

18. Single Cell Spatial Transcriptomics of the Murine Embryonic Palate Links Pax9 to Patterning and Organization of Extracellular Matrix Components

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Introduction: To explore in greater depth the genomic basis of palatal clefts, we designed and implemented the first single-cell spatial RNA-sequencing study in a cleft palate model, utilizing a *Pax9*^{-/-} murine model that exhibits a consistent cleft palate defect.

Objectives: The present study aimed to investigate further PAX9's role in regulating the molecular basis of palatogenesis across different regions and cell types in the palate prior to the osteogenic switch observed at palatal fusion. We hypothesized that PAX9's upstream regulatory role as a patterning transcription factor extends beyond the development of palatal bone, including other mesenchymally-derived cell types and extracellular matrix (ECM) components.

Materials & Methods: Time-bred wild-type (WT) and *Pax9*^{-/-} murine embryos were dissected at (E)12.5 and 13.5 and processed for H&E, Visium HD, Xenium In Situ, and RNAscope validation. Using the Visium HD platform (10X Genomics, Inc.) differentially expressed cell-type-specific markers and enriched biological cell functions were identified via whole transcriptome single-cell analysis. Then, using the Xenium In Situ platform (10X Genomics, Inc), a 350-plex in situ assay was designed and implemented to provide the spatially-resolved mRNA localization of palate-specific gene markers.

Results & Conclusions: Initial Visium HD single-cell analysis of the normal development of the WT palate from (E)12.5 - 13.5 revealed cell-matrix adhesion, cell-substrate adhesion, and collagen fibril organization among the top differentially expressed signaling pathways, while the *Pax9*^{-/-} cleft palate demonstrated disruptions in several pathways including negative regulation of cell growth and negative regulation of Wnt signaling. Further exploration using the Xenium In Situ platform showed quantitative and spatial discrepancies in the expression patterns of Wnt modulators (*Dkk1*, *Rspo1*, *Lgr5*, *Wif1*, *Sparc*, *Prickle1*, *Tnn*, and *Jag1*) and effectors (Wnt 16, Wnt5a), and genes encoding multiple ECM components, such as small-leucine rich proteoglycans (*Lum*, *Ogn*, *Fmod*, *Dcn*) and fibrous proteins (*Col1a1*, *Col12a1*, *Eln*, *Col2a1*, *Col23a1*) in the cleft palate model relative to the normal developmental setting. Our findings suggest that a critical connection exists between PAX9-mediated Wnt signaling and the formation of palatal ECM in the vertical outgrowth and elongation phases of palatogenesis.

Discussion: These data offer a pertinent framework for further investigating ECM-based diagnostic and therapeutic approaches for cleft palate anomalies.

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19. Determining the role of Gli1 1+ Cells in TMJ Condyle

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Introduction: The temporomandibular joint (TMJ) is a site for mandibular growth and a complex system crucial for dental occlusion, speaking, and chewing. TMJ osteoarthritis (OA) causes jaw mobility loss, facial pain, and occlusal changes, reducing the quality of life. While TMJ diseases affect over 10 million, there is a deficient understanding of TMJ stem/progenitor cells and their regulation, which hinders the development of new regenerative treatments. *Gli1*⁺ cartilage progenitor cells (CPCs) are known in long bone growth plate. Here, we evaluated the role of *Gli1*⁺ CPCs in the TMJ.

Objectives: (1) Determine the function of *Gli1*⁺ cells during TMJ. (2) Trace the progeny cells of *Gli1*⁺ cells in murine lineage tracing experiments.

Materials & Methods: To ablate *Gli1*⁺ cells, we crossed *Gli1*^{creERT2/+} with *R26R*^{DTA/+} mice. To induce recombination, tamoxifen was administered to *Gli1*^{creERT2/-}/*R26R*^{DTA/+} and *Gli1*^{creERT2/+}/*R26R*^{DTA/+} mice at P0 and TMJ samples were harvested at P21 and P28. Mouse TMJs were analyzed by histology with Hematoxylin-Eosin (H&E) and Safranin-O (Saf-O) staining and by RNAscope.

