: N/A
        - Faulty restorations: #2 DO composite restoration is missing, #18 O composite restoration has secondary caries. Both restorations need to be replaced.
    - Possible carious lesions: #2-DO, 9-DF, #16 DO, #17 O, #32 O
    - Condition of dental restorations: #2 DO and #18 O have faulty composite restorations.
    - Periapical areas: No pathology detected.
    - Pathology: N/A

VI. AAP classification

- AAP Classification
    - Generalized Stage 1 with localized Stage 2 on the buccal aspect of the left maxillary posterior teeth, the buccal and lingual aspect of the right mandibular molars, and the buccal distal aspect of the left mandibular first molar, Grade A.
- Rationale
    - The gingival margin is approximately 0.5mm coronal to the cementoenamel junction (CEJ). Upon probing, the pocket depth was generalized 1-3mm which indicates generalized CAL 1-2mm. The CAL is measured from the CEJ to the base of the pocket. Therefore, the localized areas with probing depths of 4-5mm had a localized CAL of 3-4mm. Grade A is indicated due to indirect evidence of the progression of radiographic bone loss or CAL being <0.25%. Patient is also a non-smoker and has not been diagnosed with diabetes.
- Modifiable factors
    - As they pertain to the patients' health and periodontal condition, modifiable factors include obesity, depression, and routine oral care. The patients unhealthy diet is the leading cause of obesity which leads to a high risk of caries and tooth loss. The patient already had to extract tooth #1 due to severe decay. Tooth #17 and #32 are at high risk of continuing down the same path if left untreated. Depression contributes to lack of motivation and concentration in patients own routine oral hygiene. In addition, the patient has xerostomia which is an adverse effect from the medications being taken. This leads to reduced salivary flow and the inability to regularly flush away unwanted bacteria from the surface of teeth. As a result, xerostomia greatly contributes to caries and periodontal disease.

VII. Treatment Plan and Supporting Rationale

- Include treatment plan, what was in plan and rationale for why this treatment plan was established
    - Special considerations
        - With the exception of local anesthetics, if needed, the use of a vasoconstrictor should be administered with caution. However, the use of local anesthesia is not anticipated. There are no indications which would require the use of nitrous oxide sedation or oral sedation. The patient has anxiety which is controlled with medication. However, the patient’s anxiety is not related to dental treatment.

- Treatment recommendation: Full mouth Prophylaxis treatment. Rationale: Generalized probing depths of 2-3mm with 1-2mm CAL, localized 4mm pockets on left maxillary posterior teeth and left mandibular first molar with 3mm CAL and localized 4-5mm pockets on right mandibular molars with 3-4mm CAL. WLAC Calculus Code: Light-2. Treatment will begin on the right mandibular quadrant as this quadrant is the most periodontally involved with the highest combined probing depth and CAL.
- Treatment Plan:

Visit #1	Assessment Only: - Review Medical History - Check vitals - EO/IO Examination - Occlusal Classification - Caries Evaluation - Gingival Description - Probing - Recession - Mucogingival Involvement - Furcation - Mobility - Calculus Classification - Review Full Mouth Series (FMX) - Periodontal Classification - Consultation
Visit #2	**1 week later** - Review Medical History - Check vitals - EO/IO Examination - Reassess initial findings from visit #1 - Plaque Index - IntraOral Photos - Present Treatment Plan
Visit #3	**1 week later** - Review Medical History - Check vitals - EO/IO Examination - Reassess findings from previous visit - Begin prophylaxis treatment (Right side) - Polish - Fluoride application - OHI
Visit #4	**1 week later** - Review Medical History - Check vitals - EO/IO Examination - Reassess findings from previous visit

	- Evaluate right side - Complete prophylaxis treatment (Left side) - Polish - Fluoride application - OHI
Visit #5	**4-6 weeks later** - Review Medical History - Check vitals - EO/IO Examination - Re-evaluation

- Number of appointments: There will be a total of 5 appointments including assessments, prophylaxis treatment, and re-evaluation. However, only 2 of these appointments will consist of prophylaxis as only half the mouth will be scaled at a time.
- Recall recommendations: It is in the patient's best interest to remain on a 3-month maintenance recall due to the level of plaque accumulation. If the patient is able to maintain routine oral hygiene care at home and routine maintenance visits to attain plaque control, the patient may move to 4–6-month maintenance recalls after one year of improvement. A 3-month maintenance recall is also suggested to help alleviate the oral effects caused by xerostomia and restore healthier oral conditions on a more frequent basis.
- Prognosis: Good with patient compliance

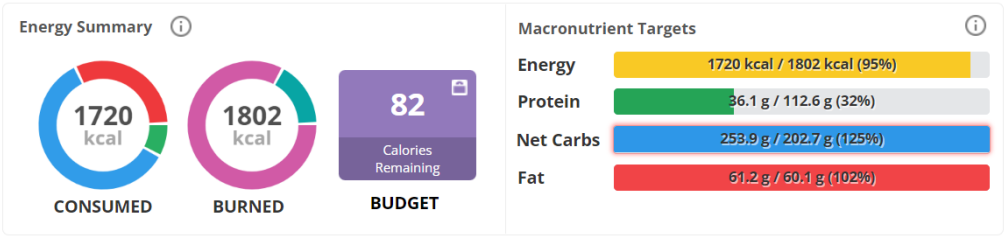
VIII. Three-day dietary nutrition report and analysis

- Detailed three-day dietary analysis

Three-day diet #1

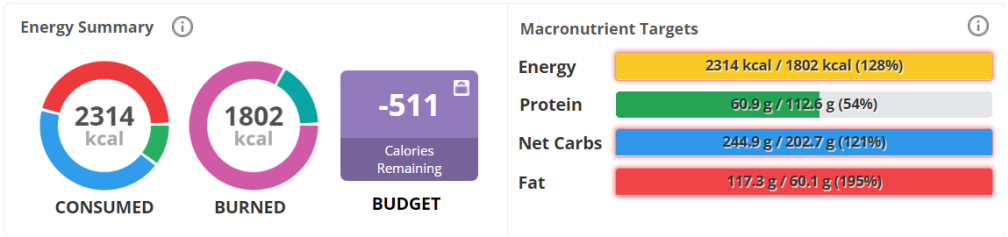
March 3, 2022

Description	Amount	Unit	Energy (kcal)
Wendy's Soda	1	small without ice - 20 fl oz cup	245.6
Wendy's, French Fries	1	small - order	315.87
Wendy's, Chicken Nuggets	10	nugget	437.38
Birria de Carne, Shredded Meat	0.25	cup	51.75
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Takis, Tortilla Chips, Fuego	0.33	oz	45.17
Russell Stover, Chocolate	2	piece	240



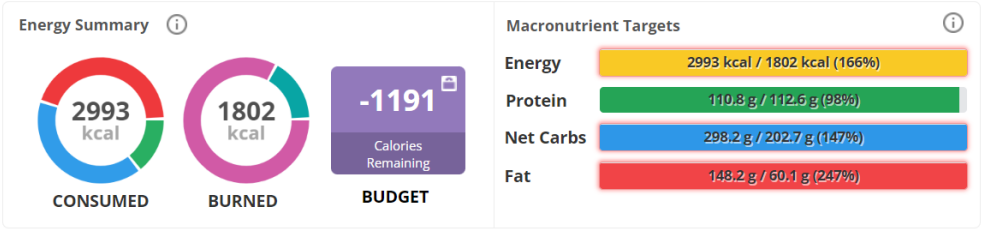
March 4, 2022

Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Philadelphia, Cream Cheese, Original	120	g	428.57
Milk, Whole	20	oz	345.86
Nestle, Nesquick	24.5	g	93.1
Sugars, Granulated	1	tsp	16.13
McDonald's, Big Mac	1	each	550.29
McDonald's, French Fries	1	child size - order	109.56
Coca-Cola Classic	1	small can - each 8 fl oz	90.87
Russell Stover, Chocolate	2	piece	240
Takis, Tortilla Chips, Fuego	0.33	oz	45.17
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97



March 5, 2022

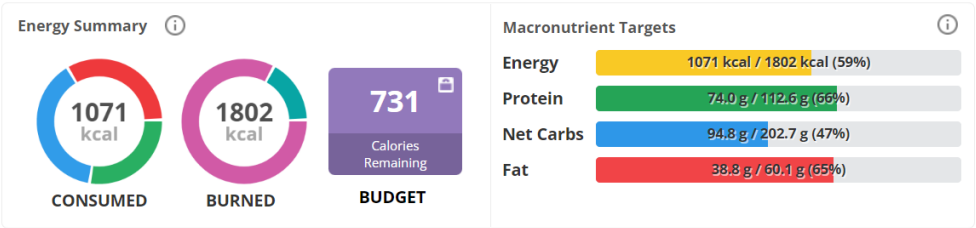
Description	Amount	Unit	Energy (kcal)
Philadelphia, Cream Cheese, Original	120	g	428.57
Milk, Whole	20	oz	345.86
Nestle, Nesquick	24.5	g	93.1
Sugars, Granulated	1	tsp	16.13
BFree, Multiseed Bagel	1	Bagel	202
Ingham's, Chicken Roasting Portions	300	g	597.51
Bimbo, White Bread	2	Slice	138.05
Kraft, Real Mayonnaise	2	tsp	58.93
Lettuce, Romaine or Cos	1	cup, chopped	7.99
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Lunchables, Ham & Cheddar	1	package	260
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Doritos, Tortilla Chips, Nacho Cheese	22	chip	281.34
Kellogg's, Rice Crispy's Treats, Chocolate	2	bar	180



Three-day diet #2

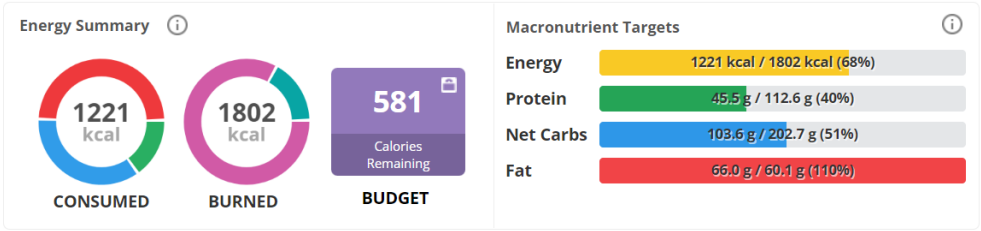
March 10, 2022

Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Cream Cheese Spread	4	tsp	59
Milk, Whole	8	oz	138.35
Lettuce, Romaine or Cos	1	cup, chopped	7.99
Kraft, Real Mayonnaise	2	tsp	58.93
Chicken breast, Oven-Roasted, Fat-Free, Sliced	150	g	118.5
Bread, Whole Wheat, Commercially Prepared	2	medium slice	181.44
Thin Sliced Sirloin Tip Steak for Carne Asada	1	× 4 ounces	200
Tortillas, Corn	2	each - 6" diameter	104.64



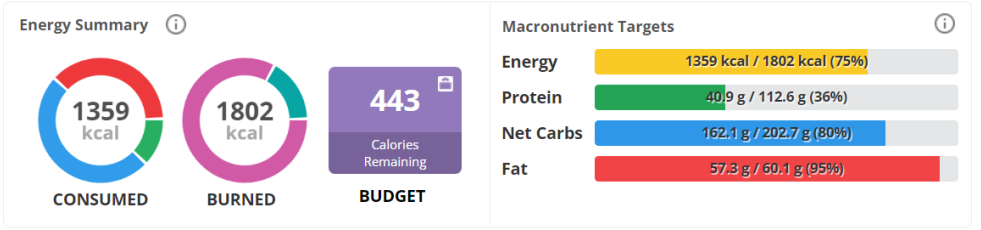
March 11, 2022

Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Cream Cheese Spread	4	tsp	59
Milk, Whole	8	oz	138.35
Wendy's, Chicken Nuggets	10	nugget	437.38
Dasani, Water	1	Bottle	0
Oscar Meyer, Select Naturals, Angus Beef Hot Dog, Bun Length	1	Link	160
Hot Dog Bun, White	1	regular - 6" x 2" x 1 1/2"	119.97
Kraft, Real Mayonnaise	2	tsp	58.93
Ketchup	3	tbsp	45.45



March 12, 2022

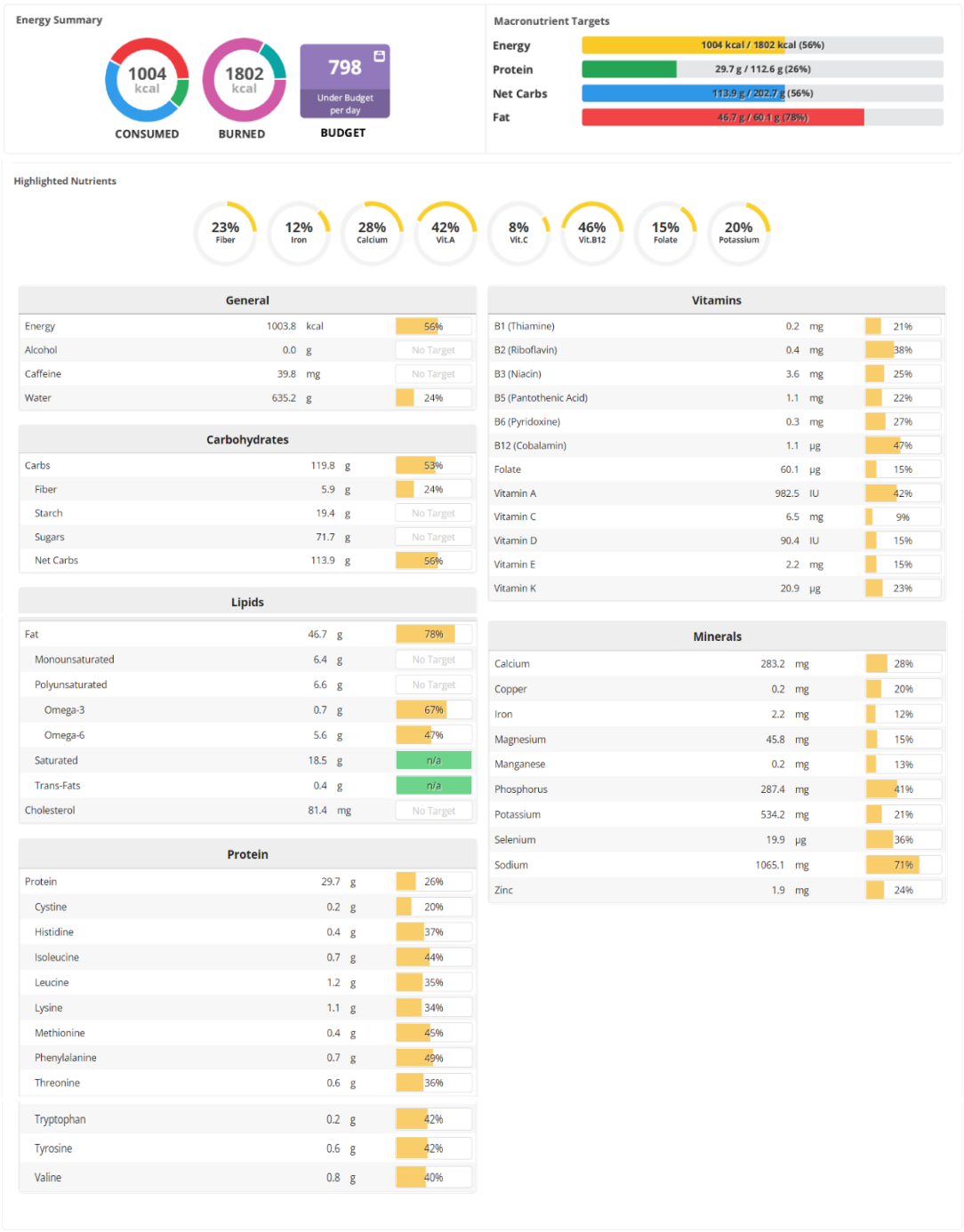
Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Cream Cheese Spread	4	tsp	59
Milk, Whole	8	oz	138.35
McDonald's, Big Mac	1	each	550.29
McDonald's, french fries	1	Small	227.68
Coke	16	fl oz	181.74



- Production of Nutritional Analysis using a diet analysis software

Three day nutritional analysis #1

March 3-5, 2022



Energy Summary

1004 kcal	1802 kcal	798 Under Budget per day
CONSUMED	BURNED	BUDGET

Macronutrient Targets

Energy	1004 kcal / 1802 kcal (56%)
Protein	29.7 g / 112.6 g (26%)
Net Carbs	113.9 g / 202.7 g (56%)
Fat	46.7 g / 60.1 g (78%)

Highlighted Nutrients

23% Fiber	12% Iron	28% Calcium	42% Vit.A	8% Vit.C	46% Vit.B12	15% Folate	20% Potassium

General

Energy	1003.8	kcal	56%
Alcohol	0.0	g	No Target
Caffeine	39.8	mg	No Target
Water	635.2	g	24%

Carbohydrates

Carbs	119.8	g	53%
Fiber	5.9	g	24%
Starch	19.4	g	No Target
Sugars	71.7	g	No Target
Net Carbs	113.9	g	56%

Lipids

Fat	46.7	g	78%
Monounsaturated	6.4	g	No Target
Polyunsaturated	6.6	g	No Target
Omega-3	0.7	g	67%
Omega-6	5.6	g	47%
Saturated	18.5	g	n/a
Trans-Fats	0.4	g	n/a
Cholesterol	81.4	mg	No Target

Protein

Protein	29.7	g	26%
Cystine	0.2	g	20%
Histidine	0.4	g	37%
Isoleucine	0.7	g	44%
Leucine	1.2	g	35%
Lysine	1.1	g	34%
Methionine	0.4	g	45%
Phenylalanine	0.7	g	49%
Threonine	0.6	g	36%
Tryptophan	0.2	g	42%
Tyrosine	0.6	g	42%
Valine	0.8	g	40%

Vitamins

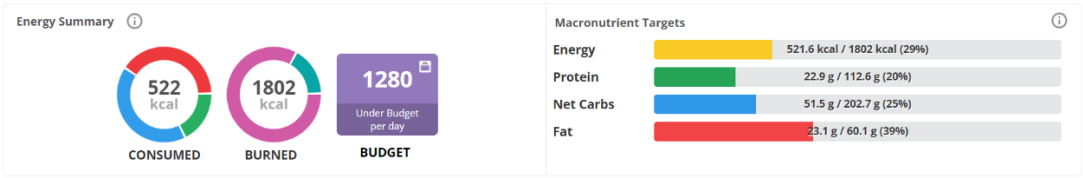
B1 (Thiamine)	0.2	mg	21%
B2 (Riboflavin)	0.4	mg	38%
B3 (Niacin)	3.6	mg	25%
B5 (Pantothenic Acid)	1.1	mg	22%
B6 (Pyridoxine)	0.3	mg	27%
B12 (Cobalamin)	1.1	µg	47%
Folate	60.1	µg	15%
Vitamin A	982.5	IU	42%
Vitamin C	6.5	mg	9%
Vitamin D	90.4	IU	15%
Vitamin E	2.2	mg	15%
Vitamin K	20.9	µg	23%

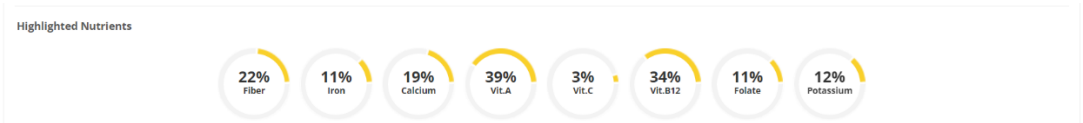
Minerals

Calcium	283.2	mg	28%
Copper	0.2	mg	20%
Iron	2.2	mg	12%
Magnesium	45.8	mg	15%
Manganese	0.2	mg	13%
Phosphorus	287.4	mg	41%
Potassium	534.2	mg	21%
Selenium	19.9	µg	36%
Sodium	1065.1	mg	71%
Zinc	1.9	mg	24%

Three day nutritional analysis #2

March 10-12, 2022





General			
Energy	521.6	kcal	29%
Alcohol	0.0	g	No Target
Caffeine	6.9	mg	No Target
Water	289.7	g	11%

Carbohydrates			
Carbs	57.3	g	25%
Fiber	5.7	g	23%
Starch	15.4	g	No Target
Sugars	16.5	g	No Target
Net Carbs	51.5	g	25%

Lipids			
Fat	23.1	g	39%
Monounsaturated	4.7	g	No Target
Polyunsaturated	4.6	g	No Target
Omega-3	0.6	g	51%
Omega-6	3.9	g	32%
Saturated	7.8	g	n/a
Trans-Fats	0.5	g	n/a
Cholesterol	57.5	mg	No Target

Protein			
Protein	22.9	g	20%
Cystine	0.2	g	26%
Histidine	0.5	g	39%
Isoleucine	0.7	g	48%
Leucine	1.3	g	37%
Lysine	1.1	g	36%
Methionine	0.4	g	50%
Phenylalanine	0.7	g	51%
Threonine	0.6	g	38%
Tryptophan	0.2	g	45%
Tyrosine	0.6	g	42%
Valine	0.8	g	41%

Vitamins			
B1 (Thiamine)	0.2	mg	20%
B2 (Riboflavin)	0.3	mg	28%
B3 (Niacin)	3.8	mg	27%
B5 (Pantothenic Acid)	0.8	mg	16%
B6 (Pyridoxine)	0.2	mg	17%
B12 (Cobalamin)	0.8	µg	35%
Folate	46.8	µg	12%
Vitamin A	931.7	IU	40%
Vitamin C	2.6	mg	3%
Vitamin D	59.2	IU	10%
Vitamin E	1.5	mg	10%
Vitamin K	19.5	µg	22%

Minerals			
Calcium	196.5	mg	20%
Copper	0.1	mg	13%
Iron	2.1	mg	12%
Magnesium	36.9	mg	12%
Manganese	0.4	mg	23%
Phosphorus	227.7	mg	33%
Potassium	329.7	mg	13%
Selenium	20.6	µg	37%
Sodium	959.6	mg	64%
Zinc	1.6	mg	20%

Food Group Report

- Assess average daily kilocalories
    - The first three-day diary nutritional analysis measured an average kilocalorie consumption of 2,342 kcal/day.
        - Patient is exceeding daily recommended kilocalories.
        - The report generated and included in this report was generated based on a 7-day nutritional analysis. However, only three days are being considered.
    - The second three-day diary nutritional analysis measured an average kilocalorie consumption of 1,217 kcal/day.
        - Patient's average kilocalorie diet is below the daily recommended amount.
        - The report generated and included in this report was generated based on a 7-day nutritional analysis. However, only three days are being considered.

