



## Effect of Wall Thickness of 3D-Printed Models on Resisting Deformation from Thermal Forming In-Office Aligners

Tia DiGiovanni, Jace Hanisch, Dr. Gregory Bennett, D.M.D.  
 University of Nebraska Medical Center College of Dentistry, Lincoln, NE



**Background**  
 The increase in patient desire for clear aligner therapy over traditional fixed wire orthodontics has led to the experimentation with in office fabrication of clear aligners. In office fabrication of clear aligners comes with significant economic benefits, but little is known about the most efficient and effective production methods for models. A high degree of accuracy is necessary in printed models in order to fabricate effective aligners. In order to improve the print time and reduce cost and wanted materials, models can be 3D printed with a hollow geometry of varying wall thickness or solid.

**Objective**  
 Evaluate the effect of wall thickness of 3D printed models on the accuracy of pressure formed clear aligners.

**Methods**  
 Models of different wall thicknesses (n=10) (group of 0.6mm, 1.0mm, 1.5mm, 2.0mm and solid) were printed using model resin (Model V2, Formlabs) on a low-force stereolithography printer (Form 3B, Formlabs) were then fabricated using a thermal pressure forming machine (Great Lakes Dental Technologies) utilizing 25 second cycles to heat acrylic sheets (Invisalign, Great Lakes Dental Technologies) were then removed and sprayed with a contrast powder (Dentsply Sirona) to aid in scanning with an intra oral scanner (Dentsply Sirona). The original file was then compared to the original file used for 3D comparison software (Geomagic Control X, 3D Systems).

**Results**  
 Figure 1. Color dimensional deviation maps were generated for scanned models. The dark blue color indicates negative deviations greater than 0.3 mm, green areas indicated deviations less than 0.3 mm, which lie within the limits of clinical acceptability. A 0.5 mm model (A) shows significant deviation across the posterior dentition. A solid model (B) shows high accuracy with near complete green.

**Results and Discussion**

**Table 1.** This descriptive statistics table demonstrates how sample sizes offered due to the failure of models to create an aligner from catastrophic compression during thermofforming or inability to be removed from supports without breaking (n=8 for 0.5 mm, n=6 for 1.0, n=6 for 1.5, n=10 for 2.0 mm, and n=10 for solid). Additionally, the mean percent in tolerance is demonstrated, and it can be observed how it increased as the shell thickness increased.

**Table 2.** This information from the post-hoc power analysis shows alpha=0.05, beta=0.998, meaning that n=44 was suitable to detect statistical significance.

**Power Analysis Table**

Desired Power	n	1-β	Effect Size	β
0.80	44	0.998	0.184	0.002

**Table 3.** Post-hoc Tukey HSD shows significant differences between group comparisons. Red asterisks indicate the mean difference between categories are significant at the 0.05 level.

**Table 4.** ANOVA was used to test the hypothesis that there would be no differences in the mean percent in tolerance between the sample groups, which was rejected with a P-value of < .001.

**Conclusion**  
 Hollow models of thicknesses 2.0 mm produced clinically acceptable aligners while utilizing less material and compared to solid models (44% reduction in material usage), thus being more cost effective (\$1.08 vs. \$1.88, respectively), time efficient and eco-friendly. Therefore, a recommendation can be made to print hollow models with a shell thickness of 2.0 mm or greater for aligner fabrication.

**References**

**ANCOVA**

Parameter	Sum of Squares	DF	Mean Square	F	Pr > F
Model	10.000	4	2.500	10.000	0.0001
Error	1.000	45	0.022		
Total	11.000	49			



# UNMC College of Dentistry Research Day

February 23, 2024



# Special Thanks

## Student Scientific Program Sponsors

*Thank you to the following organizations who sponsored the awards for the winning student research presentations.*

Alpha Lambda Chapter of Sigma Phi Alpha  
National Dental Hygiene Honor Society

Dentsply Sirona

International College of Dentists

Nebraska Dental Hygienists' Association

## Student Scientific Program Judges

Ms. Nicole Baker  
Dr. Gerard Byrne  
Dr. Po-Jung Chen  
Dr. Larry Crouch  
Dr. Peter Giannini  
Ms. Noni Henderson  
Dr. Zachary Houser  
Ms. Gina Kissel  
Dr. Bradley Krivohlavek  
Ms. Connie Kugel  
Dr. Benjamin Kwok  
Ms. Emily Lindquist

Dr. Julie Marshall  
Ms. Lisa Moravec  
Dr. Ali Nawshad  
Dr. Gregory Oakley  
Dr. Jeffrey Payne  
Dr. Thomas Petro  
Dr. Myhanh Phan-Rinne  
Dr. Richard Reinhardt  
Dr. Corinne Van Osdel  
Dr. Amanda Ribeiro Wobido  
Dr. Shayla Yoachim

## Research Day Committee

Dr. Gerard Byrne  
Ms. Amanda Dolen  
Dr. Benjamin Kwok  
Ms. Lisa Moravec  
Dr. Gregory Oakley

Dr. James Wahl  
Ms. Erin Wirth  
Dr. Amanda Ribeiro Wobido  
Ms. Katie Whittaker (student member)

# Event Schedule

All events will be held at the UNL East Campus Union - Great Plains Room.

## 57th Annual Frank M. Wentz Student Scientific Program

### Poster Viewing

12:00 - 3:30 p.m.

DH4

[See presenters.](#)

D3

[See presenters.](#)

Postgraduate

[See presenters.](#)

### Judging Schedule

12:00 - 2:00 p.m.

DH4 First Round Judging

D3 First Round Judging

Postgraduate Judging

2:00 - 3:30 p.m.

DH4 & D3 Final Round Judging

## Keynote Speaker

3:30 - 4:30 p.m.

**Gerry Kugel, DMD, MS, PhD**  
**Dean, College of Dentistry**



"Who Cares About Research?"

This presentation will showcase real-world examples where oral health research has contributed to the advancement of dental practice. Attendees will gain insight into how clinical research plays a vital role in translating new knowledge into better oral health outcomes.

## Awards Ceremony

4:30 - 5:00 p.m.

**DH4, D3 & Postgraduate Award Winners**

# DH4 Presenters

## **#1 In-Vitro Study: Comparing the Effectiveness of Commercial Whitening Mouth Rinse and At-Home Mouth Rinse Composed of Hydrogen Peroxide and Sodium Bicarbonate**

Emma Betts & Madisyn Gardient  
Mentor: Todd Junge, RDH

## **#2 Effects of Disinfecting Suction Line Cleaners in the Dental Setting to Reduce Microbial Agents**

Madison Frank & Jayce Vrbka  
Mentor: Emily Lindquist, RDH

## **#3 The Effects of Coca-Cola and Kool-Aid on the Discoloration of UltraSeal XT™ Hydrophilic and 3M™ ESPE™ Clinpro™ Hydrophobic Sealants**

Capri Dethlefs & Julia Raun  
Mentor: Jaimee Shropshire, RDH

## **#4 A Study of Oral Mouth Rinses and Their Antimicrobial Effect on *S. mutans***

Ellie Buresh & Samantha Nielson  
Mentor: Lindsay Mundil, RDH

## **#5 The Effect of “Healthy” Energy Drinks on Enamel Demineralization: An In Vitro Study**

Sydney Samson & Allison Cuciti  
Mentor: Emily Lindquist, RDH

## **#6 Effectiveness of Different Oral Hygiene Techniques for Orthodontic Patients with Fixed Retainers**

Adanna Paden & Mikayla Kiefel  
Mentor: Lindsay Mundil, RDH

## **#7 The Pivotal Role of Ergonomic Loupes in Dentistry: A Research Survey of Loupe Selection Among Dental Professionals**

Ella Simonson & Emma Schock  
Mentor: Dr. Upoma Guha

## **#8 The Effects of Advantage Arrest® SDF Gel and Riva Star® SDF/KI on *S. mutans* and *P. gingivalis*: An In-Vitro Study**

Diana Acosta Delgado, Lulu Acosta Delgado & Jose Marquez  
Mentor: Lisa Moravec, RDH

## **#9 In-Vitro Study Comparing the Effects of 3D Crest Whitening Strips on Stain Removal Compared to Light Emitting Diode (LED) Activated 3D Crest Whitening Strips**

Wendy Barcenas-Soto & Jennifer Garcia  
Mentor: Todd Junge, RDH

## **#10 The Effects of Vape Oil on Streptococcus Mutans Growth in the Oral Cavity: An In-Vitro Study**

Taylor Beacom & Jamie Johnson  
Mentor: Todd Junge, RDH

## **#11 Short Term Staining Effects of Chlorhexidine on Extracted Teeth**

Rebecca Steffen & Georgina Dishman  
Mentor: Amanda Dolen, RDH

# D3 Presenters

## **#12 Assessment of Predoctoral Students' Confidence in Pediatric Dentistry in US Dental Schools**

Madyson Anglim & Anna Edet  
Mentor: Dr. Sarah Lowman

## **#13 The Effect of Arthroscopic Temporomandibular Joint Discopexy for the Patient with Anterior Disc Displacement Without Reduction: A Retrospective CBCT Study**

Yiwen Chen & Bailey Peckham  
Mentors: Drs. Po-Jung Chen & Kavya Muttanahally

## **#14 The Evolution of Mental Health in Dental Students Over the Four Years of Dental School**

Natalie Benoy & Therese Cooney

## **#15 A Retrospective Study of the College of Dentistry's Smoking Cessation Program**

Kinsely England & Claire Janecek  
Mentor: Dr. Peter Giannini

## **#16 Three-Dimensional Characterization of the Morphology of the Temporomandibular Joint in the Arthroscopic Discopexy Relapse Cases: A Pilot Study**

Gage Fenski & Josh Madsen  
Mentor: Dr. Po-Jung Chen

## **#17 Clash of Two Collagens: Membrane vs. Wound Dressing for the Coverage of Single-Tooth Ridge Preservation Sites**

Delaynie Field & Delaney Glazier  
Mentors: Drs. Amy Killeen & Paula Schlemmer

## **#18 Reliability of ORADIII Application in Rendering Diagnosis, A Retrospective Study**

Juan Gonzales & Gabriel Crocker

## **#19 Evaluation of Dental Students' Mental Health and Its Effect on Teeth Relation and Position**

Peyton Halverson & Lauren Peterson  
Mentor: Dr. Amanda Wobido

## **#20 Effectiveness of the Summer Health Professions Education Program: Fourteen Years of Program Outcomes for UNMC Participants**

Gisselle Hernandez & Kimberly Pierre

## **#21 Analysis of Occlusal Clearance of Crown Preparations made by Predoctoral Dental Students at the UNMC College of Dentistry**

Lucas Jarecke & Luke Wordekemper  
Mentor: Dr. Gregory Bennett

## **#22 Examining Admissions Trends of the Pre-Doctoral Program at the UNMC College of Dentistry: Rural vs Urban**

Payton Kidder  
Mentor: Dr. Merlyn Vogt

## **#23 Evaluating Student Shade Matching Ability**

Carter Kocian & Tyler Lutt  
Mentor: Dr. Upoma Guha

# D3 Presenters (cont.)

## **#24 Experience and Comfort Levels of Orthodontists in Treating Patients with Special Needs**

Morgan Lashley & Emily Swanson  
Mentors: Drs. Meenakashi Vishwanath & Jennifer Kallio

## **#25 Restoring Single Implants via Digital Workflow**

Jordan Tice & Megha Mathur  
Mentor: Dr. Makena Sundine

## **#26 The Effect of Time on Retention of General Pathology Course Material Amongst Second, Third, and Fourth-Year Dental Students at UNMC College of Dentistry**

