UNMC COLLEGE OF DENTISTRY

UNMC COLLEGE OF DENTISTRY RESEARCH DAY

Feb. 27, 2026

Special Thanks

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Tom Petro, PhD
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Julie Marshall, DDS
Bradley Krivohlavek, DDS
Amanda Wobido, DDS
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Peter Giannini, DDS
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Laura Anderson, RDH, BS

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Vickie Gabriel-Barry
Lindsay Kretchman

Student Representatives:
Tanner Delaney
Mikah Hoppens

Event Schedule

59th Annual Frank M. Wentz Student Scientific Program

12:30 – 2:05 pm: Welcome & Opening Instructions: Dixon Auditorium
D3 first round judging
DH4 first round judging
Advanced Standing / Post-Graduate first round judging

2:05 – 3:00 pm: Final round judging (D3 & DH4)

3:05 – 4:15 pm: Opening Remarks: Dixon Auditorium
UNMC COD Dean: Gerard Kugel, DMD, PhD
UNMC Vice Chancellor for Research: Ken Bayles, PhD
UNMC COD Associate Dean for Research: Sangamesh Kumbar, PhD
Keynote Speaker: Thomas Hill, PhD, Manager of Scientific Services, Ivoclar Vivadent

4:15 – 4:45 pm: Awards Ceremony: Dixon Auditorium

On behalf of the Student Scientific Program Committee, "Thank You" for your contributions to the success of this event. We appreciate you!

Dental Hygiene Abstracts

Effect of Lactobacillus-Containing Dentifrice on Streptococcus Mutans Biofilm Formation: An In Vitro Study

Natalie Blumenkemper, Brittney Brtek, & Kelsey Hudecek
Mentor: Tom Petro, PhD

Purpose: To compare the inhibitory effects of a probiotic containing toothpaste and a standard antimicrobial toothpaste on S. mutans biofilm formation

Methods: Using a 96-well plate, 100 microliters of BHI broth was added to rows A-D, and 100 microliters of BHI + sucrose broth to rows E-F. A 1:100 dilution and 1:1000 dilution of probiotic dentifrice was made using PBS to create a flowable solution. The previous step was completed for the antimicrobial dentifrice. In one entire column, 20 microliters of one dentifrice was added and then repeated in a different column for each subsequent dilution. Column 1 contained only BHI or BHIS as a negative control. Column 2 had only BHI/ BHIS and S. mutans as a positive control. Columns 2-9 were inoculated with 20 microliters of S. mutans and then incubated at 37 degrees Celsius for 24 hours before beginning the rinsing process. The plates were then rinsed to remove non-adherent cells by washing the plate with sterile PBS twice. The biofilm was stained using 0.1% crystal violet and left to sit for 15 minutes. The crystal violet was removed by washing the wells with distilled water twice. Then a 95% EtOH was placed in the wells for 30 minutes to release any bound dye. The plate was then placed in a microplate reader at 570 nm and gave an output reading which aided in determining biofilm formation and antimicrobial effects.

Results: While examining the inhibitory effect of both OralHoe Probiotic Toothpaste SP-10 and Crest Pro-Health Gum Detoxify, we found that both were able to reduce S. mutans formation compared to our positive control at a 1:100 dilution. This suggests that both toothpastes work effectively at this dilution. However, when comparing both toothpastes with our positive control at a 1:1000 dilution, OralHoe Probiotic Toothpaste SP-10 showed more of an ability at reducing the formation of S. mutans. This may suggest that as the amount of Crest Pro-Health Gum Detoxify toothpaste decreases, its inhibitory effects on S. mutans also decreases. When comparing the 1:1000 dilutions of both OralHoe Probiotic Toothpaste SP-10 and Crest Pro-Health Gum Detoxify to each other, OralHoe Probiotic Toothpaste SP-10 better inhibited S. mutans formation.

Conclusions: Both toothpastes showed an inhibitory effect on S. mutans biofilm formation at the lowest dilutions compared to the positive control suggesting that both are effective at reducing biofilm.

Are Patients with Xerostomia More Likely to Be Diagnosed for Scaling and Root Planing Compared to Patients Without Xerostomia

Kimmy Hoang and Fatima Anguiano Cortes
Mentor: Todd Junge, RDH, BS

Objectives: To evaluate if there's a correlation between xerostomia and SRP treatment by identifying patients that reported having dry mouth and identifying if they were treated for scaling and root planing.

Methods: Using SALUD database, we narrowed down patients that came to the COD dental clinic within the last five years, ranging from ages 40-50 yrs old. IRB approval was not needed since we did not look through patient's charts or any other identifiable information. There was a total of 2,347 patients that visited the school within that time frame. Then, we narrowed this pool of patients to see how many of them had checked yes to xerostomia in the medical history form. Finally, we were able to figure what type of treatment they received either a prophylaxis or scaling and root planing.

Results: Out of 2,347 patients 359 of them checked yes to xerostomia vs 1,988 who did not report xerostomia. From the 359 patients that reported having xerostomia only 64 of them were treated for scaling and root planing, the rest of the 295 patients were treated for prophylaxis or Perio maintenance.

Conclusions: This study does not highlight a correlation between xerostomia and scaling and root planing treatment. Since the majority of the patients that had reported having xerostomia were not treated for scaling and root planing. Although saliva can act as a filtering system in our mouths, there's other factors that contribute to calculus build up that we did not take into account for this study. Our p-value was 0.5089 which means there was no significant association between patients experiencing xerostomia and being treated for scaling and root planing.

Summary: Although we did not find a correlation between xerostomia and scaling and root planing in 50-60 yr old patients at UNMC's COD. It would be interesting to conduct a similar study in different dental clinics to see how the results vary. We could also look at older age groups since they are more likely to take more medications which can reduce salivary flow and result in xerostomia.

In Patients with White Spot Lesions (WSLs), Is Curodont Repair More Effective than MI Paste in Promoting Enamel Remineralization?

Gracen Fehlhafer and Diana Acosta
Mentors: Lisa Moravec, RDH, BSDH, MSDH, FADHA, Mark Beatty, DDS, MSE, MS, MSD, BS, Bobby Simetich

White spot lesions (WSLs) are early signs of enamel demineralization that affect both esthetics and long term oral health. This in vitro study evaluated the effectiveness of two remineralizing agents MI Paste Plus and Curodont Repair with and without fluoride varnish, in promoting enamel remineralization following acid induced demineralization. Thirty-five extracted human teeth, including anterior and posterior teeth were sectioned using Leco VC-50 precision diamond saw. The enamel surface was polished to create a flat 2 x 2 mm surface with Buehler EcoMet 30 Semi-Automatic Grinder-Polisher. Samples were randomly assigned to five groups: Control, MI Paste Plus (MI), MI Paste Plus with fluoride varnish (MIF), Curodont Repair (CU), and Curodont Repair with fluoride varnish (CUF). White spot lesions were created using an acidic beverage, then remineralizing products were applied according to manufacturer guidelines. Enamel surface microhardness was measured at baseline, post demineralization, and at 7, 14, and 21 days using a Shimadzu HMV microhardness tester.

Results demonstrated a significant effect of time on enamel remineralization, with progressive increase in hardness observed across all treatment groups except the control group. No significant differences were found between treatment groups when averaged over time. The relation between treatment and time displayed differences in the order of remineralization among agents. Enamel hardness did not return to baseline levels within the 21 day period. The findings suggest that both MI Paste Plus and Curodont Repair are effective non-invasive options for managing white spot lesions, emphasizing the importance of early intervention and sustained remineralization over time.

Retrospective Study: Patient Satisfaction at UNMC College of Dentistry Dental Hygiene Clinics

Alora Ferguson and Kristan Rinkol
Mentor: Lisa Moravec, RDH, BSDH, MSDH, FADHA

Patient satisfaction surveys are essential tools for assessing communication, professionalism, and quality of care in dental hygiene programs. They also support Commission on Dental Accreditation (CODA) requirements by providing measurable evidence of patient outcomes, program effectiveness, and continuous quality improvement. With several states considering expanded duties for dental assistants without CODA level education, demonstrating the value and outcomes of accredited dental hygiene training is vital. This study analyzed long term patient satisfaction to evaluate program quality and protect professional standards.

This retrospective study examined 2,473 closed ended responses and 1,046 open ended comments from patients treated at UNMC's Lincoln and West

Division clinics between 2008 and 2024. Due to extremely low numbers of negative responses, non parametric statistical methods (decision trees, random forests) identified key predictors of satisfaction. Qualitative comments underwent text mining analysis, including sentiment scoring and topic modeling. Fisher's Exact Test was used to compare the results between locations.

Student courtesy and respect (Q6) and student preparedness (Q1) were the strongest predictors of overall satisfaction. Appointment reminder calls showed minimal influence. Qualitative findings were overwhelmingly positive, with meaningful terms such as "care," "professional," and "experience" emerging across both campuses. No significant differences were found between locations.

Our findings demonstrate that professionalism, communication, and preparedness are central to patient satisfaction and reflect the strengths of CODA accredited clinical training. These results reinforce organizational excellence, support accreditation compliance, and provide evidence countering legislative efforts to reduce educational requirements for dental providers. Maintaining rigorous education standards is essential for safeguarding public health and sustaining high quality, patient centered care.

The Effects of Ergonomic Seating and Working Positions on Dental Professionals' Posture and Comfort

Alyssa Empfield, Carsyn O'Hare and Darian Hadenfeldt
Mentor: Noni Henderson, RDH, BS

The purpose of this research was to evaluate the effects of ergonomic seating and working positions on comfort among dental professionals. A survey was distributed to dental offices throughout Nebraska, with a total of 115 participants completing the study. An 18-question survey was used to assess whether ergonomic practices and seating positions influenced levels of musculoskeletal pain. Participants included dentists, dental hygienists, dental assistants, and other dental professionals, who reported both the location and severity of pain experienced. Results indicated that all participants experienced some degree of musculoskeletal discomfort, with the most reported areas being the neck, shoulders, and back. 61% of respondents reported using a standard chair and had never transitioned to ergonomic seating. 39% of respondents had transitioned to ergonomic seating, and among these individuals, 62% reported a decrease in pain and fatigue. Additionally, 94% of participants indicated that they had compromised their ergonomic positioning to improve patient comfort. In conclusion, the findings support that ergonomic seating and working positions significantly influence the level of musculoskeletal pain experienced by dental professionals. Adopting ergonomically correct seating and posture may help reduce pain and fatigue associated with dental practice.

The Effects of Fluoride and Nano-hydroxyapatite Toothpaste on Streptococcus Mutans Biofilm: An In Vitro Study

Cori Combs and Addison Knoll
Mentors: Emily Lindquist, RDH, BS and Tom Petro, PhD

Objectives: To evaluate the effects of sodium fluoride toothpaste in comparison to nano-hydroxyapatite toothpaste on the inhibition of streptococcus mutans biofilm to assess the possibility of nano-hydroxyapatite toothpaste as a supplement for sodium fluoride toothpaste.

Methods: A biofilm was created using 100 microliters of BHI or BHI-S agar in each individual well in the well-plate. 20 microliters of each toothpaste, in a 1:10, 1:100 or 1:1000 dilution was placed into the agar. Lastly, 20 microliters of S. mutans was placed into the well-plates. The well plate was incubated at 37 degrees Celsius for 24 hours in a CO2 incubator. After the incubation period, the well plates were washed with sterile PBS twice and then stained with 0.1% crystal violet for 15 minutes. After 15 minutes, the crystal violet was washed with distilled water. The bound dye is released by the addition of 95% ethanol for 30 minutes and then measured using a microplate reader at 570 nm. Results: The original comparison of fluoride and nano-hydroxyapatite toothpaste on Streptococcus mutans biofilm was not able to be adequately tested using the experiment provided.

