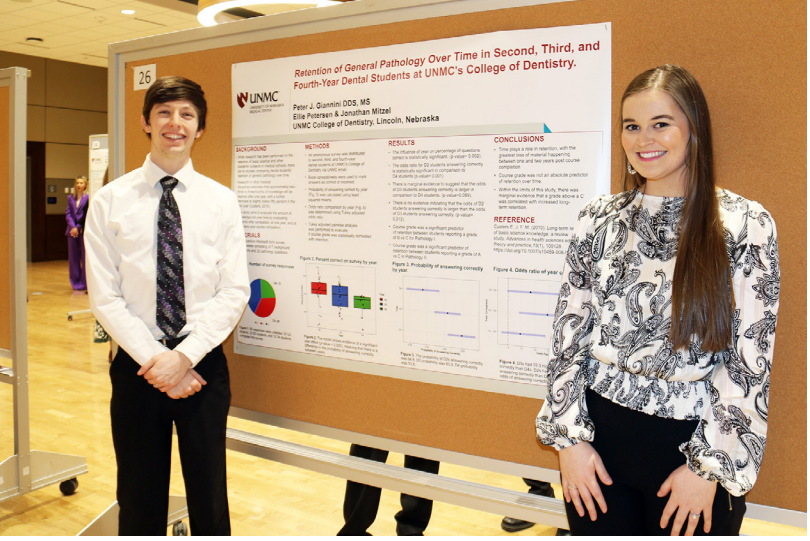
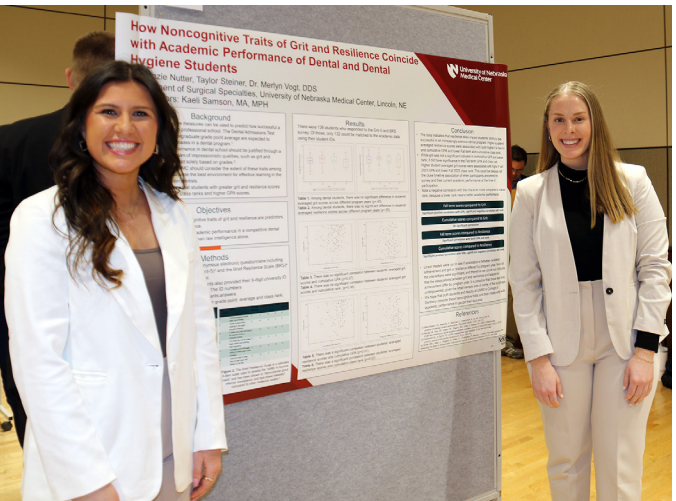
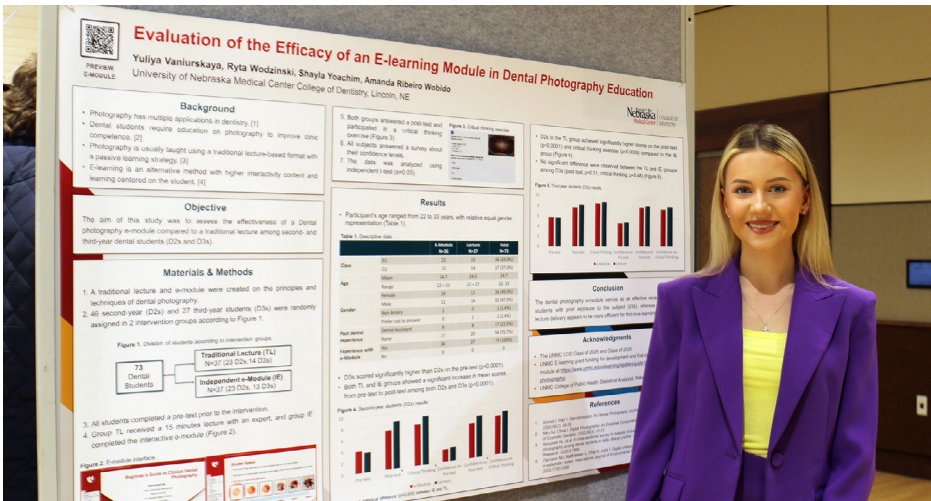


UNMC COLLEGE OF DENTISTRY

UNMC College of Dentistry Research Day

February 28, 2025





Special Thanks

Student Scientific Program Judges

Dr. Mark Beatty
Dr. Gregory Bennett
Ms. Jane Broekemeier
Dr. Gerard Byrne
Dr. Larry Crouch
Ms. Amanda Dolen
Dr. Peter Giannini
Ms. Noni Henderson
Dr. Sofia Iribarren
Dr. Bill Johnson
Mr. Todd Junge
Dr. Amy Killeen
Dr. Benjamin Kwok
Ms. Emily Lindquist
Dr. Julie Marshall
Ms. Lisa Moravec
Dr. Ali Nawshad
Dr. Gregory Oakley
Dr. Myhanh Phan-Rinne
Dr. Richard Reinhardt
Ms. Jaimee Shropshire
Dr. Amanda Wobido
Dr. Shayla Yoachim

Research Day Committee

Dr. Gerard Byrne
Ms. Amanda Dolen
Dr. Benjamin Kwok
Ms. Lisa Moravec
Dr. Gregory Oakley
Dr. Makena Sundine
Ms. Erin Wirth
Mr. Nicholas Stolze (student member)

Event Schedule

58th Annual Frank M. Wentz Student Scientific Program

Poster Viewing

12:30 - 3:30 p.m.

DH4	See presenters.
D3	See presenters.
Other	See presenters.

Judging Schedule

12:30 - 2:30 p.m.	DH4 First Round Judging D3 First Round Judging Postgraduate Judging
2:30 - 3:30 p.m.	DH4 & D3 Final Round Judging

Keynote Speakers

3:30 - 4:30 p.m.

Ken Bayles, PhD
UNMC Vice Chancellor for Research

Gerard Kugel, DMD, MS, PhD
Dean

Sumit Yadav, BDS, MDS, MBA, PhD
Interim Associate Dean for Research

Sangamesh Kumbar, PhD
Professor

Awards Ceremony

4:30 - 5:00 p.m. **Awards Ceremony**

DH4 Presenters

1. Effect of Opioids on Caries Rate: A Retrospective Study

Austin Branch and Emily Erickson
Mentor: Dr. Nagamani Narayana

2. The Effects of Guru Nanda and Chlorhexidine on S. mutans: An in vitro study

Isabella Hamaker, Russell Brezina, and Hana Berge
Mentor: Nicole Baker

3. The Effects of Sodium Fluoride, Sodium Monofluorophosphate, and Stannous Fluoride on Streptococcus Mutans: An in vitro study

Mikayla DeBaets and Kaelyn Tejral
Mentor: Todd Junger

4. Analysis of Dental Erosion Induced by Alcoholic Beverages: An in vitro study

Raegan Demuth and Ashlyn Kucera
Mentor: Jaimee Shropshire

5. Enamel Demineralization from Diet versus Regular Soft Drinks: An in vitro study

Maiah Phillips and Elizabeth Freeman
Mentor: Emily Lindquist

6. Impact of Toilet Seat Closure on Microbial Contamination of Bathroom Surfaces

Morgan Harris and Tiara Matson
Mentor: Jaimee Shropshire

7. Does Using Toothpaste Tablets Cause More Abrasion on Composite Resins Compared to Using Traditional Dentifrice?

Jessica Nguyen and Jennifer Quebrado-Arcos
Mentors: Dr. Mark Beatty and Bobby Simetich

8. Ergonomics and the Effect on Musculo-skeletal Disorders (MSD) in the Dental Profession

Maddie Ochsner and Skylar Solomon
Mentor: Gina Kissel

9. The Study of the Impact of Sugar Content in Fruit Juices on S. Mutans Growth and Biofilm Formation Leading to Cavities

Kennedy Vanscoy and Alyssa Walters
Mentor: Dr. Shayla Yoachim

10. The Inhibitory Effects of Terminalia chebula and Camellia sinensis Plant Extracts on Biofilm Containing and Streptococcus mutans: An in vitro study

Gloria Larkin and Allie West
Mentor: Jaimee Shropshire

11. In Vitro Study: Comparing Oil Pulling on Permanent Extracted Teeth with Kilgore Artificial Plaque to Not Using the Oil Pulling Technique to Reduce Plaque Index

Maddie Zaborowski and Morgan Sila
Mentor: Dr. Dona McCanlies

D3 Presenters

12. Evaluation of the effect of microwave sterilization on the accuracy of 3D printed surgical guides

Quinn Adajar
Mentor: Dr. Gregory Bennett

13. Effect of print angle orientation on accuracy of Polyjet 3D printed dentures

Ian Ailts and Andrew Christiansen
Mentor: Dr. Gregory Bennett

14. Nebraska Dentists' Satisfaction with Dental Implant Software Programs

Payton Alber and Luke Andreasen
Mentors: Dr. Kavya Shankar Muttanahally, Dr. Jeffrey Payne, and Kaeli Samson

15. A Comparison Study of the Average Decibel Levels of Restorative Procedures at the North Clinic to the South Clinic Regarding Operator Risk

Farah Ali and Jack Schoenfelder
Mentors: Lisa Moravec and Dr. Shayla Yoachim

16. Disciplinary Actions Against Nebraska Professional and Occupational Licenses

Trey Asher and Mason Jensen
Mentor: Dr. M.W. Vogt

17. Sterilization costs of no-show appointments in undergraduate clinic, UNMC COD 2024

Aspen Auel and Dayne Thomas
Mentor: Rhonda Simpson

18. The Impact of Mental Health and Bruxism on Occlusal Characteristics in First-Year Dental Students

Alex Dyke and Ashley Bush
Mentors: Dr. Amanda Wobido and Dr. Makena Sundine

19. Emergency Department Prescribing Patterns Among Adults Patients with Non-Traumatic Dental Conditions

Emily Carlson and Erin Alexander
Mentor: Dr. Sarah Lowman

20. Genetically rescuing cleft palate: a potentially novel approach to correct palate cleft in TGFβ3 -/- mice

Mikah Hoppens and Tanner Delaney
Mentors: Dr. Nam Ha, Nuhad Khan, Mia Kennedy, and Dr. Ali Nawshad

21. Analyzing Trends in American Dental School Admissions Criteria from 2000-2023

TJ Haith and Zane Leibhart
Mentor: Dr. M.W. Vogt

22. Effects of e-Cigarettes on the Roughness and Color Stability of Composite Resin Materials

Kendra Kozisek and Faith Harris
Mentors: Dr. Mark Beatty and Dr. Amanda Wobido

23. Ergonomic Assessment of First-Year Dental Students At UNMC College Of Dentistry: Correlations Between RULA Scores, Pain Reports, and Loupe Usage

Kenedi Holck, Nori Khalaf, and Payton Swanson (OT Student)
Mentors: Dr. Amanda Wobido and Dr. Stacy Smallfield

24. The effectiveness of detecting plaque on tooth surfaces using traditional and AI monitoring

Carter Meyer and Samantha Hunter
Mentor: Dr. Richard Reinhardt

D3 Presenters (cont.)