Ellie Petersen & Jonathan Mitzel  
Mentor: Dr. Peter Giannini

## **#27 Impact of Pre-Dental Anatomy Experience on Dental School Anatomy Performance and Knowledge Retention**

Riley Nitsch & Hannah Janecek  
Mentor: Dr. Shayla Yoachim

## **#28 TBD**

Nicholas Peterson

## **#29 Investigation of the Impact of the Snowplow Technique on Microleakage of Permanent Posterior Teeth**

Elizabeth Dressler & Ryan Rawlings  
Mentor: Dr. Mark Beatty

## **#30 Assessment of UNMC SHPEP's Efficacy in Preparing Participants for Dental School Application**

Trent Nguyen & Alec Redwine

## **#31 SonicFill™ 3 Bulk-fill Versus Incremental Layering: Void Formation and Knoop Microhardness**

Trent Roth & Adam Mackley

## **#32 Nebraska Dentists' Views on Cannabinoids for Treatment of Orofacial Pain**

Baylor DeVries & Sierah Samway  
Mentor: Dr. Joseph Bavitz

## **#33 Assessing Risk Factors in High Risk Fall Patients in a Predoctoral Dental Clinic**

Khoi Mai & Harrison Sanny  
Mentor: Dr. Sarah Lowman

## **#34 Radiographic Bone Loss and Probing Depths in Relation to Tooth Loss: A Seven-Year Retrospective Study**

Bobbie Fowler & Laura Shaw  
Mentors: Dr. Jeffrey Payne, Dr. Kavya Muttanahally & Kaeli Sampson

## **#35 Examining Surgery Wait Times and Treatment Effects in Adult Patients with Disabilities**

Ella Majerus & Lydia Sigler  
Mentors: Dr. Jennifer Kallio, Dr. Corinne Van Osdel & Kaeli Samson

## **#36 Evaluation of the Patient Perceptions of Quality of Care at UNMC College of Dentistry**

Delaney Springer & Emma Wilkinson  
Mentor: Dr. Amanda Wobido

## **#37 How Noncognitive Traits of Grit and Resilience Coincide with Academic Performance of Dental and Dental Hygiene Students**

Taylor Steiner & McKenzie Nutter  
Mentor: Dr. Merlyn Vogt

## **#38 Can Inflammatory Markers Identify Periodontal Health Changes Following Extraction? A Pilot Study**

Jacob Stewart & Ben Wetovick  
Mentors: Drs. Richard Reinhardt & Amy Killeen

## **#39 Dental Students' Attitudes on Educational Debt and Initial Post-Graduation Career Plans**

Jaspreet Grewal & Harinderjit Kaur  
Mentors: Drs. Julie Marshall & Jim O'Meara

## **#40 Examining Associations Between Classes of Medications and Tooth Loss in Periodontal Maintenance Patients**

Nicholas Stolze  
Mentor: Dr. Jeffrey Payne

## **#41 In Vitro Tensile Strength Comparison of Denture Liners to 3-D Printed Denture Resin**

Merina Joseph & Mahima Kinra  
Mentors: Drs. Julie Marshall, Gregory Bennett & Mark Beatty

## **#42 Evaluation of the Efficacy of an E-learning Module in Dental Photography Education**

Yuliya Vaniurska & Rytta Wodzinski  
Mentors: Drs. Amanda Wobido & Shayla Yoachim

## **#43 2024 College of Dentistry Wellness Survey**

Justin Wilson & Samuel Kline  
Mentor: Dr. Sarah Lowman

# Postgraduate Presenters

## #45 Frequency of Incidental Findings on CBCT Radiographs and Influence of Risk Factors

Drs. Kelsey Wenger, Kai Hatch & Paula Schlemmer

Mentors: Drs. Shayla Yoachim, Anne Williamson & Michael McNally

## #46 Recall Attendance Following Oral Moderate Sedation in Pediatric Dentistry

Dr. Emily Starman

Mentors: Dr. Zachary Houser & Kaeli Sampson

## #47 The Effect of an Educational Intervention Regarding Athletic Mouth Guards

Dr. Bailey Neville

Mentors: Drs. Claire Koukol & Julie Marshall

## #48 The Age-Old Question: Why Do Younger, Systemically Healthy Patients have Better Wound Healing than Aged, Systemically Healthy Patients? A scRNAseq Fibroblast Study

Dr. Paula Cohen Schlemmer

## #49 Associations between Periodontitis and Serum Anti-Malondialdehyde–Acetaldehyde Antibody Concentrations in Rheumatoid Arthritis: A Case-Control Study

Dr. Joyce Lee

Mentors: Dr. Ted R. Mikuls, Dr. Geoffrey M. Thiele, Dr. Jeffrey B. Payne, Michael J. Duryee & Harlan R. Sayles

## #50 Pediatric Dental Resident Education and Preferences Regarding Primary Anterior Full-Coverage Restorations

Dr. Alexis Sandman

Mentor: Dr. Zachary Houser

## #51 How Age Affects Oral Wound Healing, A Gene Pathway Analysis

Dr. Alexander Lopez

## Abstracts

### #1: In-Vitro Study: Comparing the Effectiveness of Commercial Whitening Mouth Rinse and At-Home Mouth Rinse Composed of Hydrogen Peroxide and Sodium Bicarbonate

Emma Betts, Madisyn Gardient, Todd Junge, RDH

The objective of this study was to evaluate the effectiveness of home-made mouth rinse composed of hydrogen peroxide and sodium bicarbonate (baking soda) compared to three commercially bought mouth rinses (experimental groups) and distilled water (control group). To test the hypothesis, 175 teeth were prepared by soaking in coffee for 1 day to develop an extrinsic stain. Then, specimens were removed from the coffee solution and randomly distributed into five subgroups (n = 35) based on whitening product: distilled water (H<sub>2</sub>O), Arm & Hammer baking soda and hydrogen peroxide (BSH<sub>2</sub>O<sub>2</sub>), Crest 3D White Alcohol-Free Multi-Care Whitening Mouthwash (C3DGW), Equate Multi-Action Whitening Rinse (EMAQ), and Colgate Optic White (COW). An initial shade of teeth was then measured using the VITA Easyshade Compact and recorded as baseline, then re-evaluated once a week for a month following daily treatment in their assigned mouth rinse. The alteration in Delta E value ( $\Delta E$ ) was analyzed with standard 2 factor ANOVA in which time and treatment were interacting factors. This procedure was followed by Tukey's p-value adjustment for comparison of multiple responses. The results showed that BSH<sub>2</sub>O<sub>2</sub> had a negative effect on whitening of discolored teeth in comparison to other experimental groups (p < 0.0001). Still, shade change from 1 to 4 weeks produced a significant difference in value within each experimental group (p < 0.0001), although teeth in BSH<sub>2</sub>O<sub>2</sub> and C3DGW typically became darker according to the Vita Shade Guide with progression of time. Consequently, BSH<sub>2</sub>O<sub>2</sub> was found to be ineffective in tooth whitening when compared to commercial rinses.

### #2: Effects of Disinfecting Suction Line Cleaners in the Dental Setting to Reduce Microbial Agents

Madison Frank, Jayce Vrbka, Emily Lindquist, RDH

Dental unit suction lines can yield harmful bacteria and fungi, making it imperative to disinfect to prevent cross-contamination in a dental setting. Dental Units require disinfecting the suction unit lines daily. It is crucial to ensure the efficacy of common suction line disinfectants by evaluating key characteristics and bacterial colonies. The purpose of this research is to compare the efficacy of SlugBuster and PureVac in suction line disinfection. Suction lines were swabbed before and after disinfection and were inoculated on agar plates. The study comprised 28 test samples of swabbed HVAC lines subsequent disinfection, with 14 from PureVac and 14 from SlugBuster disinfectants. All plates were counted for colonies and resulted in no significant difference between SlugBuster and PureVac. Both disinfectants proved the efficacy of disinfection by re-

duced plate count when compared to using no disinfectant. SlugBuster requires an 8oz solution and dilution with 2 gallons of water while PureVac requires a 1oz solution and dilution of 1 quart of water. Due to no statistical significance between disinfectants and differences in dilution volume, we conclude that PureVac is the more efficient suction line disinfectant by reducing time and resources.

### #3: The Effects of Coca-Cola and Kool-Aid on the Discoloration of UltraSeal XT™ Hydrophilic and 3M™ ESPE™ Clinpro™ Hydrophobic Sealants

Capri Dethlefs, Julia Raun, Jaimee Shropshire, RDH

The purpose of this project is to fill a gap in research about different types of dental sealant materials and staining. The goal is to determine if UltraSeal XT® Hydrophilic sealant material is more susceptible to staining than 3M™ Clinpro™ ESPE™ Hydrophobic sealant material. This study is conducted by creating ninety sealant discs, forty-five of each sealant material, and splitting each of the sealant discs into three groups of fifteen. The discs soak in Kool-Aid, Coca-Cola, and distilled water for two weeks, with the shade of the sealant discs being taken at the beginning and end of the two-week period of time. Results show that there is no statistically significant difference between hydrophobic and hydrophilic sealant materials on staining. However, there is evidence to show that Kool-Aid has a greater staining effect than Coca-Cola on both materials. Based on the outcome, dental hygienists can apply sealants without considering the resistance to staining. In addition, this study highlights the importance of educating patients and/or parents about the risk of discoloration from both Kool-Aid and Coca-Cola on dental sealants.

### #4: A Study of Oral Mouth Rinses and Their Antimicrobial Effect on *S. mutans*

Ellie Buresh, Samantha Nielson, Lindsay Mundil, RDH

As health care continues to grow, knowledge of the human body expands. New treatments and care tactics are a continuous topic among health professionals. In the dental field, mouth rinses are a common agent used or prescribed to patients. With a growing demand for better care, more natural-based products are being used by the public. These products claim to improve health as much as their opponents. This study was done to test specific mouth rinses effect on the bacteria, *Streptococcus mutans*. Of the rinses used, two included naturally based solutions. The mouthwashes consisted of Chlorhexidine Gluconate, brewed green tea, and a xylitol-based mouthwash. A control was also placed among the agents. The agents were individually placed on six agar plates coated with *S. mutans* and incubated for 48 hours. The zones of inhibition were then measured for each agent. At the end

[Go Back to List of Presenters](#)

of the experiment, the only agent showing the largest zone of inhibition was the Chlorhexidine Gluconate of 3mm. This led to the conclusion that the specific natural mouth rinses used did not have any antimicrobial impact on the *S. mutans*.

### #5: The Effect of “Healthy” Energy Drinks on Enamel Demineralization: An In Vitro Study

**Sydney Samson, Allison Cuciti, Emily Lindquist, RDH**

Energy drinks are on the rise in popularity among all age groups. Today, there are numerous different brands and options. Some options include higher amounts of caffeine, while others are advertised to have healthy effects on the body. These energy drinks are known to be acidic, which can cause demineralization by raising the pH in the oral cavity. Through this study, three different “healthy” brands of energy drinks and water will be tested to see the amount of demineralization each energy drink causes. The Canary system was used to determine the amount of demineralization on 160 teeth prior to the experiment and after the experiment. The three different energy drinks (Bubblr, Celsius, Alani) will be divided into three groups with 40 teeth getting tested in that group. Water will also be tested with 40 teeth in that group. All groups will be left for 19 days at room temperature. The results showed that there was no difference in the three different energy drinks causing demineralization. However, all three energy drinks increased the amount of demineralization. Water had no change in those 19 days. In conclusion, “healthy” energy might have healthy effects on the body, however no matter the brand, they all cause demineralization in teeth. Because of this increase in popularity of these drinks and their effects on demineralization of the teeth, dental hygienists should be equipped to educate their patients on the effects.

### #6: Effectiveness of Different Oral Hygiene Techniques for Orthodontic Patients with Fixed Retainers

**Adanna Paden, Mikayla Kiefel, Lindsay Mundil, RDH**

Background: There has been an increase in the use of orthodontics in the past few years that has led to more people wearing fixed retainers (lingual wires). Bacteria will accumulate in the areas around the lingual wires and create plaque. Dental Hygienists educate these patients on how to properly clean and take care of their lingual wires in order to maintain proper oral hygiene. This study experiments with four different methods to determine which is the best for cleaning a lingual wire.

Hypothesis: The electric toothbrush and interdental brush will be more effective than the electric toothbrush and floss and both manual toothbrush methods.