Because a significant interaction was observed, comparisons were limited to treatments within sucrose conditions. This experiment was analyzed as a completely randomized design with factorial arrangement of treatments where the factors are fluoride toothpaste and nano-hydroxyapatite toothpaste. Each petri dish showed significant findings with both toothpastes and sucrose, p values using the t-test are 0.0002 and 0.0001 respectively. The antimicrobial effectiveness of fluoride and nano-hydroxyapatite treatments is strongly influenced by the presence of sucrose, with treatment-specific and concentration-dependent effects observed.

Conclusion: The antimicrobial effectiveness of fluoride and nano-hydroxyapatite treatments is strongly influenced by the presence of sucrose.

Summary: This study compared sodium fluoride and nano-hydroxyapatite toothpastes for their ability to inhibit Streptococcus mutans biofilm formation. Biofilms were grown in vitro, treated with varying toothpaste dilutions, and quantified using crystal violet staining. Statistical analysis showed that the effectiveness of both treatments was significantly influenced by the presence of sucrose, indicating that dietary sugars play an important role in antimicrobial outcomes.

Enamel Demineralization from Formula Milk vs. Whole Milk: An In Vitro Study

Alaa Al Bayati and Jael Quick
Mentors: Jaimee Shropshire, RDH

Objectives: The purpose of this research was to identify if consuming whole milk or formula milk regularly strengthens or weakens the enamel surface in permanent teeth. This study examined 34 total extracted teeth; the teeth were assigned into two groups: whole milk (n=17) and formula milk (n=17). The teeth were stored in the refrigerator at 38°F (3.3°C) for a total of 18 days (about 2 and a half weeks). The whole milk was replaced at the date of expiration labeled on the bottle; formula milk was maintained according to the manufacturer's instructions. The enamel hardness was calculated using the Canary Systems prior to submerging the teeth in the solutions. The Canary System values were compared to pre- and post-exposure to evaluate the changes in enamel hardness within both groups. Each tooth was cleaned properly before immersion, and the Canary System was calibrated and tested to check for accuracy prior to measurements.

Methods: 34 extracted permanent teeth were collected through outreach to an oral surgery practice in Lincoln, Nebraska. The experiment involved a combination of different permanent teeth collected including molars, premolars, incisors, and canines. Many of the extracted teeth presented with prior carious lesions on the enamel. Each tooth was evaluated to determine whether the surface would be appropriate to conduct the experiment on. Prior to experimentation, the tooth was thoroughly cleaned using a dry tissue to wipe off any excess blood and granulation tissue. Upon examining a surface deemed appropriate for the experiment, a sharpie mark was applied to the tooth for evaluation before the initial immersion. Surfaces that were considered not suitable for the research experiment included carious lesions, abnormal tooth anatomy, and fractured areas.

Materials: Prior to conducting the experiment, 34 clear disposable plastic condiment cups were collected and labeled. After labeling, 34 identified teeth were placed in the appropriate categories, 17 in whole milk and 17 in formula milk. Enamel density measures were recorded using the Canary System before the experiment started. Safety glasses were used when working with the Canary System. We measured 25mL of milk, using 2 (50mL) graduated centrifuge tubes, one for the whole milk, and one for the formula milk. We poured the appropriate amount into each container. The two milks used for this experiment were Bobbie organic infant formula, milk-based powder with iron and Good and Gather whole milk. The infant formula solution was prepared in a 500mL beaker with cold tap water. Using the provided scoop in the formula container and a metal stirring rod, the solution was heated using a laboratory hot plate. At the end, labeling tape was used to group the containers together, and a refrigeration unit was needed for storage and preservation of the milk.

Summary: Previous research has been conducted comparing formula milk and whole milk, and it has shown that both have a positive effect on the enamel matrix when consumed regularly. The purpose of our research was to determine if normal consumption of milk strengthens the enamel matrix

or weakens it. A study by Reddy et al. (2023) found the effects of diverse types of milk had negligible effect on the pH of saliva. However, they found a significant difference in the pH of plaque when exposed to certain milks. If statistical significance is determined with whole milk consumption, weak areas of enamel could re-mineralize with the consumption of the appropriate milk.

The Effect of Carbonated Water and pH on the Hardness of Tooth Enamel: An In Vitro Study

Samantha Root and Hannah Parsley
Mentors: Jaimee Shropshire, RDH, BS, MHPTT, and Bobby Simetich

Objective: The purpose of this study was to evaluate the effect of carbonated water on the hardness of tooth enamel. Enamel demineralization is known to occur at a pH between 5.2 and 5.5 (Morgado et al., 2022). Due to carbonated waters often having a pH below this critical threshold, enamel breakdown was expected following prolonged exposure.

Methods: Fifteen extracted permanent human molars, varying from firsts to thirds, were obtained from the University of Nebraska Medical Center Department of Oral Surgery. Each tooth was sectioned into buccal and lingual halves and randomly assigned to one of five groups. Group 1 served as the control and was immersed in distilled water. Groups 2 through 5 were immersed in Le Croix sparkling water, San Pellegrino sparkling natural mineral water, Maison Perrier sparkling water, and Bubbl'r watermelon-flavored sparkling water. The pH of each beverage was recorded. Enamel hardness was measured using the HMV Hardness Tester, and Knoop hardness values were calculated based on indentation length. Baseline hardness measurements were recorded prior to immersion, with subsequent measurements taken at 24, 48, and 168 hours.

Results: This study highlights the importance of understanding how dietary choices affect oral health, particularly as carbonated water is often marketed as a healthier alternative to soft drinks. Results demonstrated a general trend of decreasing enamel hardness across all carbonated water groups, with the Bubbl'r watermelon-flavored samples showing the greatest degree of demineralization. These findings support the conclusion that carbonation, particularly when combined with flavoring, can contribute to enamel demineralization over time.

Morgado M, Ascenso C, Carmo J, Mendes JJ, & Manso AC. (2022). pH analysis of still and carbonated bottled water: Potential influence on dental erosion. Clin Exp Dent Res., 8(2), 552-560. doi: 10.1002/cre2.535.

Comparison of Hot Water, Cold Water, Mouth Rinse, and White Vinegar in Reducing Streptococcus Mutans on Toothbrushes: An In Vitro Study

Baili Kumpf and Grace Ehly
Mentors: Todd Junge, RDH, BSDH, BS, Tom Petro, PhD

The objective of this study was to evaluate the effectiveness of hot water, cold water, mouth rinse, and white vinegar on inhibiting the growth of Streptococcus mutans on a toothbrush. Four toothbrushes were inoculated by dipping the bristles into a test tube with S. mutans then followed by dipping the bristles into a test tube with phosphate buffered saline solution as a control. Four additional toothbrushes were inoculated with S. mutans, the designated tested solution, and then followed by PBS in the same manner. 100 microliters were taken out of the eight test tubes and then spread onto the designated plate with the mixture of brain heart infusion agar. The plates were placed in the incubator at 37 degrees Celsius for 24 hours. Since there was minimal growth of colonies after the initial 24 hours, the plates were placed back into the incubator for another 24 hours. After there was growth of colonies, the plates were taken out and compared with the controlled plates. After three rounds of completing this process, the results were that hot water was the most effective at inhibiting the growth of S. mutans while cold water was the least effective at inhibiting the growth of S. mutans. This study was successful in comparing different common household solutions that would help individuals without the means to afford a new toothbrush. This study can also be informative to practitioners when educating patients about different options to maintain a healthy oral microflora.

Investigating Coconut Oil's Potential to Reduce Growth and Biofilm Formation in Streptococcus Mutans

Jade Rodriguez, Juan Cervantes and Andrea Perez
Mentor: Dona McCanlies, PhD

Virgin coconut oil (VCO) has become more popular in oral hygiene care over the last few years due to its natural composition. Research has shown that VCO has the ability to lower bacterial counts and inhibit the growth of Streptococcus mutans. However, despite its rising popularity and preliminary supportive evidence, the current literature remains limited and further research is necessary to validate these findings. This study aimed to determine if virgin coconut oil could reduce growth and biofilm formation in S. mutans. Based on a review of the literature, we used S. mutans cultures that were grown in Brain Heart Infusion broth and treated with VCO, chlorhexidine, distilled water, and GuruNanda MCT oil. Biofilm formation was induced in 96-well microplates using sucrose supplemented media and incubated at 37 °C. Following incubation, biofilms were washed, stained with crystal violet, and quantified using colorimetric analysis to assess the effects of VCO on bacterial growth and biofilm accumulation. Our analysis demonstrated VCO had minimal to no inhibitory effect on S. mutans growth or biofilm formation, whereas chlorohexidine produced a clear reduction as expected. These findings suggest that VCO's proposed antimicrobial benefits may be limited and factors such as product composition or lack of stimulated oil pulling conditions may have influenced the results.

D3 Abstracts

The Impact of Parental Oral Health Knowledge on the Oral Health of Children Aged 10-12 Years

Sarah Bals and Emily Brande
Mentors: Corinne Van Osdel, DDS

Background: Childhood oral health is strongly influenced by family behaviors and preventive practices, yet limited research has examined the association between parental oral health knowledge and clinical oral health outcomes in children aged 10–12 years. This developmental period represents a transition toward greater independence in hygiene behaviors while parental influence remains substantial.

Objective: This study aims to evaluate the relationship between parental oral health knowledge and the oral health status of children aged 10–12 years receiving routine dental care. Secondary objectives include assessing associations between parental knowledge, reported oral health behaviors, and socio-demographic factors.

Methods: This minimal-risk, cross-sectional observational study will enroll approximately 120 legal guardians of children aged 10–12 years presenting for routine dental examinations at UNMC-affiliated pediatric dental clinics. Legal guardians will complete a one-time oral health knowledge survey during the child's scheduled dental visit. Clinical oral health indicators, including presence of dental caries and gingival health, will be abstracted from the child's routine dental examination records. Correlation and regression analyses will be used to examine relationships between parental knowledge scores and children's oral health outcomes, adjusting for relevant socio-demographic factors.

Expected Results: It is anticipated that higher levels of parental oral health knowledge will be significantly associated with better oral health outcomes in children, including lower prevalence of dental caries and gingival inflammation. Gaps in parental knowledge are expected to correlate with poorer clinical findings and suboptimal oral hygiene behaviors in children.

Conclusion: Findings from this study are expected to support the role of parental oral health knowledge as an important determinant of oral health outcomes in children aged 10–12 years. Results may help inform targeted educational interventions in pediatric dental settings aimed at improving preventive practices and reducing the burden of childhood dental disease.

The Long-Term Association of Systemic Health, Age and Local Inflammation in Periodontal Maintenance Patients - A Database of Clinical and Systemic Parameters

Xcaret Castelan and Nayeli Ayala
Mentors: Jeffrey Payne, DDS, Kaeli Samson, MPH, Richard Reinhardt, DDS, PhD, Megan Christiansen, RDH, BS, Laura Anderson, RDH, BS, Amy Killeen, DDS

Objectives: The objectives of this study were to test the hypothesis that higher body mass index (BMI) and older age are associated with greater periodontal inflamed surface area(PISA) at baseline and at one-year-follow-up in periodontal maintenance patients, We hypothesize that PISA will remain stable over a one-year period. This study is aimed to evaluate the relationships between BMI and age and PISA at baseline and one year, as well as to track longitudinal changes in PISA over time in periodontal maintenance patients.