Results & Conclusions: H&E and Safranin-O staining images showed reduced thickness of the proliferative and chondrogenic layers in *Gli1*^{creERT2/+}/*R26R*^{DTA/+} mice relative to *Gli1*^{creERT2/-}/*R26R*^{DTA/+} mice at P21. Images also showed increased thickness of the hyperplastic chondrocytes in *Gli1*^{creERT2/+}/*R26R*^{DTA/+} mice at P28, suggesting that *Gli1*⁺ cells may affect TMJ chondrogenesis. Additionally, RNAscope analyses showed reduced *Gli1*⁺ cells in *Gli1*^{creERT2/+}/*R26R*^{DTA/+} mice relative to *Gli1*^{creERT2/-}/*R26R*^{DTA/+} mice at P28, confirming *Gli1*⁺ ablation. RNAscope showed *Gli1* ablation resulted in reduced expression *Sox9*⁺ progenitors, *Col10a1*⁺ and *Runx2* hypertrophic chondrocytes. These data suggest that *Gli1*⁺ cells may regulate TMJ chondrogenesis.

Discussion: Our findings suggest that *Gli1*⁺ cells may play a critical role in TMJ chondrogenesis with their loss affecting chondrocyte homeostasis. However, further investigation is needed. We are currently collecting and analyzing μ CT from *Gli1*^{creERT2/+}/*R26R*^{DTA/+} mice to better understand *Gli1*⁺ cell function in bone. Additionally, lineage tracing studies using the *Gli1*^{cre/+}; *R26R*^{Tomato/+} mouse model are underway to map the *Gli1*⁺ cell progeny. These ongoing studies will provide deeper insights into the role of *Gli1*⁺ cells in TMJ chondrogenesis.

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20. Bioactive Glue for In-Situ Regeneration of Perforated TMJ Disc

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Introduction: Temporomandibular joint (TMJ) disc displacement can lead to disc thinning and perforation, which are predominantly involved in TMJ disorders, affecting more than 10% of adults in the U.S with debilitating pain and restricted jaw function. Current treatments for damaged TMJ discs have failed to yield good clinical outcomes.

Objectives: In this study, we explore the efficacy of bioactive glue in regenerative healing of TMJ disc perforation by stem cell recruitment.

Materials & Methods: Porcine TMJ discs were perforated by puncturing a 1.5 mm hole in the intermediate zone and then treated with bioactive glue: fibrin cross-linked with genipin (FibGen) loaded with connective tissue growth factor (CTGF) and transforming growth factor beta 3 (TGF- β 3) encapsulated in PLGA microspheres (μ S) per our well-established protocol. The disc explants were cultured with TMJ synovial mesenchymal stem/progenitor cells (syMSCs), with or without physiological loading (10%/1Hz) and 10 ng/mL IL-1 β stimulation (n = 3-6 per group). After 8 weeks, TMJ disc healing was evaluated by histology, qRT-PCR, and mechanical testing.

Results & Conclusions: Histological analysis revealed a reduced lesion size in TMJ discs treated with bioactive glue compared to FibGen alone group, with increased collagen deposition in the injured region. Alcian Blue and Safranin-O staining showed notable cartilage matrix formation in the bioactive glue-treated disc compared to FibGen group. IL-1 β stimulation appeared to interfere with the healing, but its effect was significantly attenuated by mechanical loading. Quantitatively, qRT-PCR data showed significantly increased collagen I (COL-I) and Aggrecan (AGC) expression in the group with bioactive glue and mechanical loading compared to the control groups (p<0.001). However, the elevated expressions were somewhat diminished by IL-1 β stimulation (p<0.001).

Discussion: Our study demonstrated the promising efficacy of bioactive glue and mechanical loading in TMJ disc regeneration under inflammation. Our findings may suggest an effective approach to promote the healing of perforated TMJ discs.