Materials/Methods: Two typodonts were used with stainless steel orthoflex retainers bonded from canine to canine on the mandible. An artificial plaque was painted on the lingual wire and then cleaned off using one of the four methods. Those methods include electric toothbrush with floss, electric toothbrush with interdental brush, manual toothbrush with floss, and manual toothbrush with interdental brush. A plaque index

was used to score the amount of plaque left on the typodonts.

Results: Statistical tests were performed with the data and found a significant difference among all of the groups. Each p-value was < .0001 showing their statistical significance. The electric toothbrush with interdental brush showed to have the most effective plaque removal among the four groups.

Conclusion: Any method of cleaning a lingual wire can remove plaque if performed correctly, but the most effective method found is using an electric toothbrush with an interdental brush.

### #7: The Pivotal Role of Ergonomic Loupes in Dentistry: A Research Survey of Loupe Selection Among Dental Professionals

**Ella Simonson, Emma Schock, Dr. Upoma Guha**

Introduction: Loupes have been a vital tool in the field of dentistry for over 40 years, providing magnification and clear vision inside the oral cavity. Ergonomic-style loupes have increased in popularity due to their claim to help prevent the early development of musculoskeletal disorders in dental professionals. The purpose of this research survey is to gather data by dental professionals regarding their loupe selection factors, their history of loupe purchases, and whether or not they would be more inclined to purchase an ergonomic style of loupe given what they know now.

Methods: A 17-question survey was conducted consisting of 127 participants at the University of Nebraska Medical Center-College of Dentistry (UNMC COD). Participants had the option of scanning a quick response code in person provided by the researchers or clicking a link sent via listserv email at the UNMC COD.

Results: In this observational survey, we found that with increasing years of experience, participants on average had purchased more pairs of loupes. The highest selection factor when purchasing loupes was ergonomics. However, a high percentage of these participants did not have the option to purchase them when buying their first pair. Participants who did not purchase an ergonomic design for their first pair of loupes reported experiencing pain in their clinical practice.

Conclusion: Further research is recommended to investigate the sustainability of ergonomic loupes in dental practice, and whether or not purchasing an ergonomic design would prevent premature physical and financial burdens for the dental professional.

### #8: The Effects of Advantage Arrest® SDF Gel and Riva Star® SDF/KI on *S. mutans* and *P. gingivalis*: An In-Vitro Study

**Diana Acosta Delgado, Lulu Acosta Delgado, Jose Marquez, Lisa Moravec, RDH**

Silver diamine fluoride, or SDF, was initially introduced as a desensitizing agent for the oral cavity. SDF is a cost friendly option due to it being a non-invasive procedure that does not

require anesthesia. Research has shown that SDF also has antimicrobial properties and can arrest the progression of carious lesions. Advantage Arrest® SDF Gel and Riva Star® SDF/KI are two competing brands of SDF that were compared against two prominent bacteria found in the oral cavity: *S. mutans* and *P. gingivalis*. Twelve tryptic soy agar plates with 5% sheep blood were streaked with *S. mutans*. On five of the plates, two sterile discs immersed in Advantage Arrest® SDF were placed and incubated for two days. Two of the plates received five blank sterile discs as the control group. Each of the other five discs received two sterile discs saturated with Riva Star®. The same process was repeated for twelve TSA plates streaked with *P. gingivalis*; however, these plates were incubated for 5-7 days. The results of the study did not support our initial null hypothesis, which was that neither SDFs would be favorable compared to each other in inhibiting both pathogenic microorganisms. Advantage Arrest® exhibited a greater zone of inhibition for the respected microorganisms, especially on the inhibition of *S. mutans*.

This study is significant to dental professionals for understanding which SDF can be more advantageous in the arresting of caries in the mouth.

### #9: In-Vitro Study Comparing the Effects of 3D Crest Whitening Strips on Stain Removal Compared to Light Emitting Diode (LED) Activated 3D Crest Whitening Strips

**Wendy Barcenas-Soto, Jennifer Garcia, Todd Junge, RDH**

The present study is aimed to evaluate the most effective whitening technique on coffee-stained extracted teeth, using Crest 3D whitening strips with and without the photoactivated blue LED light by measuring the color shades at the beginning, middle, and end of the process with a VITA Easyshade spectrophotometer. Twenty-four teeth were divided into 3 groups, group A (Crest 3D Whitestrips + LED Light), group B (Crest 3D Whitestrips only), and group C (control group). All teeth were stained in dark roast coffee for 24 hours prior to whitening. Groups A and B had whitening strips placed on the facial surface for 1 hour a day for 14 consecutive days. Group A had the blue LED light placed against the whitening strips for the first 5 minutes of treatment and was left to sit for the remaining 55 minutes. Group C was stored in distilled water throughout the whole experiment. All groups had color shades measured on days 0, 7, and 14. The results showed with 95% confidence, Group A (Crest 3D Whitestrips + LED Light) had a higher delta E (16.9060) than both Groups B (8.1582) and C (5.8730). Since Delta E was higher in group A, there is statistical evidence showing that Crest Whitestrips + LED had increased whitening effects when compared to whitening strips alone and the control group.

### #10: The Effects of Vape Oil on Streptococcus Mutans Growth in the Oral Cavity: An In-Vitro Study

**Taylor Beacom, Jamie Johnson, Todd Junge, RDH**

The oral cavity is an environment that is in constant flux due to various influences. Some factors influence the oral cavity towards health or disease by altering the pH of the environment. An environment that can be specifically suitable for *S. mutans* growth or inhibition. The focus of this study is to analyze how vape oil with nicotine affects the growth of *S. mutans*, a virulent bacteria associated with the development of dental caries. This was examined by spreading *S. mutans* on 20 agar plates and dropping three different concentrations of nicotine into each quadrant. The outcome was observed 24 hours later. The mean zone of inhibition for 0 mg and 6 mg of nicotine was 16.4286 and 14.9048, respectively. The results did not support our hypothesis that nicotine would increase the growth of *S. mutans*. Further studies are needed to indicate statistical significance. Studies indicate that nicotine stimulates bacterial growth. However, oil is responsible for breaking down bacterial cell walls. The combination of both oil and nicotine together in the increasingly popular hobby of vaping, poses a potentially significant threat to the health of the oral cavity. Vape oil alone can decrease the bacterial growth of *S. mutans*, however, when the nicotine content is increased, the *S. mutans* content slowly increases. For future experimentation, researchers should consider using a larger sample size, and only using one vape oil on each plate. As this hobby increases, it is essential that healthcare professionals understand the implications vaping can have on a patient's oral cavity and what risks are involved.

### #11: Short Term Staining Effects of Chlorhexidine on Extracted Teeth

**Rebecca Steffen, Georgina Dishman, Amanda Dolen, RDH**

In this study the short-term staining effects of 0.12% chlorhexidine (CHX) mouthrinse were measured and compared to that of 0.05% cetylpyridinium chloride (CPC) mouthrinse and distilled water. The study took place over 14 days and used 75 extracted teeth which were divided into three groups and rinsed twice daily for 30 seconds per rinse in their assigned solution. Baseline color measurements were taken before treatment. During treatment, tooth color was measured once daily. Measurements were made using a spectrophotometer. After 14 days, there was an increase in the  $\Delta E$  of each group. The only groups which had a significant difference between them were the distilled water and the 0.05% CPC groups. The difference in  $\Delta E$  between these groups was 2.8473, meaning the distilled water group had a  $\Delta E$  of almost three times that of the 0.05% CPC group. Future studies should attempt to standardize the location that tooth shade is measured as that impacted the results of this study.

[Go Back to List of Presenters](#)

[Go Back to List of Presenters](#)

## #12: Assessment of Predoctoral Students' Confidence in Pediatric Dentistry in US Dental Schools

**Madysen Anglim, Anna Edet, Dr. Sarah Lowman**

Purpose: The study is an exploration of national pre-doctoral curriculum in pediatric dentistry to assess trends in dental education and dental student preparedness to care for children.

Method: A RedCap survey consisting of questions in four key domains (in addition to school characteristics): clinical experiences and patient factors, competencies/Entrustable Professional Activities, faculty workforce, and didactic curricula, was disseminated to US pediatric dental school program directors (n=70). If schools did not have a pediatric program director, the survey was sent to pediatric department chairs or, lastly, academic deans.

Results & Conclusion: Final Data Pending.

## #13: The Effect of Arthroscopic Temporomandibular Joint Discopexy for the Patient with Anterior Disc Displacement Without Reduction: A Retrospective CBCT Study

**Yiwen Chen, Bailey Peckham, Dr. Po-Jung Chen, Dr. Kavya Muttanahally**

Background: Temporomandibular joint (TMJ) anterior disc displacement (ADD) is one of the most common diseases of TMJ, including anterior disc displacement with reduction (ADDWR) and anterior disc displacement without reduction (ADDWoR). ADD often results in progressive joint dysfunction, including clicking, arthralgia, functional limitations, osteoarthritis, and even condylar resorption.

Objective: To evaluate the radiographic outcomes of TMJ arthroscopic discopexy for the ADDWoR patients via Cone-beam computed tomography (CBCT)

Methods: CBCT scans were collected from the patients who had undergone arthroscopic discopexy at three different time points: initial (T0), 3 months (T1) and 6 months (T2) after surgery. Dolphin Imaging program was used to analyze posterior joint space (PJS), superior joint space (SJS), anterior joint space (AJS) and the angle of mandibular condyle. The TMJ quality and morphology were also assessed.

Results: A total of 13 subjects (19 joints) were included in this study. Comparing T1 to T0, there were significant increased on PJS (p=0.002), AJS (p<0.001), SJS (p=0.009) while there was significant decreased on the angle of mandibular condyle (p=0.038). No significant changes were found between T1 and T2.

Conclusions: Arthroscopic TMJ discopexy positioned condyle and disc on a stable relationship and significant improved the TMJ quality of the patients with ADDWoR.

## #14: The Evolution of Mental Health in Dental Students Over the Four Years of Dental School

**Natalie Benoy, Therese Cooney**

While in dental school, students face a variety of stressors which may result in feelings of depression, anxiety, and burn-out. High expectations throughout schooling can exacerbate negative emotions, contributing to mental health crisis. Students are also on highly busy schedules, limiting their ability to seek emotional counseling or support for their mental health. Our research aimed to study how feelings of anxiety, depression, and burnout changed over the four years of dental school. We found existing research on mental health of dental students, especially students at midwestern schools, to be limited. We were also unable to find research comparing student's mental health across the four years of dental school. This led us to a question: does the mental health of dental students significantly change across the four years of dental school? In an attempt to answer this question, a research survey was sent to all DDS candidates at the University of Nebraska Medical Center's College of Dentistry. The survey consisted of 22 questions compiled from the Generalized Anxiety Disorder-7 (GAD-7) survey, Patient-Health Questionnaire-9 (PHQ-9), and the Mini-Z Burnout Questionnaire. Through this survey we were able to discover high rates of depression, anxiety, and burnout amongst all years of dental students. Between years, there was not as high of a difference as we were expecting for any of our three metrics, however we found interesting correlations between our metrics. An example of this would be that for students in their 2nd, 3rd, or 4th years, anxiety and burnout were directly related whereas 1st year students were more likely to have high levels of anxiety without corresponding high levels of burnout. Seeing these trends and the prevalence of mental illness amongst dental students, it is clear that access to mental health resources in dental schools are crucial.

## #15: A Retrospective Study of the College of Dentistry's Smoking Cessation Program

**Kinsely England, Claire Janecek, Dr. Peter Giannini**

Background: According to the CDC, "Smoking leads to disease and disability and harms nearly every organ system of the body. It is the leading cause of preventable death." Therefore, the conversation with patients regarding smoking cessation is one of utmost importance.

Purpose: The objective of this retrospective study is to determine the most common driving factors that encouraged patients to pursue our school's tobacco cessation program. Based on the results of the study, we plan to not only help refine our schools program within our clinic but also fabricate a pamphlet that we can provide to fellow students in order to address smoking cessation with patients

Methods: In order to complete this study, we keyword searched our patient records for "smoking cessation, tobacco cessation, bupropion, and chantix" We then categorized the patients into four categories and reviewed their progress notes to determine if the patients actually completed the pro-

gram and what their reasoning for quitting was.