Methods: Participants were recruited on a rolling accrual basis from the periodontal maintenance population at the University of Nebraska Medical Center (UNMC) College of Dentistry. Eligible patients were followed as part of routine periodontal maintenance care at four-month intervals. Demographic and clinical characteristics, including age, sex, height, weight, smoking status, and glycated hemoglobin (HbA1c) when applicable,

were recorded at each study visit. Comprehensive periodontal examinations were conducted by calibrated examiners at baseline, four months, eight months, and one year. Probing depths and bleeding on probing (BOP) were recorded for all teeth present in the dentition at each examination. All patient data were entered into and managed using REDCap. Periodontal epithelial surface area (PESA) and periodontal inflamed surface area (PISA) were calculated using a standardized Excel-based formula originally described by Hujoel et al. (2001). To improve efficiency and reproducibility, these calculations were recreated using SAS code. Verification checks were performed to confirm agreement between the Excel- and SAS-derived values. Changes in PESA and PISA over time were calculated by subtracting baseline values from follow-up visit values. Descriptive statistics for continuous data are given as means and standard deviations. Pearson correlations were run to assess associations between continuous variables. Differences in PISA values over multiple time points were assessed using a linear repeated-measures model to account for correlations within patients. All analyses were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC).

Results: Our analysis also demonstrated no significant correlation between BMI and PISA at baseline (r=0.12; p=0.45) and no significant correlation at the 12- month visit(r=0.16; p=0.33).No significant correlation was noted between age and PISA at baseline (r=-0.00; p=0.99) and no significant correlation was observed at the 12-monthvisit (r=0.00; p=0.97). Additionally, there was no significant difference in PISA values in periodontal maintenance patients across baseline, 4, 8, and 12-months; the median PISA remained relatively stable.

Conclusion: There was no significant relationship between BMI and total PISA score at baseline or at the 12-month follow-up. There was no significant correlation between PISA in older individuals at baseline and at the one year follow up compared to younger patients. PISA remained stable at the one-year-follow-up in periodontal maintenance patients when compared to baseline PISA scores.

Summary: Considering the relationship between oral and systemic inflammation, future study designs should consider strategies to decrease oral inflammation.

The Role of Social Media in Shaping Perceptions of Fluoridated Products

Chiquette Adkins and MacKenzie Conklin
Mentor: Julie Marshall, DDS

Objective: To evaluate and understand if there are correlations between social media exposure and attitudes towards fluoride and/or fluoridated products.

Methods: A voluntary 19-question secure REDCap survey investigating social media use and attitudes toward fluoride was distributed to the general public. A power analysis (N=200 participants) predicted 80% confidence in detecting differences in media exposure and variables studied. Inclusion criteria included English language skills, >19 years old, and ability to access a web-based survey. Distribution tools included a "video-ask" on UNMC College of Dentistry(COD) and Health Center Association of Nebraska social media platforms and a QR code given to COD patients during dental appointments. Participants were directed to access actual screen time on their device or provide an estimated amount.

Results/Data Analysis: A total of 171 respondents were included. Participants represented Gen Z/iGen, Gen Y, Gen X, Baby Boomer, and Silent Generation cohorts. Sixty-four percent reported an education level of bachelor's degree or higher, 70% were non-dental health professionals, and 95% reported visiting a dental healthcare provider at least once every two years.

Fisher's exact tests were used to assess associations between demographic characteristics, social media use, and fluoride-related opinions. No significant associations were found between demographic variables or social media use and whether participants reported that social media influenced their opinion on fluoride ($p > 0.05$).

Support for the addition of fluoride to public drinking water differed significantly by age, education level, and dental visit frequency. Age was significantly associated with support for water fluoridation when analyzed both as two groups (Gen Z vs. others; $p = 0.039$) and across four generational categories ($p = 0.021$). Support was highest among Baby Boomers (85.0%) and Generation Z (80.5%). Education level

was also significantly associated with support for fluoridation (p = 0.040), with highest support among individuals with graduate or professional degrees (83.3%). Dental visit frequency was additionally associated with support for water fluoridation (p = 0.048). Belief that fluoride is beneficial to health was high overall (91.8%); however, daily time spent on social media was significantly associated with this belief (p = 0.017). No significant associations were observed for beliefs that fluoride is detrimental to health or active avoidance of fluoridated products (p > 0.05).

Conclusions/Implications: Significant associations were observed between demographic factors, social media use, and attitudes toward fluoride. While most participants did not perceive social media as influencing their opinions, increased social media use was associated with beliefs regarding fluoride's health benefits. These findings suggest that fluoride perceptions may be shaped by indirect media exposure rather than self-identified influence. Targeted, evidence-based messaging by dental professionals may help address misinformation and support public trust in preventive oral health measures.

Career Aspirations and Influencing Factors Among Dental Students

Adam Deutsch and Riley Krolikowski
Mentor: Jon Asbjornson, DDS

Background: There are many factors that influence dental students' postgraduate plans. Students are faced with deciding if they want to go into general dentistry, specialization, or public health just to name a few potential landing spots. Understanding which factors influence students the most may help improve support for students during dental school to prepare them for their career after graduation.

Objective: To evaluate career aspirations among dental students and identify the relative importance of factors influencing post-graduate career decisions.

Methods: A cross-sectional survey was distributed to dental students at the University of Nebraska Medical Center College of Dentistry (n=43). The survey collected demographics, intended career paths, post-graduate education plans, intended practice settings, and perceived future challenges. Nine influencing factors were rated on a 1–5 scale (1 = low influence, 5 = high influence). Students were also asked what barriers they face that influence their career paths; this was a free response question. Influence ratings were compared using a Friedman test. Associations between career path and demographic variables were assessed using chi-square or Fisher's exact tests.

Results: Most participants planned to pursue general dental practice (81.4%), with almost all of them planning to work in private practice within 10 years (97.7%). The highest-rated influences on career decision-making were work-life balance (mean 4.65), opportunity to help others (mean 4.49), personal interest/passion (mean 4.21), and financial stability (mean 4.16). Prestige/social recognition (mean 2.56) and family influence (mean 2.63) were rated lowest among the participants. 75% of respondents planned to return to their home state following dental school. The most common anticipated challenges were financial burden and loan repayment, as well as identifying an appropriate practice setting after graduation.

Conclusion: Dental students in this study prioritized lifestyle and intrinsic factors such as wanting to help others and personal interests over prestige-based factors. Financial burden is a key barrier that may warrant targeted financial counseling and career guidance during dental training. These findings support the value of targeted career guidance throughout dental school to help students feel prepared for their postgraduate plans.

Attitudes and Preferences of Parents or Legal Guardians Being Present in the Pediatric Dental Operatory, a Survey Post-Covid

Raven Diers and Brooke Hanson
Mentors: Kylie Sims, DDS, Alexandra Bilunas, DDS

Purpose: Parental or legal guardian presence during pediatric dental treatment has long been debated, with mixed evidence regarding its impact on child behavior, parental satisfaction, and provider efficiency. Pandemic-related infection control restrictions temporarily limited parental access

to dental operatories, potentially altering parental expectations. The purpose of this study is to evaluate post-COVID attitudes and preferences of parents or legal guardians regarding presence in the pediatric dental operatory.

Methods: This cross-sectional survey study will include parents or legal guardians of pediatric patients receiving care at the University of Nebraska Medical Center Pediatric Dental Clinics in Omaha and Lincoln, NE. Participants will complete a survey assessing preferences for operatory presence during commonly performed pediatric dental procedures, willingness to follow provider recommendations regarding presence, and associated demographic factors. Data analyzed using descriptive statistics and chi-square tests, with statistical significance set at $P \leq .05$.

Conclusions: This study will provide insight into contemporary parental expectations regarding operatory presence following the COVID-19 pandemic and may inform pediatric dental clinic policies and communication strategies.

Asynchronous E-Module vs. Traditional Lecture: A Pilot Study on Learning Outcomes in Pericoronal Lesion Diagnosis

Cole Baeder and Joseph Dworak
Mentors: Kavya Muttanahaly, MDSc, MS, Nagamani Narayana, DMD

Objectives: The objective of this study was to evaluate differences in student learning outcomes between an asynchronous e-module and a traditional live lecture format for instruction on the differential diagnosis of pericoronal lesions.

Methods: An asynchronous e-learning module was developed using the UNMC E-learning platform. Eighteen students were assigned evenly to one of two instructional groups using pre-assigned color groupings. The traditional lecture group received a 10-minute live instructional session, while the e-module group independently completed the online module delivered via email. Following instruction, all participants completed an identical post-instruction quiz and engagement survey. Quiz scores and engagement ratings were compared between groups.

Results: Students who completed the e-module demonstrated higher mean quiz scores compared to those who received the traditional lecture (8.5 vs. 7.5). While this difference did not reach statistical significance ($p = 0.096$), the observed effect size was large (Cohen's $d = 0.88$), indicating a potentially meaningful educational advantage that may not have been detected due to the limited sample size. No significant differences in engagement ratings were observed between instructional formats.

Conclusions: In this pilot study, students instructed via an asynchronous e-module demonstrated higher quiz performance compared to those receiving a traditional live lecture. Although statistical significance was not achieved, the large effect size suggests a potentially meaningful benefit of the e-module format. Comparable engagement ratings between groups indicate that e-modules may enhance learning outcomes without diminishing student engagement. Further studies with larger sample sizes are warranted to confirm these findings.

Summary: This pilot study compared learning outcomes and engagement between traditional lecture-based instruction and an asynchronous e-module focused on the differential analysis of pericoronal lesions. Students in the e-module group achieved higher mean quiz scores than those in the lecture group (8.5 vs. 7.5), with no difference in engagement ratings. Although the difference in quiz performance did not reach statistical significance, the large effect size suggests that e-modules may represent an effective alternative instructional approach, meriting further investigation in larger cohorts.

Intaglio Accuracy of DPSLA-Fabricated Crowns

Raigan Kocian and Colby Grossart
Mentor: Greg Bennett, DMD

Objectives: The purpose of this pilot study was to evaluate the accuracy of the intaglio surface of DPSLA ceramic resin crowns using the Midas printer. Accuracy was assessed by using RMS values, which show the overall trueness of the intaglio of the 3D-printed dental crowns.

Methods: Three identical full-coverage crowns in shade A1 were designed and fabricated using the SprintRay Midas 3D printer. One crown print failed, so two crowns were printed and post processing was completed using the manufacturer's recommended parameters and in the same build orientation to minimize variability. Following fabrication, the printed crowns were scanned using a 3Shape desktop scanner. The resulting digital scans were superimposed onto the original reference design to evaluate trueness. Deviations were analyzed using 3D comparison software.

Results: For crown one, the RMS was 0.0509 and the AVG was 0.0175. For crown two, the RMS was 0.1643 and the AVG was 0.0107. As the RMS was lower for crown one, it demonstrates more trueness and consistency as compared to the original design. Crown one is consistently inaccurate by about 0.05 mm. Crown two has a lower overall average, so it is closer to the design on a point-by-point average. It is mostly accurate, but likely contains a major defect. Overall dimensional accuracy indicated that the Midas DPSLA system is capable of producing clinically acceptable crown restorations. The printed crowns demonstrated measurable levels of trueness when compared to the reference design. Due to the limited sample size, statistical significance testing was not performed.

Conclusions: Within the limitations of this study, the Midas digital press stereolithography printer demonstrated encouraging accuracy in the fabrication of ceramic resin dental crowns. The results suggest that DPSLA technology may be a viable alternative for fixed prosthodontic applications. Further studies with larger sample sizes are necessary to validate these findings and enable more significant statistical analysis.

Summary: This pilot investigation assessed the accuracy by looking at the trueness of the intaglio of crowns produced using a DPSLA printer. While limited by materials, print failure, and sample size, the findings indicate consistent and accurate crown fabrication, supporting continued research into DPSLA technology for dental applications.