- Inadequacies and excesses
    - On average, the patient consumed foods high in fat and low in protein.
    - Inadequate food group
        - Protein
    - Exceeded
        - fats (lipids)
        - Sodium
        - carbohydrates

IX. Carbohydrate Analysis

- List fermentable carbohydrates and caries relationship
    - Fermentable carbohydrates are cariogenic due to the sugar and/or sweeteners contained within the food that is absorbed by bacteria to produce acid.
    - Foods containing high-fructose corn syrup, fructose syrup, corn sugar, maize syrup, crystalline fructose, glucose syrup, and corn syrup solids.
    - Cariogenic foods consumed by patient:
        - Soda
            - Contains acid and sugar
        - French fries
            - Contains sucrose
        - Takis
            - Contain refined carbohydrates
                - Sugar and starch
        - Chocolate
            - Low pH
            - Contains sugar
        - Bread
            - Contains sugar and starch

- Calculate exposures

Forms of sugar	When eaten	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Liquid	With meals	1	1	1	1	1	2	7
	Between meals	2	2	2				6
Solid	With meals		2	2	2	2	2	10
	Between meals	1	4	1				6

Grand total = 13 (Sugar in liquid form)
Grand total= 16 (Sugar in solid form)

13 (Liquid Exposure) x 20 min (pH below 5.5) = 260 (Acid production) ÷ 6 days = 43. (Daily liquid acid Production)

16 (Solid Exposure) x 40 min (pH below 5.5) = 640 (Acid production) ÷ 6 days = 106. (Daily liquid acid Production)

Total daily acid production = 43. (Liquid acid production total) + 106 (Solid acid production total) = 149 min. (total time tooth is exposed to acid daily)

- Provide modification recommendations
  - Limit carbohydrate intake to mealtime
  - Avoid sweets
  - opt for healthier alternatives to sweets when snacking
    - Reduced sugar options
    - Fruits and vegetables
    - Switch soda for water
  - Do not exceed daily recommended calorie consumption
  - Rinse with water after meals to counteract acidity of foods

X. Relevant Nutritional Information

- Social history
    - How often eat away from home?
        - Eats fast food daily
        - Eats out or has fast food delivered
            - Favorite restaurants include:
                - McDonalds
                - Subway
                - Wendy's
                - Panera Bread
                - Simply Salad
                - Panda Express
                - Carl's Jr.

- Who does cooking/shopping?
    - Patient does her own grocery shopping
    - Grocery items generally consist of:
        - Multiseed bagels
        - Cream cheese
        - Sliced roasted chicken
            - For sandwiches, incl. cheese, mayo, lettuce
        - Ground beef
            - For taco bowls, incl. sour cream, cheese, tostada chips
        - Lunchables
        - Cases of Dr. Pepper
        - Frozen pizza
        - Canned tuna
        - Chips, peanuts, cookies, crackers, etc.

- Who lives at home?
    - Lives with mom, dad, and older brother

- Number meal/snacks per day?
    - Meals: 3 per day
    - Snacks: 1-2 per day

- Working? Number of hours/weeks?
    - Works from home via zoom
        - 15 hours per week

- As a tutor, she assists students in areas of math, English, Spanish, and study and motivational skills.

- Regular hours?
  - Monday
    - School 9 am-12 pm
    - Tutoring 2:00 pm-6:30 pm
  - Tuesday
    - School 3:34 pm – 7:30 pm
    - Tutoring 1:00 pm – 5:00pm
  - Wednesday
    - School 11:00 am -2:30 pm
    - Tutoring 3:00 pm - 8:30 pm
  - Thursday
    - Tutoring 1:00 pm – 2:00 pm
    - School 3:34 pm – 7:30 pm
  - Friday
    - No school
    - Tutoring 7:30 pm – 8:30 pm
  - Saturday & Sunday
    - Free time/ study

- Special dietary considerations
  - Cultural
    - N/A
  - Lactose intolerance
    - N/A
  - Low fat
    - N/A
  - Low calorie
    - N/A
  - Allergies
    - N/A
  - Intolerances
    - N/A
  - Vegetarian
    - No
  - Religious
    - During lent, patient does not eat meat on Friday's.

- 3. Compare intake with Dietary Guidelines
    - What guidelines are followed
        - Patient is not consistent with dietary guidelines.

    - Where can there be improvement
        - Patient should consume a lower calorie diet and consume less foods with sugar and starches. Carbohydrates should be limited to mealtime and healthier options for snack should be considered.

    - Provide specific and realistic recommendation
        - Start with portion control
        - Then slowly switch out foods for healthier options
            - i.e., switch soda for water, chips for nuts/seeds, chocolate for fruits, etc.
        - choose foods low in fat and cholesterol
        - salt and sugar should be consumed only in moderation

XII. Nutritional Recommendation letter for patient

Dear _____,

I hope this letter finds you well. I am writing to provide you with nutritional recommendations based on the nutritional analysis of your three-day diet diaries. My assessment indicates that you are high risk for caries because you consume a high amount of Dr. Pepper and consume an excess amount of starchy and sugary foods. It is our goal to help you achieve a healthy oral cavity which can also substantially assist your overall oral health. My recommendations are as follows:

- Strictly adhere to oral hygiene instruction and nutrition recommendations.
- Limit consumption of carbohydrates during meals and avoid, if possible, when snacking. Sugar free gum can assist with tricking your brain to thinking you are snacking while also helping to alleviate dry mouth.
- Brush twice a day using Prevident 5000 Plus. The high fluoride concentration will help re-mineralize and strengthen your teeth while protecting them against cavities.
- Floss twice a day using the c-shaped method to cover more tooth surface and eliminate any residual plaque accumulation between teeth.
- Rinse using ACT mouth rinse. This rinse contains fluoride and is alcohol free. It is specifically designed for patients with xerostomia to alleviate dry mouth and assist in the elimination of bacteria.
- Schedule a visit with your dentist to treat the teeth that need fillings and the teeth that need extractions.

- Make an appointment to treat the teeth where sealants were recommended. Sealants are a thin layer of resin that is placed in the deep grooves of your teeth to protect against caries and promote the longevity of your teeth.
- Maintain the recommended 3-month maintenance recall interval. It is of the upmost importance for you to see your dental hygienist regularly to for a professional teeth cleaning to maintain good oral hygiene and good periodontal health.
- Receive regular fluoride varnish application at each recall appointment.

If you have any questions regarding my recommendations, please know that I am happy to answer any questions and address any concerns you may have.

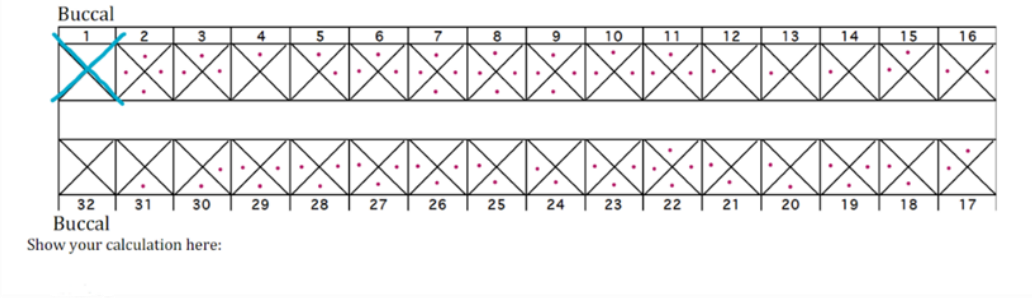
XIII. Proper citations and use of evidence to support recommendations

- Please see XXIV. References

XIV. Writing Style: organization, grammar, spelling, and references.

XVI. Oral Hygiene Evaluation and Fluoride Analysis

- **Pre-treatment:**



Calculation: Plaque Index = $\frac{\text{\# of teeth surfaces recorded with plaque}}{\text{\# of teeth x 4}} \times 100$

Plaque Index = $\frac{75}{124} \times 100$

Plaque Index = 60%

The plaque index calculation demonstrates the amount of bacteria, or plaque accumulation, on the surface of the patients' teeth. There is a strong correlation of bacteria accumulation with periodontal conditions. The longer plaque accumulates on the surface of teeth, the more harmful it can become to the gingiva and surrounding dentition by causing an increased risk of caries or eventually spreading subgingival and leading to infection. The patient is affected by the increased risk of caries but is still able to effectively manage and treat the periodontal condition to avoid progression to moderate or advanced periodontitis.

Right Side (Buccal view)

Anterior view

Left Side (Buccal view)

Palatal View

Right maxillary lingual view

Palatal view

Left maxillary lingual view

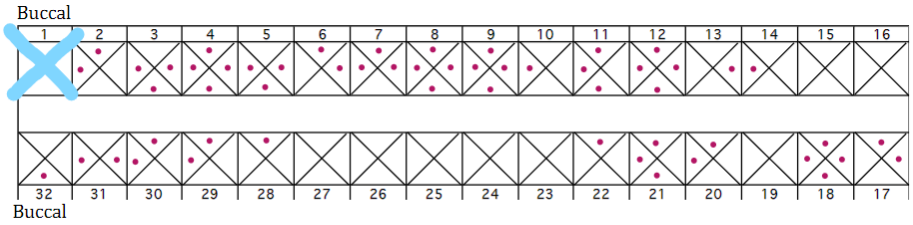
Right mandibular lingual view

Lingual view

Left mandibular lingual view

Lingual view

- **Post-treatment (re-eval appointment):**



  - Show your calculation here:

Calculation: Plaque Index = $\frac{\text{\# of teeth surfaces recorded with plaque}}{\text{\# of teeth x 4}} \times 100$

Plaque Index = $\frac{55}{124} \times 100$

Plaque Index = 44%

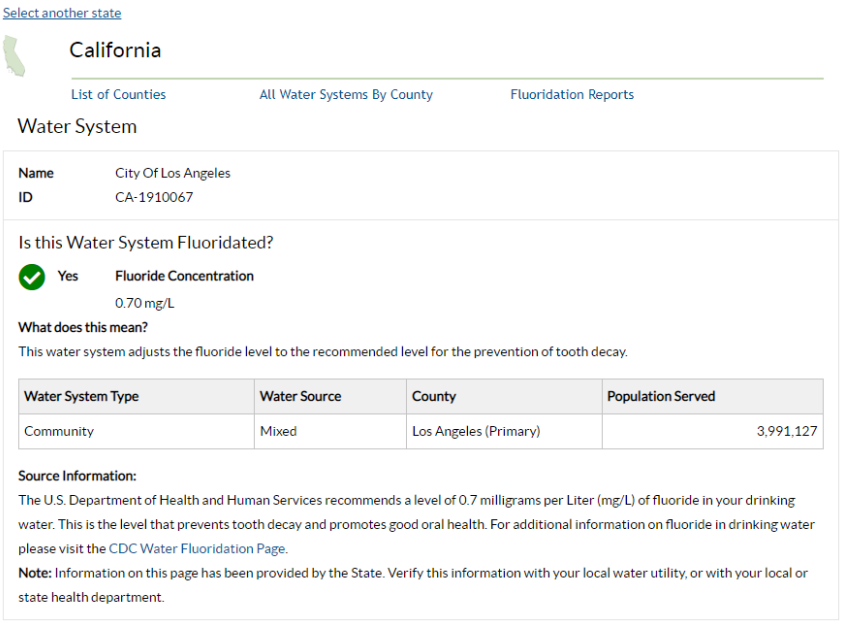
Oral Hygiene reassessment Status

- How Patient's OH skill level was assessed and evaluated
    - Gingival assessment
    - Periodontal assessment
    - Plaque Indices
    - Communication

- Patient's knowledge and awareness of dental and periodontal diseases.
    - Knowledge was limited to basic principles of brushing and flossing to maintain clean teeth and eliminate bad breath. After participating in the project, the patient learned the importance of periodontal health, the correlation with systemic conditions, the effects of nutrition on oral health, and how to address these concerns.

- Current usage of fluoride (Type, amount, supplemental, the fluoride concentration of water in the city where patient lives)
    - Fluoride concentration in the city where patient lives is 0.70 mg/L.

- Patient does not drink tap water or bottled water.
- https://nccd.cdc.gov/DOH_MWF/Default/WaterSystemDetails.aspx



Select another state

California

List of Counties | All Water Systems By County | Fluoridation Reports

Water System

Name City Of Los Angeles
ID CA-1910067

Is this Water System Fluoridated?

Yes **Fluoride Concentration**
0.70 mg/L

What does this mean?
This water system adjusts the fluoride level to the recommended level for the prevention of tooth decay.

Water System Type	Water Source	County	Population Served
Community	Mixed	Los Angeles (Primary)	3,991,127

Source Information:
The U.S. Department of Health and Human Services recommends a level of 0.7 milligrams per Liter (mg/L) of fluoride in your drinking water. This is the level that prevents tooth decay and promotes good oral health. For additional information on fluoride in drinking water please visit the CDC Water Fluoridation Page.
Note: Information on this page has been provided by the State. Verify this information with your local water utility, or with your local or state health department.

XVII. CAMBRA Analysis

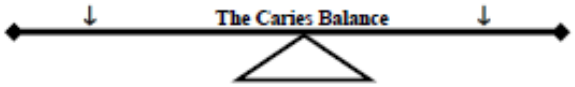
- CAMBRA Assessment

CARIES RISK ASSESSMENT FORM - ADULTS/CHILDREN AGED 6 YEARS AND OVER

[redacted] Age 27

Assessment date: 2/25/22 Is this: (please circle) Baseline or Recall

FACTORS	HIGH	MODERATE	LOW
1. Local Factors	(Please circle responses)		
Plaque/Calculus	generalized	localized	minimal/none
2. Dental Conditions			
*Visible cavitations	YES		no
Cavity in last 3 years	yes		no
+Inadequate saliva flow	yes		no
Exposed roots		yes	no
Deep pits/fissures		yes	no
Radiographic lesions		yes	no
White spot lesions		yes	no
Appliances present	yes		no
3. Medical History:			
Sjogren's syndrome	yes		no
Hyposalivary meds	yes		no
Radiation Therapy	yes		no
4. Dietary Habits			
Snacks between meals	>3 times	1-3 times	infrequent
Regular Soda	yes	infrequent	no
5. Environmental			
Recreational drugs	yes		no
6. Protective Factors			
Fluoridated water	no		yes
Fluoridated toothpaste	no		yes
Adequate saliva flow	no		yes
Fluoride mouthrinse		no	yes
Xylitol gum/mints		no	yes
Chlorhexidine rinse		no	yes
Povidone Iodine rinse		no	yes
7. Laboratory Tests			
Saliva Flow	Recommended	Recommended	Optional
Bacterial Culture	Recommended	Recommended	Optional
Lab Test Results: MS:	LB:	Flow Rate:	ml/min.



CARIES RISK ASSESSMENT:	HIGH	MODERATE	LOW
PROGNOSIS:	POOR	MODERATE	GOOD

I have been given the recommendation to have a CRT to determine my bacterial counts as a part of my overall caries risk assessment. I understand the risks and benefits of the test and I decline, releasing my dentist(s) of any liability associated with declining the test.

[redacted] Date 2/25/22

* If visible cavitation present CRT test and saliva flow rate measurement are recommended

+If saliva flow appears inadequate Saliva Flow test is recommended. If rate <1 ml/min follow protocol for xerostomia

Patient Recommendations for Control of Dental Decay-ADULTS/CHILDREN OVER AGE 6

[redacted] Chart #_____

I. LOW RISK

Daily Oral Hygiene (Aimed at reducing the overall bacteria in the mouth, especially at sites likely to decay. Choose the recommendations based on the danger sites and the condition of the mouth)

____ brush twice daily (with fluoride toothpaste, all patients) ____ floss daily ____ Superfloss
____ interproximal brush ____ Stimudents ____ toothpick
____other:_____

Diet (The most important thing is to reduce the number of snacks between meals that contain carbohydrates, especially sugars. Substitution by snacks rich in protein, such as cheese, will also help)

____ OK as is ____ limit snacking ____ limit sodas
____ other:_____

Fluorides (**All patients should use fluoride toothpaste twice daily**). Additional fluoride products should be added, depending on whether the risk level is medium or high. Home fluoride products must be used daily to be effective).

____ regular fluoride-containing toothpaste
____ fluoride rinse (0.05 % NaF, *ACT* or *Fluorigard*) 2X/day (use twice a day, once in the morning after breakfast and once last thing at night. Continue long term with older patients or those who need or want extra protection). Note that *ACT* contains no alcohol and may be preferred by a patient with dry mouth.)

Xylitol gum/mints (The gums or mints that contain xylitol cannot cause cavities. In addition, xylitol has an anti-cavity effect against the decay-causing bacteria. Look for xylitol products at stores that list "xylitol" as the first ingredient, or even better (and cheaper) search for "pure" xylitol products, under "xylitol" on the World Wide Web. Xylitol can be used as a sugar substitute even while cooking or baking; however, it may cause diarrhea if used in excess.) **Note: xylitol is a "special" sugar substitute that tastes just like table sugar. Other sugar substitute products will not have its cavity fighting properties and table sugar is sure to make things worse.**

____ Chew xylitol gum for 5 minutes after snacks or at least 3-5 times/day.
____ Use xylitol mints 3 – 5 times/day
____ office fluoride trays
____ office fluoride varnish

II. MODERATE TO HIGH RISK (ALL THE ABOVE PLUS:)

Daily high concentration fluoride

____ *Prevident* **5000 Plus (high fluoride toothpaste)**
____ *Prevident* "brush-on" nightly, **OR** in custom tray 10 min./night (For high risk patients, especially those with low saliva flow, or root caries, or active cavities. Continue until the risk status is lowered, then revert to fluoride as above).

Antibacterial rinse

____ **Chlorhexidine gluconate**, 0.12% (*Periogard, Peridex, Oral Rx*, available on prescription). Rinse 1 minute with ½ oz. at bedtime for one week (discontinue *ACT* or *Fluorigard* for this week). Stop for three weeks (resume use of *ACT* or *Fluorigard* during this time). Repeat chlorhexidine rinse for one week each month.
____ 10% providone iodine (*Betadine*) to be **administered by dental professional only** (ask about allergies and contraindications). Rinse or swab topically for 1-2 minutes 1x/mo.

III. FOR DRY MOUTH (ALL THE ABOVE PLUS:)

____ baking soda toothpaste with fluoride
____ baking soda gum - *Dental Care Gum* (Arm & Hammer, or similar product containing baking soda and xylitol.) Chew frequently throughout the day, especially after snacks.
____ rinse frequently with baking soda suspension during the day, especially after snacks. (Fill a sports water bottle with water and add 2 teaspoons of baking soda for each 8 oz. of water).
____ fluoride lozenges (*Lozi-Flur* or *Fluor-a-day*) 1X/day (use for high risk patients with low saliva flow, such as radiation xerostomia.) By dissolving in the mouth, these lozenges provide a concentrated fluoride reservoir to protect against mineral loss, and to enhance repair by remineralization. Dissolve slowly in mouth by holding the lozenge in a convenient place)
____Calcium and phosphate enhancing products (*MI Paste with Recalcident*)

- Recommendations based on patient's need
  - Brush twice daily with Prevident 5000 Plus
    - Rationale: high concentration of fluoride is ideal for patients at high risk of caries
      - Works faster than regular fluoride toothpastes for fluoride absorption
      - Intended for patients with high levels of tooth decay
      - High caries risk
      - Prescription required
      - Use after regular brushing
  - Floss twice daily with traditional floss
    - Rationale:
      - Removes residual interproximal plaque
      - Protects against interproximal caries and periodontal disease
      - Apply C-Shaped flossing method
  - Fluoride rinse (ACT)
    - Rationale:
      - Contains active ingredient sodium fluoride 0.05%
      - It is alcohol free and a great alternative for patients with xerostomia
      - Alleviates dry mouth
      - Helps to strengthen tooth enamel
  - Fluoride varnish application at recall appointments
    - Rationale:
      - Fluoride varnish application at 3-6 month intervals is recommended for patients at high risk of caries
      - Substantially reduces risk of caries
      - Helps reverse early progression of caries
      - Re-mineralizes tooth enamel
      - Strengthens teeth
  - Dental Care Gum
    - Rationale:
      - Helps to increase the flow of saliva
      - Reduces plaque
      - Strengthens teeth
      - Reduces decay
      - Good alternative to snacking in between meals
  - Reduce amount of soda, sugar, and carbohydrate consumption
    - Rationale:
      - Reduces the risk of acid in soda eating away at the enamel surface of teeth
      - Less sugar consumption = less decay

        - Carbohydrates are broken down to sugar in the body
            - Triggers bacteria to form acid that can break down enamel
    - Sealants
        - Rationale:
            - Deep grooves on #2, #12-16, #19-21, #28-29
            - #30 has partially missing sealant
            - Blocks out bacteria on occlusal surfaces of teeth
            - Protects against cavities

- Caries risk prognosis and its rational
    - Prognosis: High caries risk
    - Rationale:
        - High consumption of cariogenic foods such as breads, sweets, and soda.
        - Inconsistent oral hygiene home care
        - Visible cavitation
        - Xerostomia (hyposalivary medications)
        - Deep pits/fissures

XVIII. Oral Hygiene Instruction and Plan

- Oral hygiene instruction provided and its rationale
    - Brush twice daily
        - In the morning after breakfast
            - Counteracts acid in sugary/starchy foods
            - Eliminates bacteria accumulation throughout the day
        - At night time before bed
            - Saliva protects to efficiently remove plaque and bacteria throughout the day however, less saliva is produced while we sleep.
            - Protects your teeth at night against plaque buildup and gum disease.
        - Brush at a 45 degree angle
            - Angle soft bristles slightly into the sulcus to stimulate the gingival tissues and blood vessels to get rid of unwanted bacteria.
            - Brush gently and cover all surfaces of teeth
            - Brush for a minimum of two minutes
            - Manual toothbrush may be used
        - Use regular toothpaste twice a day and follow up with Prevident 5000 Plus once a day
            - Contains high fluoride concentration to re-mineralize and strengthen teeth

- Floss twice a day after brushing
  - Use C-shaped flossing technique
    - Covers more surface area of the tooth
    - Eliminates plaque on the line angles of teeth that otherwise could be missed
  - Wrap 18 inch piece of floss around middle fingers leaving half an inch of floss between fingertips
  - Insert floss between teeth in a seesaw motion wrapping each side of the tooth in a c-shape
  - Floss in an up and down motion making 3-4 strokes and gently reaching the sulcus
- Rinse once a day after brushing
  - Use ACT mouth rinse
    - Alcohol free
      - Great alternative for patients with Xerostomia
    - Contains fluoride
      - Strengthens teeth
      - Prevents cavities
    - Kills bad breath
  - Rinse for one minute and spit it out into the sink
  - No eating or drinking for at least 30 minutes after rinsing

- Fluoride products – rationale: inhibits demineralization and promotes remineralization

- How does design address patient's needs
  - Protects against health risks like periodontal disease
  - Addresses patients oral habits
    - Nutritional habits
    - Poor oral hygiene home care
  - OHI recommendations are pain free
  - Addresses oral hygiene care to assist with the appearance of teeth
    - Patient will smile more and exude more confidence
  - Addresses periodontal health
    - Reducing pocket depth
    - Gingival inflammation
    - BOP
    - Xerostomia
  - Addresses active carious lesions
  - Opens lines of communications to ask questions to address concerns

    - Involves patient in taking on responsibility for her own oral health
        - Plaque control
        - Oral hygiene home care
        - Routine dental hygiene visits
        - Wisdom teeth extractions

- Goals developed with patient during OHI
    - Patient will begin brushing, flossing, and rinsing twice daily as discussed during OHI
        - Once in the morning after breakfast
        - Once at night time before bed
    - Patient will apply brushing and flossing methods discussed during OHI
        - 45 degree angle
        - c-shaped method
    - Patient will use sugarless chewing gum as an alternative to snacking between meals
    - 3 month maintenance recall appointments

- Smoking cessation program recommendations
    - N/A

- Preventive recommendations (sealant application, fluoride etc…)
    - Sealant #2, #12-16, #19-21, #28-30
        - Deep pits and fissure
        - #30 has partially missing sealant
    - Fluoride products (Prevident 5000 Plus, ACT mouth rinse, Fluoride varnish application)
        - Inhibits demineralization and promotes remineralization
        - Strengthens teeth
        - ACT mouth rinse is alcohol free and contains fluoride which makes it a great alternative for patients with xerostomia.
            - Alleviates dry mouth
        - Prevident 5000 Plus contains high fluoride concentrations and is only available with a prescription.
            - Works faster than regular fluoride toothpastes for fluoride absorption
        - Fluoride varnish is professionally applied in a dental setting after a dental cleaning has been performed.
            - Recommended at 3-6 month intervals for patients that are high caries risk.