25. Perceptions and Adoption of Teledentistry in Nebraska: A Survey-Based Study

Eugene Kim and Jose Mendoza
Mentor: Dr. Sarah Lowman

26. Impact of Learning Modality on Quality of Radiographic Communication between Dental Student and Standardized Patient

Kathryn Benson and Rachael Krinke
Mentor: Dr. Shayla Yoachim

27. Nebraska's Drinking Water Nitrate Levels Effect On Oral Cancer

Alyson Kuehn and Kesean Bundy
Mentors: Dr. Gregory Oakley, Dr. Corinne Van Osdel, and Kaeli Samson

28. Impact of Polishing Systems on the Surface Roughness of Resin Composites?

Elaina Spanel and Logan Spanel
Mentor: Dr. Amanda Wobido

29. Assessing Dental Students' Ability to Identify Signs and Symptoms of Depression, Anxiety, and Burnout

Brad Schoch and Preston Macdonald
Mentor: Dr. Larry Crouch

30. Accuracy Of Virtual Surgical Planning In Bimaxillary Orthognathic Surgery

Logan McNeil
Mentor: Dr. Minnie Vishawanath

31. Examining the Mental Health Status of Dental Students in the Midwest

Shayla Meyer and Anna Campbell
Mentors: Dr. Sarah Fischer and Dr. Steven Wengel

32. Impact of Sphenoid Expansion on Cranial Base Morphology; Exploring relationships between sphenoid and maxillo-mandibular dimensions

Julia Reimer and Lauren Riley
Mentor: Dr. Shayla Yoachim

33. The Effects of Energy Drink Acidity on Enamel Hardness: An In Vitro Study

Jacob Wiesen and Joshua Roh
Mentor: Dr. Makena Sundine

34. Print Orientation and Mechanical Performance: A Tensile Strength Analysis of 3D-Printed Mouthguard Materials

Nathan Slusarski
Mentor: Dr. Gregory Bennett

35. Artifacts Generated by Pediatric Stainless Steel and Zirconia Crowns on MR and CT Head and Neck Imaging

Jaclin Stonacek and Ashley Suchyta
Mentor: Dr. Tracy Peitz

36. Non-sterile vs Sterile Glove Infection Rates in Surgical Dental Procedures

Conner Ulrich and Jacob Olsen
Mentor: Dr. J. Bruce Bavitz

37. Caregiver's Accuracy in Assessing Child's Oral Health Disease and What Influences Seeking Care

Kate Ewing and Emma Verbrugge
Mentor: Dr. Alexandra Bilunas

38. CBCTs in Nebraska General Dentist Practices

Pierson Foi and Gracie Smith
Mentor: Dr. M.W. Vogt

Other Presenters

39. Adoption of Dental Implant Software and Technology by Nebraska Dentists

Luke Andreasen and Payton Alber
Mentors: Dr. Kavya Shankar Muttanahally, Dr. Jeffrey Payne, and Kaeli Samson

D4

40. Assessing multiple domains of wellness in dental and dental hygiene students: Questionnaire design, findings, and future directions

Sam Kline and Justin Willson
Mentors: Makayla Schissel, J. Smith, and Dr. Shayla Yoachim

Advanced Standing

41. Retention of Oral Pharmacology Knowledge in Dental Students: Survey

Jaisleen Kaur and Priyaben Patel
Mentor: Dr. Gregory Oakley

Postgraduate

42. Clear Cell Odontogenic Carcinoma: A Diagnostic Challenge

Dr. Otto Czechner
Mentor: Dr. Peter Giannini

43. Single cell RNA-sequencing identification of cell mediators involved in wound healing after single tooth extraction

Dr. Duke Davis
Mentor: Dr. Richard Reinhardt

44. Comparison of Diameters of Trunatomy Rotary files & Gutta Percha

Dr. Morgan Holmes and Dr. Karan Mirchandani
Mentor: Dr. Anne Williamson

Faculty

45. Examining Associations Between Classes of Medications and Tooth Loss in Periodontal Maintenance Patients

Dr. Po-Jung Chen and Dr. Kavya Shankar Muttanahally
Mentor: Dr. Sumit Yadav

Abstracts

1. Effect of Opioids on Caries Rate: A Retrospective Study

Austin Branch and Emily Erickson
Mentor: Dr. Nagamani Narayana

This research paper analyzes the correlation between opioid drugs and their effect on caries rate. To gather this information, we conducted research through reviewing 200 patients' charts that have previously attended the University of Nebraska Medical Center College of Dentistry. We used the DMFT index to compare the data of each patient. Our results show that there is a correlation between long-term opioid use and an increase in caries rate. The findings of our study show that there is an increase in the DMFT scores of patients taking opioids, which means that there should be precautions taken considering oral health prior to prescribing opioids to patients long term.

2. The Effects of Guru Nanda and Chlorhexidine on S. mutans: An in vitro study

Isabella Hamaker, Russell Brezina, and Hana Berge
Mentor: Nicole Baker

Chlorhexidine is the gold standard antimicrobial agent in dentistry. This product was introduced as an effective means to kill harmful bacteria in the oral cavity, which has been proven through prior research. GuruNanda is a natural product that has been promoted for its assumed capabilities of caries prevention, as well as whitening and periodontal disease maintenance. Both products were compared against the cavity causing bacteria: Streptococcus mutans. Thirteen Muller Hinton agar plates with 5% sheep's blood were all streaked with active S. mutans that had been incubated in a BHI solution for 48 hours. Each plate was sectioned into thirds and a sterile disc saturated with either chlorhexidine, GuruNanda, or the controlled solution, distilled water, was placed in the center of one of the three sections. Once the plates had received three discs saturated with each of the solutions, they were all incubated for 48 hours. Measurements were recorded at 24 hours and then again at 48 hours. The results of the study proved our hypothesis, which was that chlorhexidine would result in greater antimicrobial effects compared to GuruNanda. Chlorhexidine was the only solution to produce a zone of inhibition, GuruNanda and distilled water both accentuated the growth of S. mutans. This study is relevant to the dental field because it allows providers to understand different products available for patients and be able to provide beneficial recommendations.

3. The Effects of Sodium Fluoride, Sodium Monofluorophosphate, and Stannous Fluoride on Streptococcus Mutans: An in vitro study

Mikayla DeBaets and Kaelyn Tejral
Mentor: Todd Junge

This study compared the effectiveness of stannous fluoride, sodium fluoride, and sodium monofluorophosphate in inhibiting the growth of Streptococcus mutans. Five plates with the mixture of brain heart infusion agar were inoculated with S. mutans spread evenly. The plates were divided into 8 quadrants, with 2 quadrants designated for each agent (sodium fluoride, stannous fluoride, sodium monofluorophosphate, and a control) and applied directly on filter paper. The plates were placed in the incubator at 38 degrees Celsius for 24 hours. After minimal growth, the plates were returned for another 24 hours. The plates were then taken out with growth of colonies and the zone of inhibition was measured. The result of the study was stannous fluoride having the largest zone of inhibition which was 15mm and the smallest zone of inhibition being sodium monofluorophosphate which was 6 mm. Overall, this study shows that stannous fluoride was able to exhibit a significant difference in inhibition compared to both the control and sodium monofluorophosphate. This study can be informational to dental hygienists as they decide what fluoride is most beneficial to their patient.

4. Analysis of Dental Erosion Induced by Alcoholic Beverages: An in vitro study

Raegan Demuth and Ashlyn Kucera
Mentor: Jaimee Shropshire

Alcohol continues to be one of the most popular beverages today. Alcoholic beverages contain an acidic pH, which causes demineralization of enamel. Through this study, alcoholic beverages and alcohol-containing mouthwashes were tested to determine the amount of demineralization caused by each. The Canary System was utilized to determine the amount of demineralization on 50 extracted teeth before and after the experiment was conducted. The 50 teeth were divided into groups of 10 for all categories of alcohol (beer, wine, liquor, and alcohol-containing mouthwashes) as well as the control (water). Furthermore, 10 teeth for each category of alcohol were divided into 2 groups of 5. There were 2 brands of alcohol for each category. All of the extracted teeth remained in the solutions for 19 days at room temperature, which is the equivalent of drinking alcohol for 30 minutes every day for one year. After allowing the extracted teeth to soak in their respective alcohol-containing drinks for 19 days, the 50 teeth were retested using the Canary system to see if demineralization occurred. Overall, we found that each of the alcohol-containing products caused a notable rate in demineralization. It was determined that many of the alcoholic beverages had similar rates of demineralization, while wine caused a significantly higher amount of demineralization. Alcohol-containing products can have damaging effects on not only the oral cavity but the entire body as a whole. As a hygienist, it is essential to inform patients about the impact of what they put into their bodies and how it can hinder their oral health. Future research should look into how brushing, flossing and routine dental cleanings can potentially help slow the rate of demineralization.

5. Enamel Demineralization from Diet versus Regular Soft Drinks: An in vitro study

Maiah Phillips and Elizabeth Freeman
Mentor: Emily Lindquist

In the present experiment, the effects of diet versus regular soft drinks effects on enamel were observed. Dental caries are one of the most common dental diseases worldwide. The development of dental caries is multifactorial, including the pH of the oral cavity, carbohydrate intake, and proper dental hygiene. The role of one's diet directly impacts these factors of disease progression. Soft drinks have become increasingly prevalent in diets worldwide since their creation. The first diet soft drink was made to market a "healthier" option due to the low sugar and calorie content. However, there is a lack of research on the impact of diet soda on the incidence of dental caries. This study was conducted using a total of 18 extracted teeth placed in Coke, Pepsi, Starry, and their zero-sugar/diet counterparts. Baseline data on the amount of demineralization of the direct occlusal surface was measured using the Canary System by Quantum Dental Technologies. Each tooth was scored from a range of 1 (healthy enamel) to 100 (advanced decay). All teeth were left in the sealed solution for 20 consecutive days at room temperature (21°C), then the same direct occlusal surface demineralization was re-measured. Diet soda was found to cause less enamel demineralization with a mean Canary System score of 15.3 vs. regular soda's mean of 26.7. This data is pertinent in adhering to the dental standard of care through education. Dental professionals can use the data to educate patients to prevent dental decay through their soda choices.