Investigating the Link Between Periodontal Disease and Dementia, Alzheimer's, and Parkinson's Disease

Alice Guo
Mentors: Amy Killeen, DDS, Kaeli Samson, MA, MPH, Jenni Craft

Objectives: This study aims to evaluate the correlation between periodontal disease and neurodegeneration by analyzing electronic dental records from the UNMC College of Dentistry. By investigating this relationship, this study will aid in understanding the potential systemic links between periodontal disease and neurological health, raise awareness of the importance of early periodontal intervention, and enhance interdisciplinary communication between dental and medical fields.

Methods: This study is a records review analyzing dental records in the Salud system at the UNMC College of Dentistry. We queried electronic dental records existing from August 29, 2012, to April 5, 2025, for patients aged 55 and older, yielding a data pull consisting of 14,833 deidentified records. Patients with documented neurodegenerative disorders, including dementia, Alzheimer's, and Parkinson's disease, were categorized as the inclusion group. The control group consisted of patients without neurodegenerative disorders, matched 1:2 based on age and sex. The prevalence of periodontitis was compared between the two groups to evaluate its association with neurodegenerative disorders.

Results: After evaluating the prevalence of periodontal disease within the inclusion group and the control group, no statistically significant difference was found between patients with (36.6%) or without (36.6%) a documented neurodegenerative disease. Additionally, documentation of periodontal disease and documentation of a neurodegenerative disease could have been documented at any time relative to each other, p=0.99.

Conclusion: The link between periodontal disease and dementia, Alzheimer's, and Parkinson's Disease warrants further clinical research using more comprehensive data. The findings from this study highlight the need for an integrated medical and dental record to be utilized, rather than only a dental

record used in this study. An integrated health record will not only advance research more rapidly, but it will also contribute to the quality of patient care and better patient outcomes, as providers and researchers will have access to the patient's complete health history.

Evolution of Mental Health in Dental Students Throughout the Four Years of Dental School

McKenzie Bietz and Lexi Gutschow
Mentors: Steven Wengel, MD, Sarah Fischer, PhD, Carson Trego (Department of Statistics, Master's student)

Objective: The purpose of this study was to evaluate changes in the mental health of dental students throughout the course of their four years of dental school.

Methods: A cross-sectional survey was distributed to all dental students attending UNMC in the 2025-2026 academic year. The survey contained questions from the GAD-7, PHQ-9, and Mini-Z Burnout questionnaire to evaluate the students for symptoms of depression, anxiety, and burnout. The survey also contained questions about the students' perception of access to mental health resources on campus. The students were asked to complete the survey anonymously via email during November 2025. The survey was given after midterms week and before finals, so that the results were not skewed from the excessive stressors that can occur during heavy examination periods. The survey was open for 2 months. The results were then analyzed in comparison with the results from the same survey given during the 2023-2024 and 2025-2026 academic years.

Results: Responses were received from students across all four years, with higher participation from D2 and D3 students. Second- and third-year students reported the highest frequency of depressive and anxiety-related symptoms by reporting that symptoms were occurring more than half of the days or nearly every day. Burnout was the most prevalent amongst the D2 and D3 students. D1 students generally reported lower symptom severity; however, there was a lack of responses from the D1 group, which could contribute to a lack of representation of the first-year students. D4 students demonstrated variable levels of stress and burnout. Although most respondents were aware of counseling services, the reported likelihood of utilization remained low to moderate.

Conclusion: Mental health symptom severity did not differ significantly across the different years of dental school. Trends found that worsening depression and anxiety in the year 2024-2025, previously thought to be due to the election year. This trend was followed by partial improvement in depression and anxiety scores in 2025-2026. Though these symptoms remain elevated compared to the first year (2023-2024). These findings lead to the conclusion that no one year of dental school causes significantly worse anxiety, depression, or burnout. Instead, each year of dental school has their own mental health challenges.

Summary: This study was used as a continuum of past studies to further examine health trends across dental students in their prospective year of study. The survey used symptom questions to produce mental health scores to analyze depression (PHQ), anxiety (GAD), and burnout (Mini-Z). The study was grouped and analyzed based on the year of dental school. These scores were then compared cross-sectionally to previous years' data (2023-2024) and (2024-2025) to develop possible trends. The comparisons revealed no statistically significant difference in mental health scores or symptoms across the four different years of dental school. This tells us that mental health is consistent throughout all four years of dental school. Classes of 2026 and 2027 demonstrated significant positive trends for the depression (PHQ) and anxiety (GAD) in the years 2024 and 2025, suggesting worsening of symptoms. In the year 2025-2026, classes of 2026 and 2027 showed partial improvement by a significant negative shift in these scores. These scores have not yet returned to the baseline of the first study conducted in 2023-2024. Class of 2027 also showed this similar trend with burnout scores, while the class of 2026 did not follow this trend.

Awareness of Oral Cancer Symptoms and Screening Behaviors

Ibrahim Hussain
Mentor: Nagamani Narayana, DMD

Background: Oral cancer is a significant public health concern, with early detection strongly associated with improved survival outcomes. Public awareness of oral cancer symptoms and screening behaviors plays an important role in timely diagnosis. This study evaluated awareness, perceived knowledge, and screening behaviors related to oral cancer among adults in a community-based sample.

Methods: A cross-sectional anonymous survey was distributed to approximately 500 adult participants receiving care at the UNMC College of Dentistry, as well as patients at local clinics and community centers in Lincoln and Omaha, Nebraska. A total of 82 individuals participated (response rate ≈16%). The survey collected information on demographic characteristics, tobacco and alcohol use, dental attendance patterns, knowledge of oral cancer symptoms and experiences with oral cancer screening. Descriptive statistics were used to summarize participant responses.

Results: Most respondents (>80%) believed that oral cancer can be successfully treated if detected early. However, over half of participants reported low confidence in their knowledge of oral cancer symptoms. While many respondents correctly identified common warning signs such as non-healing oral sores, red or white patches, and difficulty chewing or swallowing. Regular oral cancer screening was inconsistently reported. 51% of participants indicated that screenings occurred less than once per year or only during emergency dental visits. 85% reported that a direct recommendation from their dentist would increase their likelihood of undergoing oral cancer screening; Additional motivating factors included public awareness campaigns, increased education about symptoms and access to free or low-cost screenings.

Conclusion: Despite general awareness of the importance of early detection, gaps remain in patient knowledge, confidence, and routine oral cancer screening behaviors. The low response rate highlights challenges in community engagement and underscores the need for improved outreach strategies. Dentists are at a positioned to improve screening uptake through routine examination, patient education, and clear communication regarding oral cancer risks. Targeted educational efforts and expanded access to screening services may support earlier detection and improved patient outcomes.

Up in Smoke: Effects of Prenatal Cigarette Exposure on Tooth Development in a Murine Model

Luke Jacobs and Ethan Christie
Mentor: Ali Nawshad, PhD

Introduction: Prenatal exposure to cigarette smoke is associated with adverse developmental outcomes; however, its effects on tooth development and underlying molecular mechanisms remain unknown. A previous study showed significant correlation between maternal smoking during pregnancy and childhood caries. However, the causal relationship between them cannot be determined. In this study, we investigated the impact of gestational cigarette smoke exposure on odontogenesis using a murine model.
Objective: To characterize the molecular and structural disruptions in tooth development induced by maternal cigarette smoke exposure through a histological, and transcriptomic analysis.

Methods: Pregnant CF1 mice (n=20 smoked, n=20 control) were exposed to whole-body cigarette smoke at a concentration of 750 mg/m^3 total particulate matter; 4 h/day throughout gestation (~19-21 days), while wild types were exposed to clean air. Pups were collected and immediately euthanized at birth (n=431). Serum cotinine levels were quantified to verify in utero smoke exposure. Tooth germ tissues were processed for hematoxylin and eosin (H&E), Alazarin Red and immunoflorensce protein expression. Single-cell RNA sequencing was completed using Nanostring Geomix Digital Spatial Profile, and was analysed using Ingenuity Pathway Analysis (IPA) to identify smoke-induced transcriptional alterations and the pathways they used in both palatal epithelium and mesenchymal cells.

Results: Prenatal smoke exposure resulted in significant reductions in both enamel and dentin thickness in mandibular and maxillary molars.

Mandibular enamel thickness was reduced by approximately 55%, and maxillary enamel by 51% compared to wild types ($p < 0.05$). Dentin thickness was similarly diminished, with reductions of 48% in mandibular and 39% in maxillary molars ($p < 0.05$). Additionally, mandibular tooth germ dimensions, including buccal–lingual width and incisal–apical height, were significantly decreased following smoke exposure, whereas maxillary tooth germ size was not significantly altered. Compounds in cigarette smoke aberrantly activate receptor protein tyrosine kinases through oxidative stress and ligand-independent phosphorylation, driving persistent PI3K signaling that disrupts TP53 regulation during tooth development. RNA sequencing revealed downstream decreases in AMPK, SCO2, PTEN, and TIGAR, promoting Warburg-like metabolic reprogramming from oxidative phosphorylation to anaerobic glycolysis, reducing ATP availability and impairing the energy-dependent processes required for proper enamel and dentin formation. In addition, autophagy was markedly impaired with downregulation of key regulatory genes including FOXD1, BCL2 and MYC. This likely disrupts ameloblast and odontoblast survival and function, contributing to defective enamel and dentin matrix formation and mineralization consistent with the pathogenesis of amelogenesis and dentinogenesis imperfecta.

Conclusion: Collectively, these findings demonstrate that prenatal cigarette smoke exposure profoundly disrupts tooth development by impairing enamel and dentin formation through widespread transcriptional and metabolic dysregulation. These results underscore the importance of minimizing prenatal smoke exposure to protect early dental development and reduce the risk of long-term oral health complications.

Parental Perceptions of Telehealth for Underage Three Dental Visits

Ethan Kloster and Owen Kershner
Mentor: Sofia Iribarren, DDS

Purpose: There is a lack of evidence regarding how parents of young children perceive the use of teledentistry. This study examined whether parents prefered a teledentistry visit rather than an in-person visit for their child's dental examination. It was hypothesized that parents would be more likely to prefer an in-person visit compared to a teledentistry visit.

Methods: This cross-sectional study was conducted between June 26th 2025 and February 15th 2026 at the UNMC/Children's Hospital Nebraska Pediatric Dental Clinic. The study population included parents of children under four who scheduled a dental visit. These parents were offered either a telehealth or in-person visit during appointment scheduling. Additionally, they were asked to participate in a one time survey to learn about parent familiarity with telehealth, perceived barriers, and child sociodemographic characteristics including age, distance to the clinic, and race/ethinicity. Descriptive statistics were used to summarize characteristics, and bivariate analyses were conducted to examine relationships between parents who schedule teledentistry visits versus in-person

Results: Out of approximately (N=150) parents who scheduled a dental visit for their child, approximately 50 completed the survey. Preliminary results indicate that 31% of surveyed parents preferred a teledentistry visit, with travel distance to the clinic identified as the primary factor influencing the choice between telehealth and in-person care. Further analysis will compare characteristics of parents who chose teledentistry versus those who did not.

Conclusions: The findings provide insight on the perceived impact of teledentistry on access to dental care for young children and how it can be used to supplement in-person exams.