- Possible implications of systemic conditions
    - Individuals with anxiety and depression suffer from a lack of energy and motivation for self-care.
        - Reduced oral care
            - Oral complications
                - Caries
                - Periodontal disease
                - Anti-depressant induced xerostomia

- Discussion of OHI modifications made during re-evaluation based on findings
    - Positive reinforcement
    - Patient showed improvement in reduced gingival inflammation, reduced pocket depth and reduced plaque accumulation.
        - Clinician provided support for changes/improvements that have been made by the patient.
        - Patient admitted to only brushing, flossing, and rinsing once a day.
            - An improvement from previous patterns (brushing once every few days and flossing on occasion)
    - Enforced OHI previously discussed
        - Brushing, flossing, and rinsing twice a day
    - Reinforced the oral health benefits of a reduced sugar diet.
        - Patient showed more motivation during this appointment after seeing improvement in her oral health.

- DDS referral, MD referral and specialty referral
    - #17-O Decay
    - #18 recurrent caries
    - #31 active caries

XIX. Discussion of Clinical Reassessment Status (*assessment at re-evaluation appointment)

- E & I examination
    - Extra Oral Examination and Findings, not limited to occlusion, TMJ and Oral Habits.
        - Occlusal Classification
            - Right Canine: Class II
            - Left Canine: Class I
            - Right Molar: Class II
            - Left Molar: Class I with Class II tendency
            - Maximum Opening: 43mm
            - Overjet: 7mm

        - Overbite: 3mm
        - Underbite: None
        - Crossbite: Left maxillary and mandibular third molars (Tooth #16 and #17)
        - Open bite: N/A
        - Facial profile: mesognathic

    - TMJ assessments and oral habits
        - No TMJ detected
        - No deviation or deflection detected
        - No pain or tenderness upon opening or closing jaw
        - Patient is aware of grinding and does not have a night guard

- Intra Oral Examination and Findings
    - Lips, cheeks, and pharynx are WNL
    - Tooth #10 is out of alignment
    - Tooth #7 and #9 appear to have enamel chipped off at the cervical third of the tooth along the gingival margin.
    - Bilateral lineal alba on buccal mucosa
    - Xerostomia, which may be due to current medications.

- Identification of findings on hard tissues:
    - Teeth #6-11 & #28 present with decalcification along the cervical margin.
    - Cusps of maxillary and mandibular posterior teeth appear worn down due to grinding and parafunctional habits.

- Evaluation of gingival tissue
    - Gingival description:
        - Maxillary Free gingiva appears pink, firm, smooth, and scalloped.
        - Maxillary attached gingiva appears pink, firm, and smooth.
        - Mandibular free gingiva appears pink, firm, smooth, and scalloped.
        - Mandibular attached gingiva appears pink, firm, and smooth.

- Periodontal Re-Evaluation (Probing, recession, furcation, mobility)
    - Mobility: N/A
    - Furcation: N/A

PERIODONTAL CHART

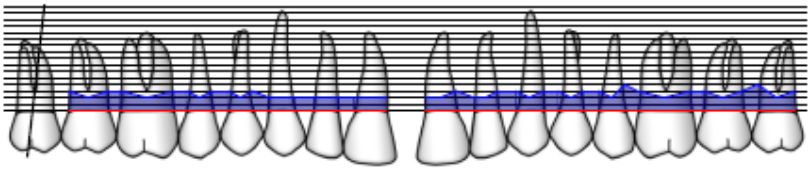
Date 5/24/22

Patient Last Name | First Name | Date Of Birth

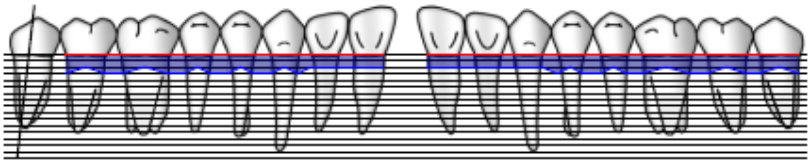
☐ Initial Exam ☑ Reevaluation Clinician Harte 2332

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Mobility		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Implant																
Furcation																
Bleeding on Probing													■			
Plaque																
Gingival Margin		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	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 3	2 2 3	3 2 3	3 2 3	3 2 4	3 2 3	3 2 3	4 2 3

Buccal



Lingual

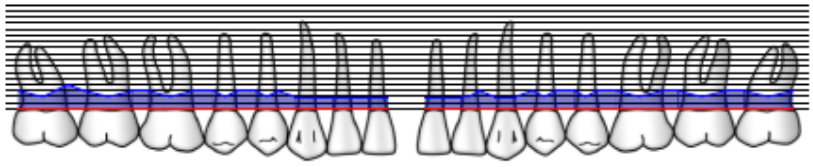


	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Gingival Margin		0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3
Plaque																
Bleeding on Probing																
Furcation	|	|	|		|								|	|	|
Note																

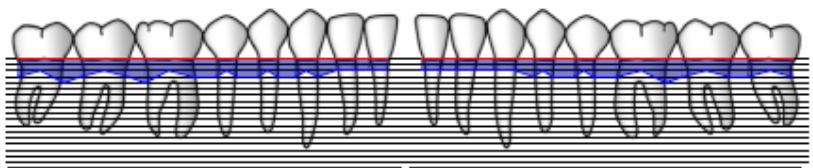
Mean Probing Depth = 2.5 mm Mean Attachment Level = -2.5 mm 0% Plaque 2% Bleeding on Probing

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Note																
Furcation																
Bleeding on Probing																
Plaque																
Gingival Margin	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	0 0 0	0 0 0	0 0 0	0 0 0
Probing Depth	3 2 4	3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 2	2 2 3	2 2 2	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3

Lingual

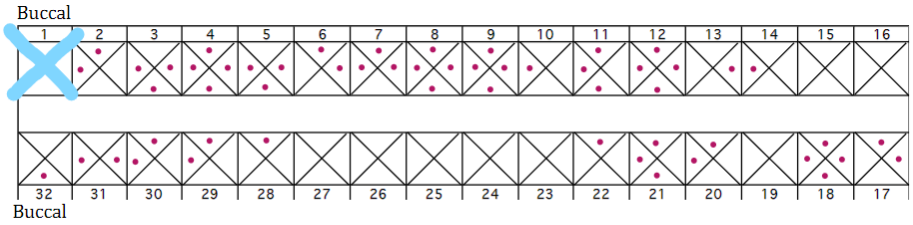


Buccal



	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Gingival Margin	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	0 0 0	0 0 0	0 0 0	0 0 0
Probing Depth	3 2 4	3 2 3	4 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	3 2 3	3 2 3	3 2 4	3 2 3	3 2 3
Plaque																
Bleeding on Probing			■											■		
Furcation																
Implant																
Mobility	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- Plaque index and photos of before and after disclosing



Show your calculation here:

Calculation: Plaque Index = $\frac{\text{\# of teeth surfaces recorded with plaque}}{\text{\# of teeth x 4}} \times 100$

Plaque Index = $\frac{55}{124} \times 100$

Plaque Index = 44%

XX. Oral Hygiene reassessment Status

- Patient compliance with recommended home care (oral hygiene/ prevention instructions/nutrition/referral).
    - Patient stated she is brushing, flossing, and rinsing once a day
        - Either morning or at night
        - Patient has a difficult time, due to her anxiety and depression, having the energy or motivation to brush, floss, and rinse more than once a day.
        - Patient is brushing at 45 degree angle, flossing using c-shaped method, and rinsing using ACT mouth rinse.

- Patient compliance with recommended nutritional diet. Modification of goals and post treatment status.
    - Patient is consuming less soda than usual and is consuming less calories per day staying within the recommended 2000 calories/day. However, there has not been any modification in the choices of food being consumed.
    - Modification: begin with small changes
        - Switch to options with less sugar or sugar free options
        - Consume carbohydrates in moderation not to exceed 225-325 grams per day.
        - Train the body
            - As time progresses, the body will become adjusted to consuming less sugar and carbohydrates per day and will begin to desire healthier alternatives to food and drinks.

XXI. Discussions

The overall treatment outcomes included reduced pocket measurements in maxillary left premolars and molars as well as mandibular right molars. Localized pocket measurements in these areas of 4-5mm decreased, in most areas, by 1mm over the 5-week healing period. In addition, plaque indices concluded an 18% decrease in plaque accumulation. There were no new areas of concern during the re-evaluation appointment that were not originally present during the initial assessment appointment. The patient affirmed that although the recommendation was to brush and floss twice daily, she is now, at minimum, brushing and flossing once a day. This is a significant improvement from her previous routine of brushing once every few days. She is brushing at a 45-degree angle to stimulate the gingiva and is applying the C-shaped method when flossing. She also uses the end-tuft brush that was provided to her during her last appointment to focus on the distal aspect of the most distal molars. Great improvement in plaque reduction was noticed in this area during her re-evaluation appointment. Patient also indicated having an appointment with her oral surgeon to remove #16, #17, & #32 in the upcoming week due to cavities and her desire to align her teeth.

Prior to participating in the project, the patient had a limited understanding on nutrition. She understood that certain foods were bad for you and may cause you to gain weight if consumed in excess. However, she was not fully aware of the systemic correlation of nutrition and the body, especially oral health. During her participation in the project, she learned that nutrition has a great impact on the overall health of your teeth and that foods, especially those high in sugar, should be consumed in moderation. The acid in soda, which she drank daily throughout the day, in combination with the high consumption of carbohydrates has had a significant effect on breaking down the enamel of teeth leading to decay, cavities, and sensitivity in certain areas.

During the re-evaluation appointment, it was determined that the patient should remain on a 3-month maintenance interval. Although the plaque accumulation decreased post-treatment in comparison to pre-treatment, plaque accumulation remained in roughly 42% of surfaces. For this reason, more frequent hygiene appointments are recommended to remove plaque accumulation on a more frequent basis. The application of professionally applied fluoride varnish on a clean enamel surface will also help re-mineralize and strengthen teeth. In turn, this will also help reduce the risk of cavities forming in areas where plaque accumulates the most.

Treatment can be provided better for the patient by providing 1-2 small attainable goals within appointments. This means, instead of providing a long list of changes and/or products for my patient to try, I would focus first on oral hygiene routine before focusing on which new products to try. Once my patient has arrived for her re-evaluation appointment and sees improvement, it will not only show her that what she is doing is working, but it will motivate her to continue improving her oral hygiene routine. With positive reinforcement from her clinician,

the patient will be more likely to ask more questions regarding which products will work best for her. It will also make the patient feel more comfortable in following recommendations.

Upon speaking to the patient and assessing her periodontal health during her reevaluation appointment, the goal was to see improvement in her overall periodontal health. The patient did demonstrate improvement in periodontal pocket reduction and a reduction in plaque accumulation. Oral hygiene instructions were followed to an extent. The patient went from brushing every few days and flossing only occasionally to now brushing and flossing at least once a day. While the recommendation was to brush, floss, and rinse twice a day, this is still a significant improvement in her overall oral hygiene care. Her systemic conditions contribute to the lack of motivation and consistency in self-care. However, she is working hard to overcome this issue and take better care of herself overall. This includes following a reduced calorie diet and substituting some servings of soda with water.

XXII. Conclusions

Oral health is comprised of teeth, periodontium, appearance, self- esteem, and has a strong correlation with overall systemic health. For this assessment, we will discuss only the conditions affecting the health of the patient. We will focus on anxiety and depression, and the correlation with poor oral home care, xerostomia, obesity, and high risk of caries. Other contributing factors to general oral health include malocclusion and parafunctional habits however, we will not focus on these in the immediate imminent. We must first address poor oral home care and subsequently tackle one element at a time. It would be easy to think that these factors should not limit the ability of a person to maintain good oral hygiene home care but, lets concentrate on each condition and how they actually affect an individual's overall health.

Anxiety and depression are systemic conditions that affect the mood and energy levels of a person. This can lead to a lack of motivation in self-care, including oral care. As a result, this can lead to increased plaque accumulation, calculus build up, gingival inflammation, and periodontitis. Several studies have been conducted to demonstrate the correlation of these systemic conditions with the overall oral health. Some have found no correlation, while others like the one discussed by Tayabeh Malek Mohammadi in his research article regarding anxiety, depression, and oral health found a "significant relationship between depression and oral health indices but not with anxiety." (Mohammadi 139) This indicates placing a focus on addressing the oral needs of those with depression. Although, depression is usually not present without anxiety. In addition, people with anxiety and depression often take psychotropic drugs. These drugs can include Venlafaxine, Sertraline, Duloxetine, and Fluoxetine which manage these disorders but may cause adverse effects such as xerostomia.

Xerostomia is a condition known as dry mouth that alters the salivary flow in the oral cavity. In the case of this patient, it is a condition due to the adverse reaction of the psychotropic drugs being taken to control her anxiety and depression. Saliva is the main component in the oral cavity needed to maintain oral homeostasis. It is detrimental to continuously washing away unwanted bacteria from the oral cavity and helping to protect oral health. A reduced salivary flow leads to a high risk of caries, which has been known to be one of the most common oral conditions, alongside to periodontitis. "Saliva is crucial in dental decay prevention, anti-microbial protection and protection of oral tissues from oxidative stress." (Roganovic 102) If not treated with saliva substitutes and other practices (i.e., frequent sips of water, alcohol free mouth rinses, and avoiding sugar or acid), xerostomia can pose great risk within the oral cavity.

Obesity correlates with poor nutritional choices (i.e., excess consumption of sugar) and lack of self-care, especially oral care. The patient is not consistent with oral hygiene dental visits. Recently, due to COVID, her dental visits have been pushed back more than usual. The patient acknowledged drinking Dr. Pepper throughout the day on a regular basis. Her nutritional choices are high in fats, carbohydrates, and sodium. This is a significant risk factor in causing both dental caries and obesity. “The obesity measure is of significance, especially with regard to behavior, like irregular dental visits.” (Kaur)

The patient’s depression causes a lack of motivation for self-care. As a result, this also causes poor nutrition choices and leads to oral health problems and obesity, when nutrient intake recommendations are consumed in excess. The patient is taking anti-depressant medications which have adverse reactions such as xerostomia. Xerostomia, as we have learned, causes oral problems such as caries if not treated with appropriate alternatives. However, one thing circles back to the next. Despite the obstacles faced by systemic conditions, prognosis is good with patient compliance. Patient has already demonstrated some improvement in oral hygiene home care which was evident with reduced periodontal pocket depths. As a clinician, it is my obligation to continue educating my patient and provide positive reinforcement. Patient did not thoroughly follow oral hygiene recommendations but, given the obstacles she faces, she still did a good job. I could tell upon speaking with the patient that she had motivation to continue her new oral hygiene home care after noticing improvement during her re-evaluation appointment. She was comfortable in asking questions about how to continue and improve her oral hygiene home care. This is a step in the right direction.

XXIII. Summary

The most important thing I learned from this project is how to properly manage patient

care. I learned a lot about medications and their correlation between the overall health of a person. There is a reason or cause behind every condition and it is our job as future professionals to understand the root of the problem and to know how to treat a person with these conditions. As I continue to say, each patient will have different necessities during their routine hygiene visits. We cannot assume that every patient will be provided with the same hygiene services. I was able to learn first-hand the effects of xerostomia and the effects of systemic conditions like anxiety and depression. As frequent as these conditions are, I feel fortunate to have had the opportunity to learn in depth, from a real patient, at this stage in my educational journey.

XXIV. References

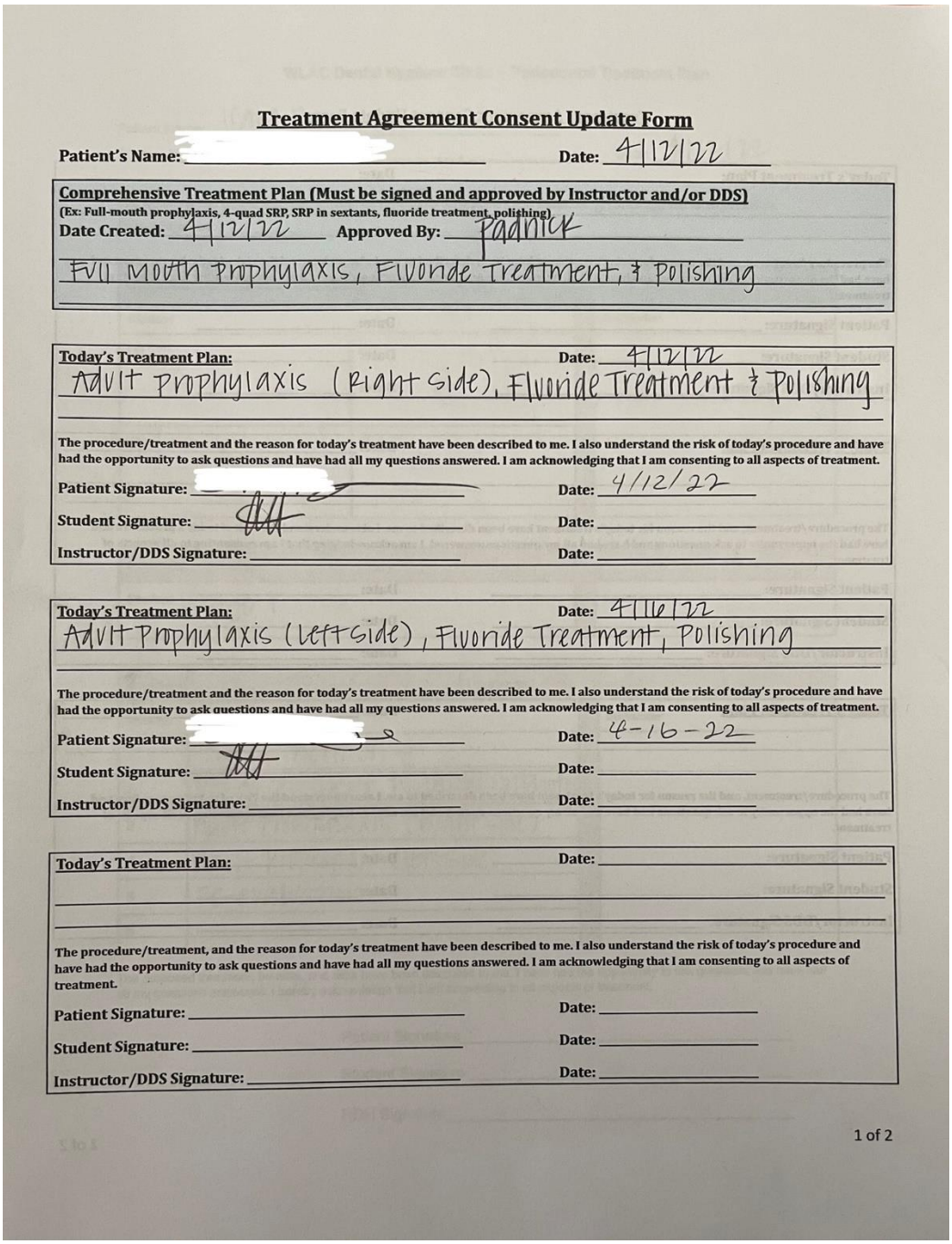
Kaur, K.K., Allahbadia, G., Singh, M. (2018). Correlation of poor oral hygiene with obesity-a mini review. *EC Dental Science, 17*(6). Retrieved May 31, 2022, from https://www.researchgate.net/publication/325425392_Correlation_of_Poor_Oral_Hygiene_with_Obesity-A_Mini_Review

Mohammadi, T. M., Sabouri, A., Sabouri, S., & Najafipour, H. (2019). Anxiety, depression, and Oral Health: A population-based study in southeast of Iran. *Dental research journal, 16*(3), 139-144. Retrieved May 30, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6474177/

Roganovic, J. (2018). Pharmacodynamic causes of Xerostomia in patients on psychotropic drugs. *ACTA Scientific Dental Sciences, 2*(11), 102-106. Retrieved May 30, 2022, from https://www.researchgate.net/publication/352410445_Pharmacodynamic_Causes_of_Xerostomia_in_Patients_on_Psychotropic_Drugs

XXV. Documentation

- Documents
  - Copy of the signed treatment consent form



Treatment Agreement Consent Update Form

Patient's Name: [redacted] **Date:** 4/12/22

Comprehensive Treatment Plan (Must be signed and approved by Instructor and/or DDS)
(Ex: Full-mouth prophylaxis, 4-quad SRP, SRP in sextants, fluoride treatment, polishing)
Date Created: 4/12/22 **Approved By:** Padrick

Full Mouth Prophylaxis, Fluoride Treatment, & Polishing

Today's Treatment Plan: **Date:** 4/12/22
Adult Prophylaxis (Right side), Fluoride Treatment & Polishing

The procedure/treatment and the reason for today's treatment have been described to me. I also understand the risk of today's procedure and have had the opportunity to ask questions and have had all my questions answered. I am acknowledging that I am consenting to all aspects of treatment.

Patient Signature: [redacted] **Date:** 4/12/22
Student Signature: [redacted] **Date:** _____
Instructor/DDS Signature: _____ **Date:** _____

Today's Treatment Plan: **Date:** 4/16/22
Adult Prophylaxis (Left side), Fluoride Treatment, Polishing

The procedure/treatment and the reason for today's treatment have been described to me. I also understand the risk of today's procedure and have had the opportunity to ask questions and have had all my questions answered. I am acknowledging that I am consenting to all aspects of treatment.