6. Impact of Toilet Seat Closure on Microbial Contamination of Bathroom Surfaces

Morgan Harris and Tiara Matson
Mentor: Jaimee Shropshire

This cross-sectional study compared bacterial aerosol contamination on bathroom surfaces from flushing a toilet with the seat open versus closed. Settling plates with brain heart infusion agar were placed in six separate bathrooms to collect aerosols. Three of these bathrooms were the closed toilet seat group and three were the open toilet seat group. Two plates were utilized per bathroom and one control was in a separate, unused room. Each group was left open on the bathroom counter for 6 hours. The plates were placed in an incubator for 40 hours and then the number of colony-forming units (CFU) were counted. These steps were repeated for a second trial. The average number of colony-forming units (AvgNCFU) was greatest among the open seat groups. T-tests were completed to compare each group and the only group which showed a significant difference was the comparison of the open and control groups. The study shows that closing the toilet seat before flushing can result in decreased aerosol contamination which is relevant for anybody who stores their toothbrush on their bathroom counter. This study can be informational to dental hygienists as they educate their patients about toothbrush storage.

7. Does Using Toothpaste Tablets Cause More Abrasion on Composite Resins Compared to Using Traditional Dentifrice?

Jessica Nguyen and Jennifer Quebrado-Arcos
Mentors: Dr. Mark Beatty and Bobby Simetich

Study Purpose/Objective: To determine whether toothpaste tablets are more abrasive than traditional dentifrice on composite restorations.

Methods and Materials: Ten resin composite, circular tablets (1 mm x 3 mm) were created using packable composite resin with the shade B2, mylar strips, a curing light, and 1mm x 3mm circular molds. The center of each circular tablet was marked with a dot using a sharpie. Over the course of six months, the tablets were brushed with an Oral-B electric toothbrush with light pressure for five seconds, twice a day. After each month, the surface roughness was measured using the Mitutoyo SJ-210 profilometer. Half of the tablets were brushed using the Hello Toothpaste Tablets, while the other half was brushed using the traditional dentifrice of the same brand.

Results: According to the findings, traditional toothpaste was more abrasive than the toothpaste tablets. Traditional dentifrice had a higher standard deviation compared to the toothpaste tablets, which allowed more room for error.

Conclusion: It was hypothesized that toothpaste tablets would be just as abrasive as traditional dentifrice due to having similar ingredients. However, after all data was collected, it was determined that traditional dentifrice was more abrasive than toothpaste tablets due to having a higher standard deviation. Since the Mitutoyo SJ-210 profilometer was very fine compared to the composite resin tablet surface, it was difficult to test the exact spot that was abraded after each month. More studies over toothpaste tablets is recommended since it is still a new concept with limited resources. Composite resins should be abraded with machinery to allow more accurate control and pressure.

8. Ergonomics and the Effect on Musculoskeletal Disorders (MSD) in the Dental Profession

Maddie Ochsner and Skylar Solomon
Mentor: Gina Kissel

An anonymous research survey was conducted on the effects of ergonomic equipment such as ergonomic loupes and saddle

Go Back to List of Presenters

Go Back to List of Presenters

chairs and their effects on Musculoskeletal Disorders (MSDs). Previous research has concluded that proper ergonomics helps to prevent MSDs from developing, however, the goal of our survey was to see if individuals that had already been diagnosed with an MSD had seen any relief in MSD pain after switching to ergonomic equipment. The survey questions focused on if respondents had been diagnosed with an MSD, if ergonomic equipment decreased respondents MSD pain, and the types of treatment rendered if it was treatment or preventative. Results that concluded switching to ergonomic equipment reduced or removed pain from MSDs. Expanding the number of questions inquiring about the use of ergonomic equipment on the reduction of MSD pain, would have yielded an understanding of the respondents data more clearly. Instead of having one question dedicated to the aforementioned question, the one question could have been turned into two or three questions. This could have helped both respondents and survey hosts understand and have a clearer representation of the data in the use of equipment in reducing MSD pain. The original singular question makes it seem as if respondents had to utilize both saddle chairs and ergonomic loupes to see a reduction in MSD pain.

9. The Study of the Impact of Sugar Content in Fruit Juices on S. Mutans Growth and Biofilm Formation Leading to Cavities

Kennedy Vanscoy and Alyssa Walters

Mentor: Dr. Shayla Yoachim

Oral biofilms are key contributors to dental caries, with diet playing a significant role in their growth and maturation. Streptococcus mutans are the most numerous bacteria in biofilm, however there are a number of factors that can influence the quality and quantity of bacteria making up the biofilm. While the acidic and sugary nature of fruit juices, such as orange juice, can contribute to biofilm development, the effects of juice dilution on bacterial growth is well researched. This study aimed to evaluate how different dilutions of orange juice influenced the growth of S. mutans biofilms. Using different dilutions of orange juice mixed with phosphate-buffered saline (PBS), the growth of S. mutans was measured by the use of crystal violet dye and a Spectrometer. Results indicated that more diluted orange juice mixtures created a more favorable environment for bacterial growth. The largest growth was observed in the most diluted concentration. However, the statistical analysis showed no significant difference between the dilutions, suggesting that dilution alone may not be the sole factor influencing bacterial growth. These findings indicate the need for further research into the dietary effects on children's dental health relating to juice consumption. The study also emphasizes the importance of educating parents on the implications of juice consumption and its potential to create an oral environment favorable to the growth of harmful bacteria, regardless of dilution.

10. The Inhibitory Effects of Terminalia chebula and Camellia sinensis Plant Extracts on Biofilm Containing and Streptococcus mutans: An in vitro study

Gloria Larkin and Allie West

Mentor: Jaimee Shropshire

Purpose of research: To determine if T. chebula and C. sinensis extracts have an inhibitory effect on S. mutans biofilm growth in vitro.

Methods: Six rows of a 96 well-plate with six wells each were inoculated. Five rows were inoculated with S. mutans and a treatment. One row was inoculated without S. mutans for a control. The inoculated plate incubated for 48 hours in a CO2 incubator before being washed and dyed with 0.1% crystal violet. A spectrophotometer microplate reader at 570nm was used to record optical density.

Results: The average optical density of cells with no treatment was 2.981OD. C. sinensis had the highest average optical density at 4.232OD followed by artificial saliva with an average optical density of 3.606OD. Both treatments' average optical densities were above the average optical density of the cells with no treatment rendering both not effective at inhibiting S. mutans biofilm growth. T. chebula had an average optical density of 1.923OD while chlorhexidine gluconate 0.12% had the lowest average optical density at 0.140OD. Both treatments' average optical densities were below the average optical density of the cells with no treatment rendering both effective at inhibiting S. mutans biofilm growth. Chlorhexidine gluconate 0.12% was most effective. All p-values were significant.

Conclusion: C. sinensis was not effective at the inhibition of S. mutans biofilm growth due to higher average optical density, however, T. chebula effective at the inhibition of S. mutans biofilm growth due to a lower average optical density.

11. In Vitro Study: Comparing Oil Pulling on Permanent Extracted Teeth with Kilgore Artificial Plaque to Not Using the Oil Pulling Technique to Reduce Plaque Index

Maddie Zaborowski and Morgan Sila

Mentor: Dr. Dona McCanlies

The objective of this study was to evaluate the effectiveness of Guru Nanda Natural Oil-Pulling Oral Rinse compared to not using the oil-pulling technique to reduce plaque index. To test this hypothesis, 100 extracted teeth were rinsed, dried, and painted with Kilgore Artificial Plaque on the Buccal, Lingual, Mesial, and Distal surfaces of the CEJ. The teeth were randomly distributed into two groups, experimental or control. Within those two groups, teeth were divided into subgroups of five. Each subgroup of teeth was then numbered one through five. Five teeth were placed into each 50mL conical tube. There was a total of 20 50mL conical tubes for this experiment. Groups C1-C10 were the control and contained artificial saliva. Groups E1-E10 were the experimental group and contained the Guru Nanda natural oil. All tubes were placed on the Stovall Life Science Inc. rocker for two minutes daily to mimic the oral cavity's swishing motion. After two minutes, the tubes were emptied, and the teeth were rinsed with water and stored in a dry environment. The results showed a very low p-value (p= <0.0001), indicating that there is strong evidence of a difference in treatments. There is strong evidence of a difference in the proportion of plaque spots between artificial saliva and oil pulling. The estimated odds ratio is 63.411. This means that the estimated odds of plaque spots with artificial saliva are 63.411 times as large as the estimated odds of plaque spots with oil pulling. For the confidence interval: with 95% confidence, the true odds of plaque spots with artificial saliva are between 37.891 and 106.118 times as large as the true odds of plaque spots with oil pulling.

12. Evaluation of the effect of microwave s terilization on the accuracy of 3D printed surgical guides

Quinn Adajar

Mentor: Dr. Gregory Bennett

Surgical guides are used in placement of implants to improve accuracy and predictability when compared to non-guided implant placement techniques. Historically, dental surgical guides have been sterilized by using an autoclave or disinfected by soaking in alcohol. The autoclave, a preferred choice for sterilization, typically requires 30-60 minutes to complete a cycle. Microwaves have been shown to effectively sterilize objects in under 10 minutes and present an intriguing alternative to sterilize dental appliances quickly. This would have practical time savings when a short turnaround time is required. This study explores the effect of using consumer microwave ovens on the fit of 3D printed surgical guides. 20 surgical guides were 3D printed on a Stratasys J5 DentaJet in MED610 resin and scanned before and after their respective sterilization method. 10 guides were exposed to microwave sterilization and 10 guides underwent autoclaving. Guides exposed to microwave sterilization did not differ significantly in fit from the group that was autoclaved, and all samples were within clinically acceptable tolerance levels. Microwave sterilization appears to be a promising and efficient technique for processing 3D printed surgical guides.

13. Effect of print angle orientation on accuracy of Polyjet 3D printed dentures

Ian Ailts and Andrew Christiansen

Mentor: Dr. Gregory Bennett

Literature has shown that dentures must have retention, support, and stability to be a successful prosthesis (2018, R. Mistry). Accuracy in the final impression stage of denture fabrication is a technique sensitive process and is vital to denture retention, support, and stability. Advancements in digital dentistry, including CAD-CAM and 3D printing, have revolutionized denture fabrication by improving accuracy of denture bases and reducing appointment times. Recent literature has demonstrated that a print angle of 45 degrees for denture bases has the highest accuracy, though the print angle that gives the highest accuracy using polyjet printing technology is still unknown. This study evaluates the effect of print orientation on the accuracy of complete dentures fabricated using Polyjet 3D printing, a novel additive manufacturing (AM) technology with a unique material deposition and curing process. A total of fifty denture bases were printed, 10 dentures at five orientations (0°, 45°, 90°, 135°, and 180°) Each denture was analyzed for trueness (mean deviation from the digital design) and precision (inter-sample variability). Statistical analysis was performed using one-way ANOVA and Tukey's post hoc test (a = 0.05) to determine significant differences among orientation groups. Results indicated that print angle did have an influence on trueness and precision. These results suggest that Polyjet printing has a different optimal printing angle than other AM methods, such as stereolithography (SLA) and digital light processing (DLP). Further research may be necessary to validate these results and establish Polyjet technology as a potential gold standard for digital denture fabrication.