Incidence of Osteomyelitis Over a 34-Year Period - A Retrospective Study

Maryssa Lira and Katie Ligocki
Mentor: Nagamani Narayana, DMD

Osteomyelitis of the jaws, described as inflammation of the bone and marrow, has been commonly associated with microorganisms, trauma, and medications. Bisphosphonate use is a particular concern in dentistry, often requiring a multidisciplinary approach, due to the risk of 'medication related osteonecrosis of the jaw' or 'MRONJ.' While these medications are beneficial in treating resorptive bone diseases, they prove to be a concern in dental procedures requiring the

manipulation of bone, and subsequent healing. Bisphosphonates prevent proper bone turnover and the result is decreased vascular supply and subsequent necrosis of bone. Modern dental education has primarily focused on screening patients for bisphosphonate use as a predictor of the risk of future osteomyelitis. However, osteomyelitis can also result independent from bisphosphonate use, due to immune suppression, radiation therapy, vascular insufficiency, and a possible combination of risk factors such as smoking and alcohol abuse. The aim of this study is to address the gap in risk factors for overall incidence of osteomyelitis, and to identify other correlations that dental practitioners should be aware of prior to treatment. A retrospective study was conducted using UNMC College of Dentistry oral pathology database service to identify 350 cases of osteomyelitis over a 34-year period (1990-2024). Data was collected from biopsy reports including patient age, gender, and medications, pre-existing dental and medical conditions, location by quadrant, and histology. The data was analyzed to statistically represent overall trends and possible correlations in osteomyelitis incidence. Pre-clinical diagnoses made by the dentist were also compared to confirmed histological diagnoses by pathologist to determine the relative accuracy of clinical judgement over a 34-year period. Our findings indicate a progressive increase in the multi-factorial etiology behind the incidence of osteomyelitis over the years. It emphasizes the importance of staying well-informed on medical conditions with dental implications, encourages a broader clinical perspective on osteomyelitis risk, and supports a more comprehensive approach to risk assessment in dental education and practice.

Effect of Surface Treatment and Thermal Cycling on Denture Resin Surface Properties

Logan Lawrence and Luke Monson
Mentors: Greg Bennett, DMD, Bobby Simetech

Introduction: Digital dentistry is a rapidly expanding field that allows for expedited delivery of removable prostheses. While this presents many advantages to patients, 3D-printed materials also have some of the highest rates of surface roughness. This roughness can lead to plaque retention that can adversely impact patient outcomes. This study evaluates the effect of surface finishing techniques and thermal cycling on surface roughness, microhardness, and gloss of a denture base resin. These results can inform provider decision-making regarding post-processing strategies for digital dentistry.

Methods: Thirty discs were printed from SprintRay Apex Base pink resin using SprintRay Pro2 PolyJet printer and washed in 90% isopropyl alcohol. After curing, the discs were divided into three groups (n = 10) according to surface treatment: unpolished, polished, and glazed. The Kulzer Palaseal glaze was airbrushed on to one side of the disc in a thin, even coat before curing with a Valo curing light. Discs were polished using Buehler EcoMet 30 polishing machine, starting with 800 fine grit and finishing with 1200 fine grit. Surface roughness measured with Mitutoyo Surftest SJ-210 to yield RA values in micrometers. ISO-1997 standards with a delta C of 0.25 mm used to calibrate the instrument. Microhardness was measured using the Shimadzu HMV-2T with the Knoop hardness test, which minimizes elastic recovery, making it well-suited for dental materials. The Shimadzu was set to a load of 25 grams over 15 seconds. Gloss measured with Betagloss I Gloss Meter on a 0.0 to 10.0 scale with a white background as per standards. The machine uses a single light source and dual detectors to capture and calculate the gloss. All discs labeled to ensure repeatable testing. Measurements conducted before and after 3-day thermal cycling to simulate oral aging conditions. Data was analyzed using ANOVA statistical tests ($p<0.05$). After statistically significant differences were found, paired t-tests were performed (critical value >2.9) for further conclusions.

Results: ANOVA testing of data before thermal cycling confirmed statistically significant differences between the three groups for all measured values. When comparing the surface roughness of the three groups, the polished group (Ra 0.0709 µm) had a statistically significantly lower Ra value than the glazed (Ra 3.203 µm) and unpolished (Ra 0.5123 µm) groups, while there was no significant difference between the unpolished and glazed groups. Glossiness of polished (8.44) and glazed (7.61) discs were statistically significantly higher than unpolished discs (6.26), although there was no significant difference between polished and glazed discs. Microhardness of polished (52.49 N/mm2) and glazed (54.69 N/mm2) discs were statistically

significantly higher than unpolished discs (28.05 N/mm2), with no statistical difference between the polished and glazed groups. The same testing protocol and analysis will be conducted after a 3-day thermal cycling of all discs.

Conclusions: Surface finishing technique significantly influenced the surface characteristics of PolyJet–printed denture base resin.

Summary: Polishing and glazing both produced more ideal surface properties than unpolished discs, emphasizing the importance of post-processing for clinical outcomes of digital denture materials. These findings may inform future clinical use of surface coating for denture longevity. Clinicians should be aware of these outcomes to provide the best standard of care for their patients.

Evaluation of 3 vs. 4-Hour Appointments in a Dental School Clinic Setting

Jillian Lowe and Jared Mulder
Mentor: Greg Bennett, DMD

Objective: To compare clinical productivity and procedure mix between 3-hour and 4-hour appointments in a predoctoral dental school clinic setting.

Methods: A retrospective analysis of appointment records from a dental school clinic was conducted. Appointments were categorized by session length (3 hours vs 4 hours). Procedural data from fall 2024 (4-hour sessions) and fall 2025 (3-hour sessions) were extracted and categorized according to established procedural classifications (CDT code). Total procedures completed within each category were collected for each semester and compared to evaluate differences in clinical output.

Code Blue to the Nation: Are Your Dental Students Prepared for Hypoglycemic Episodes?

Melissa Ainsworth and Uyen Pham
Mentor: Larry Crouch, PhD

Objective/Introduction: Hypoglycemic episodes are common emergencies experienced in a dental office and require an immediate response to mitigate injuries. Certain medications that manage Type II diabetes mellitus restricts which oral countermeasures that can effectively and efficiently reverse hypoglycemia. The objective of the project was to evaluate how well-prepared dental and dental hygiene students are in response to a patient on an acarbose regimen experiencing a hypoglycemic episode in the dental chair.

Methods: First, an anonymous online survey was developed through REDCap and received an IRB exemption as it was not considered to be human subject research. The survey was to test whether students could differentiate between effective and ineffective treatments for a clinical based scenario: a patient taking the drug acarbose experiencing a hypoglycemic episode during a dental appointment. We initially sent the survey out to the students at our school, UNMC. Then, to expand our population, the academic and/or student deans of 65 dental schools were identified and emailed. The email informed them of the survey and it was requested they pass it along to their students. Subsequently, the data from the responses was analyzed and interpreted.

Results: Regarding the project's primary objective, the survey revealed that there were 195 surveyors who began the questionnaire, but responses dropped to 151 upon encountering the question for countermeasure selection. Results revealed that only 8.61% (13 respondents) selected the correct countermeasure (only glucose liquid and glucose tablets) with second year dental students being most of the group (69.2%, 9 respondents). Additionally, 2.65% (4 respondents) selected only glucose tablets which comprised one second year dental student, one third year dental student, and two fourth year dental students. There was only one respondent who did not select either glucose liquid or glucose tablets but instead selected only 100% fruit juice. Furthermore, selections of 100% fruit juice, glucose liquid, and glucose tablets (frequency percentage: 86.1%, 91.4%, and 94.7%, respectively) were the most common countermeasures.

Regarding the project's student solicitation strategy, out of the 65 dental schools we reached out to, we heard back from 15 schools (25% response rate), 8 agreed, 7 denied. In addition, we directly emailed the students at our own school: UNMC. Based on

incoming class sizes it was sent out to potentially 2,880 dental students and 426 dental hygiene students, a total of 3,306 students. We projected a possible response rate of 10% (roughly 330 students). 195 students started the survey (5.6% response rate). Of the 195 students who started the survey, 151 (~77% of respondents) of which completed the survey.

Conclusions: This study shows that dental hygiene and dental students are not well prepared to respond to a hypoglycemic episode with a patient taking acarbose medication.

Summary: The survey essentially asks: what is the correct countermeasure under this set of circumstances. Due to the circumstances, only the pure glucose options were correct. This study reveals that most dental students include the correct choices, but few choose only the correct choices.

Relationship Between the DAT Perceptual Ability Test (PAT) Scores and Final Class Rank: A Retrospective Study

Luke Rodriguez and Carson Schvaneveldt
Mentor: M. W. Vogt, DDS

Objective: This study evaluated whether performance on the Perceptual Ability Test (PAT), a component of the Dental Admission Test (DAT), is associated with students' final class rank after the completion of dental school.
Methods: A retrospective analysis was conducted using four consecutive graduating classes from the University of Nebraska Medical Center College of Dentistry. Data included students' PAT scores at admission and then final class rank at graduation from cumulative grade point average (GPA). Spearman's rank testing was used to assess the correlation between PAT scores and final class rank. An ordinal logistic regression model further evaluated the predictive relationship between PAT and final rank. Statistical significance was set at $p<0.05$.
Results: Spearman's rank testing demonstrated a weak negative association between PAT scores and final class ranks ($p= -0.24$), indicating that higher PAT scores were associated with slightly higher class ranks. However, this relationship was not statistically significant ($p=0.11$). Ordinal logistic regression analysis showed a small negative effect of PAT scores on final rank ($B= -0.17$), which did not reach statistical significance. Overall, PAT scores explained minimal variability in final academic standing.
Conclusion: The data presents that PAT performance on the DAT was not significantly associated with final class rank at graduation. These findings suggest that while PAT may assess spatial and perceptual abilities relevant to dentistry, it is not a strong independent predictor of long-term academic performance as measured by final class rank. Although some correlation was shown, but not statistically significant, further studies incorporating additional dental cohorts' data may better clarify the relationship between PAT performance and final class rank.

Effects of Repeated Use and Sterilization on the Polishing Efficacy of Zirconia Polishing Burs

Blake Rule and Ryan Patel
Mentor: Jenna Hubacz, DMD

Zirconia-based restorations have become increasingly more popular among the dental community due to their strength, cost-effectiveness, and biocompatibility (Singh et al., 2023) (Tafuri et al., 2024). It is known that unpolished zirconia restorations lead to excessive wear on opposing dentition (Burgess et al., 2013). Utilizing a zirconia polishing system to achieve a smooth restorative surface is critical for optimizing clinical effectiveness, as well as the longevity of prosthesis and dentition (Lawson et al., 2014) (Hmaidouch et al., 2014) (Vohra et al., 2024).
As the use of zirconia for dental applications has become more ubiquitous, numerous authors and manufacturers have recommended polishing materials and protocols to promote safe and efficient use of the material (Mai HN et al., 2019) (Pfefferle et al., 2020) (Amaya-Pajares et al., 2016) (Abdulmajeed et al., 2024). Many chairside zirconia polishing systems undergo routine sterilization, offering the opportunity to safely reuse them. It is unknown to what extent repeated sterilization may degrade the components of these polishing systems, thereby reducing their efficacy and thus potentially diminishing the clinical acceptability

of the zirconia restorations they are being used upon. Existing literature on the wear rate of zirconia polishing burs having undergone multiple heat sterilization cycles is limited. Thus, the purpose of this study was to evaluate the effects of routine use and sterilization cycles on the efficacy of commonly available zirconia polishing burs, utilizing the null hypothesis that there would be no statistical difference between the efficacy of burs processed through multiple sterilization cycles versus those not subjected to any heat treatment.

Materials and Methods
A total of 50 zirconia specimens were prepared and assigned to four categories designed to isolate the effects of bur use and sterilization on polishing efficacy in both controlled and clinically relevant circumstances. Sample groups included five specimens each of zirconia (Ivoclar) squares cut to uniform dimension of 10 mm x 10 mm x 1.5 mm utilizing a specimen saw (Buehler Isomet 1000) In order to simulate the process and effects of chairside occlusal adjustment that would occur during insertion of a zirconia crown, each sample was initially roughened by a single operator (B.R) using a fine diamond bur in a high speed handpiece (Bien Air electric contra angle) operating at 150,000 rpm (revolutions per minute) with continuous water irrigation for a period of 15 seconds. Samples were stored at room temperature positioned between two pieces of foam in a sealed container. Dialite ZR (Brasseler, USA) zirconia polishing system was utilized to polish all sample groups using a previously established protocol (Chavali et al, 2017). The sample groups were divided as follows:

1. Control: Non-sterilized bur use (n = 10)
Samples were polished by a single operator (R.P) using new, unsterilized burs based on previously established protocol to measure efficacy of the burs. (Chavali et al, 2017).