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21. Modulation of Chondrocyte Senescence for the Treatment of Osteoarthritis

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Objectives: Osteoarthritis (OA) causes progressive cartilage degeneration leading to pain and disability. Osteoarthritic chondrocytes undergo senescence characterized by irreversible growth arrest, high metabolic activity, and senescence-associated secretory phenotype (SASP), producing proinflammatory and matrix-remodeling factors. Chronic canonical Wnt (cWnt) signaling induces cellular senescence, but its role in senescent chondrocytes is unknown. We previously developed StemJel, an OA therapy comprised of hyaluronic acid (HA) and cWnt inhibitor sclerostin (SOST). Our objectives are to investigate the role of cWnt in mediating chondrocyte senescence and to determine StemJel's ability to prevent chondrocyte senescence during OA.

Materials & Methods: Primary human chondrocyte cultures (n=12) were subjected to IL-1 β -induced senescence and treated with StemJel using transwell inserts. Knee joint OA was evaluated using anterior cruciate ligament transection (ACLT) post-traumatic OA rat model, Prg4^{-/-} mice, and aged mice (n=6/model). Rotarod running performance and histology/immunohistochemistry were assessed in experimental groups relative to sham-injury or wild-type animals (n=6/model).

Results & Conclusions: In human chondrocytes IL-1 β induced senescence (*CDKN2A-p16*) and SASP (*Tnfa*, *IL-1 β* , *IL-10*, *Mmp13*, *Adamts-4*) genes, cWnt signaling (activated β -catenin protein), and senescence-associated β -galactosidase (SA- β -gal) activity in vitro. Treatment with StemJel rescued chondrocyte senescence and SASP, downregulated cWnt signaling, and attenuated SA- β -gal activity. In the ACLT rat model, Prg4^{-/-} mice, and aged mice, StemJel treatment improved rotarod performance, maintained cartilage structural integrity (OARSI scoring) and significantly decreased OA (MMP13), senescence (p21), and SASP (TNF α) relative to PBS, HA, and SOST treatment groups.

Discussion: We demonstrate that StemJel rescues IL-1 β -induced senescence in vitro, preserves joint function and cartilage structural integrity, and modulates chondrocyte senescence in three different knee OA models. Future studies will clarify the role of cWnt- β -catenin complex component GSK-3 β as a driver of the p53/p21 senescence pathway.

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Predoctoral Abstracts

**Social & Behavioral,
Education, Geriatric Oral
Health, Health Service, and
Global Oral Health**

22. The State of Public Funding for Orthodontic Treatment in the United States

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Introduction: Medicaid plays a vital role in dentistry by providing essential care to patients who cannot afford out-of-pocket dental expenses. While orthodontic treatment is often perceived as an elective procedure, patients requiring orthodontics may possess malocclusions that handicap or worsen their quality of life. Various orthodontic procedures may be deemed medically necessary and can be covered under Medicaid, with eligibility and reimbursement varying by state. This project examines Medicaid coverage for orthodontic care across all 50 states, with the goal of identifying eligibility criteria, covered procedures, and financial allocations. A clear understanding of state-specific Medicaid policies for orthodontics is crucial in identifying care gaps and reducing disparities moving forward.

Objectives: Our primary three objectives are as follows: Establish which Orthodontic procedures are covered by Medicaid programs in each U.S state, determine the reimbursement fee for each covered procedure and the frequency in which a provider can submit for billing during treatment, and identify the eligibility criteria required for patients in each state to qualify for Medicaid covered orthodontic procedures.

Materials & Methods: All data was obtained by manual search of public documents published on the official website of each state’s Medicaid reviewer. Coverage of twelve dental codes were the focus of the data compilation due to their relevance and high frequency of use during treatment (tx). This data was obtained using the most updated fee schedule documents for each state. All other information including eligibility criteria, required records, and billing frequency information was identified using the most recently updated Medicaid provider manuals. If certain information was not available for a specific state, nothing was recorded for that metric. Future methods will include communication directly with Medicaid officials via telephone or email to verify the validity of the collected data and make revisions if necessary.

Results & Conclusions: Eligibility requirements and coverage allowances for Orthodontic procedures by Medicaid programs were found to vary greatly from all 50 states. Total reimbursement for orthodontic treatment ranged from <\$1,000 to >\$5,000 with many states choosing to manually price treatment on a case by case basis. Characteristics consistent across the large majority of states were the limit of coverage to adolescents under the age of 21, requiring an orthodontist to perform treatment, and requiring prior authorizations various steps of treatment. Further analysis is needed in order to determine the overall trends spending, eligibility criteria, and billing frequency as compared with previous data.