14. Nebraska Dentists' Satisfaction with Dental Implant Software Programs

Payton Alber and Luke Andreasen

Mentors: Dr. Kavya Shankar Muttanahally, Dr. Jeffrey Payne, and Kaeli Samson

Objectives: To evaluate Nebraska-licensed dentists' satisfaction with software programs (SP) used for implant treatment planning and how satisfaction varies between general dentists and specialists.

Methods: A 2022 list of all Nebraska-licensed dentists (1,736 individuals, Nebraska.gov) was sorted into a list of 657 dentists who may place dental implants based on practice websites mentioning dental implants. One hundred fifty-four dentists (23.4% response rate) responded to our emailed online survey. Of these respondents, 100 dentists confirmed that they surgically place dental implants. This data was summarized using frequencies and percentages.

Results: Nebraska dentists used a variety of dental implant SP. In our sample, 61.9% of respondents have never switched SP and 38.1% indicated they had switched. Reasons for switching SP included cost, moving offices, workflow or ease of use. Seventy-eight percent of respondents rated their SP as supporting virtual implant placement and positioning "very"- or "exceptionally well", and only 43.8% said their SP were "very"- or "exceptionally user-friendly" in terms of ease of navigation, tool accessibility and overall usability. The ratings of user-friendliness were as follows when broken down by type of dentist: general dentists (40.8%), oral and maxillofacial surgeons (40.0%), with a slight increase for periodontists (53.9%) and prosthodontists (66.7%). Of those who responded, 93.8% said they would recommend their current SP either with some or without reservation. Specific features that respondents found valuable include but are not limited to the learning curve, integration ability, paralleling implants, and ease of use.

Go Back to List of Presenters

Go Back to List of Presenters

Conclusion: Switching dental implant SP was not uncommon. In addition, most dentists did not find their dental implant SP to be very or exceptionally user friendly, although 93.8% recommended their current SP. Ratings of user-friendliness appeared to be higher for periodontists and even more so for prosthodontists.

15. A Comparison Study of the Average Decibel Levels of Restorative Procedures at the North Clinic to the South Clinic Regarding Operator Risk

Farah Ali and Jack Schoenfelder
Mentors: Lisa Moravec and Dr. Shayla Yoachim

Occupational noise exposure in dental clinics poses risk to the long-term hearing health of dental professionals. The noise levels in dental college clinics are high due to dental equipment and multiple users. The National Institute for Occupational Safety and Health (NIOSH) recommends keeping workers' noise exposure below 85 dB(A) for 8 hours a day to prevent hearing loss. This research investigates potential differences in average decibel levels generated during restorative procedures across two clinic locations at the College of Dentistry (COD): North Clinic vs South Clinic. The study aims to test the hypothesis that the North Clinic, due to its small operatory space, produces greater occupational noise compared to the South Clinic. Decibel X mobile application was selected for its reliability and precision and carried by participating dental student to collect data during standard restorative procedures in both clinics. The study utilizes a direct measurement approach to quantify average decibel levels. The findings indicate that there is no significant difference (t=-0.3685, p-value=0.721) in mean sound pressure level between North and South clinics during restoration purposes. Study limitations included a small sample size due to limited restorative procedures performed by the participating dental student. Further investigation is warranted to increase sample size and compare noise exposure for different dental procedures.

16. Disciplinary Actions Against Nebraska Professional and Occupational Licenses

Trey Asher and Mason Jensen
Mentor: Dr. M.W. Vogt

Background: Disciplinary actions throughout the state of Nebraska have been expressed in various professions. The study conducted examined individuals in a wide variety of health care related occupations that have violated state law in some fashion. Data extends into specific penalties given to enforce legal action on various unlawful duties.

Methods: 43 occupations licensed by the Department of Health and Human Services were included. Analysis of each occupation and the number of licenses revoked were examined. Specific disciplinary actions taken against dental professionals was analyzed and categorized. A total of 1544 disciplinary action cases were recorded and analyzed between August 2014 – August 2024. Furthermore, data was separated based on the career professions that ranged from blue to white collar. Data was also collected analyzing the number of licenses revoked amongst the professions analyzed.

Results: Data was first broken down to analyze the different levels of discipline and the number of cases associated with each. In the data collected, probation/suspension was the leading discipline associated with dental professionals. Another graph was computed showing the total number of disciplinary actions per career. Nursing was the leading job associated with disciplinary course, with dentists making up only 2%. The "other" group consisted of careers ranging from other health care professions to blue collar workers. This group consisted of 39 different occupations and made up a total of 58% of cases. The final data analysis looked at number of licenses revoked per career. In the data collected, a total of 2% of dentists voluntarily revoked their licenses. In total, 85 cases of voluntary surrendering of professional licenses occurred between August 2014-August 2024.

Conclusion: The lead profession associated with disciplinary action was nursing. Probation/suspension, as recorded by the state of Nebraska, made up the most cases of disciplinary action of dental professionals. In total, dentists made up 1.7% of disciplinary actions among the careers studied. Further analysis showed dentists made up 2% of the 85 total voluntary licenses that surrendered between August 2014 – August 2024.

17. Sterilization costs of no-show appointments in undergraduate clinic, UNMC COD 2024

Aspen Auel and Dayne Thomas
Mentor: Rhonda Simpson

Overhead costs are one of the many essential factors one must consider when operating a dental practice. Preparing for appointments is one of these overhead expenses, and as dental students, that may be easily forgotten. Students receive all instruments and cassettes in sterilized bags with individual chemical integrators, indicating they have been properly sterilized and are safe to use. In UNMC COD's undergraduate clinic, these bags tend to be opened before the patient shows up. While over-preparedness may help dentists succeed when the patients do show up, it may be hurting overhead costs when the patient misses without warning. The goal of this research study is to analyze the prevalence of no show appointments in the undergraduate clinic at UNMC College of Dentistry in 2024 and its effect on the school's overhead costs, specifically relating to dental sterilization bags and chemical integrators. This research can be used to educate students about the costs of setting up prematurely and can give perspective on how they want to approach overhead costs and no show appointments in the future. This data may also be used to determine a protocol to decrease overhead expenses in the undergraduate clinic at UNMC COD. Data was collected from UNMC COD's electronic dental records, the dental store, and the instrument management center. The combined data was then analyzed to determine the amount of money wasted due to sterilization bags and integrators at each no show appointment in the undergraduate clinic and the collective cost of no show appointments in 2024. The impact this research has on UNMC COD is that it could reduce unnecessary costs for no show appointments. For students this can help them think about how they want to handle set up protocol in their future practice. This research can help make the UNMC COD and its future alumni practices more efficient.

18. The Impact of Mental Health and Bruxism on Occlusal Characteristics in First-Year Dental Students

Alex Dyke and Ashley Bush
Mentors: Dr. Amanda Wobido and Dr. Makena Sundine

This study assesses the relationship between mental health, bruxism, gender, and occlusal characteristics in first-year dental students. Eligibility criteria included enrollment in the dental program as a first-year dental students in the years of 2023 and 2024, and being between 20 and 35 years old. Exclusion criteria included active orthodontic treatment or missing permanent first molars. Participation was voluntary, with written informed consent obtained. Seventy-five participants (30 from the Class of 2027, 45 from the Class of 2028) provided demographic information (age, gender, year in dental school, orthodontic treatment status), completed validated bruxism and mental health questionnaires, and underwent a clinical occlusal examination using the Occlusense digital device. Bruxism was identified using a validated six-question survey, while mental health was assessed with the Depression, Anxiety, and Stress Scale (DASS-21). Occlusal analysis included maximum intercuspation (MI), lateral movements, and incisor guidance, with total and high contacts measured at MI. Descriptive statistics summarized the sample (64% female, 42.7% reported bruxism), with anxiety levels ranging from normal (56%) to extremely severe (2.7%), depression from normal (70.7%) to severe (5.3%), stress from normal (62.7%) to extremely severe (2.7%). Spearman correlation analysis revealed a strong relationship between total number of contacts and high contacts ($p = 0.702$, $p < 0.001$), but found no significant association between bruxism and mental health scores ($p > 0.05$). Mann-Whitney U tests showed no significant differences in mental health levels between bruxism groups or academic years, though gender differences in anxiety approached significance ($p = 0.062$). Logistic regression revealed a significant interaction effect between anxiety and gender on bruxism ($p = 0.013$), suggesting anxiety was more strongly linked to bruxism in females. Multivariate analysis (GLM) confirmed this interaction but found no significant effects on occlusal characteristics ($p > 0.05$). These findings suggest anxiety and gender interact to influence bruxism, but occlusal characteristics remain independent of psychological factors. This study highlights the need to consider gender differences in the mental health–bruxism relationship but does not support a direct link between mental health, bruxism, and occlusal factors.

19. Emergency Department Prescribing Patterns Among Adults Patients with Non-Traumatic Dental Conditions

Emily Carlson and Erin Alexander
Mentor: Dr. Sarah Lowman

The purpose of the study is to explore factors that are associated with prescribing patterns among adult dental patients that present to the Emergency department with non-traumatic dental conditions. By doing this study, we hope to increase knowledge and understanding of how and when antibiotics and opiates are used to treat non traumatic dental conditions according to JADA guidelines. We intend to use data from 2019-2023 at Nebraska Medicine's main emergency department, looking at the following: -insurance status (medicaid/medicare, private insurance, none)-patient age-patient MRN-diagnostic codes/chief complaints-treatment rendered/prescribed-provider at discharge) Odds ratios with 95% confidence interval will be used to identify statistically significant differences between patients that are prescribed an antibiotic/opiate vs. patients that are not when correlated with the independent variables. Variables that were statistically significant in the bivariate analyses will be included in multiple logistic regression models to identify correlates of antibiotic prescribing patterns. We hope this research will allow us to better understand how and when antibiotics and opioids are used to treat non-traumatic dental conditions that may or may not be the standard treatment specified by the ADA.