Findings/Results: Of the 357 patients charts, dating back to 2016, that this retrospective study looked at: 10 patients completed the smoking cessation program at our school, 141 were interested but never started a program, 47 pursued smoking cessation elsewhere, and 159 were not interested in smoking cessation. It was determined that dental health was the most common driving factor for patients to begin our program and Bupropion was the most commonly prescribed medication.

Conclusion: In conclusion, our research helped us to better navigate the conversation of smoking cessation with patients and determine the most common causes. In addition, were able to determine some areas of disconnect in our schools program and plan for ways to improve them.

## #16: Three-Dimensional Characterization of the Morphology of the Temporomandibular Joint in the Arthroscopic Discopexy Relapse Cases: A Pilot Study

**Gage Fenski, Josh Madsen, Dr. Po-Jung Chen**

Purpose: Arthroscopic discopexy is a procedure used to help treat patients with Internal Derangement of the TMJ. The purpose of this study is to determine the morphological changes that occur and how that affects the incidence of relapse.

Patients and Methods: This is a case-control study. The study included patients who had success with the surgery and patients who have relapsed. Patient records were taken from Chang Gung Memorial Hospital. Six CBCT's were utilized for this study. Three that were successful and three that had relapsed. Each CBCT was imported into Dolphin Imaging Software and oriented in sagittal and coronal plane. In the sagittal direction, each glenoid fossa length, condyle length, glenoid fossa depth, and condyle to glenoid fossa relationship was measured. In the coronal plane, each glenoid fossa length, condyle length, and condyle to glenoid fossa relationship was measured. Each TMJ volume will also be calculated.

Results: After a short analysis of the data collected from the CBCT measurements it was hypothesized that patients with a smaller mesial lateral width of the Glenoid fossa, when measured in the axial plan using Dolphin Imaging Software, relapsed more than patients with a larger measurement.

Conclusion: One could make the assumption that the ML width of the Glenoid fossa has a direct impact on the relapse of disc location. However, more data points need to be measured and compared to truly understand if this or a number of factors plays a roll in relapse after arthroscopic discopexy was done.

## #17: Clash of Two Collagens: Membrane vs. Wound Dressing for the Coverage of Single-Tooth Ridge Preservation Sites

**Delaynie Field, Delaney Glazier, Dr. Amy Killeen, Dr. Paula Schlemmer**

The purpose of this study is to compare the effectiveness of a porcine collagen membrane (Mucograft Seal) to a bovine collagen wound dressing (Integra Heliplug) for atraumatic extraction and ridge preservation. These are commonly used as a barrier and containment materials over atraumatic extraction sites grafted for future implant placement. This study is a double-blind randomized controlled trial involving 10 patients assigned to two groups. Prior to extraction, probing depths and a digital intraoral scan, Trios, are taken. Following the extraction, hydrated AlIOss 50/50 DFDBA:FDBA bone particulate is condensed into the socket. One group received Mucograft Seal over the graft, while the other group received Integra HeliPlug. To measure the volumetric changes of the tissue, a digital scan is taken at 2-weeks, 8-weeks, and 3-months post-operative, while probing depths of the adjacent teeth are re-measured at 3-months. Using the digital scans to analyze the volumetric changes, the greatest change was seen between the 2- and 8-week follow-up appointments, with a smaller amount of change seen between the 8-week and 3-month follow-up. It was determined that patients who received the Mucograft Seal had an increase in the volumetric change in tissue and a decrease in probing depth. This revealed promotion of tissue regeneration with the Mucograft Seal compared to the control wound dressing. Clinicians may want to consider the use of Mucograft Seal in areas where negative volumetric changes would compromise the esthetic outcomes of implant therapy.

## #18: Reliability of ORADIII Application in Rendering Diagnosis, A Retrospective Study

**Juan Gonzales, Gabriel Crocker**

Background: Accurate interpretation of radiographic images is crucial for general dentists, yet the reliability and precision of their diagnoses are often uncertain.

Purpose: This retrospective study aims to assess the efficacy of the differential diagnosis software, ORADIII, used by general dentists using CBCT scans, by comparing its diagnostic performance with that of an oral radiologist and pathologist.

Methods: Thirty patients were in this pilot study. The selection criteria included patients that have a CBCT scan patients that have a CBCT scan with/without a biopsy and hard-tissue lesions. The cases were selected from 2013-2023. Among the 30 patients, only 20 contained a biopsy report with a definitive diagnosis. Anatomage Invivo6 3D-imaging software in combination with clinical reports of the patient were used to provide differential diagnoses for both ORADIII and the oral radiologist. The analysis by the students and the radiologist were both blind evaluations with individual, separate differential diagnoses of the pathology noted without knowledge of the definitive diagnosis available from the biopsy report. Using a power analysis table, we will calculate the significance between ORAD-

[Go Back to List of Presenters](#)

[Go Back to List of Presenters](#)

DIII's diagnosis compared to an oral radiologist's diagnosis and the associated histopathology.

Results: For the cases where biopsy reports were available (20 cases), ORADIII provided correct diagnoses 35% of the time. When comparing ORADIII's diagnoses to those of the oral radiologist (30 cases), ORADIII was accurate 36% of the time. More comprehensive statistical data is expected to be available in the coming weeks, as we now have a total of 102 patients and our results are being further analyzed with the help of a statistician.

Conclusions: ORADIII appears promising as an additional tool for general dentists in providing differential diagnoses for pathological lesions within CBCT scans. However, ORADIII should not be solely relied upon as a stand-alone tool for evaluating radiographic pathologies.

### **#19: Evaluation of Dental Students' Mental Health and Its Effect on Teeth Relation and Position**

**Peyton Halverson, Lauren Peterson, Dr. Amanda Wobido**

This study aimed to assess the occlusion of dental students using digital occlusal analysis and explore its correlation with mental health and bruxism status. Participants completed demographic, self-reported bruxism and mental health questionnaires, and underwent a clinical oral examination for Angle's Classification (I, II, III). Bruxism was evaluated using a validated questionnaire comprising six questions, categorizing participants as either bruxers or non-bruxers. Mental health was assessed using the Depression, Anxiety, Stress Scale (DASS-21), yielding scores and classifications for each emotional state. The occlusal analysis was performed using a digital device (Occlusense, Bausch) to record static and dynamic occlusion, including maximum intercuspation (MI), lateral movements (right and left), and incisor guidance. The total number of contacts at MI was classified by range. Statistical analysis included Fisher's exact test for categorical variables and the Kruskal-Wallis test for numerical variables with a 95% confidence interval. Mental health classifications revealed that 28.7% of students experienced some level of anxiety or depression, while 33.3% reported some level of stress. Additionally, 55.6% exhibited bruxism, with the majority (78.7%) having undergone previous orthodontic treatment. No significant association was found between mental health and bruxism, dental school year, Angle's classification, presence of premature contact, lateral guidance classification, or interference during excursive movements. However, a significant difference was noted between the total number of contacts and anxiety ( $p=0.010$ ) as well as stress scores ( $p=0.049$ ). No difference was observed between depression scores and total number of contacts ( $p=0.140$ ). In conclusion, while a notable proportion of students experienced anxiety, depression, or stress, their mental health did not significantly influence bruxism or most occlusal parameters. However, anxiety and stress scores were significantly correlated with the total number of occlusal contacts, suggesting a potential link between emotional stress and occlusal characteristics. These findings highlight the complexity of factors contributing

to dental occlusion and emphasize the need for further research in this area.

### **#20: Effectiveness of the Summer Health Professions Education Program: Fourteen Years of Program Outcomes for UNMC Participants**

**Gisselle Hernandez, Kimberly Pierre**

Background: Racial and ethnic diversity in the U.S. dental workforce does not reflect the diversity of The United States' population. A variety of pathways programs exist nationally for prospective career-oriented individuals who are first-generation college students, members of URM racial and ethnic groups, individuals from low socioeconomic status households and/or rural communities, and those who are at a disadvantage due to other reasons.

Aim/Purpose of Research: The goals of this study are to evaluate the success of the UNMC College of Dentistry's SHPEP program and to better understand the perceived barriers to healthcare careers among URM students pursuing dentistry.

Methods: The measures that will be taken is to use the contact information for the 297 UNMC dental SHPEP alumni from 2008-2022 and update it by the means of calling, mailing, emailing and texting to efficiently gauge those interested in participating in the survey. Those who are willing to participate will receive a secure survey link via email to further assess their attitudes towards the program in which the survey results will be analyzed.

Results: Results Pending

Conclusion: Results Pending

### **#21: Analysis of Occlusal Clearance of Crown Preparations made by Predoctoral Dental Students at the UNMC College of Dentistry**

**Lucas Jarecke, Luke Wordekemper, Dr. Gregory Bennett**

Zirconia crowns are the most commonly used indirect restorations in dentistry and current literature shows that the leading cause of failure is bulk fracture. The risk of crown fracture is significantly increased as the thickness of ceramic crowns decreases. Insufficient tooth preparation leading to inadequate occlusal clearance of crown preparations is a chief concern. All-ceramic crowns account for about 95% of crowns delivered at the University of Nebraska Medical Center College of Dentistry. The purpose of this study is to assess the ability of UNMC COD predoctoral dental students to adequately prepare teeth for crowns, specifically regarding adequate occlusal clearance. Secondly, we also aim to make dental students and post-doctoral practitioners more aware of their crown preparation shortcomings. Lastly, we aim to justify the need for quality assurance protocols in dental schools using digital scanners prior to fabrication of the crown. Although research has been conducted surrounding all-ceramic crown thickness and fracture, as well as digital scanning and its accuracy, our

specific research methods and goals are novel. We hypothesized that a majority of the crown preparations analyzed would have inadequate clearance according to the UNMC COD crown preparation guidelines. To test our hypothesis, we used digital scanning technology to scan crown preparations on mounted stone casts before delivery to a lab for crown fabrication. To analyze occlusal clearance of the crown preparations, opposing mounted casts and a bite scan were also obtained before digitally measuring clearance; the distance between the crown preparations and opposing dentition were collected. Data collection yielded results consistent with our hypothesis. Over 50% of the crown preparations analyzed lacked occlusal clearance in at least one area. The results of this study highlight the significant commonality of shortcomings in crown preparation clearance. These findings emphasize the necessity of quality control and analysis via digital scanning of crown preparations prior to crown fabrication to minimize risk of crown fracture and failure, increasing the lifetime and functionality of all-ceramic crowns.

### **#22: Examining Admissions Trends of the Pre-Doctoral Program at the UNMC College of Dentistry: Rural vs Urban**

**Payton Kidder, Dr. Merlyn Vogt**

This study was conducted to examine and understand trends of the last 7 years of applicants to the pre-Doctoral Dentistry program at the UNMC College of Dentistry, specifically data that pertains to applicants from Rural Nebraska. Even though UNMC COD has the highest percentage of graduates that return to rural practice, (Journal of the American Dental Association, 2015), there is a perception among UNMC COD alums who have practices in rural Nebraska, that the college of dentistry does not accept enough rural applicants. In speaking with Dr. Vogt, Dean of the Admissions department, he has been approached by alums who feel that the admissions committee has favored urban applicants over those from rural backgrounds.

We utilized admission data from the past six application cycles from Analytics by Liaison, and the WebAdmit Dashboard. Applicant information obtained includes number of applicants from each Nebraska county, number of urban vs number of rural applicants, number of Nebraskans in each class, number of offers declined (out of state vs Nebraska) and number of Nebraska applicants that declined acceptance offer (Urban vs Rural). 67% of Nebraska applicants have come from three counties, Douglas, Sarpy, and Lancaster. On average, only 20 of the 93 counties have applicants-20% of counties. An average of 71 Nebraskans have applied for admission, 67% are from Urban counties. The typical class of 53 students has 35 Nebraskans and 18 nonresidents, 51% are from urban backgrounds. 25 offers of admission were declined per cycle. An average of 7 Nebraskans decline admission offers (high of 10, low of 2)

In conclusion, even though the majority of Nebraska applicants come from the three Urban counties, Douglas, Sarpy and Lancaster, over the past six cycles the average class has been composed of 51% urban students and 49% rural students. The perception that UNMC matriculants are disproportionately

from urban counties has not been found to be true.