Patient Signature: [redacted] **Date:** 4-16-22
Student Signature: [redacted] **Date:** _____
Instructor/DDS Signature: _____ **Date:** _____

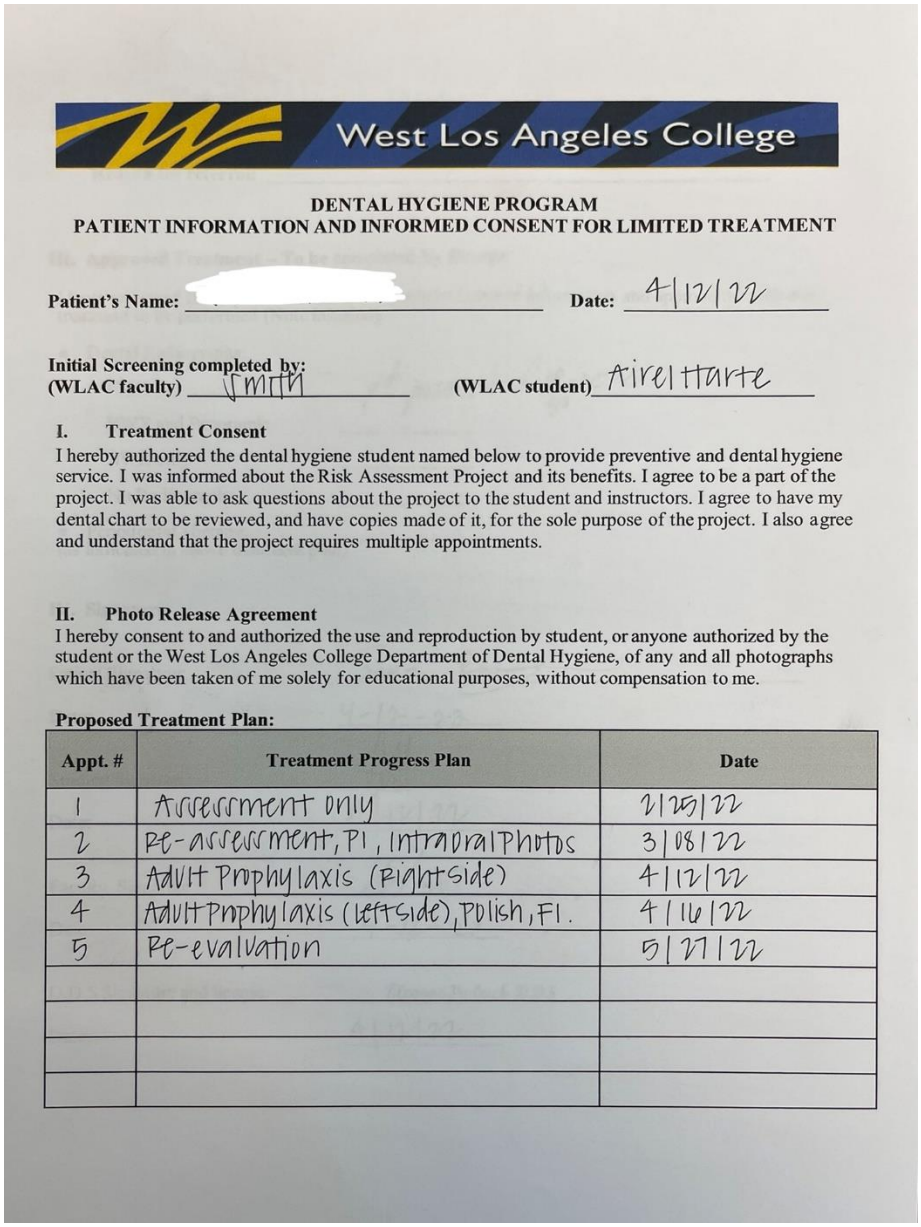
Today's Treatment Plan: **Date:** _____

The procedure/treatment, and the reason for today's treatment have been described to me. I also understand the risk of today's procedure and have had the opportunity to ask questions and have had all my questions answered. I am acknowledging that I am consenting to all aspects of treatment.

Patient Signature: _____ **Date:** _____
Student Signature: _____ **Date:** _____
Instructor/DDS Signature: _____ **Date:** _____

1 of 2

- Copy of signed treatment plan form



West Los Angeles College

DENTAL HYGIENE PROGRAM
PATIENT INFORMATION AND INFORMED CONSENT FOR LIMITED TREATMENT

Patient's Name: [redacted] **Date:** 4/12/22

Initial Screening completed by:
(WLAC faculty) Smith **(WLAC student)** Aire Harte

I. Treatment Consent

I hereby authorized the dental hygiene student named below to provide preventive and dental hygiene service. I was informed about the Risk Assessment Project and its benefits. I agree to be a part of the project. I was able to ask questions about the project to the student and instructors. I agree to have my dental chart to be reviewed, and have copies made of it, for the sole purpose of the project. I also agree and understand that the project requires multiple appointments.

II. Photo Release Agreement

I hereby consent to and authorized the use and reproduction by student, or anyone authorized by the student or the West Los Angeles College Department of Dental Hygiene, of any and all photographs which have been taken of me solely for educational purposes, without compensation to me.

Proposed Treatment Plan:

Appt. #	Treatment Progress Plan	Date
1	Assessment only	2/25/22
2	Re-assessment, PI, Intraoral Photos	3/08/22
3	Adult Prophylaxis (Right side)	4/12/22
4	Adult Prophylaxis (Left side), Polish, FI.	4/16/22
5	Re-evaluation	5/27/22

☐ **Patient referral to:** _____

Reason for referral: _____

III. Approved Treatment – To be completed by Dentist

I have reviewed the required assessment records and patient information and approve the following treatment to be performed (Note initialed):

- Dental Radiographs:
  - FMX: pt presented 10-2020 JP
  - BWX and Panoramic: _____
  - BWX only: _____
  - No Radiographs: _____
- Periodontal Therapy: _____
(as indicated in above treatment plan)

IV. Signatures

Patient Signature: [redacted]

Date: 4-12-22

Student Signature: _____

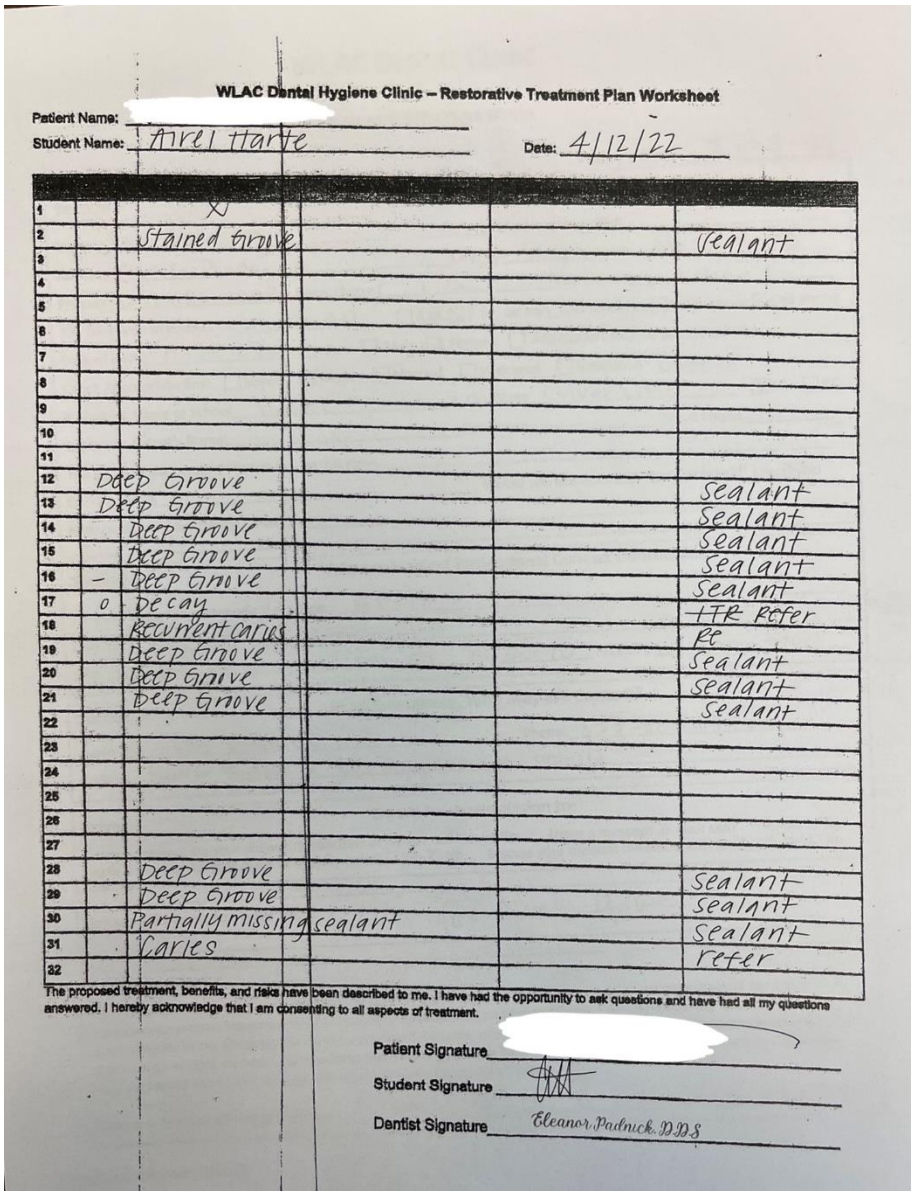
Date: 4/12/22

Faculty Signature: _____

Date: 4-12-22

D.D.S Signature and license: Eleanor Padnick DDS

Date: 4/12/22



WLAC Dental Hygiene Clinic – Restorative Treatment Plan Worksheet

Patient Name: [redacted]

Student Name: Ariel Harte

Date: 4/12/22

1		X			
2		Stained Groove			Sealant
3					
4					
5					
6					
7					
8					
9					
10					
11					
12		Deep Groove			Sealant
13		Deep Groove			Sealant
14		Deep Groove			Sealant
15		Deep Groove			Sealant
16	-	Deep Groove			Sealant
17	o	Decay			ITR Refer
18		Recurrent caries			Re
19		Deep Groove			Sealant
20		Deep Groove			Sealant
21		Deep Groove			Sealant
22					
23					
24					
25					
26					
27					
28		Deep Groove			Sealant
29		Deep Groove			Sealant
30		Partially missing sealant			Sealant
31		Caries			Refer
32					

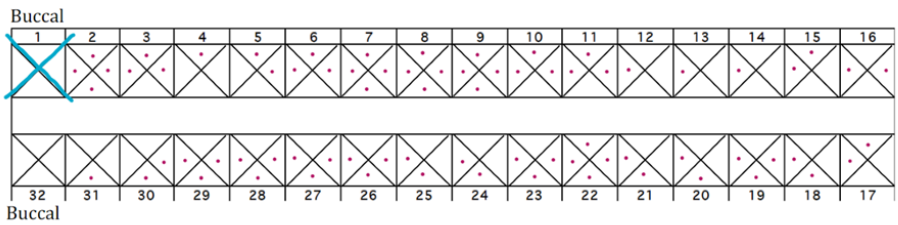
The proposed treatment, benefits, and risks have been described to me. I have had the opportunity to ask questions and have had all my questions answered. I hereby acknowledge that I am consenting to all aspects of treatment.

Patient Signature [redacted]

Student Signature [signature]

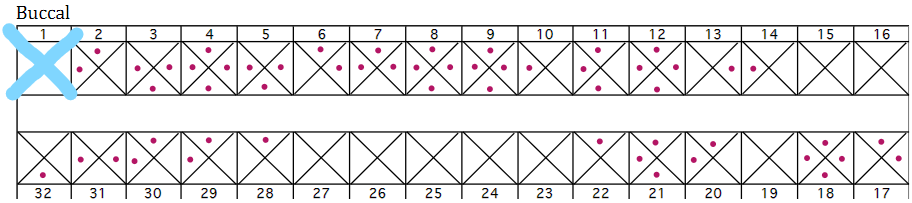
Dentist Signature Eleanor Padnick DDS

- Copy of the pre and post oral hygiene status - PI and MBI form or PE form
  - Pre oral hygiene status: Plaque Index



Show your calculation here:

  - Post oral hygiene status: Plaque Index



Show your calculation here:

- Copy of pre and post photographs of non-disclosed teeth
  - Pre photographs of non-disclosed teeth:

Right (Buccal view)

Anterior view

Left (Buccal view)

Palatal view

Right maxillary

Palatal view

Left maxillary

lingual view

Right mandibular lingual view

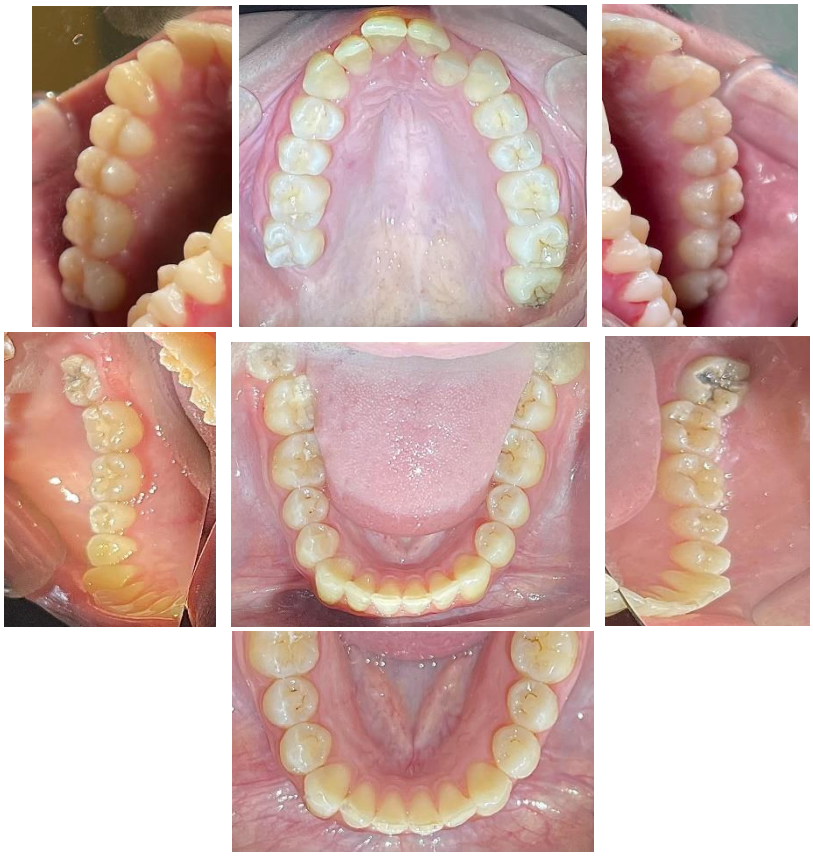
Lingual view

lingual view

Left mandibular lingual view

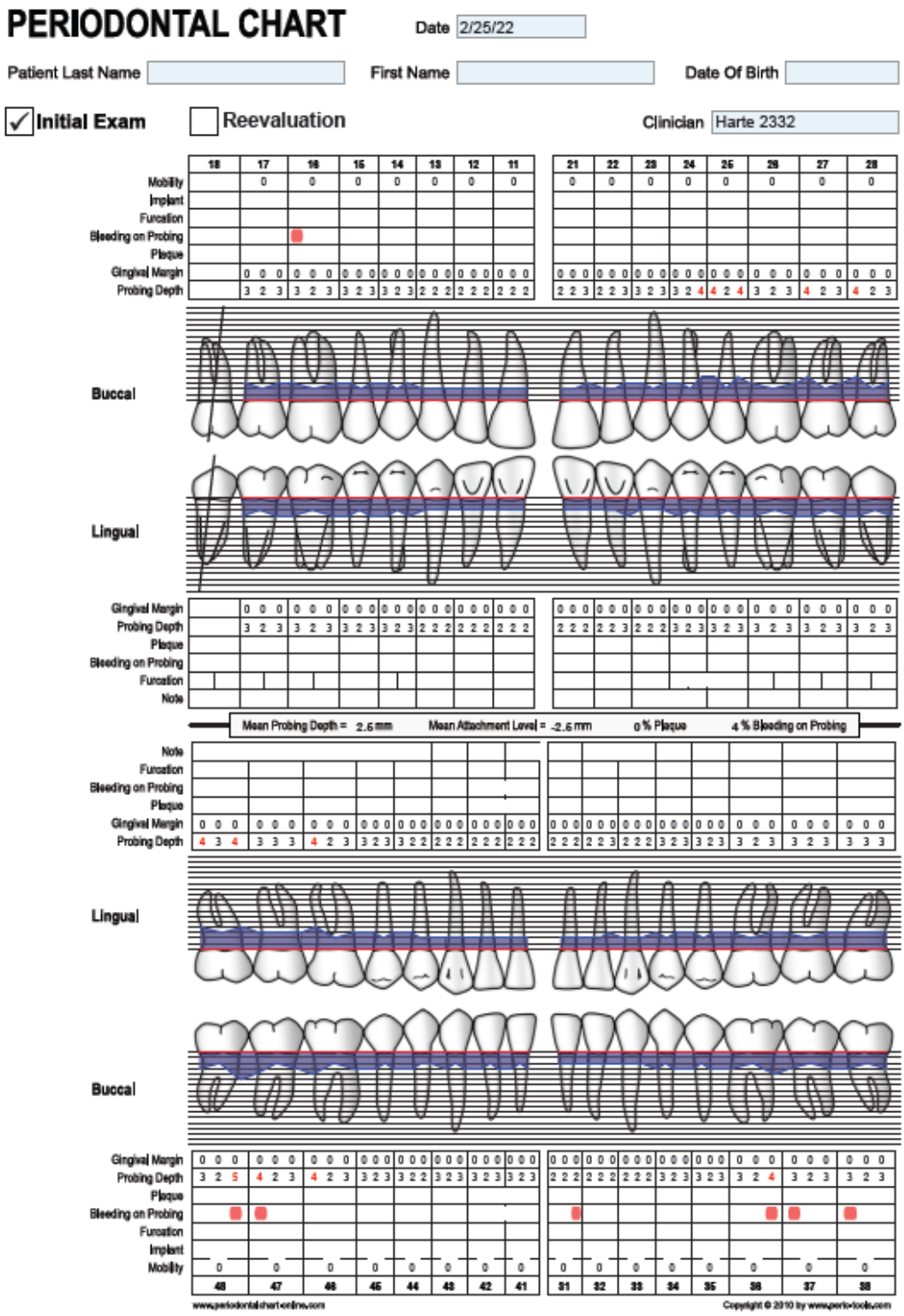
Lingual view

- Post photographs of non-disclosed teeth:



- Copy of full mouth, pano or BWX radiographs

- Copy of pre and post probing records (include PE form here if taken on patient)
  - Pre-treatment probing recordings:



PERIODONTAL CHART

Date 2/25/22

Patient Last Name | First Name | Date Of Birth

☑ Initial Exam ☐ Reevaluation Clinician Harte 2332

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Mobility		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Implant																
Furcation																
Bleeding on Probing			●													
Plaque																
Gingival Margin		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	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 3	2 2 3	3 2 3	3 2 4	4 2 4	3 2 3	4 2 3	4 2 3

Buccal

Lingual

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Gingival Margin		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	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 2	2 2 3	2 2 2	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3
Plaque																
Bleeding on Probing																
Furcation																
Note																

Mean Probing Depth = 2.6 mm Mean Attachment Level = -2.6 mm 0 % Plaque 4 % Bleeding on Probing

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Note																
Furcation																
Bleeding on Probing																
Plaque																
Gingival Margin	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	0 0 0	0 0 0	0 0 0	0 0 0
Probing Depth	4 3 4	3 3 3	4 2 3	3 2 3	3 2 2	2 2 2	2 2 2	2 2 2	2 2 2	2 2 3	2 2 2	3 2 3	3 2 3	3 2 3	3 2 3	3 3 3

Lingual

Buccal

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Gingival Margin	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	0 0 0	0 0 0	0 0 0	0 0 0
Probing Depth	3 2 5	4 2 3	4 2 3	3 2 3	3 2 2	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	3 2 3	3 2 3	3 2 4	3 2 3	3 2 3
Plaque																
Bleeding on Probing	●	●							●					●	●	●
Furcation																
Implant																
Mobility	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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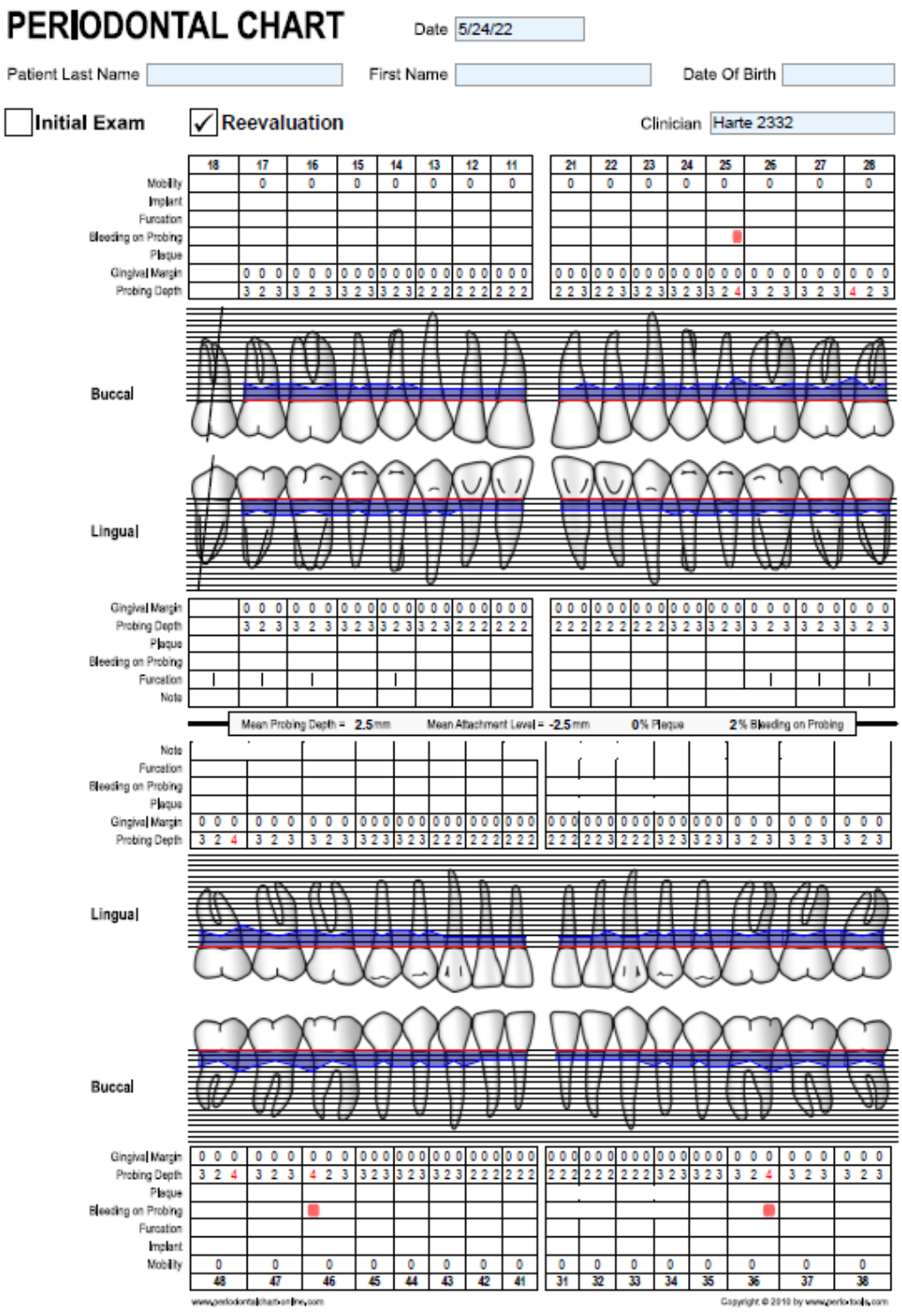
- Re-evaluation probing recordings:



PERIODONTAL CHART

Date 5/24/22

Patient Last Name | First Name | Date Of Birth

☐ Initial Exam ☑ Reevaluation Clinician Harte 2332

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Mobility		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Implant																
Furcation																
Bleeding on Probing													■			
Plaque																
Gingival Margin		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	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 3	2 2 3	3 2 3	3 2 3	3 2 4	3 2 3	3 2 3	4 2 3

Buccal

Lingual

		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	0 0 0	0 0 0	0 0 0
Gingival Margin		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	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3
Plaque																
Bleeding on Probing																
Furcation		I	I	I										I	I	I
Note																

Mean Probing Depth = 2.5 mm Mean Attachment Level = -2.5 mm 0% Plaque 2% Bleeding on Probing

		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	0 0 0	0 0 0	0 0 0
Note																
Furcation																
Bleeding on Probing																
Plaque																
Gingival Margin		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	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 4	3 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 3	2 2 2	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3

Lingual

Buccal

		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	0 0 0	0 0 0	0 0 0
Gingival Margin		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	0 0 0	0 0 0	0 0 0
Probing Depth		3 2 4	3 2 3	4 2 3	3 2 3	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 2	3 2 3	3 2 3	3 2 4	3 2 3	3 2 3
Plaque																
Bleeding on Probing				■										■		
Furcation																
Implant																
Mobility		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38

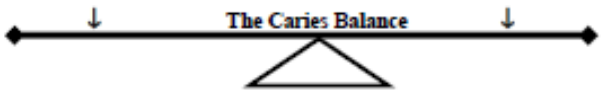
- Copy of CAMBRA evaluation form

CARIES RISK ASSESSMENT FORM - ADULTS/CHILDREN AGED 6 YEARS AND OVER

[redacted] Age 27

Assessment date: 2/25/22 Is this: (please circle) Baseline or Recall

FACTORS	HIGH (Please circle responses)	MODERATE	LOW
1. Local Factors			
Plaque/Calculus	generalized	localized	minimal/none
2. Dental Conditions			
*Visible cavitations	YES		no
Cavity in last 3 years	yes		no
+Inadequate saliva flow	yes		no
Exposed roots		yes	no
Deep pits/fissures		yes	no
Radiographic lesions		yes	no
White spot lesions		yes	no
Appliances present	yes		no
3. Medical History:			
Sjogren's syndrome	yes		no
Hyposalivary meds	yes		no
Radiation Therapy	yes		no
4. Dietary Habits			
Snacks between meals	>3 times	1-3 times	infrequent
Regular Soda	yes	infrequent	no
5. Environmental			
Recreational drugs	yes		no
6. Protective Factors			
Fluoridated water	no		yes
Fluoridated toothpaste	no		yes
Adequate saliva flow	no		yes
Fluoride mouthrinse		no	yes
Xylitol gum/mints		no	yes
Chlorhexidine rinse		no	yes
Povidone Iodine rinse		no	yes
7. Laboratory Tests			
Saliva Flow	Recommended	Recommended	Optional
Bacterial Culture	Recommended	Recommended	Optional
Lab Test Results: MS:	LB:	Flow Rate:	ml/min.



CARIES RISK ASSESSMENT:	HIGH	MODERATE	LOW
PROGNOSIS:	POOR	MODERATE	GOOD

I have been given the recommendation to have a CRT to determine my bacterial counts as a part of my overall caries risk assessment. I understand the risks and benefits of the test and I decline, releasing my dentist(s) of any liability associated with declining the test.

[redacted] Date 2/25/22

* If visible cavitation present CRT test and saliva flow rate measurement are recommended

+If saliva flow appears inadequate Saliva Flow test is recommended. If rate <1 ml/min follow protocol for xerostomia

- Copy of CAMBRA form for patient recommendation

Patient Recommendations for Control of Dental Decay-ADULTS/CHILDREN OVER AGE 6

[redacted] Chart #_____

I. LOW RISK

Daily Oral Hygiene (Aimed at reducing the overall bacteria in the mouth, especially at sites likely to decay. Choose the recommendations based on the danger sites and the condition of the mouth)

____ brush twice daily (with fluoride toothpaste, all patients) ____ floss daily ____ Superfloss
____ interproximal brush ____ Stimudents ____ toothpick
____other:_____

Diet (The most important thing is to reduce the number of snacks between meals that contain carbohydrates, especially sugars. Substitution by snacks rich in protein, such as cheese, will also help)

____ OK as is ____ limit snacking ____ limit sodas
____ other:_____

Fluorides (**All patients should use fluoride toothpaste twice daily**). Additional fluoride products should be added, depending on whether the risk level is medium or high. Home fluoride products must be used daily to be effective).

____ regular fluoride-containing toothpaste
____ fluoride rinse (0.05 % NaF, *ACT* or *Fluorigard*) 2X/day (use twice a day, once in the morning after breakfast and once last thing at night. Continue long term with older patients or those who need or want extra protection). Note that *ACT* contains no alcohol and may be preferred by a patient with dry mouth.)

Xylitol gum/mints (The gums or mints that contain xylitol cannot cause cavities. In addition, xylitol has an anti-cavity effect against the decay-causing bacteria. Look for xylitol products at stores that list "xylitol" as the first ingredient, or even better (and cheaper) search for "pure" xylitol products, under "xylitol" on the World Wide Web. Xylitol can be used as a sugar substitute even while cooking or baking; however, it may cause diarrhea if used in excess.) **Note: xylitol is a "special" sugar substitute that tastes just like table sugar. Other sugar substitute products will not have its cavity fighting properties and table sugar is sure to make things worse.**

____ Chew xylitol gum for 5 minutes after snacks or at least 3-5 times/day.
____ Use xylitol mints 3 – 5 times/day
____ office fluoride trays
____ office fluoride varnish

II. MODERATE TO HIGH RISK (ALL THE ABOVE PLUS:)

Daily high concentration fluoride

____ *Prevident* **5000 Plus (high fluoride toothpaste)**
____ *Prevident* "brush-on" nightly, **OR** in custom tray 10 min./night (For high risk patients, especially those with low saliva flow, or root caries, or active cavities. Continue until the risk status is lowered, then revert to fluoride as above).

Antibacterial rinse

____ **Chlorhexidine gluconate**, 0.12% (*Periogard, Peridex, Oral Rx,* available on prescription). Rinse 1 minute with ½ oz. at bedtime for one week (discontinue *ACT* or *Fluorigard* for this week). Stop for three weeks (resume use of *ACT* or *Fluorigard* during this time). Repeat chlorhexidine rinse for one week each month.
____ 10% providone iodine (*Betadine*) to be **administered by dental professional only** (ask about allergies and contraindications). Rinse or swab topically for 1-2 minutes 1x/mo.

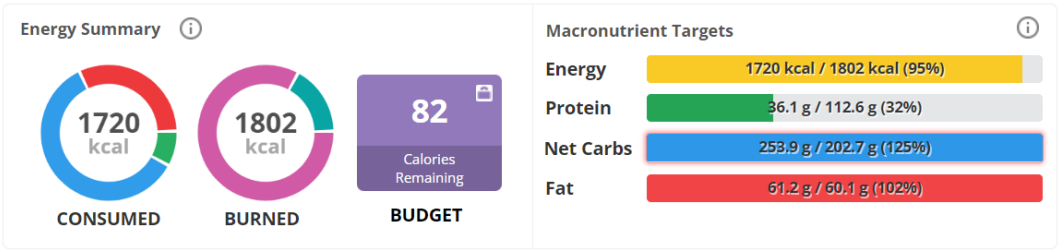
III. FOR DRY MOUTH (ALL THE ABOVE PLUS:)

____ baking soda toothpaste with fluoride
____ baking soda gum - *Dental Care Gum* (Arm & Hammer, or similar product containing baking soda and xylitol.) Chew frequently throughout the day, especially after snacks.
____ rinse frequently with baking soda suspension during the day, especially after snacks. (Fill a sports water bottle with water and add 2 teaspoons of baking soda for each 8 oz. of water).
____ fluoride lozenges (*Lozi-Flur* or *Fluor-a-day*) 1X/day (use for high risk patients with low saliva flow, such as radiation xerostomia.) By dissolving in the mouth, these lozenges provide a concentrated fluoride reservoir to protect against mineral loss, and to enhance repair by remineralization. Dissolve slowly in mouth by holding the lozenge in a convenient place)
____Calcium and phosphate enhancing products (*MI Paste with Recalcident*)

- Copy of the three-day Food Diary before advising and after advising

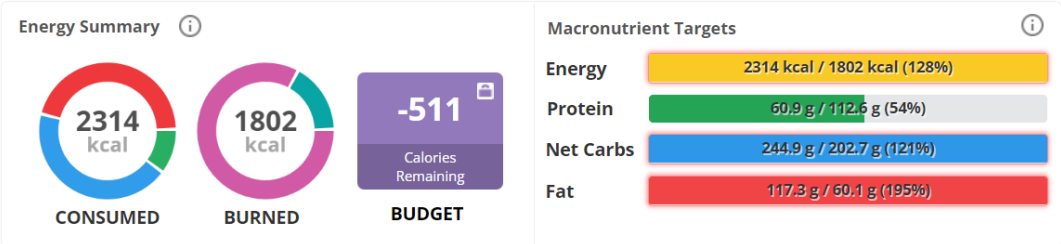
March 3, 2022

Description	Amount	Unit	Energy (kcal)
Wendy's Soda	1	small without ice - 20 fl oz cup	245.6
Wendy's, French Fries	1	small - order	315.87
Wendy's, Chicken Nuggets	10	nugget	437.38
Birria de Carne, Shredded Meat	0.25	cup	51.75
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Takis, Tortilla Chips, Fuego	0.33	oz	45.17
Russell Stover, Chocolate	2	piece	240



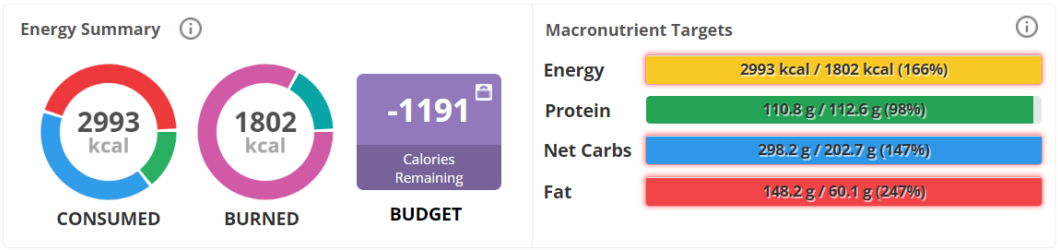
March 4, 2022

Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Philadelphia, Cream Cheese, Original	120	g	428.57
Milk, Whole	20	oz	345.86
Nestle, Nesquick	24.5	g	93.1
Sugars, Granulated	1	tsp	16.13
McDonald's, Big Mac	1	each	550.29
McDonald's, French Fries	1	child size - order	109.56
Coca-Cola Classic	1	small can - each 8 fl oz	90.87
Russell Stover, Chocolate	2	piece	240
Takis, Tortilla Chips, Fuego	0.33	oz	45.17
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97



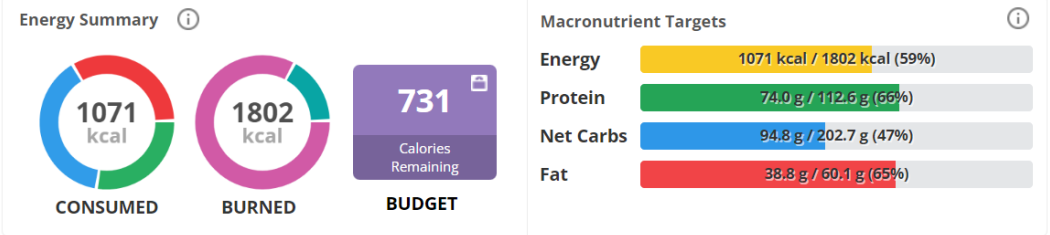
March 5, 2022

Description	Amount	Unit	Energy (kcal)
Philadelphia, Cream Cheese, Original	120	g	428.57
Milk, Whole	20	oz	345.86
Nestle, Nesquick	24.5	g	93.1
Sugars, Granulated	1	tsp	16.13
BFree, Multiseed Bagel	1	Bagel	202
Ingham's, Chicken Roasting Portions	300	g	597.51
Bimbo, White Bread	2	Slice	138.05
Kraft, Real Mayonnaise	2	tsp	58.93
Lettuce, Romaine or Cos	1	cup, chopped	7.99
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Lunchables, Ham & Cheddar	1	package	260
Dr Pepper	1	small bottle - each 16.9 fl oz	191.97
Doritos, Tortilla Chips, Nacho Cheese	22	chip	281.34
Kellogg's, Rice Crispy's Treats, Chocolate	2	bar	180



March 10, 2022

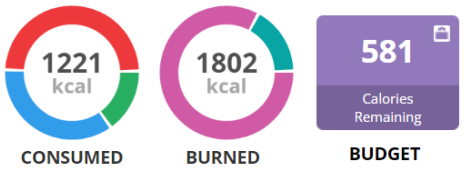
Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Cream Cheese Spread	4	tsp	59
Milk, Whole	8	oz	138.35
Lettuce, Romaine or Cos	1	cup, chopped	7.99
Kraft, Real Mayonnaise	2	tsp	58.93
Chicken breast, Oven-Roasted, Fat-Free, Sliced	150	g	118.5
Bread, Whole Wheat, Commercially Prepared	2	medium slice	181.44
Thin Sliced Sirloin Tip Steak for Carne Asada	1	× 4 ounces	200
Tortillas, Corn	2	each - 6" diameter	104.64



March 11, 2022

Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Cream Cheese Spread	4	tsp	59
Milk, Whole	8	oz	138.35
Wendy's, Chicken Nuggets	10	nugget	437.38
Dasani, Water	1	Bottle	0
Oscar Meyer, Select Naturals, Angus Beef Hot Dog, Bun Length	1	Link	160
Hot Dog Bun, White	1	regular - 6" x 2" x 1 1/2"	119.97
Kraft, Real Mayonnaise	2	tsp	58.93
Ketchup	3	tbsp	45.45

Energy Summary



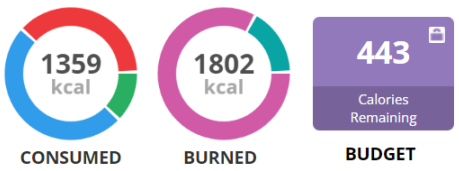
Macronutrient Targets

Energy	1221 kcal / 1802 kcal (68%)
Protein	45.5 g / 112.6 g (40%)
Net Carbs	103.6 g / 202.7 g (51%)
Fat	66.0 g / 60.1 g (110%)

March 12, 2022

Description	Amount	Unit	Energy (kcal)
BFree, Multiseed Bagel	1	Bagel	202
Cream Cheese Spread	4	tsp	59
Milk, Whole	8	oz	138.35
McDonald's, Big Mac	1	each	550.29
McDonald's, french fries	1	Small	227.68
Coke	16	fl oz	181.74

Energy Summary



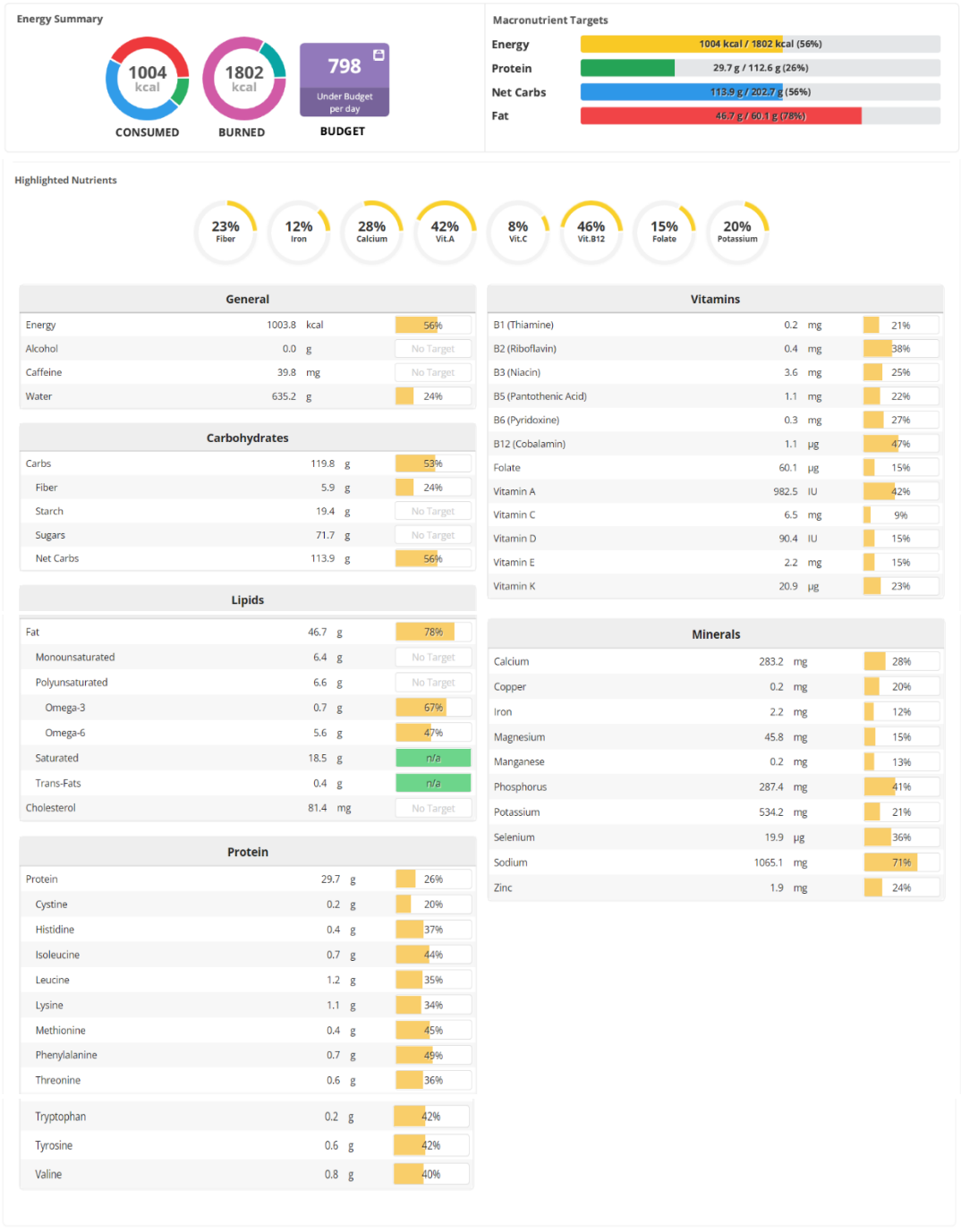
Macronutrient Targets

Energy	1359 kcal / 1802 kcal (75%)
Protein	40.9 g / 112.6 g (36%)
Net Carbs	162.1 g / 202.7 g (80%)
Fat	57.3 g / 60.1 g (95%)

- Copy of the nutritional analysis print out

Three day nutritional analysis #1

March 3-5, 2022



Energy Summary

1004 kcal	1802 kcal	798 Under Budget per day
CONSUMED	BURNED	BUDGET

Macronutrient Targets

Energy	1004 kcal / 1802 kcal (56%)
Protein	29.7 g / 112.6 g (26%)
Net Carbs	113.9 g / 202.7 g (56%)
Fat	46.7 g / 60.1 g (78%)

Highlighted Nutrients

23% Fiber	12% Iron	28% Calcium	42% Vit.A	8% Vit.C	46% Vit.B12	15% Folate	20% Potassium

General

Energy	1003.8	kcal	56%
Alcohol	0.0	g	No Target
Caffeine	39.8	mg	No Target
Water	635.2	g	24%

Carbohydrates

Carbs	119.8	g	53%
Fiber	5.9	g	24%
Starch	19.4	g	No Target
Sugars	71.7	g	No Target
Net Carbs	113.9	g	56%

Lipids

Fat	46.7	g	78%
Monounsaturated	6.4	g	No Target
Polyunsaturated	6.6	g	No Target
Omega-3	0.7	g	67%
Omega-6	5.6	g	47%
Saturated	18.5	g	n/a
Trans-Fats	0.4	g	n/a
Cholesterol	81.4	mg	No Target

Protein

Protein	29.7	g	26%
Cystine	0.2	g	20%
Histidine	0.4	g	37%
Isoleucine	0.7	g	44%
Leucine	1.2	g	35%
Lysine	1.1	g	34%
Methionine	0.4	g	45%
Phenylalanine	0.7	g	49%
Threonine	0.6	g	36%
Tryptophan	0.2	g	42%
Tyrosine	0.6	g	42%
Valine	0.8	g	40%

Vitamins

B1 (Thiamine)	0.2	mg	21%
B2 (Riboflavin)	0.4	mg	38%
B3 (Niacin)	3.6	mg	25%
B5 (Pantothenic Acid)	1.1	mg	22%
B6 (Pyridoxine)	0.3	mg	27%
B12 (Cobalamin)	1.1	µg	47%
Folate	60.1	µg	15%
Vitamin A	982.5	IU	42%
Vitamin C	6.5	mg	9%
Vitamin D	90.4	IU	15%
Vitamin E	2.2	mg	15%
Vitamin K	20.9	µg	23%

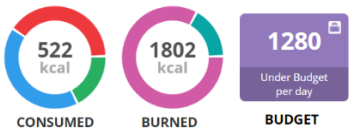
Minerals

Calcium	283.2	mg	28%
Copper	0.2	mg	20%
Iron	2.2	mg	12%
Magnesium	45.8	mg	15%
Manganese	0.2	mg	13%
Phosphorus	287.4	mg	41%
Potassium	534.2	mg	21%
Selenium	19.9	µg	36%
Sodium	1065.1	mg	71%
Zinc	1.9	mg	24%