20. Genetically rescuing cleft palate: a potentially novel approach to correct palate cleft in TGFβ3 -/- mice

Mikah Hoppens and Tanner Delaney
Mentors: Dr. Nam Ha, Nuhad Khan, Mia Kennedy, and Dr. Ali Nawshad

Failure in palatal shelf fusion during palate development results in cleft palate, which is one of the most common birth defects in the US. During the final phases of palatogenesis, the palatal periderm (a protective cell layer that prevents premature adhesion) must be removed, which is a prerequisite for the establishment of the midline seam in the fused palate. Previous studies have shown that transforming growth factor-β3 (TGFβ3) plays an irreplaceable role in palate development in both mice and humans. These studies have outlined the role of TGFβ3 and a regulatory feedback loop between ΔNp63 and Irf6 in differentiating oral/palatal epithelial cells that are potentially dependent on functional TGFβ3 signaling. Our goal in this research is to answer the question "Can Tgfb3-/- palatal fusion defects be corrected through the timely induction of periderm desquamation?" We investigated the mechanisms by which Tgfb3-/- induced cleft palate can be rescued via in vivo manipulation of ΔNp63 and Irf6 genes in triple transgenic TGFβ3, Irf6, and ΔNp63 mouse model systems. Our hypothesis is that the timely removal of the periderm or addition of the key peridermal regulators ΔNp63 and Irf6 in Tgfb3-/- mice will rescue defective palatal shelf adhesion. To test this, we utilized the K14Cre-loxp genetic recombination system to create trans-

Go Back to List of Presenters

Go Back to List of Presenters

genic mice followed by innovative micro-CT imaging, Hematoxylin-Eosin (H/E) and Safranin O staining of newborn pup skulls. Imaging data, width of cleft, and cross-sectional area of palates were all collected. Our results demonstrate that induction of ΔNp63 in Tgfb3-/- mice rescued cleft palate in 40% of mice, as hypothesized. However, induction of Irf6 in Tgfb3-/- mice did not rescue cleft palate. This unique observation agrees with our hypothesis that TGFβ3 and ΔNp63 play crucial roles in periderm morphogenesis and desquamation and is dependent on functional TGFβ3 signaling. However, while IRF6 is necessary for palatal fusion, it is not dependent on functional TGFβ3 signaling. We propose that IRF6 has its own independent pathways in palate development. Our study presents a new paradigm with significant conceptual advances in understanding the hierarchical order TGFβ3, IRF6, and ΔNp63 and is critical in the development of approaches to prevent cleft palate as well as in the development of therapeutic strategies.

21. Analyzing Trends in American Dental School Admissions Criteria from 2000-2023

TJ Haith and Zane Leibhart

Mentor: Dr. M.W. Vogt

The ability to evaluate applicants through their prior academic history, as well as the Dental Admissions Test (DAT) is a key part of evaluating a candidate for potential admission into a dental school program. There are no current available studies that have directly correlated undergraduate GPA and DAT scores with performance in dental school, however a study conducted on veterinary students found that undergraduate GPA as well as their standardized admissions test (GRE) have significant predictive ability on the success of students once in professional school. We wanted to examine trends in these admissions criteria to inspire further research in the field. This study aims to evaluate trends in undergraduate students' GPA and DAT scores for those applying and admitted to dental school, as well as demographical t trends in recent years. Historical data from 2000-2023 application cycles to dental school through AASDAS was sourced from the ADEA.org website. This admissions data was analyzed for trends using a linear regression, and it was found that there has been a significant increase in mean GPA and DAT scores of both applicants and enrollees of dental schools since 2023. Moreover, male enrollees have not significantly increased or decreased, but female enrollees have significantly increased since 2000. More studies in the future should be conducted to further analyze how past GPA and DAT score correlates with performance, both academically and clinically, in dental school students. Possible studies between current DAT scoring and the new DAT scoring method should be conducted in the future.

22. Effects of e-Cigarettes on the Roughness and Color Stability of Composite Resin Materials

Kendra Kozisek and Faith Harris

Mentors: Dr. Mark Beatty and Dr. Amanda Wobido

The increasing use of e-cigarettes has raised concerns within the dental community regarding their potential effects on oral health. While prior research has primarily focused on traditional smoking, limited studies have examined how vaping—containing chemicals such as propylene glycol, glycerin, and flavoring agents—impacts composite resins. This study investigates the effects of e-cigarette exposure on the color stability and surface roughness of nanofilled and microhybrid composites. A total of 30 composite discs were fabricated, with 15 from a nanofilled composite and 15 from a microhybrid composite. Each composite type was divided into three groups (n = 5 per group) based on nicotine concentration (0, 3, and 6 mg/mL). The discs were exposed to e-liquid vapor using a fog machine, with 60 mL of vape liquid delivered in cycles of 50 seconds of exposure followed by a 50-second wait time. Surface roughness (Ra) and color change (ΔE) were measured before and after exposure. Data were analyzed using repeated-measures ANOVA for Ra and one-way ANOVA for ΔE, with post hoc comparisons using Tukey's test (a = 0.05). Microhybrid composites exhibited a greater increase in roughness compared to nanofilled composites (p = .029), with mean Ra values increasing from 0.186 µm to 0.374 µm. Nicotine concentration did not significantly affect Ra (p = .278). However, ΔE was significantly influenced by nicotine concentration (p < .001), with the 3 mg/mL nicotine group showing the highest color change (ΔE = 0.727, p < .001). A significant interaction between composite type and nicotine concentration was also found (p < .001), indicating that color change varied based on both factors. Despite these changes, ΔE values remained below the clinical perceptibility threshold of 3.3, suggesting limited esthetic impact. These findings suggest that vaping affects both surface roughness and color stability, with the extent of change dependent on composite type and nicotine concentration. Further studies should investigate the effects of prolonged exposure to determine potential clinical significance.

23. Ergonomic Assessment of First-Year Dental Students At UNMC College Of Dentistry: Correlations Between RULA Scores, Pain Reports, and Loupe Usage

Kenedi Holck, Nori Khalaf, and Payton Swanson (OT Student)

Mentors: Dr. Amanda Wobido and Dr. Stacy Smallfield

Objective: This study aimed to evaluate the ergonomic risks faced by first-year dental students by analyzing Rapid Upper Limb Assessment (RULA) scores, self-reported pain and discomfort, loupe usage, and common ergonomic issues during clinical procedures.

Methods: A descriptive, cross-sectional study design was employed, utilizing data collected as part of clinical training for first-year dental students at the University of Nebraska Medical Center College of Dentistry in Spring 2024. Baseline demographic and clinical practice data were collected alongside self-reported pain and discomfort surveys. Ergonomic assessments were conducted using RULA, which evaluated students' posture, muscle activity, and task-specific forces. Personalized ergonomic reports provided actionable recommendations to improve posture and reduce strain. The collected data were de-identified and analyzed to explore relationships between RULA scores, pain reports, and loupe usage.

Results: Preliminary analyses indicate that ergonomic risks, as measured by RULA scores, are correlated with self-reported pain frequency, severity, and interference with work. The type of loupes used (traditional vs. ergonomic) showed potential associations with more favorable RULA scores and reduced musculoskeletal strain. Common areas of discomfort reported included the neck, back, and shoulders. Statistical analyses are underway to determine the strength and significance of these relationships.

Conclusion: Ergonomic risks and musculoskeletal discomfort are prevalent among first-year dental students. Integrating ergonomic assessments and individualized feedback into dental curricula can play a critical role in mitigating these risks. Findings from this study provides evidence-based recommendations for improving ergonomic practices and enhancing student well-being, including optimizing loupe selection and posture during clinical procedures.

24. The effectiveness of detecting plaque on tooth surfaces using traditional and AI monitoring

Carter Meyer and Samantha Hunter

Mentor: Dr. Richard Reinhardt

Microbial plaque accumulation is a key factor in oral health, yet the optimal method for efficient assessment remains an area of investigation. This study evaluates the correlation between full-dentition microbial plaque scores and those of select teeth to determine whether targeted assessments can serve as reliable indicators of overall plaque buildup. The hypothesis suggests that plaque accumulation on individual teeth mirrors patterns observed across the entire dentition, enabling efficient data collection and analysis.

Additionally, this research explores the application of Dental Monitoring® imaging technology in identifying plaque indices and facilitating remote plaque evaluation. By comparing manually recorded full-dentition plaque scores with those derived from Dental Monitoring® images, the study aims to assess the viability of AI-assisted remote monitoring in dental practice. The null hypothesis states no statistically significant difference between full-dentition plaque scores and those of select teeth, as well as between manual plaque scores and those obtained via Dental Monitoring®.

If validated, these findings could streamline clinical plaque assessments, reduce in-office examination times, and support remote patient monitoring. The results may provide a foundation for broader adoption of AI-driven dental imaging, improving early plaque detection and preventive care in both clinical and home settings. This study holds the potential to enhance efficiency in dental evaluations while maintaining diagnostic accuracy, ultimately contributing to improved oral health outcomes.

25. Perceptions and Adoption of Teledentistry in Nebraska: A Survey-Based Study

Eugene Kim and Jose Mendoza

Mentor: Dr. Sarah Lowman

Background: Teledentistry is emerging as a transformative tool in dental healthcare, offering remote consultations and improved accessibility. However, adoption among dental professionals in Nebraska remains uncertain. This study explores the perceptions, usage, benefits, and challenges associated with teledentistry.

Methods: A survey was distributed to dental professionals in Nebraska, gathering 56 responses. Due to the low response rate (385 responses required for statistical significance at α = 0.05), findings provide preliminary insights rather than definitive conclusions. Participants answered questions regarding familiarity, usage, interest, perceived benefits, challenges, and future participation in teledentistry.

Results: The majority of respondents were familiar with teledentistry but reported limited usage. Key perceived benefits included improved access to care and reduced unnecessary in-person visits. Major challenges cited were concerns about reimbursement, technology integration, and staff training. Interest in incorporating teledentistry into practice varied, with some practitioners hesitant about its feasibility and effectiveness.

Conclusion: While teledentistry is recognized as a beneficial tool, adoption remains limited due to logistical and financial concerns. Future efforts should focus on addressing these challenges through policy development, education, and technological support to enhance implementation within the dental community in Nebraska. Further research with a larger sample size is needed to validate these findings.

26. Impact of Learning Modality on Quality of Radiographic Communication between Dental Student and Standardized Patient

Kathryn Benson and Rachael Krinke

Mentor: Dr. Shayla Yoachim

Background: Effective clinical communication and the application of dental radiology knowledge are essential skills for dental professionals. Traditional lecture-based instruction has been the standard in dental education but increasing curricular demands have encouraged the integration of interactive E-modules. While E-modules enhance learner engagement and support knowledge acquisition, their effectiveness in developing clinical communication skills and applying theoretical knowledge in practice is unclear. Previous research suggests

Go Back to List of Presenters

Go Back to List of Presenters

that eLearning can promote critical thinking, but its impact on clinical performance requires further investigation. This study evaluates how E-modules and traditional lectures influence dental students' confidence and ability to apply radiology knowledge in clinical communication settings.

Materials and Methods: An E-module on dental caries diagnosis, developed by UNMC faculty and students, was compared to an equivalent lecture. Fifty-two first-year dental students were randomly assigned to either the E-module or lecture group. Students reviewed marked radiographs for caries diagnosis, and their interactions were recorded for assessment. Performance was scored on communication quality, diagnostic accuracy, confidence, body language, and learner reflections. Two project creators and standardized patients conducted the evaluations.