### **#23: Evaluating Student Shade Matching Ability**

**Carter Kocian, Tyler Lutt, Dr. Upoma Guha**

Objective: To determine whether the increasing clinical experience of dental students improves their ability to accurately select dental shades without the use of a VITA shade guide.

Materials and Methods: 8 different resin based composite discs were made in the shades of A1, A2, A3, B1, C2, C3, D2, D3. Each disc was placed on a sheet of blue background and the students were given a VITA shade guide and once comfortable, they were asked to evaluate the shades of the discs, without the shade guide. Each shade of composite was given a "rank," 1-16 (lightest to darkest) and the subjects answer was compared to the correct shade of composite to deem how far off they were based on the ranking scale. We then analyzed D2 vs D4 dental students by taking the average absolute value of how far each student was off the true value and dividing by the class total. We then utilized two-way analysis of variance to determine significance between the two classes, using a significance of ( $p < .05$ ).

Results: In looking at the evaluation, the D2 dental students were, on average, farther from the true value than the D4 dental students.

Conclusion: Shade matching of composite improves as clinical experience is gained, without the use of a VITA shade guide.

Clinical significance: Younger dental students may select composite shades that are not as close to the color of the natural tooth as compared to those that have clinical experience. It is also important to consider the increased efficiency in chair time as we predict the shades more accurately with increased clinical experience.

### **#24: Experience and Comfort Levels of Orthodontists in Treating Patients with Special Needs**

**Morgan Lashley, Emily Swanson, Dr. Meenakshi Vishwanath, Dr. Jennifer Kallio**

A significant gap in knowledge currently exists in the dental education orthodontists have received in treating patients with special healthcare needs (SHCN). The goal of this research is to assess the dental education, training, and comfort level in treating patients with special needs of practicing orthodontists in the United States. By better understanding the educational backgrounds of orthodontists and determining their comfort levels, we hope to improve the access and quality of orthodontic treatment for patients with SHCN. A Microsoft Forms survey was created to assess the educational backgrounds and comfort levels of orthodontists in treating patients with SHCN. The survey is divided into three sections, assessing the training received at the predoctoral dental level and during orthodontic residency, as well as experiences in orthodontic practice. The survey was distributed to orthodontists across

[Go Back to List of Presenters](#)

[Go Back to List of Presenters](#)

the U.S. via the American Association of Orthodontists, and 43 responses were collected. The results show that 42% of predoctoral programs and 37% of orthodontic residency programs did not have classes focused on patients with SHCNs, but 98% of them are currently treating patients with SHCNs. 72% of respondents are not comfortable treating patients with SHCNs, and the main reasons are lack of staff training, patient behavior, oral health status, difficulty achieving ideal treatment. In conclusion, a lack of education at both predoctoral dental programs and orthodontic residency have led to a decrease in orthodontists' confidence when treating patients with SHCNs.

### **#25: Restoring Single Implants via Digital Workflow**

**Jordan Tice, Megha Mathur, Dr. Makena Sundine**

This research aims to assess the effectiveness of an electronic module (e-module) in improving the understanding of dental students in the restoration of single implants via a digital workflow. As the field of dentistry continues to evolve, it is essential to incorporate effective educational tools to keep pace with the advancements in technology and treatment modalities. The e-module is designed to cover essential aspects of single-unit implant restorations, which includes implant components, digital impression techniques, and basic instruments and procedures required in the delivery process. The study will use a quantitative approach, using pre- and post-assessment surveys to evaluate the impact of the e-module on students' knowledge, skills, and confidence. These questions include Likert scale self-assessment and multiple-choice questions. The results will be compared to assess the effectiveness of the e-module in enhancing students' understanding and proficiency in single implant restorations. The results obtained may help identify the strengths and potential areas for improvement in integrating electronic learning resources into dental education curriculum. Ultimately, the goal of this research is to enhance dental education and improve the overall preparedness of dental students for clinical practices in implant dentistry via a digital workflow.

### **#26: The Effect of Time on Retention of General Pathology Course Material Amongst Second, Third, and Fourth-Year Dental Students at UNMC College of Dentistry**

**Ellie Petersen, Jonathan Mitzel, Dr. Peter Giannini**

Objective: This study is intended to shed light on the amount of retained general pathology information as students progress through dental school and near graduation. Our study identifies factors most predictive for long-term retention.

Methods: A survey consisting of 7 demographic and 32 pathology questions were created on Microsoft forms and emailed to all second, third, and fourth-year dental students at the University of Nebraska Medical Center College of Dentistry. The survey questions were created by referencing a dental boards pathology review book. Data was analyzed by a statistician from the University of Nebraska-Lincoln.

Results: 19 second-year students, 21 third-year students, and 13 fourth-year students completed the survey for a total of 53 responses. Average score for second-year students was 64.8%, 60.9% for third-year students, and 53.85% for fourth-year students.

Conclusion: Analysis of the data showed a statistical difference between retention rates of second and fourth-year students, and third and fourth-year students.

### **#27: Impact of Pre-Dental Anatomy Experience on Dental School Anatomy Performance and Knowledge Retention**

**Riley Nitsch, Hannah Janecek, Dr. Shayla Yoachim**

Background: As a challenging foundational course, Head and Neck Anatomy poses a major hurdle in the first-year traditional dental curriculum. It has been hypothesized that students electing to take undergraduate anatomy coursework may perform better in professional school anatomy by building onto a basic scaffold that undergraduate anatomy coursework provided. We aim to determine the impact on dental student pre-professional anatomy exposure on academic success, stress level, confidence in application, and long-term retention of anatomy knowledge.

Materials and Methods: Recruitment of students from the first-year dental student (D1), second year dental student (D2), and third year dental student (D3) COD classes for voluntary participation in a survey and retention assessment including both lower-level anatomy recall and high-level clinical anatomy integration questions.

Results and Conclusions: There is significant association between what grade a student receives or expects to receive in Head and Neck anatomy and whether they took an anatomy course during their undergraduate training ( $p=0.004$ ). Qualitatively, of students who took pre-dental anatomy, 74% reported feeling increased confidence going into dental school anatomy; however, 46% of those students did not report feeling as though they could decrease the amount of time necessary to study dental school anatomy. Quantitatively, performance on the retention assessment was impacted by pre-dental anatomy completion only in the D1 cohort, who collectively scored significantly higher overall than both the D2 and D3 cohorts ( $p<.0001$ ) as well as in each tier of cognitive processing (lower, intermediate, and higher level questions;  $p<0.0001$ ). Within the D1 class, students with pre-dental anatomy experience scored significantly higher than those without on each tier of questions, most notably in the 'higher level' questions (6.8 vs. 5.9;  $p=0.045$ ). Collectively, these results suggest recommending undergraduate anatomy training for students applying to dental school.

### **#28: TBD**

**Nicholas Peterson**

The oral cavity hosts approximately 772 bacterial species (Verma et al). Many of these bacteria can induce inflammation and transmit disease. The potential of these bacteria to adhere

to needle tips and create bacteremia, septicemia, or localized infections with dental injections should be investigated along with methods to mitigate the bacterial load. This study's objective is to quantify the number of bacteria collected on the needle tip upon consecutive local anesthetic injections. The results of this study aim to assess if needle tips can become contaminated and then ultimately should dental providers be changing needle tips to reduce potential bacteremia? The method used to quantify bacteria was with three needles used for each patient. One needle was a control placed immediately into a test tube containing 3 milliliters of sterile PBS; the second needle was only injected once into patient tissue, while the third was injected into patient tissue three or more times. A 200-microliter aliquot was then taken from the sample containing and plated out on nutrient agar. Colony forming units (CFUs) were than counted after incubating for 96 hours (about 4 days) at 37 degrees Celsius. \*Results (still collecting some data from samples) - but what has been recorded so far – The control needle tip did not form any CFUs while on average the one needle stick had an estimated 30 CFUs and the three plus stick cultured 99+ CFUs on average. The results of this indicate that needle tips can become contaminated on consecutive needle sticks and that alternative methods to mitigate bacterial load introduced into patients could be of potential value. Changing needle tips is a potential solution while considering the use of a pre-injection antibacterial mouth rinse such as chlorhexidine could also potentially mitigate bacterial load.

### **#29: Investigation of the Impact of the Snowplow Technique on Microleakage of Permanent Posterior Teeth**

**Elizabeth Dressler, Ryan Rawlings, Dr. Mark Beatty**

Background: The snowplow technique is a novel method of composite restoration. It consists of using a flowable liner, condensing packable composite with the uncured liner, and then co-curing the mixture together.

Aim: The purpose of this experiment was to evaluate the in vitro performance of class II direct composite restorations using the snowplow technique compared to other methods.

Materials and Methods: In this experiment, 30 extracted posterior human teeth that were healthy (free from decay, restoration, fracture, or crack) were collected and randomly divided into three groups of ten. One group was restored with conventional composite technique. The second was restored with a flowable composite liner that was cured, after which packable composite was placed. The last group was cured with the snowplow technique, in which both the flowable liner and packable composite were cured at the same time. The teeth were thermocycled for 1,000 cycles between 5 degrees and 55 degrees C with a one-minute dwell time. Apices were sealed with epoxy cement and the teeth were varnished to within 1mm of the margins. Samples were placed in methylene blue dye (1%) for 24 hours, rinsed, and sectioned to measure the microleakage under a stereomicroscope. ANOVA was used to analyze data.

Results: Had to restart due to over-leakage of Methylene blue dye. Results pending.

### **#30: Assessment of UNMC SHPEP's Efficacy in Preparing Participants for Dental School Application**

**Trent Nguyen, Alec Redwine**

The Summer Health Professions Education Program (SHPEP) is a program for undergraduate students to explore their interest in health-related fields, including dentistry. The goal of the SHPEP dental program at UNMC (University of Nebraska Medical Center) is to prepare participants for a successful application to dental school through numerous opportunities such as experiencing what it is like to be a dental student through hands-on labs, learning about the application process, barriers to dental school, and networking with students and faculty. Using anonymous pre-SHPEP and post-SHPEP surveys, the aim was to determine if participation in the UNMC College of Dentistry SHPEP program leads to an increased chance of participants applying for dental school. A secondary aim was to evaluate factors such as cost of tuition, application fees, GPA requirements, and how socioeconomic status impacts participants' interest in continuing education in dental school. To our knowledge, there has not been a study completed by UNMC College of Dentistry (COD) students that has looked at whether the UNMC SHPEP program dental track is achieving the goals set in the UNMC SHPEP mission statement to strengthen academic proficiency and career development. Most students felt that learning about the application process and how to prepare for taking the DAT were the most beneficial experiences. On the other hand, most students wanted more hands-on clinical experience and wanted to spend more time at the COD, rather than having only one day per week on campus. Comparing pre-program to post-program survey responses, the UNMC COD SHPEP program provides an enriching and informative experience for dental scholars. However, some areas of the dental scholars' experience could be improved by providing more dental specific hands-on experiences and allowing them to spend more time with the dental students and faculty, rather than spending most of their time in Omaha.

### **#31: SonicFill™ 3 Bulk-fill Versus Incremental Layering: Void Formation and Knoop Microhardness**

**Trent Roth, Adam Mackley**

Aim/Purpose: Compare presence of internal voids and surface microhardness in resin composites using sonic insertion or incremental layering techniques; analyzed using optical microscopy and Knoop microhardness.