Three day nutritional analysis #2

March 10-12, 2022

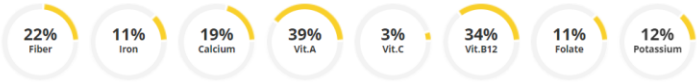
Energy Summary



Macronutrient Targets

Energy	521.6 kcal / 1802 kcal (29%)
Protein	22.9 g / 112.6 g (20%)
Net Carbs	51.5 g / 202.7 g (25%)
Fat	23.1 g / 60.1 g (39%)

Highlighted Nutrients



General

Energy	521.6	kcal	29%
Alcohol	0.0	g	No Target
Caffeine	6.9	mg	No Target
Water	289.7	g	11%

Carbohydrates

Carbs	57.3	g	25%
Fiber	5.7	g	23%
Starch	15.4	g	No Target
Sugars	16.5	g	No Target
Net Carbs	51.5	g	25%

Lipids

Fat	23.1	g	39%
Monounsaturated	4.7	g	No Target
Polyunsaturated	4.6	g	No Target
Omega-3	0.6	g	51%
Omega-6	3.9	g	32%
Saturated	7.8	g	n/a
Trans-Fats	0.5	g	n/a
Cholesterol	57.5	mg	No Target

Protein

Protein	22.9	g	20%
Cystine	0.2	g	26%
Histidine	0.5	g	39%
Isoleucine	0.7	g	48%
Leucine	1.3	g	37%
Lysine	1.1	g	36%
Methionine	0.4	g	50%
Phenylalanine	0.7	g	51%
Threonine	0.6	g	38%
Tryptophan	0.2	g	45%
Tyrosine	0.6	g	42%
Valine	0.8	g	41%

Vitamins

B1 (Thiamine)	0.2	mg	20%
B2 (Riboflavin)	0.3	mg	28%
B3 (Niacin)	3.8	mg	27%
B5 (Pantothenic Acid)	0.8	mg	16%
B6 (Pyridoxine)	0.2	mg	17%
B12 (Cobalamin)	0.8	µg	35%
Folate	46.8	µg	12%
Vitamin A	931.7	IU	40%
Vitamin C	2.6	mg	3%
Vitamin D	59.2	IU	10%
Vitamin E	1.5	mg	10%
Vitamin K	19.5	µg	22%

Minerals

Calcium	196.5	mg	20%
Copper	0.1	mg	13%
Iron	2.1	mg	12%
Magnesium	36.9	mg	12%
Manganese	0.4	mg	23%
Phosphorus	227.7	mg	33%
Potassium	329.7	mg	13%
Selenium	20.6	µg	37%
Sodium	959.6	mg	64%
Zinc	1.6	mg	20%

- Copy of 8 Human Needs Form

Protection from health risks	Treatment recommendations protect against oral conditions such as periodontal disease
Freedom from fear and stress	Addresses oral habits – Nutritional habits – Parafunctional habits
Freedom from pain	OHI recommendations are pain free – Brushing with soft bristled toothbrush – Flossing with traditional floss – ACT mouth rinse – Sugar free gum Lowest allowable dose of epinephrine should pain control be indicated.
Wholesome facial image	Appearance of teeth will improve Patient will exude more confidence and smile more
Skin and mucous membrane integrity of head and neck	Protects against periodontal health – Reduced periodontal pocket depth – Reduced gingival inflammation – Reduced BOP – Salivary substitute to address xerostomia
Biologically sound and functional dentition	Active carious lesions Malocclusion
Conceptualization and problem solving	Opens lines of communication for patient to ask questions regarding oral health concerns
Responsibility for oral health	Communication – Involved patient in their own treatment planning – Patient understanding of treatment, treatment outcomes, and responsibility of continued oral hygiene home care – Plaque control – Routine oral hygiene dental visits – Referral to DDS for fillings and wisdom teeth extractions

- Copy of all journal articles used for this project

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EC DENTAL SCIENCE
Mini Review

Correlation of Poor Oral Hygiene with Obesity-A Mini Review

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Abstract

Poor oral hygiene is associated with obesity in both extremes of ages along with decreased salivation. In this minireview we examine the effects of bad dentition, extremes of sweets, and association of obesity with oral hygiene as evidenced by improvement following bariatric surgery both in salivation along with weight loss.

Keywords: *Poor Oral Hygiene; Decreased Salivation; Desacyl Ghrelin; Bariatric Surgery*

Introduction

Poor oral health in obese people have been found [1]. The greater the number of teeth loss, periodontal disease was found more frequently in obese individuals [2,3].

There has been similar causal and behavioral mechanisms [4] between teeth and oral health and what an individual perceives self regarding oral health has been related to general health [5]. Dental attending patterns are correlated with other health habits [6]. Irregular dental caries was found to be associated with dental anxiety [3].

There are a number of common possible confounders, important to be taken into consideration in studies of oral health and obesity. Like socioeconomic and lifestyle factors which are associated with body weight [7] and oral health [4].

Ostberg., *et al.* studied in Western Sweden the association between oral health variables and total and central obesity respectively and investigated the influence of socioeconomic factors, lifestyle, dental anxiety and comorbidity.

The subjects used were a randomized sample from the 1992 data collection in the Prospective population Study of women in Gottenburg, Sweden (n = 999, 38-> = 78 yr). In this study a clinical and radiological examination along with self-administered questionnaire was given. They defined obesity as a BMI >= 30 KG/m^2, waist hip ratio (WHR) >= 0.80 and waist circumference (WC) > 0.88m. Logistic regression was used to estimate associations including adjustments for confounders.

They found that the mean BMI value was 25.96 kg/m^2, mean WHR 0.83, mean WC-0.83m. Total number of teeth, the restored teeth, xerostomia, dental visiting habits and self-perceived health were associated with both total and central obesity, independent of age and sex. e.g. There were statistical significant associations between small number of teeth (< 20) and obesity. BMI (OR1.95, CI-1.40 - 2.73),

WHR-1.67, 1.28 - 2.19), WC (1.94, 1.47 - 2.55) respectively. The number of carious lesions and masticatory function showed no association with obesity. The obesity measure was of significance, especially with regard to behavior, like irregular dental visits, with a greater risk associated with BMI (1.83, 1.23 - 2.71) and WC (1.96, 1.39 - 2.75) but not with WHR (1.29, 0.90 - 1.85). Thus they concluded that associations were found between oral health and obesity. Choice of obesity measure in oral health should be carefully considered [8].

Similarly Albright., *et al.* investigated the associations between type2 diabetes (T2DM) and other variables like poor oral health (POH) and overweight/obesity (OW) among a group of elderly Hmong subjects who were > 60 yrs and had emigrated to USA after the Vietnam conflict. Following an interview of each subject their weight, height and waist circumference were measured. Each subject had an oral examination and their saliva was examined for the seven components related to inflammation. The presence of DM was correlated with POH and OW separately. A strong association was found between concurrent POH and OW and the presence of DM: all subjects with both POH and OW had DM. Logistic multivariate analysis of OW, POH, age, years of residency in California, and stress levels showed a marked association between presence of DM and concurrent OW and POH. A change in diet after immigration were excluded as an explanatory variable. Subjects with DM and concurrent OW and POH had significantly elevated salivary levels of 5 analyses related to chronic inflammation. The association between POH and OW and presence of DM needs further study was their conclusion [9].

Cardozo., *et al.* assessed the impact of bariatric surgery on the oral health. They invited all patients who underwent Roux-en Y gastric by-pass at Nossa Senhora da C onceicao hospital between October 2009 - January 2011 to participate. They conducted oral examination and interviews in 2 stages and performed a descriptive analysis, Mcnemar's test, Students t test for paired samples, and the Wilcoxon test.

39 patients completed the protocol. A statistically significant reduction in the number of medications taken daily, sensation of dry mouth and increased stimulated salivary flow rate. Hence they concluded that oral health of patients who underwent bariatric surgery improved along with reduction in the sensation of dry mouth [10].

Sede and Ehzele conducted a study to determine the relationship between obesity and periodontal status and dental caries experience of a group of Nigerian dental patients. They selected patients attending dental outdoor clinics of University of Benin Teaching hospital, Benin city, Nigeria. Height and weight were measured and BMI calculated in kg/m^2, gingival health assessed using bleeding on probing index, oral hygiene estimated using the simplified oral hygiene index (OHI-S), periodontal health estimated using the basic periodontal examination (BPE) and caries experience was estimated with the decayed, missing and filled teeth (DMFT) index.

3.8% participants were found to be underweight, 52.6% were In the normal BMI range, 28.2% pre-obese, 12.2% obese class 1 and 3.2% obese class II. The mean OHI-S score was 2.16 +- 1.13 among the overweight participants and 2.05 +- 1.13 among those who are not ($p = 0.543$). The mean DMFT score was 3.03 +- 4.25 among the overweight participants and 2.32 +- 3.01 among those who are not ($p = 0.223$). 65% of participants with BPE score 0, considered to signify periodontal health, had normal BMI while all the participants with the worst BPE score recorded belong to the obese group 1 group ($p = 0.070$). The binary logistic expression showed that the likely predictor of gingival bleeding in the study is BMI between 35.0 and 39.9 (obese class 2 ($p = 0.046$, odds ratio = 0.07, 95%CI = 0.01 - 0.96). Hence concluded that there are no statistically significant relationship between obesity and periodontal status and dental caries experience in the group of dental patients they studied. Increased BMI may however be a predictor of gingival bleeding [11].

Nakamura., *et al.* assessed the relation of POH, diet in relation to weight loss, stable underweight and obesity in a community dwelling of older adults. They analyzed 96794 subjects of > 65 yrs who were randomly selected from 31 Japanese municipalities in the Japan Gerontological evaluation study. Weight loss was defined as >=2-3 kg of loss over the preceding 6 months. BMI was evaluated in respondents without weight loss. Multiple logistic regression analysis was performed with weight loss, underweight and obesity as dependent variable and having fewer teeth (< 20) and infrequent food intake variables with adjustment for potential confounders.

Weight loss was associated with having fewer teeth (men: odds ratio [OR] 1.3, 95%CI, 1.2 - 1.3, women: OR 1.2, 95%CI, 1.1 - 1.3) and infrequent fruits, vegetables intake (men: OR 1.1; 95%CI 1.1 - 1.2; women: OR 1.4; 95%CI 1.3 - 1.5) and fish/meat intake (OR 1.2; 95%CI- 1.1 - 1.3 for both sexes). No interaction was seen between having fewer teeth and food intake. Obesity was associated with the same factors: having fewer teeth (ORs 1.2 and 1.3 for men and women, respectively) and infrequent intake of fruits/vegetables (ORs 1.1 and 1.2 for men and women, respectively) and fish/meat (ORs 1.1 for both sexes). Infrequent fruit/vegetable intake showed a higher OR for underweight in women with fewer teeth than others. Thus they concluded that having fewer teeth and infrequent food intake was associated with both weight loss and obesity. There was a significant interaction in the association of having fewer teeth and infrequent food intake with underweight in women [12].

Oral Hygiene in Childhood Obesity

Dental Caries and Obesity

96 healthy children between 6 - 11 years were studied by Cotasuna., *et al.* [13] for the effect of dental caries, food intake, oral hygiene and lifestyle on obesity and found a direct association between dental caries and obesity as evident from correlation between prevalence of dental caries in obese children. Analysis of food intake and deciduous teeth/permanent teeth, measured by Dual X-ray Absorptiometry (DXA), showed that specific dietary habits (intake of sugar sweetened drinks, frequency of sugar intake limited to main meals, frequency of food intake between meals) may be considered risk factors that are common to both dental caries and childhood obesity.

Role of Salivary secretions

Various neuropeptides including deasacyl ghrelin, leptin also affect salivary secretions. Saliva gets secreted not only from parotid, submandibular and sublingual paired major glands but also several hundred minor glands spread over oral mucosa. Salivary secretions gets induced by salivary gland reflex on eating, is there on resting and even on sleeping and present during both biting and teeth grinding (bruxism) [14]. Besides components of saliva, like acyl ghrelin desacyl ghrelin, other components observed along with histamine are IgA, epidermal and transforming growth factors and lysozymes. These have been shown to possess properties of growth and differentiation, besides that of wound healing [15]. Mostly secretion is controlled by autonomic nervous system (ANS), with parasympathetic nerves controlling the secretion of water and electrolytes while sympathetic nerves controlling protein secretion from acinar cells by exocytosis [16]. These secretions of saliva control innate immunity as well as defense at mucosal surface and both ghrelin as well as soluble IgA may play a regulatory role against inflammatory infections. These neuropeptides have been identified in saliva as well as their associated receptors being located in the salivary glands and in the nerve innervating the salivary glands. Further salivary ghrelin levels in adolescents as well as children are known to correlate with BMI [16]. The salivary secretion is stimulated through parasympathetic and sympathetic ganglion, parasympathetic ganglion receives its stimulus via Nucleus Tractus Solitarius (NTS) and sympathetic ganglion receives its input from the NTS via the spinal cord. Both ganglia regulate salivary secretion, parotid gland supplies ghrelin which circulates throughout body. Primary parasympathetic salivary centre send connections to lateral hypothalamus, paraventricular hypothalamus (PVN), central nucleus of Amygdala along with the PVN and preoptic area [18,19]. Obesity is associated with decreased salivation and thereby related to severe aspect of oral health such as caries and periodontitis. Hyposalivation is a severe morbidity that can lead to precipitous decline in oral hygiene which further leads to multifocal dental caries and periodontitis or even cardiac disorders [20].

Role of Salivary Antioxidants

An association has been shown between dental caries and gingival inflammation in obese children [21]. Obese children have been shown to have accelerated dental development even after adjusting for age and gender [22]. A study was conducted by Gunjali., *et al.* in 42 children aged 6 - 12 yrs of both sexes from different schools in coastal Karnataka for total antioxidant capacity, oral hygiene index, and dentition status. They found that salivary total antioxidants were significantly high in overweight and obese children as compared to their

normal counterparts. Prevalence of dental caries was high in obese/overweight in contrast to normal children. Normally oxidative stress and low grade silent inflammation, caused due to high levels of free radicals in the body as a result of the unavailability of antioxidants is the underlying cause of chronic diseases like diabetes mellitus, hypertension, heart diseases premature ageing and even obesity [23], so it is paradoxical to find high salivary antioxidants in this study [24].

Conclusions

Thus it is important that to maintain oral dental hygiene, including decreasing oral sweets intake and preservation of salivary secretions in preventing childhood obesity. Similarly in adults as well it has been found that there is a correlation between poor oral health, low salivation and obesity as revealed by results of bariatric surgery while extremes of age further there is a correlation in both underweight and obesity regarding dental health oral hygiene and number of teeth.

Bibliography

1. Mathus Miegen EM., *et al.* "Oral aspects of obesity". *International Dental Journal* 57 (2007): 1249-256.
2. Ostberg AI., *et al.* "Tooth loss and obesity in a defined Swedish population". *Scandinavian Journal of Public Health* 37 (2009): 427-433.
3. Forslund HB., *et al.* "Number of teeth, body mass index and dental anxiety in Swedish women". *Acta Odontologica Scandinavica* 60.6 (2002): 346-352.
4. Steiham A and Watt RG. "The common risk factor approach: a rational basis for promoting health". *Community Dentistry and Oral Epidemiology* 28.6 (2000): 399-406.
5. Kieffer JM and Hoogstraten J. "Linking oral health ,general health and quality of life". *European Journal of Oral Sciences* 116.5 (2008): 445-450.
6. Lopez R and Baelum V. "Factors associated with dental attendance among adolescents in Santiago Chile". *BMC Oral Health* 7 (2007): 4.
7. Lahmann PH., *et al.* "Sociodemographic factors associated with longterm weight gain ,current body fatness and central adiposity in Swedish women". *International Journal of Obesity and Related Metabolic Disorders* 24.6 (2000): 685-694.
8. Ostberg AI., *et al.* "Oral health and obesity indicators". *BMC Oral Health* 12 (2012): 50.
9. Albright JW., *et al.* "Synergism between obesity and poor oral health associated with diabetes in an elderly human population". *Southeast Asian Journal of Tropical Medicine and Public Health* 44.2 (2013): 318-331.
10. Cardozo DD., *et al.* "Impact of bariatric surgery on the oral health of patients with morbid obesity". *Obesity Surgery* 24.10 (2014): 1812-1816.
11. Sede MA and Ehizele AO. "Relationship between obesity and oral diseases". *Nigerian Journal of Clinical Practice* 17.6 (2014): 683-690.
12. Nakamura M., *et al.* "Poor oral health and diet in relation to weight loss ,stable underweight and obesity in Community dwelling older adults: A cross-sectional study from the JAGES 2010 Project". *Journal of Epidemiology* 26.6 (2016): 322-329.
13. Constansuna M., *et al.* "Dental caries and childhood obesity: analysis of food intake and lifestyles". *European Journal of Paediatric Dentistry* 15.4 (2014): 343-348.
14. Anderson DJ., *et al.* "The effects of unilateral and bilateral chewing, empty clenching and bruxism on the masticatory parotid reflex salivary secretion in man". *Experimental Physiology* 81.2 (1996): 305-312.

15. Atkinsen JC and Wu AI. "Salivary gland dysfunction: Causes, symptoms and treatment". *Journal of the American Dental Association* 125.4 (1994): 409-416.

16. Garrett JR., *et al.* "Secretory responses in granular ducts of acini of submandibular glands in vivo to parasympathetic or sympathetic nerve stimulation in rats". *Cell and Tissue Research* 264.1 (1991): 117-126.

17. Aydin S., *et al.* "A comparison of leptin and ghrelin levels in plasma and saliva of young healthy subjects". *Peptides* 26.4 (2005): 647-652.

18. Matsuo R., *et al.* "Lateral hypothalamus modulations of oral sensory afferent activity in nucleus tractus solitaries neurons of rats". *Journal of Neuroscience* 4.5 (1984): 1201-1207.

19. Matsuo R and Kusano K. "Lateral hypothalamus modulations of the gustatory–salivary reflex in rats". *Journal of Neuroscience* 4.5 (1984): 1208-1216.

20. Ueda H., *et al.* "The role of salivary secretions ,brain-gut peptides and oral hygiene in obesity". *Obesity Research and Clinical Practice* 7.5 (2013): e321-e329.

21. Omar OM., *et al.* "Lifestyle and body mass index ,implications for oral health in a group of Egyptian children". *Cairo Dental Journal Part* (II) 183 (2013): 192.

22. Hilgers KK., *et al.* "Childhood obesity and dental development". *Pediatric Dentistry* 28.1 (2006): 18-22.

23. Johnson BC and Lincoln NE. "New prescriptions for Childhood obesity: Fight Childhood obesity with Antioxidants and Phytonutrients". I Universe (2008).

24. Gunjali G., *et al.* "Total salivary Antioxidant levels, dental development and oral health status in Childhood obesity". *Journal of International Oral Health* 6.4 (2014): 63-67.

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Original Article

Anxiety, depression, and oral health: A population-based study in Southeast of Iran

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ABSTRACT

Background: Depression and anxiety are two psychosocial illnesses that mostly are comorbid. The prevalence of these diseases is increasing worldwide. Both can affect general health also oral and dental health. The effects can be physiological and behavioral. Patients with these disorders are not willing to keep oral hygiene. The purpose of this study was to investigate the association between depression/anxiety and oral health indices in the 15–75-year-old population of Kerman.
Materials and Methods: This cross-sectional study recruited 5900 people aged 15–75 years through one-stage cluster sampling (Kerman coronary artery disease risk factors study, KERCADRS). Data were collected through beck questionnaires for anxiety and depression and clinical examinations. Oral health indices including decayed, missing, filled teeth, gingival index (GI), and community periodontal index (CPI) were also measured. Data were analyzed by SPSS 21 software. Chi-square, *t*-test and regression analysis were used to determine the relationship between the variables. $P \leq 0.05$ was considered as the level of statistical significance.
Results: In the study, 1975 (33.6%) of patients showed moderate-to-severe anxiety and 3502 (59.5%) got the scores as depressed. There was a significant difference between GI and CPI indices of the normal and depressed group ($P < 0.01$), but the difference in the anxious and normal group was not statistically significant ($P > 0.05$).
Conclusion: The results of the study showed a significant relationship between depression and oral health indices but not with anxiety. Therefore, the present study suggests that more attention should be paid to the oral health of people with a history of depression.

Key Words: Anxiety, dental caries, depression, oral health, periodontal diseases

INTRODUCTION

Oral health is an important issue that affects not only the teeth and mouth but also general health, appearance, and self-esteem. Recently, researchers have shown that there is a relationship between oral diseases and conditions such as diabetes, heart, lung, and kidney diseases.[1-5] The most common problems of the oral cavity are dental caries and periodontitis; however, these two are preventable.[2] Based on the

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World Health Organization (WHO), 5%–20% of adults have periodontitis.[6]

Mental disorders such as depression and anxiety are pervasive problems worldwide.[7] Depression is the fourth leading cause of disability and will be the second by 2020 based on the WHO documents.[8] Anxiety disorder is also frequent as a feature of modern life.[9] The two disorders are comorbid, and the diagnosis should be done carefully. Although there are psychological and medical therapies for these disorders, half of the patients do not follow-up the treatment and the other half which seek the treatment do not receive suitable treatment.[10]

It is proved that these two conditions can influence the physical health by several pathophysiologic mechanisms. Enhancing the risk of infections by modification of the immune system function and increasing pro-inflammatory cytokines and thereafter induction of vascular inflammation are of the most proposed mechanisms of action of depression and anxiety on the human body.[11] It is proposed that these two conditions can cause oral and dental problems since emotional changes can influence oral mucosa.[12] Several researches have also shown a relationship between anxiety or depression and periodontal health[13-15] while others have not.[16,17] Because of the controversy, the aim of this study was to investigate the relationship between oral health and depression/anxiety in a large general population in the southeast of Iran.

MATERIALS AND METHODS

Data collection

This cross-sectional study was part of a big cohort study Kerman coronary artery disease risk factors study (KERCADRS) started from 2010 in Kerman Province of Iran.[18] The sampling was done by one-stage clustering from 250 postal codes randomly selected among Kerman city postal codes. The participants were a population of families who admitted to participating in the study and signed a written consent form after ensuring their understanding of the whole process. For participants under the age of 18 years, their parents/guardians signed the consent form. All procedures of this study were carried out according to the Declaration of Helsinki. The study was reviewed and approved by the Research Review Board of Kerman University of Medical Sciences (Ethic code: 88–110 KA). Some demographic information was recorded. The methodology of the whole project has been published in Iranian journal of public health.[18] Beck anxiety questionnaire and Beck Depression Inventory-IA were used to determine the score of anxiety and depression.[19,20] The decayed, missing, filled teeth (DMFT) index was measured based on the WHO protocol using a mouth mirror under the light of the dental unit and DFMT were assessed.[21] Gingival status was assessed using Silness and Leo's index of the gingival bleeding, gingival index (GI). For assessing this index, patient's teeth were dried, and then, index teeth were examined on the basis of index criteria.[22] The community periodontal index (CPI) was assessed by CPI probe (Fresno-Surge, Pakistan), and index teeth were coded by standard codes of the index.[22] A trained dentist performed the oral examination. The beck questionnaires were completed by participants and they were helped by a health worker if it was necessary.