Results and Conclusions: Pre-intervention confidence in basic dental radiology did not significantly differ between groups (p=0.57). Post-intervention confidence in radiology knowledge (p=0.82) and clinical communication abilities were also similar across groups. However, standardized patient scores significantly favored the lecture group (mean 11.1, SD 2.20) over the E-module group (mean 9.2, SD 2.10) (p<0.01). Researcher assessments also showed higher mean scores for the lecture group (10.9, SD 2.30) compared to the E-module group (7.9, SD 1.90) (p<0.01). While learning modality did not impact confidence, lecture-based instruction led to better clinical communication performance.

27. Nebraska's Drinking Water Nitrate Levels Effect On Oral Cancer

Alyson Kuehn and Kesean Bundy
Mentors: Dr. Gregory Oakley, Dr. Corinne Van Osdel, and Kaeli Samson

Background: This study examined the effect of levels of nitrates in drinking water in Nebraska to explore any correlation to oral cavity and pharynx cancer (OC). Higher rates of fertilizer used in rural counties suggest elevated nitrate levels in drinking water. It's hypothesized that if levels of nitrate are increased in the drinking water, then higher incidences of oral cancer will be present.

Materials and Methods: The age-adjusted incidence of OC by county in Nebraska from CDC National Cancer Institute (2017-2021) will be analyzed against data from Nebraska Groundwater Quality Clearinghouse levels of groundwater nitrates (2017-2021) for each county. Only counties with more than 3 cases of OC were included in the statistical analysis (N=17). Maximum nitrate level was used for any facility that had more than one recorded level. State farmland acres for each state in the U.S.A was analyzed against the oral cancer age-adjusted incidence to check for correlation. Nitrate levels in counties with available oral cancer data were compared to those without, to assess whether the counties that were not included could have potentially altered results of the study. Statistical tests were run to determine correlations in nitrate levels and oral cancer.

Results and Conclusions: There was no significant correlation between county-averaged maximum facility nitrate values and county age-adjusted incidence rates (per 100,000) of OC (rho=-0.09, p=0.74). There was no significant correlation between state farmland (in 1000's of acres) and state age-adjusted incidence rates (per 100,000) of OC (rho=-0.02, p=0.91). There was no significant difference in the distribution of county-averaged maximum facility nitrate values between counties that had OC incidence data available (median=5.9(IQR:4.0, 6.7)) and those which did not (median =6.3(IQR:4.1,9.6)),p=0.29. These findings suggest no clear relationship between nitrate levels in drinking water and OC incidence in Nebraska. However, given that nitrates are linked to other cancers, further research with more comprehensive data is necessary to determine if nitrate levels impact oral cancer.

28. Impact of Polishing Systems on the Surface Roughness of Resin Composites?

Elaina Spanel and Logan Spanel
Mentor: Dr. Amanda Wobido

The surface roughness of resin composites affects esthetics, wear resistance, and plaque accumulation, making effective polishing essential for clinical longevity. This study evaluated the effectiveness of various polishing systems in refining composite surfaces, starting from either an initially smooth or initially rough condition. A nanohybrid composite was used to fabricate standardized discs, which were mechanically abraded with sandpaper to simulate either a high-roughness surface (mimicking an unfinished restoration) or a low-roughness surface (simulating a pre-polished composite). The discs were polished according to the manufacturer's instructions using one of seven polishing systems: Jiffy Polishers (Ultradent), Brasseler Universal Polisher (Brasseler USA), Enhance Finishing System (Dentsply Sirona), Sof-Lex Discs (3M/Solventum), Brownie/Greenie/Supergreenie Polishers (Shofu), carbide finishing bur, or diamond finishing bur. Surface roughness (Ra, in micrometers) was measured before and after polishing. Paired t-tests compared surface roughness before and after polishing, and one-way ANOVA with Tukey's test compared final roughness among polishing systems. In the initially rough group, all polishing systems significantly reduced roughness ($p < 0.05$), except for the diamond finishing bur, which increased roughness from 0.98 ± 0.04 µm to 1.21 ± 0.25 µm ($p = 0.015$). Sof-Lex Discs produced the smoothest final surface (0.28 ± 0.04 µm), followed by Jiffy Polishers (0.34 ± 0.04 µm) and Brasseler Universal Polisher (0.39 ± 0.04 µm). In contrast, the carbide finishing bur (0.89 ± 0.13 µm) and diamond finishing bur (1.21 ± 0.25 µm) left significantly rougher surfaces, suggesting these burs alone are insufficient for achieving an optimal finish. For the initially smooth group, polishing results varied. Enhance Finishing System best preserved surface smoothness, whereas the carbide and diamond finishing burs significantly increased roughness ($p < 0.001$), with the diamond bur producing the highest post-polishing roughness (1.21 ± 0.44 µm). Overall, Sof-Lex Discs were the most effective system for refining rough composite surfaces, while Enhance Finishing System best preserved the smoothest initial condition. Conversely, carbide and diamond finishing burs resulted in significantly higher residual roughness, reinforcing the importance of using dedicated polishing systems after carbide and diamond burs to achieve optimal surface smoothness, reduce plaque accumulation, and enhance restoration longevity. The effectiveness of a polishing system depends on the initial surface condition, highlighting the need for careful selection to optimize clinical outcomes.

29. Assessing Dental Students' Ability to Identify Signs and Symptoms of Depression, Anxiety, and Burnout

Brad Schoch and Preston Macdonald
Mentor: Dr. Larry Crouch

Mental health disorders, including depression, generalized anxiety, and burnout, are widespread among dental professionals and students driven by high academic and clinical demands, prolonged exposure to stressful environments, and the pressure to maintain high standards of patient care, all of which can significantly impact their overall well-being and professional performance. While numerous studies highlight the prevalence of anxiety, depression, and burnout among dental professionals and students, our focus was on their ability to recognize the differences between these conditions, empowering them to seek the most appropriate self-care and professional support. This study aimed to assess whether dental and dental hygiene students at UNMC College of Dentistry could accurately identify the symptoms of these disorders. The authors hypothesized that students would struggle to differentiate between depression, anxiety, and burnout symptoms.

A survey was developed based on three validated instruments: the Patient Health Questionnaire-9 (PHQ-9) for depression, Generalized Anxiety Disorder-7 (GAD-7) for anxiety, and the Maslach Burnout Inventory (MBI) for burnout. Findings revealed that students at UNMC College of Dentistry frequently misidentified or overgeneralized symptoms, often attributing a single symptom to multiple disorders or confusing one condition for another. These results underscore the critical need for targeted mental health education to enable early and accurate identification, as effective treatments for these conditions vary significantly.

30. Accuracy Of Virtual Surgical Planning In Bimaxillary Orthognathic Surgery

Logan McNeil
Mentor: Dr. Minnie Vishawanath

Objectives: To evaluate the accuracy of virtual surgical planning (VSP) in Class III malocclusion patients undergoing Lefort I or segmental Lefort I osteotomy with bilateral sagittal split osteotomy by quantifying the differences between the planned and actual surgical outcomes.

Methods: A sample population was collected from a medium sized university practice in a midwestern state. Thirty consecutively operated Class III malocclusion patients that underwent bimaxillary orthognathic surgery had their surgical movements simulated by adjusting the presurgical CBCT using 3D Systems VSP software®. A postsurgical CBCT scan was obtained within one week after the completion of the surgery. The presurgical VSP adjusted CBCT was then superimposed on the postsurgical CBCT, and linear differences were calculated in the x, y, and z coordinate system.

Results: There was a statistically significant difference between the planned surgical outcome and the actual surgical outcome for the anterior nasal spine in the x plane (p=.0453) and the A point in the x plane (p =.0446). The average difference between the planned and actual surgical outcome for the anterior nasal spine, A point, B point, and pogonion in the x, y, and z planes was .36 mm, .34 mm, .60 mm. and .62 mm respectively. The largest difference seen between the planned and actual surgical outcome was for the mesiobuccal cusp of the lower left anterior molar with an average movement in the x, y, and z planes of .73 mm. Repeated independent samples t-tests were performed for each variable considered.

Conclusions: VSP is accurate to within three quarters of a mm and therefore it can be used to increase surgical accuracy and improve outcomes.

31. Examining the Mental Health Status of Dental Students in the Midwest

Shayla Meyer and Anna Campbell
Mentors: Dr. Sarah Fischer and Dr. Steven Wengel

Mental health in young adults, especially those in graduate-level education, continues to be an under-studied and under-evaluated research topic. Dental students endure four years of rigorous courses, pre-clinical, and clinical work that may negatively affect a person's overall mental health and well-being. To better understand the effect dental school has on its students, a survey was sent to all dental students at the UNMC College of Dentistry during the 2023-2024 and 2024-2025 fiscal years. The survey consisted of (number of questions) questions compiled from the Generalized Anxiety Disorder-7 (GAD-7) survey, Patient-Health Questionnaire-9 (PHQ-9), and the Mini-Z Burnout Questionnaire. Data from this survey was used to analyze dental school's effects on UNMC dental students and to determine if there were any changes in mental health within the same year of schooling during different school years. Our hypothesis for this study is that there will not be a significant difference in mental health conditions within a certain school level between the different school years. With our data, we discovered that the depression, anxiety, and burnout scores of the 2024 first and third-year dental students were significantly different from the 2025 years (except the burnout scores of the 2024 third-year students were not significantly different from the 2025 third years). This indicates that the 2024-2025 school year had worse mental health scores than the 2023-2024 school year. Since these results suggest that mental health scores in dental students have become worse in the last year, we conclude that it is important for dental students to have access to mental health resources.

Go Back to List of Presenters

Go Back to List of Presenters

32. Impact of Sphenoid Expansion on Cranial Base Morphology; Exploring relationships between sphenoid and maxillo-mandibular dimensions

Julia Reimer and Lauren Riley
Mentor: Dr. Shayla Yoachim

Craniofacial features, including the sphenoid and dental arches, may be subject to evolutionary changes influenced by environmental and lifestyle factors. Previous studies have shed light on the impact of diet, specifically masticatory-heavy whole and unprocessed foods, on arch expansion, suggesting an interplay between forces at the TMJ and expansion of the cranial base. This study explores the relationship between cranial base expansion and the development and expansion of dental arches, hypothesizing that the width of the sphenoid dictates the width of the dental arch, and that the widths are becoming smaller in younger generations, which may be, in part, associated with dietary changes to more soft, processed foods . A sample of patients at the University of Nebraska Medical Center with head and neck computed tomography (CT) imaging were selected for data collection on Change Healthcare PACS imaging system. Once optimally aligned, axial measurements of mandibular condylar width and maxillary tuberosity width as well as coronal measurements of lateral pterygoid plates were taken. A total of 113 patients were analyzed, 51 females and 62 males. Descriptive statistics, means and standard deviation, median and interquartile range, range, and counts and percentages, were used to summarize the dental measurements across age groups and sex. A significant positive correlation exists between sphenoid width and maxilla width in both females ($p \leq 0.05$) and males ($p \leq 0.0001$). This suggests that there is a positive relationship between sphenoid expansion and maxilla width. Similarly, a significant positive correlation between the sphenoid and condyle width was observed in both females ($p < 0.01$) and males ($p < 0.01$). Aligning with previous studies indicating generational changes in the dimensions of the skull and dental arches, our data reveals a trend in narrowing maxillary and mandibular dimensions which directly correlates to age. While the generational window captured by this data is relatively small, further study is warranted to elucidate the significance of this trend over time.