Methods: Two resin composite systems, SonicFill™3 Nano-hybrid Bulk-fill Composite (Kerr Corporation) and Mosaic™ Universal Conventional Composite (Ultradent Products Inc), were evaluated. Four groups (n=5) were evaluated according to insertion method (sonic or incremental layering) and shade (Vita A2, A3). Cylindrical brass molds, 5.5mm diameter by 4.0mm depth, were fabricated. For sonic insertion, bulk-fill

[Go Back to List of Presenters](#)

[Go Back to List of Presenters](#)

composites (BA2, BA3) were inserted in a single increment (4mm). Sonic insertion was performed, using the SonicFill proprietary Handpiece (Kerr Corporation) at maximum dispensing rate, by keeping the tip within material while dispensing. For conventional composites (CA2, CA3), incremental layers (2mm) were utilized. Composites were light cured at their respective increments for 20s using a multi-peak light-emitting diode light-curing unit (VALO) in standard output mode (wave-length: 385-515nm; intensity: 1000mW/cm<sup>2</sup>) at a distance of 1mm through a glass microscope slide. Samples were stored (24hrs) in dH<sub>2</sub>O and light shelter, evaluated for Knoop microhardness (KHN) using Shimadzu Micro Hardness Tester (HMV-G Series) at 100g/15s stress; measured surface center plus two areas ~100um from center. Samples were then sectioned longitudinally and evaluated for internal voids (0.05-0.7mm) using Nikon Measuring Microscope (MM-11). Data were analyzed using ANOVA and Tukey-Kramer Multiple-Comparison (alpha = 0.05).

Findings/Results: Significant differences were observed in microhardness among groups based on type and shade of composite, and void formation based on type of composite. Conventional composites had significantly higher KHN (Table I). Sonic insertion had significantly fewer voids than incremental layering (Table II).

Conclusion: Results suggest sonic insertion might reduce void formation during composite delivery, while incremental layering might increase surface microhardness. Further studies are indicated to ensure differences observed in this study can influence the clinical relevance of resin composite delivery systems.

### **#32: Nebraska Dentists' Views on Cannabinoids for Treatment of Orofacial Pain**

**Baylor DeVries, Sierah Samway, Dr. Joseph Bavitz**

Research on the use of cannabinoids for the treatment of orofacial pain has found it to have comparable results as non-steroidal anti-inflammatory drugs (NSAIDs). Those allergic to NSAIDs have limited options for pain relief, however, cannabinoids may be an option for them. The goal of this research is to determine the knowledge Nebraskan dentists' have on the use of cannabinoids for orofacial pain and if that knowledge or perception impacts their openness to utilize cannabinoids in the future if found effective. This research utilized a survey that was sent to all dentists that currently hold a license in the state of Nebraska. Ten multiple choice questions were asked and consisted of demographic information (age, gender, area of practice) and questions aimed to gauge the dentists' views and knowledge on the use of and research on cannabinoid products for the treatment of orofacial pain. This research found that more than half of participants had not heard of the use of cannabinoid products for the treatment of orofacial pain, however, majority of participants responded that they would be open to utilizing cannabinoids as a treatment option. These results indicate that research should continue in this area and more research must be done to expand on the medicament needed to obtain the results that are desired for those suffering from orofacial pain.

### **#33: Assessing Risk Factors in High Risk Fall Patients in a Predoctoral Dental Clinic**

**Khoi Mai, Harrison Sanny, Dr. Sarah Lowman**

Background: With a growing aging population, falls are becoming an increasingly prevalent public health crisis. Falls can result in death, debilitating injury, and increased healthcare costs for those affected. The CDC has put forth an initiative (STEADI) for fall risk assessment and while many healthcare facilities have adopted the methods of screening set forth by the CDC, many dental facilities have not.

The CDC's STEADI initiative states that if a 60+ year old patient worries about falling, has fallen in the last year, or feels unsteady while walking then they are at high risk for a fall.

Purpose: The UNMC College of Dentistry's patient base is made up of a large number of 60+ year old individuals, and at the time of the start of this research project had not incorporated the facets of the STEADI initiative. The goal of this project was to: 1) Collect quantitative data on the number of new patients who were 60+ years old and are at high fall risk. 2) Assess additional risk factors that may contribute to a patient's risk of falling (Missing teeth, neurological conditions, and dental anxiety.)

Methods: The three questions recommended by the STEADI initiative (Have you fallen in the last year?, Do you feel unsteady while walking?, and Do you worry about falling?) were added to the UNMC College of Dentistry's electronic dental record in the medical history tab. This data was collected for new patients 60 years or older along with their responses to four other questions regarding missing teeth, neurological conditions, and dental anxiety to assess the relationships between their answers and their fall risk status.

Results/conclusion are pending at this time.

### **#34: Radiographic Bone Loss and Probing Depths in Relation to Tooth Loss: A Seven-Year Retrospective Study**

**Bobbie Fowler, Laura Shaw, Dr. Jeffrey Payne, Dr. Kavya Muttanahally, Kaeli Sampson**

Objective: To determine associations between radiographic bone loss and deep probing depths with tooth loss in periodontal maintenance patients over a seven-year period.

Methods: The number of sites per patient among 323 patients with probing depths  $\geq$  6 mm and the deepest probing depth at baseline were recorded by BF and the percentage of sites with these probing depth thresholds were determined. BF also recorded, for each patient, whether or not any tooth in the dentition had mobility. Differences between dichotomous groups were assessed with independent samples t-tests or Wilcoxon Rank Sum tests for continuous variables, and Chi-Square or Fisher's exact tests for categorical variables. Bitewing radiographs acquired and archived using MiPACS software (Medicor Imaging, Charlotte, NC) were taken from a randomized sub-sample made up of 146 patients' dental records in this

study. LS recorded linear alveolar bone height measurements between the cemento-enamel junction and alveolar crest using the method described by Hausmann and colleagues (1992).

Results: There was a higher proportion of patients who lost at least one tooth among patients who had at least one probing depth 6 mm or greater at baseline (57.0%) compared to patients who did not (42.2%),  $p = 0.01$ . Among patients with at least one site with a probing depth 6 mm or greater at baseline ( $n = 207$ ), patients who lost at least one tooth had a higher median percentage of baseline sites with probing depths of at least 6 mm (2.8% (IQR: 0.8%, 5.8%)) compared to patients who did not lose any teeth during follow up (1.4% (IQR: 0.7%, 3.2%)),  $p = 0.002$ . Having any tooth with mobility at baseline was not significantly associated with tooth loss ( $p = 0.19$ ). Patients who lost at least one tooth during the study period had a significantly higher mean radiographic distance averaged across all teeth and sites (2.9 mm [SD = 1.03]) relative to patients who did not lose any teeth (2.4 mm [SD = 0.69]). Tooth loss due to periodontitis, non-restorability, and endodontic reasons were all significantly associated with baseline radiographic alveolar bone loss ( $p$ -values  $< 0.05$ ). Tooth loss due to caries was not significantly associated with baseline radiographic bone loss ( $p = 0.14$ ).

Conclusion: Patients who had higher radiographic bone distance, or at least one probing depth greater than or equal to 6 mm at baseline, were more likely to lose teeth over seven years.

### **#35: Examining Surgery Wait Times and Treatment Effects in Adult Patients with Disabilities**

**Ella Majerus, Lydia Sigler, Dr. Jennifer Kallio, Dr. Corinne Van Osdel, Kaeli Samson**

Aim: The purpose of this study is to analyze the impact of long wait times for special healthcare needs patients who receive dental care under general anesthesia in the operating room. The wait times since the COVID-19 pandemic have increased, and longer wait times are hypothesized to be connected to more extensive treatment rendered during the OR appointment. Currently the wait time at the UNMC GPR program is approximately 4-5 years, and before COVID-19 the wait time was approximately 2-3 years.

Methods: The researchers gathered data from patient records ages 19 and older that were seen in the operating room by the UNMC GPR residency program from June 30th, 2016 to June 30th, 2019 and June 16th, 2020 to June 16th, 2023. Values collected included age, gender, ASA, number of teeth extracted, periodontal treatment code, and cost of treatment.

Results: In total, 602 patient records were analyzed. To ensure independence in the data for analysis, only the first visit per patient in the dataset was included ( $n=409$ ). Patients were more likely to have teeth extracted during the pandemic period (61.5%) compared to the pre-pandemic period (37.7%). Among patients who had at least one tooth extracted, patients in the pandemic period had a higher median number of teeth extracted (4.0) compared to those in the pre-pandemic period (2.0). Patients were more likely to have restorative work done

in the pandemic period (64.2%) compared to the pre-pandemic period (52.5%). Patients were more likely to have scaling and root planing completed during the pandemic period (59.9%) compared to the pre-pandemic period (36.4%).

Conclusion: Longer wait times for patients have equated to more treatment rendered in the operating room, including increased number of extractions, more extensive restorative work, and more scaling and root planing compared to pre-pandemic patients.

### **#36: Evaluation of the Patient Perceptions of Quality of Care at UNMC College of Dentistry**

**Delaney Springer, Emma Wilkinson, Dr. Amanda Wobido**

This study aimed to investigate the factors influencing patients' perceptions of quality of dental care at the UNMC College of Dentistry (CoD) and to identify areas for enhancement in dental care delivery within the academic setting. A patient satisfaction survey, comprising 27 questions covering demographic information, quality of care, service speed, and specific aspects related to general/facility, student, faculty, and general practice coordinator (GPC), was developed and distributed by the CoD administration to all patients treated at the College between 2022 and 2023. The anonymous survey was available via email or in paper format in the waiting room or at the end of appointments. Responses were analyzed using a 5-point Likert-type scale, with the average score calculated for each topic. Data analysis included the exclusion of incomplete surveys and employed statistical tests such as the Kruskal-Wallis and Fisher's exact tests for numerical and categorical data, respectively ( $\alpha=0.05$ ). The correlation between quality of care and specific topics was assessed using Pearson's Correlation test. Results from 196 patient surveys (114 from 2022, 82 from 2023) revealed that the majority were female (62.2%) and white (90.3%). Overall, 78.1% rated care quality as very good, while 61.2% evaluated service speed as reasonable. Significant associations were found between quality of care and evaluations of speed of care, CoD facilities, students, faculty, and GPCs ( $p < 0.001$ ), with a positive correlation. However, the year of evaluation, patient gender, and race/ethnicity did not significantly influence care quality perception ( $p=0.252$ ,  $p=0.617$ ,  $p=0.940$ ). This study shows the multifaceted nature of patients' care quality perceptions, highlighting the significant influence of factors beyond dental treatment. Interactions with students, faculty, GPCs, and facility ambiance play pivotal roles in shaping overall patient experiences. Therefore, emphasizing not only technical treatment aspects but also overall patient experiences is important to ensure high-quality care dental care delivery.

[Go Back to List of Presenters](#)

[Go Back to List of Presenters](#)

### #37: How Noncognitive Traits of Grit and Resilience Coincide with Academic Performance of Dental and Dental Hygiene Students

Taylor Steiner, McKenzie Nutter, Dr. Merlyn Vogt

Background: Several objective measures can be used to predict how successful a person will be in professional school. The Dental Admissions Test (DAT) and cumulative grade point average are all expected to correlate with grades in a dental program. The matriculation process into dental school is extremely competitive, and it is easy to assume that every student possesses a high level of grit and resilience to reach that milestone. Academic performance in dental school should be justified through a multifaceted realm of impressionistic qualities such as grit and resilience and not raw intelligence alone. Understanding this may help students overcome the hardships associated with a rigorous dental program. Additionally, educators at the University of Nebraska Medical Center's College of Dentistry should consider the extent of these traits among students to cultivate the best environment for effective learning in the next generation of dentists.

Objectives: This study was performed at a CODA-accredited dental school to determine how conducive noncognitive traits of grit and resilience are as a possible predictor of academic performance among dental and dental hygiene students. We predict that there will be a direct correlation between the two.

Materials/Methods: Students completed an anonymous electronic questionnaire that included the Short Grit Scale (Grit-S) and the Brief Resilience Scale (BRS) during the Fall 2023 semester. Students also provided their university ID numbers to maintain anonymity while corresponding grade point average and class rank to their responses of our survey. Statistical analyses using linear models were performed to determine association.

Results: Analysis revealed a significant correlation between student's averaged resilience scores and their cumulative GPA ( $p=.01$ ) and their cumulative class rank ( $p=.02$ ). There was no significant correlation between student's average grit scores and their cumulative GPA ( $p=.07$ ) and their cumulative rank ( $p=.08$ ). There was no significant difference between cohorts regarding both grit and resilience.

Conclusion: This data indicates that resilience does impact students' ability to be successful in an increasingly onerous dental program, while grit is not a significant indicator. Additionally, we could not conclude that grit and resilience differed between subjects in different program years.