Psychometric instruments

Psychometric instruments used in this study were Beck's Depression and Anxiety Scales for the assessment of depression and anxiety symptoms.[19,20] Persian versions of both questionnaires are also validated.[23-25]

Beck depression index

Beck depression index (BDI) scale is a questionnaire for the assessment of depression symptoms which includes 21 items. Each item is scored from 0 to 3. BDI score is a sum of the value of each item (total: 63). A total score of 1–10 is assumed normal and total score above 10 as a level of depression (11–16 as mild mood disturbance; 17–20 as borderline clinical depression; 21–30 as moderate depression; 31–40 as severe depression; and over 40 as extreme depression).[19] In this study, the severity of depression was considered for analysis, and patients with moderate depression and above were considered as depressed.

Beck anxiety index

Beck anxiety index (BAI) scale is a questionnaire for the assessment of anxiety symptoms which includes 21 questions about anxiety symptoms. Each question is scored from 0 to 3. BAI total score is a sum of the value of each question (total: 63). The score of 0–21 is assumed as low anxiety or normal, score of 22–35 as moderate anxiety, and score of 36 and above as potentially concerning levels of anxiety.[20] In this study, the severity of anxiety was considered for

analysis, and patients with moderate and above score were considered as anxious population.

Statistical analysis

Data of noneligible people (smoking, opium abuse, complete denture, and pregnancy and a history of hemorrhagic diseases, epilepsy, immune system deficiency diseases, malignancies, chronic inflammatory diseases, and bulimia) were excluded from analysis.

The SPSS software version 21 (IBM Corp., Armonk, NY, USA) was used for data analysis. The groups' relationships were performed using Chi-square, *t*-test, and ordinal or linear regression. $P = 0.05$ and less was considered as the statistically significant level.

RESULTS

The participants in the project were 3238 female and 2662 male (total 5900 people) aged 15–75 years. The data of 4574 participants were analyzed for CPI index, 4591 for GI index, and 4640 for DMFT.

In this study, the educational state of 48.5% of participants was below diploma, 32.7% diploma, and 18.8% higher than diploma. The mean DMFT index was 13.58 (with the standard deviation of 5.96) in participants; 73.8% had mild GI; and 92.2% had CPI score 2 (calculus). The analysis of questionnaires revealed that 1975 (33.6%) of participants showed medium and severe anxiety and 3502 (59.5%) showed low, medium, and severe depression. The results of the study were analyzed in four age groups (15–24, 25–34, 35–54, and 55–74) and two sex groups. The depression showed an association with the GI index in people with the age of 40–70 years ($P < 0.001$). However, the relationship between depression and CPI index was not statistically significant.

GI and CPI indices were higher in anxious people compared to normal people; though it was not statistically significant. However, the relationship between depression and both GI and CPI indices was statistically significant ($P < 0.001$).

To determine the association of dependent variables of oral health with independent variants of depression and anxiety, the ordinal (for GI and CPI) or linear regression (for DMFT) analysis was also done. It showed that there was neither a significant association between GI and anxiety nor GI and depression. However, GI score was higher in women and in elders [Table 1]. The other oral indices (CPI and DMFT) were significantly higher in elders and patients with depression but not in patients with anxiety [Tables 2 and 3].

Comparing normal and depressed participants' scores showed that the difference between GI and CPI indices in normal and depressed people was statistically significant ($P < 0.001$) [Table 4]. However, the difference between GI and CPI indices between normal and anxious participants was not statistically significant ($P > 0.05$) [Table 5].

DISCUSSION

Since mental conditions affect the whole body and also oral health, it is estimated that anxiety and/or depression may have an influence on the incidence of oral diseases.[12] Several studies tried to detect this association, but the results are inconsistent.

In this cross-sectional study, the relationship between depression and anxiety and oral health indices were investigated in 5900 participants aged 15–75 years. About 33.6% of participants were marked with anxiety and 59.5% of participants with depression. There was a significant relationship between depression and oral health indices. Regression analysis indicated that depressed patients are at the greater risk of tooth missing and developing dental caries and presenting poor periodontal and gingival status; however, no significant relationship was found between anxiety and oral health indices. Because of the established effect of smoking and opium on periodontal diseases, people who smoke or use opium were excluded from this study.

Table 1: Association of gingival index with anxiety and depression by ordinal regression analysis

Variable	Estimate	SE	Wald	df	Significant
Depression	−0.024	0.034	−0.498	1	0.480
Anxiety	0.057	0.069	0.684	1	0.408
Age	0.048	0.003	213.461	1	0.000*
Sex	−0.219	0.079	7.640	1	0.006*

*Significant. SE: Standard error

Table 2: Association of community periodontal index with anxiety and depression by ordinal regression analysis

Variable	Estimate	SE	Wald	df	Significant
Depression	0.118	0.052	5.144	1	0.023*
Anxiety	−0.057	0.104	0.306	1	0.580
Age	0.011	0.005	5.584	1	0.018*
Sex	−0.021	0.121	0.029	1	0.866

*Significant. SE: Standard error

Table 3: Association of decayed, missing, filled teeth with anxiety and depression by linear regression analysis

Variable	Unstandardized coefficients		Standardized coefficients (β)	*t*	Significant
	B	SE			
Depression	0.326	0.070	0.072	4.684	0.000*
Anxiety	0.185	0.138	0.021	1.348	0.178
Age	0.183	0.005	0.450	34.281	0.000*
Sex	0.034	0.161	0.003	0.209	0.834

*Significant. SE: Standard error

Table 4: Comparing oral health indices in normal and depressed groups

Oral health indices	GI-score			Total	CPI-score				Total
Depression severity	Mild	Medium	Sever		1	2	3	4	
Normal									
Count	478	1488	50	2016	67	1855	90	0	2012
Percentage within depression score	23.7	73.8	2.5	100.0	3.3	92.2	4.5	0.0	100.0
Percentage within GI/CPI score	48.2	43.1	35.2	44.0	48.2	44.7	33.2	0.0	44.1
Percentage of total	10.4	32.5	1.1	44.0	1.5	40.6	2.0	0.0	44.1
Depressed									
Count	514	1962	92	2568	72	2296	181	6	2555
Percentage within depression score	20.0	76.4	3.6	100.0	2.8	89.9	7.1	0.2	100.0
Percentage within GI/CPI score	51.8	56.9	64.8	56.0	51.8	55.3	66.8	100.0	55.9
Percentage of total	11.2	42.8	2.0	56.0	1.6	50.3	4.0	0.1	55.9
Total									
Count	992	3450	142	4584	139	4151	271	6	4567
Percentage within depression score	21.6	75.3	3.1	100.0	3.0	90.9	5.9	0.1	100.0
Percentage within GI/CPI score	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of total	21.6	75.3	3.1	100.0	3.0	90.9	5.9	0.1	100.0

P<0.01 (GI×depression); *P*<0.001 (CPI×depression). 1: Normal; 2: Mild; 3: Moderate; 4: Severe. GI: Gingival index; CPI: Community periodontal index

Table 5: Comparing oral health indices in normal and anxious groups

Oral health indices	GI-score			Total	CPI-score				Total
Anxiety severity	Mild	Medium	Sever		1	2	3	4	
Mild									
Count	688	2329	90	3107	98	2814	180	2	3094
Percentage within anxiety score	22.1	75.0	2.9	100.0	3.2	91.0	5.8	0.1	100.0
Percentage within GI/CPI score	69.3	67.5	63.4	67.8	70.5	67.8	66.4	33.3	67.7
Percentage of total	15.0	50.8	2.0	67.8	2.1	61.6	3.9	0.0	67.7
Medium and severe									
Count	305	1120	52	1477	41	1337	91	4	1473
Percentage within anxiety score	20.6	75.8	3.5	100.0	2.8	90.8	6.2	0.3	100.0
Percentage within GI/CPI score	30.7	32.5	36.6	32.2	29.5	32.2	33.6	66.7	32.3
Percentage of total	6.7	24.4	1.1	32.2	0.9	29.3	2.0	0.1	32.3
Total									
Count	993	3449	142	4584	139	4151	271	6	4567
Percentage within anxiety score	21.7	75.2	3.1	100.0	3.0	90.9	5.9	0.1	100.0
Percentage within GI/CPI score	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percentage of total	21.7	75.2	3.1	100.0	3.0	90.9	5.9	0.1	100.0

P>0.05 (GI and CPI anxiety). 1: Normal; 2: Mild; 3: Moderate; 4: Severe. GI: Gingival index; CPI: Community periodontal index

Several researches reported similar data to the present paper. Rosania *et al*. showed that depression, stress, and the amount of salivary cortisol are associated with periodontal diseases in a cross-sectional pilot study. Although the number of subjects (45 periodontal patients) participated in the study was few. This means that in this study, the measurement of depression and anxiety was done in a group of people

with oral diseases.[13] Furthermore, Suresh *et al.* performed an observational study on 278 anxiety and 398 depression patients and 676 healthy controls. In this study, the results showed that depression (like the present study) and anxiety (unlike the present study) increase the incidence of oral diseases. The percentage of people suffering from oral diseases in anxiety, depression, and control groups were about 21%, 9%, and 5%, respectively. The difference of this study with the present study is that their research was done on patients with depression and anxiety, but the present study was done on a general population.[12]

In contrast, there are some studies that found no relation between anxiety/depression and periodontal diseases. Solis *et al.* performed a cross-sectional study on 153 people and could not find a relationship between depression/anxiety and periodontitis.[16] Viana *et al.* also did not find a significant association between depression and periodontitis in 191 elderly people over the age of 60.[26] Delgado-Angulo *et al.* performed a large population-based survey on 8028 participants which <5000 people had completed the survey and were included in the analysis. They reported that depression was associated with the number of decayed teeth but not with periodontal diseases. They also found that there was no relationship between anxiety and neither the number of decayed teeth nor periodontal diseases.[17] Finally, a systematic review published in 2016 could not find a relation between depression and periodontitis because of the heterogeneity among the researches.[27]

It should be mentioned that the number of participants in the present study was large. This can be the strength of this study. However, there are drawbacks for this research. For example, although self-reporting questionnaires used in this study are validated instruments, they are not diagnostic tools. Another drawback is that dental and periodontal diseases are chronic conditions and their progression takes time. It is recommended to search for a relationship between anxiety/depression and oral diseases in patients with a long history of anxiety disorders or depression.

The differences among studies done so far may refer to the different sample size of the studies, the type of the studies, the anxiety and depression questionnaires used, the difference between the races, the range of the ages of people participated in the researches, etc., For further research, it is also recommended to do the same project considering people with dental anxiety since a relationship between poor oral health and anxiety has been proposed.

CONCLUSION

Based on the results of this study, there is a relationship between depression and oral diseases; therefore, it is recommended that people who are diagnosed with depression receive more dental services. Although we did not find a significant relationship between anxiety and oral diseases, it is better to pay more attention to this group of people's oral health.

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Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, and financial or nonfinancial in this article.

REFERENCES

1. Akar H, Akar GC, Carrero JJ, Stenvinkel P, Lindholm B. Systemic consequences of poor oral health in chronic kidney disease patients. Clin J Am Soc Nephrol 2011;6:218-26.
2. Benjamin RM. Oral health: The silent epidemic. Public Health Rep 2010;125:158-9.
3. de Oliveira C, Watt R, Hamer M. Toothbrushing, inflammation, and risk of cardiovascular disease: Results from Scottish Health Survey. BMJ 2010;340:c2451.
4. Malek Mohammadi T, Wright CM, Kay EJ. Childhood growth and dental caries. Community Dent Health 2009;26:38-42.
5. Najafipour H, Malek Mohammadi T, Rahim F, Haghdoost AA, Shadkam M, Afshari M, *et al.* Association of oral health and cardiovascular disease risk factors "results from a community based study on 5900 adult subjects". ISRN Cardiol 2013;2013:782126.
6. Jin LJ, Armitage GC, Klinge B, Lang NP, Tonetti M, Williams RC, *et al.* Global oral health inequalities: Task group – Periodontal disease. Adv Dent Res 2011;23:221-6.
7. Johansson R, Carlbring P, Heedman Å, Paxling B, Andersson G. Depression, anxiety and their comorbidity in the Swedish general population: Point prevalence and the effect on health-related quality of life. PeerJ 2013;1:e98.
8. Kessler RC, Bromet EJ. The epidemiology of depression across cultures. Annu Rev Public Health 2013;34:119-38.
9. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. Dialogues Clin Neurosci 2015;17:327-35.
10. Tiller JW. Depression and anxiety. Med J Aust 2013;199:S28-31.
11. Warren KR, Postolache TT, Groer ME, Pinjari O, Kelly DL, Reynolds MA, *et al.* Role of chronic stress and depression in periodontal diseases. Periodontol 2000 2014;64:127-38.
12. Suresh KV, Shenai P, Chatra L, Ronad YA, Bilahari N, Pramod RC, *et al.* Oral mucosal diseases in anxiety and depression patients: Hospital based observational study from South India. J Clin Exp Dent 2015;7:e95-9.

13. Rosania AE, Low KG, McCormick CM, Rosania DA. Stress, depression, cortisol, and periodontal disease. J Periodontol 2009;80:260-6.
14. Johannsen A, Rylander G, Söder B, Asberg M. Dental plaque, gingival inflammation, and elevated levels of interleukin-6 and cortisol in gingival crevicular fluid from women with stress-related depression and exhaustion. J Periodontol 2006;77:1403-9.
15. Johannsen A, Rydmark I, Söder B, Asberg M. Gingival inflammation, increased periodontal pocket depth and elevated interleukin-6 in gingival crevicular fluid of depressed women on long-term sick leave. J Periodontal Res 2007;42:546-52.
16. Solis AC, Lotufo RF, Pannuti CM, Brunheiro EC, Marques AH, Lotufo-Neto F, *et al*. Association of periodontal disease to anxiety and depression symptoms, and psychosocial stress factors. J Clin Periodontol 2004;31:633-8.
17. Delgado-Angulo EK, Sabbah W, Suominen AL, Vehkalahti MM, Knuuttila M, Partonen T, *et al*. The association of depression and anxiety with dental caries and periodontal disease among finnish adults. Community Dent Oral Epidemiol 2015;43:540-9.
18. Najafipour H, Mirzazadeh A, Haghdoost A, Shadkam M, Afshari M, Moazenzadeh M, *et al*. Coronary artery disease risk factors in an urban and peri-urban setting, Kerman, Southeastern Iran (KERCADR study): Methodology and preliminary report. Iran J Public Health 2012;41:86-92.
19. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry 1961;4:561-71.
20. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: Psychometric properties. J Consult Clin Psychol 1988;56:893-7.
21. Kay EJ, Mills I, Tredwin C, Lambe P, Nassani MZ. Comparison of utility weighted DMFT with patient-reported oral well-being. J Oral Rehabil 2014;41:155-61.
22. Malek Mohammadi T, Hajizamani A. Health and disease indicators in dentistry. Kerman, Iran: Kerman Univ Med Sci Publication; 2011:82.
23. Fathi-Ashtiani A, Dastani M. Psychological Tests: Personality and Mental Health. Tehran: Besat; 2009.
24. Kaviani H, Mousavi AS. Psychometric properties of the Persian version of Beck anxiety inventory (BAI). Tehran Univ Med J 2008;65:136-40.
25. Najafipour H, Banivaheb G, Sabahi A, Naderi N, Nasirian M, Mirzazadeh A. Prevalence of anxiety and depression symptoms and their relationship with other coronary artery disease risk factors: A population-based study on 5900 residents in Southeast Iran. Asian J Psychiatr 2016;20:55-60.
26. Viana LR, Castro CP, Pereira HB, Pereira AD, Lopes FF. Is depression associated with periodontal status in elderly? Braz J Oral Sci 2013;12:20-2.
27. Araújo MM, Martins CC, Costa LC, Cota LO, Faria RL, Cunha FA, *et al*. Association between depression and periodontitis: A systematic review and meta-analysis. J Clin Periodontol 2016;43:216-28.

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Review Article

Pharmacodynamic Causes of Xerostomia in Patients on Psychotropic Drugs

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Abstract

Xerostomia is the sense of dry mouth which may results from reduced salivary flow. Since saliva plays a key role in the oral homeostasis, major oral health issues and decreased quality of life reflect xerostomia in patients. Xerostomia represents significant burden among patients on pharmacotherapy. One of the frequently used drugs which induce xerostomia are psychotropic drugs. This article summarizes major pharmacodynamic interactions of psychotropic drugs with signalling mechanisms involved in salivary secretory processes.

Keywords: Xerostomia; Psychotropic Drugs; Benzodiazepines; Antidepressants; Antipsychotics

Introduction

Oral homeostasis is highly dependent on the presence of saliva. Roles of saliva are numerous: bolus formation, initiation of food digestion, sense of taste and speech as well as protective role [1]. Namely, by forming a protective mucin layer, saliva protects oral cavity acting as lubricant, and reduces friction between contact surfaces of teeth and dentures [2,3]. Ever since the study of Fox., *et al*. it is well known that alterations in secretion of lubricating mucins had the strong impact on xerostomia sensation especially under circumstances of xerostomia associated with unchanged salivary flow [4]. Saliva is crucial in dental decay prevention, antimicrobial protection and protection of oral tissues from oxidative stress [5,6]. Thus, the salivary gland dysfunction may lead to diminished intraoral tissues protection against infection and injuries, altered mastication, taste and swallowing, disturbance in speech and dental prosthesis wearing, significantly affecting quality of life of patients [7-11]. Salivary secretion is principally regulated by autonomic nervous system: parasympathetic, through acetylcholine (ACh)-induced activation of muscarinic M_3 receptors (production of copious saliva with water and electrolytes), and sympathetic, through norepinephrine and epinephrine-mediated activation of alpha 1-adrenoceptors (production of water and electrolytes-rich saliva), and beta-adrenoceptors (production of viscous, amylase- and mucin-rich saliva) [12]. Stimulation of muscarinic M_3 and adrenergic alpha-1 receptors causes inositol phospholipid turnover and inositol triphosphate release with consequent increase in intracellular Ca^{2+} while stimulation of beta- adrenoceptors leads to an increase in intracellular cyclic AMP (cAMP) mediated by activation of adenylcyclase [12]. Elevation of intracellular cAMP is linked to secretion of salivary proteins stored in secretory pools bound to membrane [12]. Beside autonomic nervous system, significant role in regulation of salivary glands function have neuropeptides such as tachykinins (substance P, neurokinin A, neuropeptide Y) and autocoid - bradykinin [13,14].

Xerostomia- causes and evaluation

Drugs are considered to be the most frequent cause of oral dryness. More than hundred drugs were associated with this condition, considered oral dryness to be their oral adverse reaction. Among them, of most importance are frequently used antihistaminic drugs, antihypertensives and psychotropic drugs [15]. Beside drugs, other health conditions, such as autoimmune disorders, endocrine disorders or radiation therapy comprise the major causes for dry mouth. When describing the oral dryness, the term xerostomia is used to express the subjective sensation of oral dryness, while the term hyposalivation expresses the actual decrease in salivary flow rate [16].

Psychotropic drugs	Partial list of drugs
Benzodiazepines	Diazepam, Lorazepam, Alprazolam, Temazepam
Antidepressants: SSRIs, SNRIs	Venlafaxine, Duloxetine, Sertraline, Fluoxetine
Tricyclic antidepressants	Amitriptyline, Imipramine
Antipsychotics	Phenotiazine, Clozapine, Risperidone, Lithium

Table 1: Partial list of psychotropic drugs that cause dry mouth.

SSRIs: Selective Serotonin Reuptake Inhibitors; SNRIs: Selective Norepinephrine Reuptake Inhibitors.

Investigating the xerostomia, an interview is the method of choice for data collection, comprises various types of questions and responses (qualitative or quantitative), used to describe frequency, duration and degrees of dry mouth, as well as its impact on every-day life. Most frequently, a single question is used in order to describe xerostomia: question "Does your mouth usually feel dry?" combined with Yes/No answers [17-18]. On the other hand, Flink., *et al.* (2005), used six variables associated with salivary gland function ("difficulty experiencing in speaking due to dryness"; "difficulty experiencing in swallowing due to dryness"; "how much saliva there is in your mouth"; "dryness of throat"; "dryness of lips"; "consistency of saliva") which were rated using Visual Analog Scales [19].

Measurement of salivary flow rate, as objective indicator, usually is defined by estimation of unstimulated whole saliva flow rate (UWSFR) or stimulated whole saliva flow rate (SWSFR). Method of collection of saliva from individual comprises "draining", "spitting", "suction" or "swab" methods, during 5, 10 or 15 minutes, and expression of the amount of obtained saliva in volume or weight units. Depending on whether unstimulated whole saliva (UWS) or stimulated whole saliva (SWS) was collected, aforementioned methods have different suitability degree [20]. It has been proved that "suction" and "swab" methods are not suitable for UWS collection because the process itself can stimulate saliva secretion [20]. "Draining" method is not accepted in patients because of the unpleasant feeling during collection [17,20,21]. The most frequently used method for UWS collection is "spitting" method, which has been proven to be the most suitable, especially for UWS collection in cohort studies [22,23]. When collecting SWS, "spitting" method is most commonly used in combination with paraffin wax or gum base chewing or application of citric acid for saliva stimulation [22]. If UWSFR is below 0.1 ml/min and SWSFR- less than 0.7 ml/min, salivation is considered as very low, if UWSFR is between 0.1 and 0.2 ml/min and SWSFR- between 0.7 and 1.0 ml/min it is rated as low, and if UWSFR is above 0.2 ml/min and SWSFR- above 1.0 ml/min it is considered as physiologic [18,19].

Treatment of xerostomia

Xerostomia could be relieved by wetting the oral mucosa by using substitutes for saliva which contain mucin, glycerin or carboxymethylcellulose, hydroxypropyl cellulose or hydroxyethyl cellulose. However, artificial saliva, although exerting the physical characteristics of saliva does not have any antimicrobial properties. It is noteworthy to encourage patients to regularly practice oral and dental hygiene, to avoid sugar, acidic or spicy foods and to stop smoke and use alcohol.

Benzodiazepines and dry mouth

Benzodiazepines (BDZ) are anxiolytic and sedative drugs, with effects mediated by BDZ receptors [24]. These drugs are widely used in the dentistry for oral and intravenous sedation. BDZ receptors are classified into a central- type, linked to $GABA_A$ receptor containing chloride channels and peripheral-type not linked to $GABA_A$ receptor, both receptors are found to be present in brain as well as in salivary glands [25]. Clinical trials in humans point at benzodiazepines as the cause of mild to serious oral dryness [24] Studies in rat salivary glands showed that BDZ inhibit muscarinic receptor- stimulated salivary output as well as the release of amylase acting through both type of BDZ receptors [26,27]. In rat parotid cells, Kujirai., *et al.* have shown that diazepam through BDZ receptors decreased inositol 1,4,5-triphosphate and $[Ca^{2+}]$, signaling molecules involved in muscarinic and alpha-1 adrenergic-mediated salivary secretion [28].