2. Controlled Bur Sterilization (Sterilization Effect Only) (n=10)
Five separate sets of new polishing burs were subjected to varying autoclave sterilization intervals (e.g., 5x, 10x, 15x, 20x) prior to any use. Each set was then used to polish specimens, isolating the effects of sterilization alone on polishing performance.

3. Bur Used Combined with Sterilization (Simulated Clinical Reuse) (n=10)
New polishing burs were used to polish specimens followed by immediate autoclave sterilization. This use–sterilization sequence was repeated for a predetermined number of cycles (e.g., 5x, 10x, 15x, 20x) to simulate routine clinical reuse conditions.

4. Randomly Selected Clinical Burs (Real-World Conditions) (n=10)
Polishing burs were randomly selected from active clinical dispensing inventory and used to polish specimens. These burs had unknown histories of use and sterilization, representing current clinical practice conditions.

Measuring the Effects of Time on 3D Printed Denture Bases

Rohan Singh, Ty Sturlaugson and Bryan Reiter
Mentor: Greg Bennett, DMD

Objectives: 3D printed denture bases are becoming increasingly prevalent in the world of digital dentistry. This study aims to explore how different printing materials used to make denture bases may change or distort over time, and highlight what effects those changes may represent in the utilization and effectiveness of 3D printed denture bases.

Methods: Three types of 3D printed denture bases (Carbon, Sprintpray Pro, Form 3B) printed in 2020 were digitally scanned using a 3shape 3D Lab Scanner to assess the intaglio surface of each base. Bases were rescanned in 2026 and cropped using Mesh Mixer software to show only the intaglio surface of the denture bases. Scans were then superimposed through the Geomagic Control X software to compare the dimensional accuracy between the two sets of scans using the RMS (root mean square in nanometers) as the measurement to document change over time. A two-way repeated-measures ANOVA was used to evaluate changes in RMS deviation over time, with time as a within-subject factor and printer as a between-subject factor. Bonferroni-adjusted pairwise comparisons were performed. Statistical significance was set at $\alpha = 0.05$.

Results: The dimensional changes outline that if left unchecked 3D printed denture bases are likely to alter in a significant manner. While the data obtained did not show statistical significance it did

show a clear tread of printer-dependent dimensional alteration over time. This reinforces that while there are many advantages to utilizing 3D printing technology in the dental field, it is necessary to to monitor the final denture bases and make any repairs or relines necessary to avoid any changes in fit or discomfort for the patient.

Summary: Using 3D printing to make denture bases is a valuable technology, however, the ramifications of how denture bases may warp or change over time must be considered. This research aimed to measure the difference in three types of 3D printed denture bases over a span of 5 years. Analysis was completed using the RMS data of scans taken at the time of fabrication and again five years later to compare the surface dimensions. Early data indicates a clear trend towards significant changes to the surface dimensions of denture bases occurring over time. This outlines that when utilizing 3D printing methods in dentistry it is necessary to monitor the products to maintain their effectiveness in practice.

Maternal Tobacco Smoke Exposure Alters Fetal Palatogenesis in a Murine Model

Grant Steele and Connor Thompson
Mentor: Ali Nawshad, PhD

Objective: Cigarette smoke contains numerous toxic constituents, including carbon monoxide and heavy metals such as cadmium, lead, and arsenic, which readily enter the maternal circulation and can disrupt fetal development. This study aimed to investigate the effects of prenatal tobacco smoke exposure on palatogenesis using a murine model.

Methods: Pregnant CF-1 mice (n=20 smoked, n=20 control) were exposed to gaseous cigarette smoke (CS) throughout gestation using a TE10 Teague system. Mice receiving CS were exposed to their target exposure (4hr/day @ 4sec puff with 20sec inter puff) for 5 days/week for 21 days (full duration of the pregnancy ~19-21 days). Following birth, newborn pups (n=431) were collected, sacrificed, and assessed for morphometric changes in palatal vault height and arch width, and blood cotinine levels were measured to confirm in-utero smoke exposure. Palatal tissues were processed for hematoxylin and eosin (H&E), Alizarin red staining, and immunofluorescence analysis of the proliferation marker Ki67 to quantify basal epithelial cell density as well as their mitotic status. In parallel, single-cell RNA sequencing was done using Nanostring Geomix Digital Spatial Profile, and the data were analyzed using Ingenuity Pathway Analysis (IPA) to identify smoke-induced transcriptional alterations and the pathways they used in both palatal epithelium and mesenchymal cells.

Results: Transcriptomic analysis revealed significant dysregulation of the Rho GTPase, PAK, and actin signaling pathways in mesenchymal cells, pathways critical for cytoskeletal organization and cellular motility. In epithelial cells, oxidative stress–related pathways exhibited pronounced changes, with downstream implications for TGF-β signalling and epithelial–mesenchymal interactions. Maternal cigarette smoke exposure induces widespread transcriptional and morphological alterations during palatogenesis, showing narrow maxillary arch and increased palatal vault. Collectively, these molecular alterations were associated with measurable structural and biochemical differences in palatal development between smoke-exposed and control offspring.

Conclusion: These findings suggest that prenatal cigarette smoke exposure disrupts coordinated epithelial and mesenchymal signalling required for normal palatogenesis, providing mechanistic insight into how maternal smoking increases the risk of craniofacial developmental abnormalities. These abnormalities could lead to respiratory difficulties, facial malformation, and negative orthodontic consequences.

An Ethical Analysis of Artificial Intelligence in a Clinical Dental Setting

Olivia Thompson and Katherine Snapp
Mentor: M.W. Vogt, DDS

Objectives: To evaluate how the use of artificial intelligence in a dental setting (automation, diagnostics, treatment planning, etc.) fits into the four primary principles of medical ethics, namely, justice, non-maleficence, benevolence, and autonomy, and investigate the attitudes of both dental professionals and patients concerning the ethical risks of the use of AI. This data can be used to evaluate where improvements can be made

by both clinicians and AI developers to satisfy the obligations of ethical patient care.

Methods: Two separate surveys were made, one for dental professionals and one for patients. The survey consisted of scenario-based clinical questions that centered around hypothetical ethical dilemmas concerning A.I. use in a dental setting. Four questions were formulated for each of the four established medical ethics principles (justice, non-maleficence, beneficence, and autonomy) for a total of sixteen questions. All questions for the patient survey were formulated from the patient perspective, and all questions for the practitioner survey were formulated from the practitioner perspective. However, all subject matter was the same between all questions.

Results: The patient survey revealed patient attitudes concerning the ethics of artificial intelligence in dentistry to be 25.5% skeptical, 26.5% somewhat skeptical, 23.6% neutral, 18.6% somewhat trusting and 5.7% trusting. Results were also evaluated based on each of the four principles of ethics. On the principle of justice, patients were 14.2% skeptical, 23.0% somewhat skeptical, 14.9% neutral, 33.1% somewhat trusting, and 14.9% trusting. On the principle of non-maleficence, patients were 64.9% skeptical, 30.4% somewhat skeptical, 2.0% neutral, 2.0% somewhat trusting, and 0.7% trusting. On the principle of beneficence, patients were 10.8% skeptical, 27.0% somewhat skeptical, 41.2% neutral, 17.6% somewhat trusting, and 3.4% trusting. On the principle of autonomy, patients were 12.2% skeptical, 25.7% somewhat skeptical, 36.5% neutral, 21.6% somewhat trusting, and 4.1% trusting. The dental professional survey revealed practitioner attitudes concerning the ethics of the use of A.I. in dentistry to be 30.7% skeptical, 20.5% somewhat skeptical, 24.7% neutral, 18.3% somewhat trusting, and 5.8% trusting. On the principle of justice, practitioners were 19.3% skeptical, 17.5% somewhat skeptical, 18.4% neutral, 28.8% somewhat trusting, and 15.8% trusting. On the principle of non-maleficence, practitioners were 77.2% skeptical, 18.0% somewhat skeptical, 4.4% neutral, 0.4% somewhat trusting, and 0.0% trusting. On the principle of beneficence, practitioners were 8.8% skeptical, 17.5% somewhat skeptical, 43.9% neutral, 27.6% somewhat trusting, and 2.2% trusting. On the principle of autonomy, practitioners were 17.5% skeptical, 28.9% somewhat skeptical, 32.0% neutral, 16.2% somewhat trusting, and 5.3% trusting. Conclusions: Patients are overall somewhat skeptical of clinical AI. Their main concern was non-maleficence. For the practitioner survey, they were overall skeptical of clinical AI, with a primary concern of non-maleficence as well. Trends between the two groups for each ethical principle were largely parallel with slight variation. Concerning the principle of justice, both patients and providers were mostly somewhat trusting. For the principle of non-maleficence, both patients and providers were largely skeptical. For the principle of beneficence, both patients and providers were primarily neutral. Lastly, for the principle of autonomy, both patients and providers were mostly neutral.

Summary: Although both patients and providers showcase primarily parallel responses to clinical applications of artificial intelligence, questions structured around separate ethical principles yielded varying degrees of trust amongst both groups. This demonstrates that efforts need to be made in clinical A.I. to prioritize non-maleficence to improve patient and practitioner attitudes. Efforts could include practitioners using their own judgement to verify that all A.I. generated treatment plans, diagnoses, and prosthesis fabrication are correct and in the best interest of the patient.

Oral Inflammation and Bone Loss in Smokers and Vapers

Emma Vogel
Mentors: Kaeli Samson, MPH, MA, Amy Killeen, DDS, and Richard Reinhardt, DDS, PhD

Objectives: To evaluate smoking and vaping impact on oral inflammation using Periodontal Inflamed Surface Area (PISA) data calculations (in mm2) and to compare the data's relationship to bone loss, age, and sex in an exploratory analysis. The hypothesis was smokers would have higher PISA and bone loss compared to vapers, indicating vaping as a possible alternative to smokers who have high systemic inflammation and/or nicotine addiction.

Methods: Electronic health records from the University of Nebraska Medical Center College of Dentistry were reviewed to identify patients who indicated they were smokers, vapers, or nonsmokers on their medical history forms. After exclusions, 149 patients were used (50 nonsmokers,

50 smokers, 37 vapers, and 12 dual users). For each patient, their most recent periodontal chart was used to collect data for the PISA formula and bitewing radiographs were used for mean bone loss to supplement PISA values. For the data analysis, Fisher's exact tests, Kruskal Wallis tests, and Pearson or Spearman correlations were performed.

Results: Bone loss was significantly associated with smoking/vaping status, where bone loss was highest in smokers. Vapers who were significantly younger than smokers. After adjusting for age and sex, both smokers and dual users had significantly higher bone loss than nonsmokers. Although smoking has been thought to reduce gingival signs of inflammation, there was a trend toward higher PISA in the dual use group, but this difference was not statistically significant.

Conclusions: This exploratory study primarily showed that smoking was correlated with bone loss, with or without dual use of vaping. While vaping alone was not. Future studies with more patients may help indicate if vaping is safer for periodontal health.

Summary: The goal of this study was to examine PISA and bone loss values between smokers, vapers, and nonsmokers. Probing depths, BOP, and bone loss averages were used for analysis. Significant results included bone loss increases in smokers and the group that smoked and vaped, relative to nonsmokers. More research needs to be done to further examine these groups and PISA.