### #38: Can Inflammatory Markers Identify Periodontal Health Changes Following Extraction? A Pilot Study

Jacob Stewart, Ben Wetovick, Dr. Richard Reinhardt, Dr. Amy Killeen

The purpose of this pilot study was to explore the impact tooth extraction has on periodontal health and inflammatory

markers in gingival crevicular fluid (GCF) of adjacent teeth. The hypothesis for this research is that pro-inflammatory cytokines would decrease and anti-inflammatory cytokines/growth factors would increase from baseline to 3 months post-extraction. The rationale behind this hypothesis is the removal of tooth with severe periodontal bone loss, non-restorable caries, or fracture would decrease inflammation and promote periodontal health in adjacent sites. METHODS: This study investigates previous analyte data (Mohammadi, 2023)<sup>1</sup>. That study included nine teeth that were extracted atraumatically. Clinical measurements recorded were periodontal probing depth (PPD), recession (REC), clinical attachment level (CAL), and bleeding on probing (BOP) of the tooth to be extracted and adjacent teeth. Gingival crevicular fluid (GCF) was collected using collection strips from the tooth to be extracted and the adjacent teeth. All measurements were taken at baseline (before extraction) and 3 months post-extraction. Multiplex immunoassay was utilized to measure nineteen different analytes in GCF. Measurements were compared between baseline and 3 months. RESULTS: Signature pro-inflammatory cytokines, Interleukin (IL) -6 and Tumor Necrosis Factor Alpha (TNF  $\alpha$ ), were significantly decreased from baseline to 3 months. IL-6 had a median decrease of 43.7 pg/ml (IQR=-78.6,-8.6;  $p=.021$ ). TNF  $\alpha$  had a median decrease on 9.9 pg/ml (IQR=-20.2,-3.8;  $p=.041$ ). IL-1B trended down as well with a median decrease of 342.5 pg/ml (IQR=-1398.8,-165.8;  $p=.081$ ). However, there was also a noted decrease in anti-inflammatory IL-10 with a median decrease of 13.8 (IQR=-36.3,-9.3;  $p=.021$ ). Inflammatory index ratio of TNF /IL-10 also displayed a significant increase of 0.4 pg/ml (IQR=.2, 1.5;  $p=.021$ ). PPD and CAL also decreased on adjacent teeth but not significantly. CONCLUSION: Clinical measurements from this research showed no significant changes from baseline to 3 months. The predominant inflammatory mediators, therefore, could be a more sensitive tool in determining periodontal health changes following extraction.

### #39: Dental Students' Attitudes on Educational Debt and Initial Post-Graduation Career Plans

Jaspreet Grewal, Harinderjit Kaur, Dr. Julie Marshall, Dr. Jim O'Meara

Objectives: Study aims to examine relationships between educational debt and potential impact on immediate career choices for UNMC senior dental students.

Materials and Methods: A 12 questions secure REDCAP survey was distributed to UNMC Dental Class of 2024 following completion of a practice management course. Participation was voluntary and anonymous. Respondents (N=38, 49% male, 51% female) answered questions regarding career choices, the distribution of anticipated debt levels as a D1 student to total debt as a D4 student, lifestyle changes and attitudes toward educational investment. Results were compared with findings from the annual ADEA Senior Survey-2022 of US dental graduates.

Statistical Analysis: Fisher's exact test compared survey response with gender and indebtedness level ( $p<0.05$ ). Kappa statistic assessed agreement between D1 anticipations and D4 expectation.

Results and Statistics: 55% of respondents indicated debt influenced immediate career choice (ICC) with a trend of more female(62%) than male(38%) careers influenced by debt. Amount of debt (low<100K,medium 100-250K,high >250K) did not significantly influence a change in ICC. Respondents as a D1 aspired to solo practice (28.9%), group practice (50.0%) and other (21.2%). D4s response shifted to increased group practice (65.8%), compared to solo practice (2.6%) or other (31.3%) as immediate career choice.

There was good agreement (Kappa=0.69) between D1 anticipated and D4 actual educational debt. 55% of respondents indicated significant/moderate financial sacrifice or lifestyle changes due to dental debt compared to slight/none. No significant differences in lifestyle changes in relation to gender. However different levels of debt (low,medium,high) impacted lifestyle changes ( $p<0.05$ ). Respondents felt very confident(44.7%) or somewhat confident(50%) compared to slightly/very discouraged their dental education investment was a favorable financial decision.

Conclusion: The survey concluded that there is no statistically significant evidence to suggest that educational loans have an impact on the career choices of D4 students at UNMC COD, when considering gender and debt.

### #40: Examining Associations Between Classes of Medications and Tooth Loss in Periodontal Maintenance Patients

Nicholas Stolze, Dr. Jeffrey Payne

Objective: To examine associations between commonly prescribed medication classes (i.e., statins, anti-hypertensives, diabetes medications, anti-depressants, and NSAIDs) and tooth loss in periodontal maintenance patients at the College of Dentistry (COD) over a seven-year period in a retrospective study.

Methods: Medication data was collected from baseline visits of 323 periodontal maintenance patients seen at the COD in both 2013 and 2019 via the Salud Electronic Dental Record (Dublin, Ireland). Following data collection, associations between medication class at baseline and any tooth loss at seven years, as well as reasons for tooth loss, were assessed using Chi-Square or Fisher's exact tests. SAS software version 9.4 (SAS Institute Inc., Cary, NC) was used for analyses.

Results: There was a statistically significantly higher proportion of patients who lost at least one tooth among patients who were on an anti-depressant at baseline (68.9%) compared to patients who were not on an anti-depressant at baseline (48.9%),  $p = 0.01$ . After investigating specific types of anti-depressants, it was found that patients who were on a Selective Serotonin Reuptake Inhibitor (SSRI) at baseline had a higher proportion of patients who lost at least one tooth (70.4%) compared to patients who were not (50.0%),  $p = 0.04$ . No statistically significant associations between the other medication categories and tooth loss were found. Anti-depressant usage was not associated with a particular reason for tooth loss.

Conclusion: Anti-depressant usage at baseline was associated with tooth loss at seven years in this retrospective study of periodontal maintenance patients.

### #41: In Vitro Tensile Strength Comparison of Denture Liners to 3-D Printed Denture Resin

Merina Joseph, Mahima Kinra, Dr. Julie Marshall, Dr. Gregory Bennett, Dr. Mark Beatty

Objective: In vitro study to compare tensile bond strength of 2 soft tissue liners, A-Lynol@(Dentsply Caulk) and B-CoeSoft@(GC America) to TrueDent Polyjet@(Stratasys) printed denture material modified with 3 types of surface pre-treatment.

Methods: 60 pairs of TrueDent@ (10x10x20mm) resin blocks with 10x10mm interfacing surfaces were fabricated using J5 DentaJet Polyjet@ print cycle 5h9m. Blocks processed to manufacturer's specification, pressure washed, soaked in 2% NaOH solution(120m), pressure washed second cycle, post-cured in glycerin 80°C,60mx2cycles with agitation of liquid between cycles. Blocks soaked in 70% isopropyl alcohol(30m), air dried(2hrs), divided into 3 surface pretreatment groups per material(n=10). Group1-acrylic bur HPSGEB, Brassler@, Group 2-air abrasion 50µ AlO,15s,65psi,4.5bar; Group 3-medium grit slurry/ragwheel (30s) as control. Surface treatment confirmed using 3.5X magnification. Opposing blocks positioned 3mm apart using PVS matrix. Reline materials placed on opposing resin surfaces, cured(24h), placed in distilled water(24h). Instron1123/44R universal testing instrument with 5mm/min crosshead speed using 500N(50kg) load cell measured max load and tensile strength. Results analyzed with 2-way ANOVA/Tukey( $p<0.05$ )

Results: Adhesion of liner A to printed resin was significantly stronger than B with surface treatments pooled( $p<0.001$ ). Bur pretreatment of printed resin produced strongest adhesion with liner A, compared to any other liner/surface treatment combination ( $p<0.05$ ). No significant differences observed among remaining liner/treatment combinations( $p>0.05$ ) except for pumice/B, which was significantly lower than all liner A treatments ( $p<0.05$ ).

Conclusion: Best adhesion to TrueDent@ printed resin was obtained with acrylic bur pretreatment and use of Lynol@ liner.

### #42: Evaluation of the Efficacy of an E-learning Module in Dental Photography Education

Yuliya Vaniurska, Ryta Wodzinski, Dr. Amanda Wobido, Dr. Shayla Yoachim

This study aimed to assess the effectiveness of a Dental Photography e-module compared to a traditional lecture among second- and third-year dental students (D2s and D3s). A traditional lecture and e-module were created on the principles and techniques of dental photography. Forty-six second year and 27 third-year students were randomly assigned to two groups: traditional lecture (TL, n=36), and independent e-module (IE, n=37). Before the intervention, all students completed a pre-test to assess their prior exposure to the content. Following the intervention, both groups underwent a post-test and engaged in a critical thinking exercise, which involved analyzing dental images with various issues and suggesting corrective measures. Participants' ages ranged from 22 to 33, with rel-

[Go Back to List of Presenters](#)

[Go Back to List of Presenters](#)

atively equal gender representation. All participants had prior exposure to e-modules (100%), and 23.3% had previous dental experience. There was no significant difference in pre-test scores between the TL and IE groups. However, D3s scored significantly higher than D2s on the pre-test ( $p < 0.0001$ ). Both TL and IE groups showed a significant increase in mean scores from pre-test to post-test among both D2s and D3s ( $p < 0.0001$ ). D2s in the TL group achieved significantly higher scores on the post-test ( $p < 0.0001$ ) and critical thinking exercise ( $p = 0.0005$ ) compared to the IE group, whereas no significant differences were observed between the TL and IE groups among D3s (post-test,  $p = 0.31$ ; critical thinking,  $p = 0.48$ ). Confidence levels on the pre-test were comparable between groups and D2s and D3s. However, D2s in the TL group reported significantly higher confidence levels on the post-test ( $p = 0.005$ ), while D3s showed no significant differences between the groups ( $p = 0.30$ ). In conclusion, the dental photography e-module serves as an effective review tool for students with prior exposure to the subject (D3s), whereas traditional lecture delivery appears to be more efficient for first-time learners (D2s).

### **#43: 2024 College of Dentistry Wellness Survey**

**Justin Wilson, Samuel Kline, Dr. Sarah Lowman**

The present study investigates the current wellness and morale of dental and dental hygiene students at the University of Nebraska College of Dentistry. Male and female participants across the UNMC COD campus were analyzed to determine wellness related satisfaction. The aim of this study is analyzing the current physical, mental, emotional, social, spiritual, intellectual, and occupational wellbeing of students. This study could determine potential wellness related changes that need to be implemented for future students. Redcap a secure web application software will be utilized for obtaining survey results from current students. Additionally, Redcap is HIPPA compliant and a secure database to deidentify any potential surveyors. The current findings and results are pending per IRB approval and survey implementation. After the interpretation of the results, student morale and wellbeing could be better understood and future changes could improve student wellbeing and lead to better oral health care. Additionally, this could improve clinician lifestyle and happiness.

### **#45: Frequency of Incidental Findings on CBCT Radiographs and Influence of Risk Factors**

**Drs. Kelsey Wenger, Kai Hatch, Paula Schlemmer, Shayla Yoachim, Anne Williamson, Michael McNally**

Background: CBCT usage is increasing annually throughout the field of dentistry. CBCT volumes often give rise to findings that are incidental to the reason the image was obtained. The aim of this research was to assess the presence of secondary findings on CBCT radiographs and determine the extent to which selected risk factors are associated with finding frequency.

Materials and Methods: Resident dentists analyzed radiology reports generated by certified dental radiologists on CBCT volumes at the UNMC College of Dentistry. Incidental findings

were charted and background information was collected on the patient and CBCT order.