Discussion: A review of Medicaid eligibility criteria and billing coverage for orthodontic treatment across states revealed significant variability, indicating that assumptions regarding a state's coverage cannot be made. Consequently, both patients and providers should conduct thorough research into their respective state’s Medicaid policies before pursuing treatment. A notable limitation is the inaccessibility of Medicaid information for the average patient, as understanding provider manuals and dental codes requires specialized knowledge, making the process overly complex. Additionally, since states typically update their fee schedules annually, periodic follow-up studies are recommended to ensure that both patients and providers remain informed about changes in orthodontic Medicaid coverage.

23. Assessing the Effect of Episodic Care on Frankl Score

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Introduction: A child's first dental experiences significantly shape their attitude towards dental care. Positive initial visits without urgent treatments often lead to less dental anxiety. However, when neglect results in emergency procedures as a child's first dental experience, it becomes challenging to establish a good patient-dentist relationship. A study at King Abdulaziz University Dental Hospital found that children who frequently visit emergency dental clinics show more negative behavior (lower Frankl Scores) compared to those receiving regular care. The study considered factors like parental neglect, socioeconomic status, and healthcare access in examining why some children rely more on emergency dental services than routine care.

Objectives: This study aims to evaluate the correlation between continuity of care and anxiety levels in pediatric patients. Does consistent comprehensive dental care yield a more positive relationship with the dentist? Do more frequent emergency visits decrease the overall perception of the dentist and demonstrate lower Frankl scores in pediatric patients?

Materials & Methods: This study is conducted via a chart review comparing pediatric patients, ages 6-10, from the 8th floor Vanderbilt Pediatric Clinic (VC8 clinic) and the Pediatric Dental Clinic on Haven Ave (Haven clinic), in Washington Heights. 50 patient charts were randomly selected from each clinic, half of them being male and half female. The last 5 visits were analyzed and procedure types and Frankl scores were recorded for each visit.

Results & Conclusions: The results contradict the initial hypothesis that increased emergency visits would lead to lower Frankl scores. The average Frankl score remained relatively high (3.39) even among patients with more emergency visits, and the low average number of emergency visits (0.47) suggests that most children are not experiencing repeated emergencies. The ANOVA showed no significant difference in Frankl scores before, during, and after emergency visits ($F = 0.41$, $P = 0.66$), indicating that emergency visits do not significantly impact patient behavior. While individual differences in behavior were noted ($P = 0.012$), they were not linked to the timing of emergency visits.

Discussion: Several factors influence Frankl scores in pediatric dental patients, including child temperament, family factors, and patient age. Temperament traits like adaptability and anxiety levels affect behavioral responses, while parental attitudes and past experiences shape children's perceptions of dental care. Patient age is also significant, with older children generally showing higher cooperation levels. This is reflected in clinic demographics, such as VC-8 treating older patients and Haven Clinic serving younger ones. Although VC-8's mean Frankl score was slightly higher, the difference was not statistically significant, likely due to age differences rather than clinician expertise. Future research will explore these factors to refine behavioral management strategies and improve pediatric dental care.

24. The Medical Model for Caries Risk

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Introduction: The current prevailing caries risk assessment, CAMBRA, focuses on dental factors such as tooth brushing frequency and fluoridated water consumption to stratify patients according to cavity risk and then make care recommendations. However, this view is somewhat limited to the dental niche, not considering systemic factors potentially influencing the multidimensional field of caries development. Additionally, at CDM, providers have extensive access to patient's integrated electronic health record (EHR) in Epic, including medical conditions, medications, lab information, etc.

Objectives: Through the use of the EHR, the goal, at this stage of the investigation, is to determine the relationship between varying aspects of a patient's systemic health and their caries risk, and later using the identified correlations to compose a medically-driven model of caries development and later look to quantify their risk by formulating a mathematical model.