Evaluation of Cephalometric Outcomes in Patients Treated with Combined Orthodontic and Orthognathic Surgery

Betty Wang
Mentors: Varun Hansraj, DDS, Po-Jung Chen, DDS, Sumit Yadav, PhD, Vaibhav Gandhi, MDS, MSD

Introduction: Combined orthodontic-orthognathic surgical treatment is routinely employed to correct dentofacial discrepancies that cannot be resolved by orthodontics alone. While skeletal correction aims to normalize sagittal and vertical relationships, the relative contributions of presurgical orthodontics and surgery to cephalometric changes remain incompletely characterized. Understanding how key skeletal, dental, and mandibular parameters evolve across treatment phases is essential for optimizing treatment planning and patient counseling. This study evaluated serial cephalometric changes from pretreatment through presurgical and postsurgical stages in patients undergoing combined orthodontic-orthognathic therapy.

Materials and Methods: Records of 22 patients treated with combined orthodontic and orthognathic surgical therapy were retrospectively reviewed. Sixteen patients with complete pretreatment, presurgical, and postsurgical records were included in the final analysis. Lateral and posteroanterior (PA) cephalograms were generated from cone-beam computed tomography (CBCT) datasets using Planmeca software. Cephalometric analyses were performed using WebCeph software, incorporating ABO, Grummons, and Cant analyses. Statistical analysis was conducted to compare cephalometric changes across treatment stages, with significance set at $\alpha = 0.05$.

Results: Šídák-adjusted multiple comparisons demonstrated no significant changes in SNA or SNB angles across pretreatment, presurgical, and postsurgical time points ($p > 0.05$). In contrast, ANB showed significant changes between pretreatment and presurgical stages (mean difference = 1.76°, $p = 0.0046$) and between presurgical and postsurgical stages (mean difference = −4.17°, $p = 0.0085$). A significant reduction in FMPA was observed from pretreatment to postsurgical evaluation (mean difference = −5.09°, $p = 0.0303$). No statistically significant differences were detected for mandibular angular, linear, or transverse measurements, including Ag angle, Co–Ag distance, Ag–Me distance, inter-jugal, inter-antigonial, or menton planes (all $p > 0.05$).

Conclusion: Combined orthodontic–orthognathic treatment produced significant improvements in sagittal skeletal relationships, primarily reflected by changes in ANB, with minimal alterations in maxillary and mandibular positional parameters. Vertical changes were limited, with a modest but significant reduction in FMPA observed post-surgically. These findings highlight the predominant role of surgical intervention in correcting sagittal discrepancies while maintaining overall skeletal stability.

The Impact of Parental Influence on Children's Oral Health Assessment

Robin Do and Shraddha Patel
Mentors: Alexandra Bilunas, DDS

Objectives: The objective of this study is to assess the relationship between the caregiver's understanding of oral health and their child's oral hygiene practices and dental health outcomes.

Methods: Caregivers who had children scheduled for recall examinations at the UNMC COD Pediatric Dentistry Clinic at Children's Nebraska in Omaha, NE were approached to be included in this research study. A total of 38 caregivers were agreeable to be participants in this study. They were given a survey consisting of fifteen questions asking about demographics, dental insurance coverage, their child's oral health, and general dental knowledge. A clinical examination was then completed by a pediatric resident to determine the patient's DMFT score. Data was summarized using percentages to evaluate parental involvement in daily oral hygiene routines, dietary habits, and the frequency of visits to an oral health professional. A chi-squared test was utilized to compare parental knowledge of oral health care to their child's DMFT score.
Results: A majority of the participants (92.1%) in this survey strongly agree that regular visits to the dentist are important for health. It could be theorized that the population surveyed had adequate access to care as 84.2% of the patients had a dental visit within the past twelve months and 81.6% of caregivers were receiving Medicaid benefits. Another statistically significant variable from the survey is the amount of caregivers who watch or assist their child with tooth brushing, which was 92.1%. The clinical examination in this study revealed 30 patients with a low DMFT index, 4 patients with a moderate DMFT index, and 4 patients with a high DMFT index. This quantification of the DMFT index was determined by the World Health Organization. Among the 30 patients who had a low DMFT index, 63.3% of caregivers were confident in educating their child about proper oral health. From our gathered data based on taking the survey on ideal knowledge and less than ideal knowledge each patient was compared to these values where it was shown from our Chi-Square test we proved our null hypothesis that the DMFT score and parental knowledge are not associated. Although our null hypothesis is what was proven, the recommendation we set out for parents through our research remains the same, that having some sort of knowledge regarding dental health for children is important for good oral health outcomes of the child.

Conclusion: Findings suggested that children whose parents had demonstrated higher levels of oral health knowledge and encouraged consistent prevention measures showed overall better oral health assessments, including lower dental caries and improved hygiene status.

Summary: This study emphasized the importance of parental engagement in shaping children's oral health behaviors, knowledge, and attitude towards preventative care and how this can contribute to improved pediatric oral health and long-term positive oral health outcomes. These findings highlight the role parents play in establishing lifelong oral health habits early in childhood.

Comparative Evaluation of Incisive Canal Cysts Using 2D and 3D Imaging Modalities

Calissa Zanderson and Janae Hoffmann
Mentor: Kavya Muttanahaly, MDSc

Background: Incisive canal cysts, also known as nasopalatine duct cysts (NPDCs), are the most common non-odontogenic cysts of the jaws and arise from remnants of the nasopalatine duct in the anterior maxilla. They are often discovered incidentally on routine radiographs but may cause symptoms when enlarged.

Objective: To compare the radiographic features of nasopalatine duct cysts using two-dimensional (2D) radiographs and three-dimensional (3D) cone beam computed tomography (CBCT), and to assess the added diagnostic value of 3D imaging.

Methodology: Eighteen histopathologically confirmed cases of incisive canal cysts were retrospectively evaluated. Corresponding 2D periapical or panoramic radiographs and CBCT scans were independently reviewed by two dental students and a board certified oral and maxillofacial radiologist.

Results (still waiting on statistical analysis): All lesions appeared as well-defined, unilocular radiolucencies in the incisive canal region. While lesions were detectable on 2D imaging, definitive diagnosis was uncertain in several cases. CBCT confirmed the diagnosis in all cases and provided improved visualization of lesion extent and anatomical relationships.

Conclusion: CBCT offers superior assessment of lesion boundaries, buccolingual extent, and surrounding anatomy compared with 2D radiography; however, its clinical benefit is primarily in complex or diagnostically uncertain cases.

Language Spoken at Home and the Effects on Oral Hygiene/Caries in Adolescents

Jocelyn Gee and Haley Rames
Mentor: M. W. Vogt, DDS

Objectives: To help determine if there is a correlation between the language spoken at home and the effects it has on the oral hygiene/caries in adolescents through the use of surveys distributed to consenting parents/guardians and pediatric residents at the UNMC College of Dentistry Pediatric Dentistry Clinic.

Methods: Surveys written in both Spanish and English were distributed to consenting parents/guardians at the UNMC College of Dentistry Pediatric Dentistry Clinic. Their survey results were then recorded. Those who denied participation in the research were not given a survey and did not affect the research results. Residents at the UNMC College of Dentistry Pediatric Dentistry Clinic were then given surveys to answer about the consenting parent/guardian's respective child's dental exam. The collected data was then recorded. Both survey results were then summarized through the use of graphs and percentages.

Results: The survey and data collected demonstrated that there may be a direct correlation between English and Spanish parents/guardians and their child's dental records. 23.3% percent of those who responded to the survey were Spanish speaking parents/guardians. Of that 23.3%, 100% of them indicated that their child brushed two times a day or more than two times a day. 76.7% of those who responded to the survey were English speaking and had a significantly less score for brushing twice a day at 13%. It was concluded that the homes where primarily Spanish was being spoken, only 14% were indicated as having fair oral health in comparison to 52.2% when English was the primary language. Lastly, based upon the residents exam results, 85.7% of the spanish speaking parents/guardians had their child categorized as being a low caries risk in comparison to 60.9% having low caries risk when english is spoken at home.

Conclusions: This study draws attention to the idea that language can affect oral hygiene/caries in adolescents. The data from this survey indicates that adolescents with Spanish speaking parents/guardians have significantly better oral health/caries rate; however, to ensure that there is an accurate conclusion made, more data must be collected. Summary: This survey and data suggests that there may be a correlation between the language spoken at home and the effects of oral hygiene/caries on adolescents. It is ideal that more data would be collected to ensure that conclusive results can be drawn in regards to this topic.

Comparison of an E-Learning Module vs. a Traditional Lecture for Teaching TMJ Osteoarthritis in Preclinical Dental Education

Blake Welch and Steven Coray
Mentors: Kayva Muttanahally, MDSc, MDS

Objectives: To evaluate whether an asynchronous e-learning module differs in effectiveness from a traditional PowerPoint lecture for teaching temporomandibular joint (TMJ) osteoarthritis concepts to first- and second-year dental students.

Methods: First-year (D1) and second-year (D2) dental students were assigned to either a traditional PowerPoint lecture or an asynchronous e-learning module developed by the investigators using Articulate Storyline 360, with both instructional formats delivering identical TMJ osteoarthritis content. Following instruction, students completed a ten-question knowledge assessment. Mean assessment scores were compared between instructional formats within each class year and

overall using independent-samples t-tests for statistical analysis. Differences in performance between class years were also evaluated.

Results: No statistically significant differences in assessment performance were observed between the e-learning module and traditional lecture formats for the D1 cohort (mean scores 5.70 vs 5.26; $p = 0.42$), the D2 cohort (mean scores 6.47 vs 6.75; $p = 0.62$), or when data from both cohorts were combined (mean scores 6.02 vs 6.02; $p = 0.999$). When instructional format was disregarded, D2 students demonstrated significantly higher assessment scores than D1 students overall (mean scores 6.63 vs 5.50; $p < 0.01$).

Conclusions: The asynchronous e-learning module produced comparable learning outcomes to traditional lecture-based instruction for TMJ osteoarthritis content among preclinical dental students. Differences in assessment performance were more strongly associated with class year than instructional format.

Summary: This study compared assessment performance among D1 and D2 dental students who learned TMJ osteoarthritis material through either a traditional lecture or an e-learning module. No significant differences were observed between instructional formats, while D2 students performed significantly better than D1 students overall. This study supports the use of e-learning modules as a viable alternative to traditional lectures in preclinical dental education.

Advanced Standing Students

Adoption and Utilization of the International Caries Detection and Assessment System

Shivani Pandey
Mentor: Upoma Guha, MS, BDS

This cross-sectional study demonstrates a positive perception toward the use of ICDAS for early caries detection and conservative treatment planning among dental professionals. Most participants considered ICDAS feasible and clinically useful, reflecting growing awareness of minimally invasive dentistry. However, some uncertainty regarding its routine implementation persists, likely due to limited training or practical exposure. Enhanced education and hands-on training may improve confidence and encourage wider adoption of ICDAS in clinical practice. A cross-sectional survey was conducted among dental students, residents, and practicing dentists using a structured, self-administered questionnaire. The survey evaluated participants' knowledge, attitudes, and perceived feasibility of ICDAS in routine clinical practice. Data were analyzed descriptively. The majority of respondents demonstrated a positive attitude toward ICDAS, with most participants considering it feasible for detecting early enamel lesions and aiding conservative treatment planning. A smaller proportion of respondents expressed uncertainty or reluctance, indicating possible barriers such as limited training or clinical experience with the system. The study highlights a favorable perception of ICDAS among dental professionals, emphasizing its potential role in early caries detection and minimally invasive dentistry. However, enhanced training, curriculum integration, and continuing education programs are recommended to improve confidence and promote wider clinical adoption of ICDAS.