Results: 953 reports fit the criteria and were analyzed. Of the 953 reports, 517 reported incidental findings (54%). 968 incidental findings were reported among the 517 reports with a mean of 1.8 findings per CBCT. There were 282 reports with 1 finding, 121 with 2 findings, 58 with 3 findings, 30 with 4 findings, and 26 with 5 or more findings. There was a statistically significant increase in the number of incidental findings in radiographs with a larger field of view ( $p < 0.001$ ). For the location, 49.6% of findings were located on the dentition, 25% were found in the sinus, 18.5% were found in the bone. No significant association was found between the number of incidental findings and the reason that the CBCT was obtained, sex, or age.

Conclusion: As CBCT usage increases, it is essential that CBCT volumes be read in full.

### **#46: Recall Attendance Following Oral Moderate Sedation in Pediatric Dentistry**

**Dr. Emily Starman, Dr. Zachary Houser, Kaeli Sampson**

Purpose: Determine significant factors associated with patients seeking recommended preventive dental care after treatment was completed under oral moderate sedation.

Methods: A retrospective chart review of patients treated under oral moderate sedation at UNMC Pediatric Dentistry clinic from February 1st, 2021, to October 1st, 2022. Patient ID, age, sex, date of birth, insurance type, treatment completed, dates of sedation procedure and subsequent dental visits were collected. Recall attendance rate calculated and differences between subgroups assessed using Chi-Square and Fishers exact tests for categorical variables, and Wilcoxon Rank Sum or Kruskal Wallis tests for continuous variables.

Results: One-hundred sixty-nine patients treated under oral moderate sedation were analyzed (N=169). Recall rate for 6 months ( $\pm 2$  months) was 8.9% and for 12 months ( $\pm 5$  months) was 18.3%. 23.7% of patients had at least 1 recall appointment within 18 months of their sedation. Patients who were patients of record prior to their sedation appointment were the most likely to attend a recall in 12 months. There was no significant association between recall attendance rate and patient age; distance traveled; insurance; or treatment completion.

Conclusions: Recall attendance following oral moderate sedation could be an important factor for preventing future dental disease; however, it is difficult to measure or track patient follow-up for patients that do not receive restorative care at their dental home. Knowing the patient demographics of oral sedation patients may help better treat and provide follow-up, preventive dental care.

### **#47: The Effect of an Educational Intervention Regarding Athletic Mouth Guards**

**Drs. Bailey Neville, Claire Koukol, Julie Marshall**

The aim of this study was to assess the effectiveness of an educational intervention regarding the use of athletic mouth guards in youth baseball. An e-module was created to provide information on protective benefits of athletic mouthguards. An anonymous four question pre-survey and post-survey was administered via Microsoft Teams before and after viewing the e-module, and it included Likert scales response questions (strongly disagree, disagree, neutral, agree or strongly agree). Respondents (N=46) were second year dental students. Descriptive statistics summarized survey responses, and paired t-tests and sign rank tests were utilized to compare pre and post responses. Significant differences ( $p < 0.05$ ) occurred in the mean response between pre and post-survey responses to 'Mouth guards should be required at all GAMES' ( $p = 0.0117$ ) and 'Mouth guards should be required at all times, including practice' ( $p = 0.0058$ ), suggesting that athletic mouth guards serve to provide a significant protective benefit in youth baseball. Conclusion: An educational e-module regarding the protective benefits of athletic mouth guards in youth baseball suggests effectiveness in changing opinions of dental students regarding mouth guard use in youth baseball.

### **#48: The Age-Old Question: Why Do Younger, Systemically Healthy Patients have Better Wound Healing than Aged, Systemically Healthy Patients? A scRNAseq Fibroblast Study**

**Dr. Paula Cohen Schlemmer**

Background: It is well established that wound healing is slower and less robust in aged patients. However, outside of systemic comorbidities, little is known about the role aging plays at the cellular level. Immediately after an extraction, fibroblasts are activated to rebuild the extracellular matrix (ECM), which is later remodeled through the expression of matrix metalloproteinases (MMPs). Gene expression may be altered in gingival fibroblasts of aged patients leading to deficiencies in ECM deposition and the recruitment and proliferation of immune cells, resulting in a slow healing fibrotic wound.

Methods: Using single-cell RNA sequencing (scRNA-seq), a novel method for analyzing gene expression of individual cells, soft tissue was profiled from a 35 yo and 68 yo healthy patient at the time of a single atraumatic posterior extraction. Two weeks post-extraction, a second sample was taken from the healing site. Differentially expressed genes (DEGs) were used to identify distinct biological pathways for each patient via gene ontology pathway enrichment. Clinical measurements and a pre- and post-op CBCT were also taken.

Results: Eight distinct cell population clusters were identified and assigned based on the gene profiles of each cluster. Three subclusters of fibroblasts were identified: pro-inflammatory fibroblasts (PIFs), anti-inflammatory fibroblasts (AIFs), and gingival mesenchymal stem cells (GMSCs).

Pathway enrichment for two fibroblast clusters indicated a

more robust ECM assembly and innate immune response in the young patient. AIFs had enrichment for pathways involved in creating and maintaining the ECM and were more enriched in the young patient. The pathway expression profile in young PIFs exhibited the expected pro-inflammatory pathways, while the aged PIFs were enriched for similar ECM pathways to AIFs. The GMSCs of both patients had a significant overlap in DEGs that indicated cellular housekeeping and homeostasis. This may mean that GMSCs resist age-related changes and could be a source of targeted therapy for aged patients.

When comparing the patients at two weeks post-extraction, the aged patient was still differentially expressing genes for ECM production and fibrosis, while the young patient expressed genes associated with growth factors and proliferation that typically occurs at this healing time point. This may indicate that the aged patient was in a prolonged state of inflammation and fibrosis.

Conclusion: To our knowledge, this is the first study to utilize scRNAseq to understand if aging alters the fibroblast populations in wound healing after an extraction. Differences in fibroblast phenotypes, gene expression, and pathway enrichment suggest that fibroblasts in aged patients may contribute towards a slow-healing fibrotic wound. An increased understanding of these differences can help guide future biologics research.

Acknowledgments: Amy Killeen and Richard Reinhardt, Department of Surgical Specialties, University of Nebraska Medical Center, College of Dentistry, Lincoln, NE; and Tom Petro, Department of Oral Biology, University of Nebraska Medical Center, College of Dentistry, Lincoln, NE participated in this research. We thank the Windsweep Farm Fund for its generous support of our research efforts.

### **#49: Associations between Periodontitis and Serum Anti-Malondialdehyde–Acetaldehyde Antibody Concentrations in Rheumatoid Arthritis: A Case-Control Study**

**Dr. Joyce Lee, Dr. Ted R. Mikuls, Dr. Geoffrey M. Thiele, Dr. Jeffrey B. Payne, Michael J. Duryee, Harlan R. Sayles**

Background: Malondialdehyde–acetaldehyde (MAA) adducts lead to generation of anti-MAA autoantibodies and have been independently identified in inflamed periodontal and rheumatoid arthritis (RA) tissues. This study evaluates serum samples from RA cases and osteoarthritis (OA) controls to quantify associations between periodontal clinical measures, alveolar bone loss (ABL) and anti-*Porphyromonas gingivalis*, anti-*Prevotella intermedia*, and anti-*Fusobacterium nucleatum* antibody concentrations with anti-MAA antibody concentrations.

Methods: Participants (n=284 RA cases, n=330 OA controls) underwent periodontal clinical assessments and ABL measurements. Serum IgA, IgG and IgM anti-MAA and serum IgG anti-bacterial antibody concentrations were quantified by ELISA. Analyses utilized simple linear regression and multivariable adjusted models.

[Go Back to List of Presenters](#)

[Go Back to List of Presenters](#)

Results: No significant associations of periodontal clinical measures with serum anti-MAA were found. Moderate (p=0.038 and p=0.036, respectively) and high ABL (p=0.012 and p=0.014, respectively) in RA cases (but not in OA) were positively associated with IgG and IgM anti-MAA. Anti-P. gingivalis and anti-P. intermedia antibody concentrations were positively associated with IgA (p=0.001 for both), IgG (p=0.007 and p=0.034, respectively) and IgM anti-MAA antibody concentrations (p<0.001 and p=0.020, respectively) while anti-F. nucleatum was positively associated with IgG anti-MAA (p=0.042), findings that were similar across groups.

Conclusions: A positive association was demonstrated between ABL with serum IgG and IgM anti-MAA antibody concentrations that was unique to RA and not observed in OA. Serum anti-P. gingivalis, anti-P. intermedia, and anti-F. nucleatum antibody concentrations displayed significant associations with anti-MAA antibody in both groups. These findings suggest MAA may play a role in the interrelationship between the periodontium and RA.

### **#50: Pediatric Dental Resident Education and Preferences Regarding Primary Anterior Full-Coverage Restorations**

**Drs. Alexis Sandman, Zachary Houser**

The purpose of this study was to discover via survey which full coverage anterior primary tooth restorations residents are taught during residency and secondarily to determine which full coverage anterior restorations residents prefer. The goal was to identify with the survey how the treatment planning of anterior primary teeth is currently changing. An email survey was sent to AAPD member pediatric dental residents and asked about the district, type of program, and year of residency they are in. Research questions included restorations taught, feelings of competency, plans to use restoration types after graduation, and ranking decision-making factors. Descriptive statistics summarized data and Fisher's exact test was used to compare categorical variables. Results included that strip crowns were taught most, whereas open-face SSCs were not taught in 88% of programs. The top factors in deciding which restoration type are patient behavior, caries risk, and time to exfoliation, and the ranking of options of restoration per tooth type were also found. More residents plan to use Zirconia-NuSmile after graduation than pre-veneered SSCs. Comparisons showed SSCs being most common in the southwest, whereas Zirconia NuSmiles were most common in the Southwest and North Central regions. In addition, it was found that residents with prior work experience favored strip crowns less than residents without work experience (76% vs 54%). Overall, we were able to observe more information about education, decision-making, and competency regarding resident opinions on primary anterior restorations.

### **#51: How Age Affects Oral Wound Healing, A Gene Pathway Analysis**

**Dr. Alexander Lopez**

We see the changes in aging at a macro level, but little is known about the role aging plays at the cellular level. Immediately after a traumatic event, such as an extraction or root end resection and retrofill, fibroblasts are quickly activated to initiate healing. Gene expression may be altered in gingival fibroblasts of elderly patients. These differentially expressed genes (DEGs) may have effects on inflammation, immune recruitment, and differences in matrix formation and composition.

Soft tissue was analyzed from a 35yo and 68yo healthy patient at the time of a single atraumatic posterior extraction. Two weeks post-extraction, a second sample of tissue was taken from the healing site. Cells were profiled and gene expressions measured using single-cell RNA sequencing (scRNA-seq), a novel method for analyzing gene expression of individual cells. DEGs were used to identify distinct biological pathways for each patient via pathway enrichment analysis using multiple tools, including QIAGEN's Ingenuity Pathway Analysis tool. Several pools of genes including inflammatory markers, and matrix metallo-proteinases were found to have significant differences in expression.

Preliminary data is currently being analyzed, with more subjects planned to be added to the analysis pool. It is hypothesized that elder patients (65+) will demonstrate a longer period of inflammation, with a more prolonged healing period in comparison to a younger patient (18-64). This is a pilot analysis to help glean information on wound healing pathways that can then be applied to modern endodontic microsurgical and pharmaceutical concepts.

## About the **Frank M. Wentz** **Student Scientific Program**

Frank M. Wentz, DDS, MS, PhD, was a scholar, philosopher, dentist, humanitarian and a Diplomat of the American Board of Oral Medicine. His practice, in Chicago from 1955 to 1969, was limited to periodontics. He taught for many years at the University of Illinois and at the Loyola University College of Dentistry before coming to the University of Nebraska College of Dentistry in 1969.

Dr. Wentz served the college with distinction as assistant dean for graduate studies and continuing education and professor of periodontics. He made a difference in countless lives and will forever be remembered for his exuberant enthusiasm and gracious manner.

We are pleased to honor the memory of Dr. Frank M. Wentz (1917-1984) with great appreciation for his many years of dedicated service to the College of Dentistry and to the dental profession.

[Go Back to List of Presenters](#)