Materials & Methods: This investigation is conducted through Jupyter notebook using the R language, through which, all personal medical information is stored. To begin, IRB approval was sought and received, followed by performing a TRAC request to harvest desired data from Epic; this data includes, but is not limited to, medical conditions, medications, social determinants of health (SDOH), and importantly, CAMBRA risk. The data was retrieved, compiled, and cleaned. The primary factor for inclusion in this analysis is having an existing CAMBRA risk score, as this is used as a proxy for caries risk. The sample size was 17,109 patients. CAMBRA risk is stratified by "low", "medium", "high", and "high+" and possible traits are represented as binary and categorical variables, and thus a series of chi-squared tests were run for all variables, to determine which are of statistical significance and, if relevant, additional testing was completed.

Results & Conclusions: Statistical significance was identified between CAMBRA risk and many conditions, with the greatest being patients with cancer, diabetes, GERD, HIV, hypertension, kidney disease, liver disease, and previous transplant. Additionally, in patients using antivirals, corticosteroids, calcium channel blockers, anti-hypertensives, antihyperlipidemics, anxiolytics, antidepressants, smokers, alcohol users, and patients who were ever homeless there exists a relationship. Meaning, in short, there is a relationship between the systemic condition and caries risk via CAMBRA.

Discussion: It is clear from this investigation that there is some significance between systemic health and caries risk. While this investigation is by no means deterministic, it does demonstrate the existence of many relationships between medical conditions, medications, and SDOH and caries risk, and as such serves as the grounds to formulate a complete, predictive mathematical model for caries risk.

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25. Assessing the Impact of Pre-Doctoral Public Health Training on Dentists

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Objectives: The study sought to assess the impact of public health training on the careers of dentists completing the College of Dental Medicine's (CDM) federally- sponsored five-year dual degree program leading to the DDS and MPH or MHA degrees.

Materials & Methods: In October and November 2024, all 22 program completers were emailed a Qualtrics survey (100% response rate) covering questions on their demographics, post-program clinical and non-clinical activities, patient populations served, and payment arrangements accepted. A four-point Likert scale assessed the impact of their public health training on income, professional/personal clinical/social activities, and knowledge of alternative payment and delivery arrangements, cultural competency, motivational interviewing and health literacy.

Results & Conclusions: Of all program completers, 8 identified as being from disadvantaged backgrounds including from low-income families (6), children of immigrants (3), and/or first-generation students (1); 9 had college majors in social sciences and 13 in STEM; and after graduation 18 pursued primary care dentistry as general (11), pediatric (6), or public health dentists (1). All reported serving vulnerable patient populations in full- or part-time private practices (19, including 10 in DMO affiliated) and/or safety-net practice (8) including 6 in both practice types. Twelve focus their care on Medicaid/CHIP patients, 7 on underserved or marginalized populations, and/or 4 on individuals with special healthcare needs. Dentists from disadvantaged background were more likely to prioritize under-resourced populations in their practice ($P < .05$, Chi-square=7.18). Reported involvement in non-clinical activities included teaching (18), engagement in community-based or social-welfare organizations (13), presenting at professional meetings (12), research (10), leadership in organized dentistry (7), engagement in policy or advocacy (6), administration (5), publishing in peer-reviewed literature (5), and/or government service (5). All respondents agree "extremely" or "somewhat" that public health training enhanced patient care, awareness of caring for special needs patients, and enhanced knowledge of cultural competency, motivational interviewing, and health literacy. They similarly agreed that training informed their professional activities (21), enhanced the social impact of their personal activities (20), professional activities (19), led to treating more underserved (19), changed their career direction (18), increased understanding of alternative payment (17) and delivery systems (17), and enhanced their income or income potential (8).

Discussion: Columbia's DDS-MPH/MPA dual degree program was positively impactful on trainees' careers, clinical care, and personal activities. It met the funder's goals of building primary care capacity, advancing diversity, improving the oral health of underserved populations, and educating trainees about emerging models of care delivery and financing.

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26. Assessing Nursing Student Knowledge of Older Adult Oral Health

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Introduction: Older adults are an often underserved population at high risk for dental disease, with limited access to quality care. They are particularly vulnerable to conditions such as edentulism, dental caries, xerostomia, periodontitis, oral cancer, and denture-related pathologies. Nurses serving as the first point of contact can facilitate early intervention, helping patients access dental care before issues become severe or systemic.