Antidepressants and dry mouth

Prevalence of xerostomia among patients under antidepressants is being significantly more often reported in patients taking the conventional, tricyclic antidepressants (70 - 85% of patients) compared to patients under novel drugs of selective serotonine reuptake inhibitors group (15 - 35% of patients) [29-32]. Tricyclic antidepessants (TCAs), such as amitriptiline or imipramine, block the reuptake of both noradrenaline and serotonine into the nerve terminals and therefore enhance norepinephrine- and serotonin-mediated transmission. In addition, these drugs also have affinities for muscarinic, alpha-adrenergic and histamine H1 receptors, accounting for their most common side effects such as: dry mouth, postural hypotension or sedation, respectively. Investigations in humans and animals showed that TCAs by various mechanisms including: inhibiting muscarinic- [29,33], alpha- adrenergic receptors' function [34], by decreasing number and transductional signal underlying beta- adrenoceptor stimulation [35] lead to alterations in salivary output and composition [36]. Selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine, selectively inhibit the reuptake of serotonin and have little affinity for muscarinic or histamine receptors therefore induce less pronounced xerostomia [29,32]. Concerning mechanism of possible inhibitory effects of SSRIs on cholinergic-induced salivation, it is noteworthy that most recent investigations in brain have shown that fluoxetine increases activity of acetylcholinesterase, enzyme that metabolize ACh, and therefore decreases ACh-mediated transmission in brain [37].

It is interesting to note that antidepressants have opposite effects on unstimulated and stimulated salivary flow on rat model [38]. Namely, imipramine (TCAs) decreases, while fluoxetine (SSRIs) only presents tendency to decrease unstimulated salivation in rats, while both antidepressants are shown to increase muscarinic receptor-stimulated salivation with no significant alteration in total protein or amylase levels [38].

Antipsychotics and dry mouth

Antipsychotics are used for schizophrenia treatment and exert strong inhibiting effect on dopamine D_1- and D_2 -receptors (older, typical antipsychotics) or less robust, selective dopamine D_2- combined with serotonine $5HT_2$- receptors blockade (new, atypical antipsychotics). Since typical antipsychotic medications, such as chlorpromazine or haloperidol, have affinity for muscarinic-, histamine H_1- or alpha 1- receptors, also, their use is followed by frequently reported xerostomia [39]. Atypical antipsychotics, such as clozapine or olanzapine, exhibit D_2 - receptor selectivity, but have less significant affinity for histaminergic, muscarinic and alpha adrenergic receptors, also [40]. Investigations on patients and animals showed that atypical antipsychotics produce less frequently dry mouth than typical antipsychotics [41,42]. In an experimental model of rat, clozapine and olanzapine were able to exert both agonistic and antagonistic effects on salivary secretion [43,44]. Antagonistic effects on secretion of these drugs were shown to be the result of inhibition of muscarinic M_3 and alpha1 adrenergic receptors by reducing the parasympathetically- and sympathetically-stimulated salivary flow. Agonistic effects of clozapine and olanzapine are mediated by muscarinic M_1 and neurokinin receptors in rat, respectively, producing low-level and long-lasting salivation, not related to stimulatory activity [42-44]. These results support the hypothesis of dominating stimulatory effects of clozapine at rest and during the night and dominating inhibitory effects in states of increased secretory demands [44].

Lithium and dry mouth

Lithium is mood- stabilizing drug that acts via interference with phosphatidyl inositol pathway. Namely, Saiardi and Mudge showed *in vitro* that lithium regulate the rate of phosphoinositide synthesis in neurons [45]. Also, in rat submandibular gland, Popović., *et al.* showed that chronic lithium treatment significantly decreased salivation induced by muscarinic- and alpha1- receptors (activation of both involving production of phosphatidyl inositol 1,4,5-triphosphate as a second messenger), but not by beta-receptors (activation of which involves production of cyclic AMP) [46]. Beside this cellular mechanism, other factors associated with lithium therapy may contribute to decreased salivary function, such as the prominent polyuria as the result of inhibition of action of antidiuretic hormone in kidney (diabetes insipidus). One of the most common side effects during long-term lithium treatment is xerostomia reported in majority (> 70%) of patients [47].

Conclusion

Xerostomia represents significant complain among patients on pharmacotherapy with psychotropic drugs. In most cases, xerostomia is the result of psychotropic drug- interference with receptor(s) or signalling mechanisms involved in salivary secretion. Impaired salivation cause difficulties in tasting, chewing, swallowing, and speaking while increasing the chance of developing dental decay, tooth sensitivity and oral infections. Patients on therapy for depression, bipolar disorder, schizophrenia or anxiety may suffer from mild oral discomfort or major oral disease due to xerostomia resulting in compromised patient's health and quality of life.

Bibliography

1. Amerongen AV and Veerman ECI. "Saliva - the defender of the oral cavity". *Oral Diseases* 8 (2002): 12- 22.
2. Dawes C. "Salivary flow patterns and the health of hard and soft oral tissues". *The Journal of the American Dental Association* 139 (2008): 18S-24S.
3. Van Nieuw Amerongen A., *et al.* "Salivary proteins: protective and diagnostic value in cariology?" *Caries Research* 38 (2004): 247-253.
4. Fox PC., *et al.* "Subjective reports of xerostomia and objective measures of salivary gland performance". *The Journal of the American Dental Association* 115 (1987): 581-584.
5. Nagler RM., *et al.* "Characterization of the differentiated antioxidant profile of human saliva". *Free Radical Biology and Medicine* 32 (2002): 268-277.
6. Battino M., *et al.* "The antioxidant capacity of saliva". *Journal of Clinical Periodontology* 29 (2002): 189-194.
7. Nagler RM. "The enigmatic mechanism of irradiation-induced damage to the major salivary glands". *Oral Diseases* 8 (2002): 141-146.
8. Nagler RM. "Salivary glands and the aging process: mechanistic aspects, health-status and medicinal-efficacy monitoring". *Biogerontology* 5 (2004): 223-233.
9. Thomson WM., *et al.* "The impact of xerostomia on oral-health-related quality of life among younger adults". *Health and Quality of Life Outcomes* 4 (2006): 86
10. Cho MA., *et al.* "Salivary flow rate and clinical characteristics of patients with xerostomia according to its aetiology". *Journal of Oral Rehabilitation* 37 (2010): 185-193.
11. Suh KI., *et al.* "Relationship between salivary flow rate and clinical symptoms and behaviours in patients with dry mouth". *Journal of Oral Rehabilitation* 34 (2007): 739-744.
12. Proctor GB and Carpenter GH. "Regulation of salivary gland function by autonomic nerves". *Autonomic Neuroscience* 133 (2007): 3-18.
13. Stojic D. "Effects of captopril and bradykinin on chorda tympani-induced salivation in cat". *European Journal of Oral Sciences* 107 (1999): 21-24.
14. Roganović J., *et al.* "Effect of neuropeptide Y on norepinephrine-induced constriction in the rabbit facial artery after carotid artery occlusion". *Vojnosanitetski Pregled* 71 (2014): 571-575.
15. Porter SR., *et al.* "An update of the etiology and management of xerostomia". *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics* 97 (2004): 28-46.
16. Nederfors T. "Xerostomia and hyposalivation". *Advances in Dental Research* 14 (2000): 48-56.
17. Bergdahl M and Bergdahl J. "Low unstimulated salivary flow and subjective oral dryness: association with medication, anxiety, depression, and stress". *Journal of Dental Research* 79 (2000): 1652-1658.
18. Flink H., *et al.* "Prevalence of hyposalivation in relation to general health, body mass index and remaining teeth in different age groups of adults". *Community Dentistry and Oral Epidemiology* 36 (2008): 523-531.
19. Flink H., *et al.* "Influence of the time of measurement of unstimulated human whole saliva on the diagnosis of hyposalivation". *Archives of Oral Biology* 50 (2005): 553-559.
20. Navazesh M and Christensen CM. "A comparison of whole mouth resting and stimulated salivary measurement procedures". *Journal of Dental Research* 61 (1982): 1158-1162.
21. Nederfors T and Dahlöf C. "Effects on salivary flow rate and composition of withdrawal of and re-exposure to the beta 1-selective antagonist metoprolol in a hypertensive patient population". *European Journal of Oral Sciences* 104 (1996): 262-268.
22. Navazesh M. "Methods for collecting saliva". *Annals of the New York Academy of Sciences* 694 (1993): 72-77.
23. Thomson WM., *et al.* "Medication and dry mouth: findings from a cohort study of older people". *Journal of Public Health Dentistry* 60 (2000): 12-20.
24. Elie R and Lamontagne Y. "Alprazolam and diazepam in the treatment of generalized anxiety". *Journal of Clinical Psychopharmacology* 4 (1984): 125-129.
25. Yamagishi H., *et al.* "Pharmacological characterization of an 18-kDa protein associated with the peripheral-type benzodiazepine receptor in salivary glands". *The Japanese Journal of Pharmacology* 82 (2000): 110-115.
26. Ouchi K., *et al.* "Modulation of benzodiazepine receptor, adrenoceptor and muscarinic receptor by diazepam in rat parotid gland". *European Journal of Pharmacology* 657 (2011): 20-25.
27. Okubo M., *et al.* "Inhibitory regulation of amylase release in rat parotid acinar cells by benzodiazepine receptors". *European Journal of Pharmacology* 359 (1998): 243-249.

28. Kujirai M., *et al.* "Inhibitory effect of diazepam on muscarinic receptor-stimulated inositol 1,4,5-trisphosphate production in rat parotid acinar". *British Journal of Pharmacology* 137 (2002): 945-952.

29. Hunter KD and Wilson WS. "The effects of antidepressant drugs on salivary flow and content of sodium and potassium ions in human parotid saliva". *Archives of Oral Biology* 40 (1995): 983-989.

30. Friedlander AH., *et al.* "Panic disorder: psychopathology, medical management and dental implications". *The Journal of the American Dental Association* 135 (2004): 771-778.

31. Boyd LD., *et al.* "Nutritional implications of xerostomia and rampant caries caused by serotonin reuptake inhibitors: a case study". *Nutrition Reviews* 55 (1997): 362-368.

32. deAlmeida P., *et al.* "Effects of antidepressants and benzodiazepines on stimulated salivary flow rate and biochemistry composition of the saliva". *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics* 106 (2008): 58-65.

33. Mörnstad H., *et al.* "Long-term effects of two principally different antidepressant drugs on saliva secretion and composition". *Scandinavian Journal of Dental Research* 94 (1986): 461-470.

34. Wynn RL and Meiller TF. "Drugs and dry mouth". *General Dentistry* 49 (2001): 10-14.

35. Scarpace PJ., *et al.* "Desipramine desensitizes beta-adrenergic signal transduction in salivary glands: differential regulation with age". *European Journal of Pharmacology* 247 (1993): 65-72.

36. Koller MM., *et al.* "Desipramine induced changes in salivary proteins, cultivable oral microbiota and gingival health in aging female NIA Fischer 344 rats". *Life Sciences* 68 (2000): 445-455.

37. Mineur YS., *et al.* "Cholinergic signaling in the hippocampus regulates social stress resilience and anxiety- and depression-like behaviour". *Proceedings of the National Academy of Sciences U S A* 110 (2013): 3573-3578.

38. Kopittke L., *et al.* "Opposite effects of antidepressants on unstimulated and stimulated salivary flow". *Archives of Oral Biology* 50 (2005): 17-21.

39. Sreebny LM and Schwartz SS. "A reference guide to drugs and dry mouth--2nd edition". *Gerodontology* 14 (1997): 33-47.

40. Richelson E and Souder T. "Binding of antipsychotic drugs to human brain receptors focus on newer generation compounds". *Life Sciences* 68 (2000): 29-39.

41. Kane JM., *et al.* "Clozapine and haloperidol in moderately refractory schizophrenia: a 6-month randomized and double-blind comparison". *Archives of General Psychiatry* 58 (2001): 965-972.

42. Godoy T., *et al.* "Clozapine-induced salivation: interaction with N-desmethylclozapine and amisulpride in an experimental rat model". *European Journal of Oral Sciences* 119 (2011): 275-281.

43. Ekström J., *et al.* "Parasympathetic vasoactive intestinal peptide (VIP): a likely contributor to clozapine-induced sialorrhoea". *Oral Diseases* 20 (2014): e90-e96.

44. Ekström J., *et al.* "Clozapine: agonistic and antagonistic salivary secretory actions". *Journal of Dental Research* 89 (2010): 276-280.

45. Saiardi A and Mudge AW. "Lithium and fluoxetine regulate the rate of phosphoinositide synthesis in neurons: a new view of their mechanisms of action in bipolar disorder". *Translational Psychiatry* 8 (2018): 175.

46. Popović J., *et al.* "The effects of acute and chronic lithium treatment on rat submandibular salivation". *Oral Diseases* 11 (2005): 100-103.

47. Markitziu A., *et al.* "Salivary gland function in patients on chronic lithium treatment". *Oral Surgery, Oral Medicine, Oral Pathology* 66 (1988): 551-557.

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XXVI. Evaluation of Written Project

XXVII. Report Formatting

XXVIII. Overall Report Quality

XXIX. Grading Rubric

RISK ASSESSMENT PROJECT (RAP) WRITTEN PRESENTATION GRADING FORM
Spring 2022

Student Name: Airel Harte Submission Date: May 30, 2022

Advisor: Professor Bonner

This project provides evidence for PLO #2 (Patient Care)

Evaluation of Periodontal Criteria	**3-** Student accurately addressed each topic evaluated and/or required on the project guidelines. Student accurately correlated the findings with the evaluation criteria.	**2** – Student did not properly address 1 or 2 of the topics evaluated and/or required on the project guidelines - and/or- Student did not correlate the findings in 1 or 2 of the evaluation criteria.	**1 -** Student did not properly address more than 2 of the topics evaluated and/or required on the project guidelines - and/or- Student did not correlate the findings in more than 2 of the evaluation criteria.	**0 -** Student did not properly address the topic(s) evaluated and/or required on the project guidelines -or- Student did not correlate the findings with the evaluation criteria –or- **in case of a SINGLE topic/evaluation :** topic/evaluation was not addressed or correlated with the evaluation criteria.
1. Patient Selection and Personal History 1. Age 2. Gender 3. Race/Ethnicity 4. Occupation Marital Status				
2a. Medical History				

1. Summary of patient's medical history 2. Systemic conditions (possible effects on oral/periodontal health) 3. List of all current medications (include implications in dental / oral concerns / systemic) Family health history (conditions)				
2b. Medical History 4. General Health Information 5. Review of Systems 6. BMI 7. Medical history correlation with ASA status 8. Proper patient data records				
3a. Dental History 1. Dental Exam Possible carious lesion/fractures present, metallic restorations (amalgam, gold), synthetic restorations (composites and acrylics), inlay, onlay, PFM's, porcelain restorations, full metal restorations, etc.				
3b. Dental History 2. Frequency of dental hygiene services 3. Hx of SRP 4. Hx of Periodontal surgery 5. Proper patient data records				
4a. Clinical Examination (Pre-treatment) 1. Extra-and Intra-oral exam correlated 2. TMJ assessments and oral habits 3. Etiology is identified 4. Possible genetic component 5. Possible cultural/ethnic influencing factor				
4b. Clinical Examination (Pre-treatment) 1. Evaluation of periodontal structures (DMFT, gingival description, MGI, PI, PD, BOP, Recession, CAL, Furcation, Mobility, etc)				

4c. Clinical Examination (Pre-treatment) 6. Perpetuating (Contributing or Local) Factors identified and recorded 7. Plaque control record index recorded and evaluated 8. Possible carious lesions 9. Faulty restorations 10. Anatomical factors 11. Malocclusion 12. Missing/shifted teeth 13. Other(s)				
5. Radiographic Examination (Pre-treatment) 14. Radiographic Interpretation for periodontium and oral pathology (if available): 15. Pulp cavity 16. Alveolar bone 17. Lamina dura 18. Alveolar crest 19. Periodontal ligament space 20. Confirmation of contributing factors 21. Possible carious lesions 22. Condition of dental restorations 23. Periapical areas				
6. AAP Classification (provide rational)				
7. Treatment Plan Considerations, SRP, Prophylaxis, number of appointments, recommendation for Supportive Periodontal Therapy (Periodontal Maintenance) / Recare Routine).				
SUBTOTAL FOR PERIODONTAL SECTION (Max. possible points: 33)				
Evaluation of Nutrition Criteria	**3-** Student accurately addressed each topic evaluated and/or required on the project guidelines. Student accurately correlated the	**2** – Student did not properly address 1 or 2 of the topics evaluated and/or required on the project guidelines - and/or- Student did not correlate the	**1 -** Student did not properly address more than 2 of the topics evaluated and/or required on the project guidelines - and/or- Student did not	**0 -** Student did not properly address the topic(s) evaluated and/or required on the project guidelines -or- Student did not correlate the findings with the evaluation

	findings with the evaluation criteria.	findings in 1 or 2 of the evaluation criteria.	correlate the findings in more than 2 of the evaluation criteria.	criteria –or- **in case of a SINGLE topic/evaluation :** topic/evaluation was not addressed or correlated with the evaluation criteria.
8. Three day dietary nutrition report and analysis 1. Detailed three day dietary analysis are collected. Complete analysis of carbohydrate intake 2. Analyze BMI 3. Identification of activity level 4. Identification of nutritional focus and counseling 5. Select the 3-day date range and create report 6. Annotate food groups and calories section 7. Assess average daily kilocalories 8. Discuss inadequacies and excesses 9. *More details and instruction will be provided through nutrition course for nutrition course requirements.				
9. Carbohydrate Analysis 1. List fermentable carbohydrates and discuss if it is cariogenic or non-cariogenic 2. Calculate acid exposures for each day 1. Give specific recommendations for modifications				
10. Relevant information regarding patient's personal information that relates to nutrition Social History: 1. How often eat away from home? 2. Who does cooking/shopping? 3. Who lives at home? 4. Number meal/snacks per day? 5. Working? Number of hours/week?				

6. Regular hours? Special Dietary Consideration: 1. Cultural 2. Lactose intolerance 3. Low fat 4. Low calorie 5. Allergies 6. Intolerances 7. Vegetarian 8. Religious Compare Intake with <u>Dietary Guidelines for Americans:</u> 1. What guidelines are followed 2. Where can there be improvement Provide specific and realistic recommendation				
11. Food Group Report 1. SSS 2. Save the *Food Groups & Calories* report to print or to annotate electronically. 3. How do your average total daily kilocalories compare to the recommended amount? 4. In which food groups has your intake been inadequate? 5. In which food groups has your intake exceeded the recommendations?				
12. Nutrition and Health • Correlates nutritional findings with systemic and oral conditions				
13. Nutritional goals • Addresses goals supported by findings and makes necessary modifications at nutritional reevaluation				
14. Correlation of nutritional findings 3. Support treatment plan, OHI recommendations and clinical findings.				
15. Nutrition Recommendation Letter • Realistic nutritional recommendation letter for patient:				

SUBTOTAL FOR NUTRITION SECTION (Max. possible points: 24)				
Evaluation of Clinical Summary Criteria	**3-** Student accurately addressed each topic evaluated and/or required on the project guidelines. Student accurately correlated the findings with the evaluation criteria.	**2** – Student did not properly address 1 or 2 of the topics evaluated and/or required on the project guidelines - and/or- Student did not correlate the findings in 1 or 2 of the evaluation criteria.	**1 -** Student did not properly address more than 2 of the topics evaluated and/or required on the project guidelines - and/or- Student did not correlate the findings in more than 2 of the evaluation criteria.	**0 -** Student did not properly address the topic(s) evaluated and/or required on the project guidelines -or- Student did not correlate the findings with the evaluation criteria –or- **in case of a SINGLE topic/evaluation :** topic/evaluation was not addressed or correlated with the evaluation criteria.
16. Oral hygiene evaluation and fluoride analysis 1. Plaque control record index recorded and evaluated 2. How Patient's OH skill level was assessed and evaluated 3. Patient's knowledge and awareness of dental and periodontal diseases. 4. Current usage of fluoride (Type, amount, supplemental, the fluoride concentration of water in the city where patient lives) 5. Identification and rationale of fluoride focus				
17. CAMBRA analysis 1. CAMBRA Assessment (Forms are available at Google Drive) 2. Provide recommendations based on patient's need 3. Provide education and written information on caries control and management 4. Caries risk prognosis and its rational				
18. Oral Hygiene Instruction and Plan				

1. Oral hygiene instruction provided and its rationale 2. How does design address patient's needs 3. Goals developed with patient during OHI 4. Smoking cessation program recommendations 5. Preventive recommendations (sealant application, fluoride etc…) 6. Possible implications of systemic conditions 7. Discussion of OHI modifications made during re-evaluation based on findings 8. DDS referral, MD referral and specialty referral				
19. Discussion of Post Clinical Reassessment Status (*assessment at re-evaluation appointment) 1. E & I examination 2. Evaluation of gingival tissue 3. Periodontal Re-Evaluation (Probing, recession, furcation, mobility) 4. Plaque index and photos of before and after disclosing				
20. Oral Hygiene Reassessment Status (*assessment at re-evaluation appointment) 5. Patient compliance with recommended home care (oral hygiene/ prevention instructions/nutrition/referral). 6. Patient compliance with recommended nutritional diet. Modification of goals and post treatment status				
21. Discussion (Not outline format, essay format) 1. Overall treatment outcomes 2. Evaluation of patient's understanding on nutrition and participation in the project 3. Re-evaluation of original treatment plan and assessment. 4. Discuss how the treatment can be provided better for patient 5. Discuss if goals and objectives are met, why they did not meet.				

22. Conclusions 1. Correlate conclusions with evidence shown in current primary professional referred journal articles (At least 3 articles, within 5 years, no plagiarism! So please use proper APA citations) 2. Statement of final prognosis for the patient by using research findings. 3. 2 page minimum following research writing				
23. Summary 1. Concise summary of your learning experience with the project				
24. References and Citations 1. Proper citation and referencing of the minimum of 3 current (within last five years) articles from professional journals				
25. Documentation 1. Documents included, properly referenced and utilized in report.				
26. Evaluation of Written Project 1. Professional terminology used 1. Correct spelling 2. Correct grammar 3. In depth and focused development of the project 4. Presentation: typed, double-spaced				
27. Report Formatting 2. Report is well-organized and easy to follow.				
28. Overall Report Quality				
29. Grading Rubric Included • 4 points awarded for including grading rubric at the end				**_____/ 4**
SUBTOTAL FOR CLINICAL SECTION (Max. possible points: 43)				
(reduction of 1 grade for each day late) **TOTAL REPORT POINTS (Max. possible points 100):**				

COMMENTS:_____

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Instructor (Periodontal)

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Instructor (Nutrition)

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Instructor (Clinical)