Dental Anxiety in Student Dental Clinic: Patient Perceptions & Anxiety Reducing Factors

Amandeep Kaur and Mounika Palreddy
Mentor: James Jenkins, DDS

Objective: To evaluate the prevalence of dental anxiety among patients treated at the UNMC College of Dentistry D-3 and D-4 student dental clinic and identify contributing factors and effective anxiety-reducing strategies.

Methods: A cross-sectional anonymous questionnaire was completed by 59 patients receiving dental care at the UNMC College of Dentistry D-3 and D-4 student dental clinic. The survey assessed pre-treatment patient dental anxiety, sources of concern for the dental appointment, student communication quality, student's anxiety management techniques, physical symptoms due to dental anxiety, and willingness to return to the student dental clinic for further treatment. Data were analyzed descriptively using frequencies and percentages.

Results: Most participants reported no dental anxiety (45.8%) or slight dental anxiety (40.7%) prior to treatment. The main sources of anxiety were local anesthetic injections and uncertainty about dental procedures (25.4% each). Clear explanations (93.2%) and frequent comfort checks (88.1%) were commonly reported as effective in reducing dental anxiety for the patients. Effective anxiety-reducing strategies included clear communication by the student (62.7%), a gentle approach by the student (61.0%), and reassurance by the student (50.8%). Dental anxiety decreased during treatment in 45.8% of patients and increased by only 3.4%. Physical symptoms due to dental anxiety were reported by 11.9% of respondents. Overall, dental anxiety management was rated excellent by 71.2% of respondents and 84.7% of respondents were willing to return for future care.

Conclusion: Dental anxiety in the UNMC College of Dentistry student dental clinic was generally low

by 13.5% and effectively managed by strategies mentioned above. On dental students' part, strong communication, patient reassurance, and patient-centered care played a key role in reducing anxiety and promoting patient satisfaction.

Association Between Periodontitis and Alzheimer's Disease: A Scoping Review

Carolina Leme-Biran and Adriana Lamounier, DDS
Mentor: Amy Killeen, DDS

Objective: To synthesize epidemiologic and mechanistic evidence, evaluating the association between periodontitis and Alzheimer's disease and quantifying the risk of incident AD associated with periodontitis.

Methods: This scoping review was conducted in accordance with the Preferred Reporting Items for Scoping Reviews (PRISMA-ScR) guidelines. Observational epidemiologic, clinical, microbiological, biomarker, neuroimaging, and translational mechanistic studies evaluating periodontal status, periodontal pathogens, or periodontal inflammatory markers in relation to Alzheimer's disease or cognitive outcomes were identified, screened, and synthesized [7–11, 13–17, 19–23, 25–30, 32, 36, 37]. The population of interest included adults aged ≥50 years. Animal-only studies, narrative reviews, editorials, and non–peer-reviewed reports were excluded. Results: A total of 42 studies met the inclusion criteria, encompassing population-based cohort studies, cross-sectional and case–control investigations, clinical periodontal assessments, oral and salivary microbiome analyses, biomarker and antibody profiling, neuroimaging studies, and translational mechanistic research [1–40]. Periodontitis was consistently associated with an increased risk of incident Alzheimer's disease and cognitive decline in longitudinal cohort studies [7, 9, 14, 18, 21, 22, 26, 27]. Meta-analytic and large population-based evidence demonstrated a higher risk of AD among individuals with periodontitis and poor oral health [10, 20, 23, 29]. Mechanistic studies supported biological plausibility through pathways involving systemic inflammation, microbial dissemination—particularly Porphyromonas gingivalis—host immune responses, microglial activation, amyloid-β–related neurodegenerative processes, and gut–brain axis interactions [1, 2, 5, 12, 18, 24, 31, 33–35, 38–40].

Conclusions: The available evidence supports an association between periodontitis and an increased risk of Alzheimer's disease and suggests a potential contributory role of periodontal inflammation and microbial dysbiosis in AD pathophysiology [1–40]. However, heterogeneity among study designs, exposure definitions, and outcome measures, along with the limited number of interventional and long-term prospective studies, underscores the need for well-designed longitudinal investigations and randomized clinical trials to clarify causality and to determine whether periodontal prevention or treatment may influence neurodegenerative outcomes.

Summary: This scoping review found consistent evidence that periodontitis is associated with increased risk of cognitive decline and Alzheimer's disease. Findings from epidemiologic, microbiological, and mechanistic studies support biological plausibility through systemic inflammation, periodontal pathogen dissemination—particularly Porphyromonas gingivalis—immune dysregulation, and amyloid-β–related neurodegenerative processes. However, study heterogeneity and limited interventional data highlight the need for well-designed longitudinal studies and randomized clinical trials to clarify causality and assess the impact of periodontal prevention or treatment on neurodegenerative outcomes.

Artificial Intelligence Versus Human Dentists in Tooth-Level Caries Detection: A Comparative Study Using Bitewing Radiographs

Lilian Al Nihmy and Shradda Patel
Mentor: Robin Hattervig, DDS

Objectives: Artificial intelligence (AI) systems are increasingly applied to medical image interpretation, yet evidence for its accuracy in dental radiograph interpretation is still limited. This study evaluated the ability of two general-purpose AI systems to identify the presence of dental caries on posterior bitewing radiographs and compared their diagnostic performance with a human dentist consensus reference standard.

Methods: A retrospective diagnostic accuracy analysis was conducted using 100 posterior bitewing radiographs, encompassing 660 posterior teeth analyzed at the tooth level. Each tooth was assigned a forced binary label of caries present or caries absent using FDI World Dental Federation tooth numbering. ChatGPT and Gemini were evaluated using identical radiographic inputs and a standardized prompt requiring tooth-level binary decisions without lesion classification or explanation. Diagnostic performance was assessed using accuracy and agreement with the human reference standard using Cohen's kappa, and paired differences between AI systems were evaluated using McNemar's test.

Results: ChatGPT achieved an overall accuracy of 0.823, while Gemini achieved higher accuracy of 0.853 when identifying the presence or absence of dental caries on posterior bitewing radiographs. Agreement with the dentist reference standard was moderate for ChatGPT ($\kappa = 0.53$) and moderate for Gemini ($\kappa = 0.60$). Paired analysis demonstrated significantly fewer diagnostic errors for Gemini compared with ChatGPT ($p = 0.034$). These findings reflect performance under a forced binary classification approach, in which each tooth was labeled as either caries present or caries absent without lesion grading. The observed difference in error rates indicates that Gemini demonstrated more consistent agreement with the human dentist consensus reference standard than ChatGPT within this diagnostic framework.

Conclusions: These findings indicate that general-purpose AI systems can detect dental caries on posterior bitewing radiographs using a forced binary framework, though performance remains inferior to expert human interpretation.

Summary: ChatGPT achieved an overall accuracy of 0.823, while Gemini achieved higher accuracy of 0.853. Paired analysis demonstrated significantly fewer diagnostic errors for Gemini compared with ChatGPT ($p = 0.034$). These findings indicate that general-purpose AI systems can detect dental caries on posterior bitewing radiographs using a forced binary framework, though performance remains inferior to expert human interpretation.

Post Grad Students

Clinical Changes in Porcine Collagen Membrane vs. Bovine Collagen Wound Dressing in Atraumatic Extraction Sites with DFDBA Graft

Christine Alder, DDS
Mentors: Paula Schlemmer, DMD, Amy Killeen, DDS

Objectives: To compare the efficacy of porcine collagen membrane (Mucograft® Seal) to bovine collagen wound dressing (Integra Heliplug®) through evaluation of soft tissue dimensional changes when used in ridge preservation procedure(s) with atraumatic tooth extraction in non-molar sites.

Methods: This randomized, double-blind study was conducted with ten non-smoking subjects between the ages of 18-75. All subjects required extraction due to a non-restorable anterior or premolar tooth. Baseline measurements included digital intraoral scans of the entire dentition and gingival complex, probing depth, recession, and bleeding on probing. Atraumatic tooth extraction and socket particulate grafting with DFDBA was immediately followed by coverage with either Heliplug® (group H) or Mucograft® Seal (group M) according to randomization method via sealed envelopes. Post-operative recalls were scheduled at 2 weeks, 8 weeks, and 3 months for assessment and repeat digital intraoral scans. Statistical analysis was performed using Wilcoxon Rank Sum tests.

Results: HeliPlug® demonstrated superior dimensional preservation properties compared to Mucograft® Seal, with statistically significant differences observed in linear dimensional reduction of soft tissue volume at 8 weeks (-1.8mm in group M, -0.9mm in group H) and 3 months (-1.9mm in group M, -1.2 in group H). No statistically significant differences were found in attachment level changes from baseline to 3 months, but clinically, the median change in attachment level indicated a decrease in the Mucograft® group (-0.8mm) and an increase in the Heliplug® group (0.3mm).

Conclusions: HeliPlug® may be considered a viable option for ridge preservation procedures, offering advantages in cost savings and decreased dimensional reduction compared to Mucograft® Seal. Further research is needed to validate these findings with larger sample sizes and to explore additional parameters such as hard tissue outcomes.

Quantification of Moisture from Dentinal Tubules after RCT Preparation in Single Canal Human Teeth In Vitro

Cameron Gray and Conner Ulrich
Mentor: Mike McNally, DDS

Background and Purpose: Bioceramic (BC) sealers need moisture for their setting reaction. Their IFU's state to dry the canals with paper points (PP) because the moisture needed comes from within the dentinal tubules. There is a gap in knowledge regarding how much moisture can be obtained from inside a prepared tooth. The aim of this study is to investigate the amount of moisture present in dentinal tubules from extracted single canal teeth after Endodontic preparation in vitro.
Methods: Twenty-three single canal human teeth and twelve 3D-printed incisors were prepared for RCT and subjected to 2 experimental conditions: (A) roots wrapped in saline-soaked gauze or (B) roots submerged in saline. PPs were weighed before and after these 24-hour trials and compared. One-way ANOVA and Tukey-Kramer tests were used, P-value set to 0.05.

Results: The average increase of PP mass for condition A was 3.74mg for natural and 2.71mg for control teeth; condition B was 3.45mg and 2.75mg respectively. There was a statistically significant difference in the post-trial PP masses between the natural and control teeth ($p = 0.0146$). There was a significant positive linear effect from tooth mass and post-trial paper point mass ($p = 0.0263$). The only statistically significant difference between conditions A and B was with the smallest PP pre-trial masses ($p = 0.0492$).

Conclusion: Despite the control teeth having moisture leakage, the extracted teeth had a statistically significant increase in post-trial PP mass, suggesting that the current BC sealer IFU's are correct.

Using Spatial Sequencing to Identify the Effects of Macrophage Responses to Wound Healing after Tooth Extraction

Gregory Ingalsbe, DMD
Mentor: Richard Reinhardt, DDS, PhD

Objectives: Tooth extraction wound healing varies considerably among individuals, with some patients exhibiting a lag phase characterized by delayed soft tissue and bone regeneration. Excessive or prolonged inflammation is thought to contribute to impaired healing, yet the underlying cellular mechanisms remain poorly defined. Macrophages regulate the transition from the inflammation phase to the proliferation phase, with pro-inflammatory M1 and regulatory M2 phenotypes playing distinct roles in periodontal tissue repair. This study investigates macrophage population dynamics during extraction socket healing using spatial RNA sequencing.

Methods: Soft tissue biopsies were collected from patients at the time of extraction and again at two weeks post-extraction. Spatial transcriptomic analysis was employed to preserve tissue architecture while identifying macrophage-specific gene expression patterns associated with healing progression.

Results: Preliminary findings suggest differences in macrophage activation and persistence between efficient healers and those demonstrating delayed healing.

Conclusions: Improved understanding of macrophage spatial and molecular profiles may enable targeted biologic interventions to promote timely resolution of inflammation and enhance post-extraction bone healing.

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.

University of Nebraska Medical Center