33. The Effects of Energy Drink Acidity on Enamel Hardness: An In Vitro Study

Jacob Wiesen and Joshua Roh
Mentor: Dr. Makena Sundine

The rising popularity of energy drinks, often marketed as "healthy" alternatives, has raised concerns about their impact on dental health. Many of these beverages contain high levels of acidity, which can lead to significant demineralization of tooth enamel. Enamel erosion is irreversible and can result in increased tooth sensitivity, decay, and costly dental treatments. Previous research suggests that the low pH of energy drinks may reduce enamel hardness, accelerating these harmful effects.

This in vitro study aims to investigate the hypothesis that the acidic nature of energy drinks contributes to a reduction in enamel hardness. The study included five beverages: Celsius, Bublr, Gatorlyte, Coca-Cola, and saline, the latter serving as a control. The pH of each beverage was measured using pH strips, and enamel hardness was assessed using the Vickers hardness test, a widely used method for evaluating material strength. Extracted, non-carious teeth (N = 10) were immersed in the beverages for 24, 48, and 72 hours, with hardness measurements taken after each interval. This experimental design aims to mimic prolonged exposure to acidic beverages over time. Results are pending, but findings could provide valuable insights into the risks associated with frequent consumption of acidic drinks and guide recommendations for dental health.

34. Print Orientation and Mechanical Performance: A Tensile Strength Analysis of 3D-Printed Mouthguard Materials

Nathan Slusarski
Mentor: Dr. Gregory Bennett

Digital dentistry has significantly advanced, allowing dental providers to fabricate custom dental appliances with increased precision. This study investigates the effects of print orientation on the tensile strength of KeyPrint KeyGuard, a recently developed 3D-printable mouthguard material by Keystone Industries. Due to the novelty of this photopolymer resin, there is limited literature on how orientation during vat polymerization—such as Digital Light Processing (DLP) and Liquid Crystal Display (LCD) printing —influences its mechanical properties. KeyPrint KeyGuard is composed of 2-hydroxyethyl methacrylate and thermoplastic olefin (TPO). To assess the impact of print orientation, strips of the mouthguard will be printed in vertical, horizontal and diagonal (45°) orientations utilizing the Phrozen Sonic Mini 4K LCD printer. Post-processing will be performed using Sprintray Procure 1. Tensile strength testing will be conducted using an Instron Model 5500R testing system, generating stress-strain curves for each orientation. Data will be analyzed using one-way ANOVA test to quantify the magnitude of differences. Findings from this study will provide insight into the optimal printing orientation for maximizing the tensile strength of KeyPrint KeyGuard mouthguards. This information is crucial for dental providers and lab technicians to ensure proper fabrication techniques, potentially enhance the longevity of mouthguards for athletes, and minimize material waste.

35. Artifacts Generated by Pediatric Stainless Steel and Zirconia Crowns on MR and CT Head and Neck Imaging

Jaclin Stonacek and Ashley Suchyta
Mentor: Dr. Tracy Peitz

Pediatric patients who require frequent 3D imaging for medical purposes undergo standard MRI and CT imaging. Stainless steel crowns (SSCs) and preformed zirconia crowns (PZCs) may result in distortion of 3D imaging as metals are known to cause distortion in both MRI and CT images. Prior research on PZCs revealed artifacts consistent with its high atomic number and radiopaque appearance. The purpose of this study is to examine the artifacts created on head and neck MRI and CT images by SSCs and PZCs. The study consists of patients seen at Children's Nebraska for head and neck MRI and/or CT imaging after full mouth oral rehabilitation (FMOR) between 01/01/23 - 12/20/23. They were 19 or younger at the time of imagining and have both PZCs and SCCs present. A practicing radiologist at Children's Nebraska assessed the 3D imaging using the T2 axial sequence to view artifacts. Artifacts were assessed by image type separately for each crown using Fisher's Exact tests. Our research finds that an artifact is present with both SSCs and PZCs and is dependent on which 3D imaging was used. CT imaging generates greater artifacts with PZCs while MR imaging generates greater artifacts with SCCs. Our findings indicate that pediatric patients requiring frequent 3D imaging for medical purposes would benefit more from MR imaging if they have PZCs and from CT imaging if they have SCCs as each respective modality exhibited the least amount of distortion.

36. Non-sterile vs Sterile Glove Infection Rates in Surgical Dental Procedures

Conner Ulrich and Jacob Olsen
Mentor: Dr. J. Bruce Bavitz

Best practice guidelines for oral surgical procedures from the Center of Disease Control include the use of sterile gloves. This research study was performed to investigate the relationship between oral surgical procedure infection rates and the use of sterile or non-sterile gloves. Information for the study was gathered from dentists in Nebraska via a Google survey. The survey specifically asked about glove usage for implant, surgical extraction, and bone grafting cases. Dentists were asked to include their surgical case infection rates as well as information regarding their personal protocols in place for sterile glove use.

After 189 responses, we found that 39% of dentists use sterile gloves for implant cases, 19.6% for surgical extractions, and 33.5% for bone graft cases. Overall, 97% of responders estimate an incidence of postoperative infection at 20% or less. The most common reported reason for not using sterile gloves was no significant change of infection rate.

It can be suggested that a majority of dentists in Nebraska do not use sterile gloves for these three surgical procedures, and the incidence of postoperative infection remains low. No significant change in infection rate, cost, and convenience are reasons that dentists have not been using sterile gloves.

37. Caregiver's Accuracy in Assessing Child's Oral Health Disease and What Influences Seeking Care

Kate Ewing and Emma Verbrugge
Mentor: Dr. Alexandra Bilunas

BPurpose: This study investigates the accuracy between caregiver's perception of their child's oral health status and the determined oral health status from a clinical exam. It was hypothesized that caregivers will perceive the child's oral health status better than determined clinically.

Methods: A survey approach was used alongside an intra-oral clinical exam. The parent filled out the survey prior to the exam. The 15-question survey queried demographics, household income, insurance coverage, reasons for seeking dental care, and the estimated number of carious teeth. After survey completion, a routine intra-oral exam of the child was completed by a student dentist overseen by pediatric faculty. The clinical oral health status was represented by the DMFT score from the charted odontogram. Survey results were analyzed alongside clinical findings by a statistician to draw conclusions between perceived oral health and clinical health status. Odds ratios with a 95% confidence interval were used to identify statistically significant differences.

Results: Intra-oral conditions described as "fair" vs. "very good" revealed statistically significant respective DMFT scores of 9 and 0. Dental health categorized as "poor/fair" was associated with a median DMFT of 8, while "good/very good" corresponded with a median DMFT of 2. Regarding the number of cavities present, caregivers who responded "none" and "1-5" were correlated with higher DMFT means of 2.32 and 5.95, respectively.

Conclusion: In conclusion, parents were able to accurately categorize the overall condition of their child's oral health but may be underestimating the total number of carious teeth.

38. CBCTs in Nebraska General Dentist Practices

Pierson Foi and Gracie Smith
Mentor: Dr. M.W. Vogt

39. Adoption of Dental Implant Software and Technology by Nebraska Dentists

Luke Andreasen and Payton Alber
Mentors: Dr. Kavya Shankar Muttanahally, Dr. Jeffrey Payne, and Kaeli Samson

Objectives: To evaluate the flexibility and versatility of software programs (SP) used by Nebraska-licensed dentists for dental implant treatment planning, assess whether cone beam computed tomography (CBCT) is considered the standard of care (SOC) for dental implant treatment planning, and explore the utilization of surgical guides for implant placement.

Methods: A 2022 list of all Nebraska-licensed dentists (1,736 individuals, Nebraska.gov) was narrowed down to 657 dentists who may place dental implants based on practice websites. Of these dentists, 154 (23.4% response rate) responded to our online survey that was emailed. One-hundred respondents passed the initial screening question by confirming they surgically place dental implants. Data was summarized using frequencies and percentages.

Results: The survey revealed a diverse range of SP used for implant treatment planning, with 50.0% of respondents not-

Go Back to List of Presenters

Go Back to List of Presenters

ing that their chosen SP is very or exceptionally flexible, and 55.1% of respondents indicating their SP is very or exceptionally versatile. Additionally, 64.6% of respondents reported that their SP offers comprehensive tools for prosthetic-driven treatment planning and 96.2% indicated that their SP supports all the implant systems they utilize. Most respondents (81.7%) indicated that their SP integrates with other technologies, such as CBCT, intraoral scanners, or 3D printers. Notably, 95.1% of respondents considered CBCT as the SOC for implant treatment planning and responses were similar when broken down by type of dentist: general dentist (94.6%), oral and maxillofacial surgeon (90.0%), periodontist (100.0%), and prosthodontist (100.0%). Among respondents, 13.4% reported never using surgical guides, while 36.6% fabricate their own, and 50.0% use a dental lab for fabrication.

Conclusions: The study highlights the use of diverse SP for implant treatment planning, which the majority of Nebraska-licensed dentists considered very or exceptionally flexible and versatile, with a strong consensus on CBCT as the SOC and the commonplace use of surgical guides.

Summary: The survey revealed the use of various software programs (SP) in implant treatment planning, which most Nebraska-licensed dentists found to be very or exceptionally flexible and versatile; moreover, there was strong agreement on cone beam computed tomography (CBCT) being the standard of care (SOC) and surgical guide use was common.

40. Assessing multiple domains of wellness in dental and dental hygiene students: Questionnaire design, findings, and future directions

Sam Kline and Justin Willson
Mentors: Makayla Schissel, J. Smith, and Dr. Shayla Yoachim

Background: Mental health and wellness encompasses many parts of everyday life and can be heavily affected by professional school and heavy workloads. Dental and hygiene school incorporates didactic and clinical skills that are both vital to being successful in both fields following graduation. Sleep deprivation, lack of physical activity and decreased socialization can all negatively affect mental health. Dental school requires a significant time commitment and can alter students' ability to have a healthy work-life balance. The purpose of this study is to evaluate the wellness of dental and dental hygiene students throughout the UNMC College of Dentistry to guide the development of future wellness offerings and programming.

Materials and Methods: A Likert-scale and free response questionnaire was distributed to students in the College of Dentistry. Results were collected anonymously from 193 volunteer participants and grouped based on program type and year in school. Descriptive statistics were used to summarize responses and demographics of respondents; domain scores summed responses within wellness domains and compared via ANOVA tests. Tukey adjustments were performed to adjust for multiple comparisons. All statistical tests were performed in SAS version 9.4, two-sided, and a p-value < 0.05 was considered statistically significant.

Results and Conclusion: 193/272 students participated in the survey (~71% respondent rate); 64% identified as female, 31% as male. The majority (63%) of respondents were between 23-27 years of age. When comparing wellness domains by year in program, there was a significant difference in the spiritual/emotional wellness domains scores between D1s and D4s (24.1 ± 3.53 vs. 27.8 ± 2.40, $p \leq 0.001$). Similarly, there were significant differences between the D1 class and DH3, DH4, D3, and D4 cohorts in intellectual/occupational wellness ($p \leq 0.01$). When comparing between genders, the environmental wellness scores of females were statistically significantly greater than that of males (34.6 ± 5.51 vs. 30.4 ± 7.0; $p \leq 0.001$). Age of responding student did not have a statistically significant impact on any wellness category. Collectively, the means scores were lowest in physical wellness and financial wellness domains, which reveals a significant area of opportunity for enhanced support.

41. Retention of Oral Pharmacology Knowledge in Dental Students: Survey

Jaisleen Kaur and Priyaben Patel
Mentor: Dr. Gregory Oakley

Background: Oral pharmacology is a fundamental aspect of dental education, as it informs the management of dental patients, especially in relation to drug interactions, anesthesia, and pain management. While there has been research on improving the long-term retention of pharmacology. However, no research has been established which compares the effect of time relating to long term retention of oral pharmacology amongst dental students in managing the patient, pain and infection.

Objective: The purpose of this survey was to assess the retention of oral pharmacology knowledge in dental students.

Methods: A cohort of dental students at UNMC College of Dentistry enrolled in pharmacology course were provided with the survey via email. 10 questions were provided to the students with one-time access to the linked form. The questions were scenario based which incorporated infection control, patient and pain management. The survey questions were made using Pharmacology and therapeutic for Dentistry 7th Edition Dowd, Johnon and Mariotti eds, Elsevier 2017 and Dental boards materials.

Results: A total of 50 students participated in the survey. Averages were calculated for each evaluated category. The following results were obtained for Patient management- 70.5% Pain control- 62.2% and Infection management- 56%.

Conclusion: The survey data showed statistical difference between application of knowledge in all 3 categories.

42. Clear Cell Odontogenic Carcinoma: A Diagnostic Challenge

Dr. Otto Czechner
Mentor: Dr. Peter Giannini

A 67-year-old Caucasian female presented to the University of Nebraska Medial Center for routine prophylaxis recall. Upon examination, an asymptomatic red gingival swelling, measuring 3.0 cm x 2.0 cm, was noted in the upper right buccal vestibule, above teeth #3-5. The gingival mass was firm in consistency upon palpation with no suppuration noted. A periapical radiograph showed a unilocular radiolucency spanning from the mesial aspect of tooth #3 to the distal aspect of tooth #5. Cone-beam computed tomography (CBCT) imaging captured, displayed osteolytic destruction with non-corticated and ragged bony margins noted throughout the right maxillary alveolus from tooth #3 to tooth #8 with cortical interruptions noted on both the facial and palatal bony cortices. Involvement of both the right maxillary sinus and antrum were also noted. An incisional biopsy was conducted and microscopic analysis revealed fragments of a malignant neoplasm comprised of cohesive nests of cells that exhibit nuclear and cellular pleomorphism, increased nuclear to cytoplasmic ratio and prominent nucleoli. The neoplasm is set within a fibrovascular connective tissue stroma that exhibits prominent hyalinization around the tumor islands. Hypo-calcified fragments of viable bone are also observed. Histochemical staining, Periodic Acid-Schiff with and without diastase stains, immunohistochemical staining, and Fluorescence in situ hybridization (FISH) testing were performed to confirm the diagnosis of Clear Cell Odontogenic Carcinoma (CCOC), an rare malignant tumor of odontogenic epithelium.

43. Single cell RNA-sequencing identification of cell mediators involved in wound healing after single tooth extraction

Dr. Duke Davis
Mentor: Dr. Richard Reinhardt

Introduction: The study of wound healing has been ongoing for decades, yet the process of wound healing after tooth extraction is still not completely understood. Despite tooth extraction being one of the most frequently performed dental surgeries, it is still common to have post operative complications that can impact patient outcomes. During normal healing of a dental extraction there is bone loss and collapse of the surrounding gingiva. Bone resorption occurs primarily in the bucco-lingual and apico-coronal directions, not mesio-distal dimensions due to interdental bone thickness and intact adjacent teeth. This prospective cohort study will investigate the association of the periodontal status and inflammatory markers from the gingival crevicular and wound fluid with the healing outcomes following tooth extraction.

Methods: Twenty five patients at the UNMC College of Dentistry who were seeking care to extract a posterior tooth due to periodontal bone loss, non-restorable caries, or fracture were recruited. Health history, periodontal indices including periodontal probing depth (PPD), recession (REC), clinical attachment level (CAL), and bleeding on probing (BOP) were recorded on the tooth to be extracted as well as its neighboring teeth. Gingival crevicular fluid (GCF) was obtained using collection strips from the tooth to be extracted and its neighboring teeth. A limited cone beam computed tomography scan (CBCT) was taken. Routine atraumatic dental extraction under local anesthesia was completed. GCF from the neighboring teeth and wound fluid from the healing extraction socket were collected at 2 weeks. After 3 months a CBCT scan was taken. Multiplex immunoassay was used to compare initial and 2 week inflammatory markers. Post extraction ridge dimensions were measured as well as the radiodensity of the extraction socket.

Results: No significant relationships were found between preoperative periodontitis and any of the mediators or bone outcomes studied. There was a positive correlation between a reduction in vertical ridge height over a 3-month period and the proinflammatory index IL-1β/IL-22 measured at 2 weeks. A decrease in horizontal ridge width over 3 months was positively associated to baseline levels of INF-γ and IL-12, as well as 2-week proinflammatory TNF-*α*. It was also negatively associated with baseline IL-6. The average socket bone density after 3 months showed a positive correlation with baseline IL-12 and 2-week growth factors FGF, PDGF, VEGF, cytokines IL-6 and IL-10 and proinflammatory indices IL-1β/IL-22 and IL-1β/TGF-*α*.

Conclusion: These findings suggest that the presence of bone regeneration growth factors and a balanced inflammatory response during the early stages of wound healing are crucial for creating an environment conducive to timely placement of dental implants.

44. Comparison of Diameters of Trunatomy Rotary files & Gutta Percha

Dr. Morgan Holmes and Dr. Karan Mirchandani
Mentor: Dr. Anne Williamson

Objective: The Trunatomy rotary file system is a new file system that is designed with a variable, "regressive" taper, rather than a standardized taper, and includes custom sized gutta percha cones to match the files. There is a need to examine how closely the gutta percha matches the size of the rotary files in the Trunatomy system.

Methods: A sample size of 50 Trunatomy files, and 50 gutta percha cones of corresponding sizes, were selected: 25 Prime (26 / .04v taper), & 25 Medium (36 /.03v taper). Using light microscopy, measurements were made of the diameters of each of the files & gutta percha cones, at 3 locations: at the tip, at 1mm from the tip, and at 3mm from the tip. Chi-squared test used, and P values were obtained for statistical analysis.

Results: The prime files ranged from 0.27 to 0.3 mm at the tip, which are all larger than the advertised size, while the matching gutta percha ranged from 0.31 to 0.35 mm at the tip. Despite obvious differences in size at all measured points for all groups, Chi-squared analysis revealed no statistically significant difference between the file and gutta percha sizes.

Go Back to List of Presenters

Go Back to List of Presenters

Conclusion: The Trunatomy system seems to fit within acceptable tolerance limits for endodontic files and gutta percha. Ensuring the size matched gutta percha reaches working length may require changes in technique and enhanced irrigation for debris removal.

45. Examining Associations Between Classes of Medications and Tooth Loss in Periodontal Maintenance Patients

Dr. Po-Jung Chen and Dr. Kavya Shankar Muttanahally

Mentor: Dr. Sumit Yadav

Objectives: Lubricin (encoded by the gene PRG4) is the principal boundary lubricant in cartilage, and congenital missing of lubricin leads to progressive joint failure in the long bone. This study aims to characterize the roles of PRG4 in temporomandibular joint (TMJ) and determine whether restoring the PRG4 expression would delay or rescue the degeneration of TMJ cartilage. Materials and Methods: 3-week-old PRG4 gene-trap (GT/GT) mice and C57B6/J wild-type (WT) C57B6/J controls (age and sex matched) were used to characterize the phenotype in TMJ cartilage of PRG4-deficient mice. Subsequently, PRG4 expression was restored in the GT/GT mice through induction of Cre-mediated recombination with tamoxifen injection at 3 weeks of age (i.e., GTR3wk/GTR3wk). The effects of RPG4 re-expression were assessed by comparing GTR3wk/GTR3wk mice and GT/GT mice at the age of 2 months and 6 months. The condyle samples were harvested and examined with multiple approaches, including micro-CT analysis, histomorphometric analyses, immunostaining, cell apoptosis. In addition, the cartilage stiffness of the mandibular condylar cartilage was measured by an automated indentation technique using a Biomomentum Mach-1 v500csst. Results: At 3 weeks of age, PRG4 GT/GT mice exhibited a significantly lower total volume of condylar head, along with a sharp reduction in cartilage stiffness, when compared to WT mice. Histology and immunostaining revealed a degenerative phenotype in mandibular condylar cartilage (MCC) of 3-week-old GT/GT mice with increased cell apoptosis and decreased SOX-9, Col X, Aggrecan, and BMP2 expression. Osteoclastic activity in subchondral bone was drastically increased in 3-week-old GT/GT mice when compared to WT mice. At 2 months and 6 months of age, the GTR3wk/GTR3wk mice with PRG4 re-expression exhibited improved integrity of MCC, along with a significant increased tissue mineral density and bone volume fraction, when compared to PRG4-deficient GT/GT mice. Also, the condylar cartilage stiffness was significant higher after PRG4 re-expression in the 2-month group. Conclusion: Our results suggest that missing PRG4 leads to condylar cartilage degeneration and PRG4 restoration at 3 weeks of age will slow or prevent degeneration of the TMJ.

Go Back to List of Presenters

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.