Objectives: Evaluate nursing students' knowledge and attitudes regarding older adult oral health. Determine whether current nursing curricula provide adequate oral health and disease education or if gaps exist that require improvement.

Materials & Methods: A thirty-question anonymous Qualtrics survey was distributed via email to the deans of all accredited nursing programs in New York State for student participation. Additionally, a five-question survey was sent to deans for completion. Three rounds of emails were sent to 113 nursing programs, with no incentives offered for participation.

Results & Conclusions: Students' oral health knowledge, attitudes, and ability to identify oral conditions were assessed. All students agreed that an oral exam should be part of a physical exam. While most answered correctly on denture care, responses varied on oral cancer, xerostomia, large swellings, and confidence in identifying oral disease. Nearly all students supported interprofessional healthcare teams for optimal older adult care, including the involvement of dentists. Every student acknowledged the strong link between oral and overall health, and most indicated they would refer patients with oral health concerns to a dentist. Notably, students' year of training did not significantly correlate with their ability to identify oral health issues, suggesting that nursing education does not directly enhance proficiency in this area. While oral health knowledge appeared high, further education should emphasize practical application in clinical settings. Expanding oral health education in nursing programs may improve preparedness for patient care.

Discussion: Regardless of their training level, students demonstrated a basic understanding of oral health, though confidence in distinguishing between healthy and unhealthy oral conditions varied. A larger sample size is needed for more definitive conclusions, and future studies could explore offering incentives to increase participation.

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27. Evaluating Community-Based Organization Engagement in Predoctoral Dental Education: Strengthening Partnerships to Address Barriers in Special Needs Oral Healthcare

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Introduction: Columbia University's College of Dental Medicine (CDM) launched the "Oral Health Considerations for Persons/Populations with Special Healthcare Needs" course in Spring 2024 to enhance engagement between predoctoral dental students and community-based organizations (CBOs) serving individuals with SHCN. By fostering these collaborations, the course aims to equip future dental professionals with the knowledge and skills necessary to improve oral health outcomes for SHCN populations. Given the crucial role of CBOs, understanding their perspectives on strengthening partnerships with dental students is essential for addressing oral healthcare barriers more effectively.

Objectives: To identify barriers to accessing oral healthcare faced by individuals with SHCN served by CBOs in New York and to examine how CDM can address these barriers through student involvement in both the D1 SHCN course and volunteer initiatives.

Materials & Methods: A literature review was conducted to develop a semi-structured interview guide tailored for CBO representatives. Interviews were conducted with representatives from 13 CBOs to assess their perspectives on student engagement, volunteer opportunities, and key barriers to care. Qualitative data was independently coded and analyzed by two team members to identify themes and collate recommendations, with discrepancies adjudicated through discussion.

Results & Conclusion: CBOs reported key oral healthcare barriers, including provider availability (67%), dental anxiety (42%), financial limitations (42%), mobility/transportation issues (25%), and discrimination (8%). Language barriers (58%), stigma (33%), and lack of prioritization of dental care (25%) were also noted. Many CBOs emphasized a general lack of oral health awareness and literacy within their communities. Among ways to improve access, CBOs identified student volunteer opportunities in oral health education and hygiene instruction (92%), general engagement (23%), and initiatives to reduce dental fear (23%). Didactic course participation was perceived as beneficial for increasing student awareness of SHCN-related barriers (54%), enhancing dental education (46%), facilitating dental home establishment and referrals (31%), and improving dental familiarity among SN populations (38%).

Discussion: Findings highlight significant barriers to oral healthcare for SHCN populations, particularly a lack of oral health awareness. Increased student engagement through volunteerism and didactic coursework can enhance oral health education, reduce stigma, and improve access to care. However, the study is limited to CBO perspectives, with potential gaps due to non-responses. Future research should incorporate SHCN community input and dental student feedback to further strengthen engagement through clubs, advocacy, and specialized training.

Tsai-Yen (Yoyo) Wang was supported by the Columbia College of Dental Medicine Summer Research Fellowship.

28. Analyzing the Association of Free or Reduced Lunch Participation and Dental Health Measures of Schools Participating in the Give Kids a Smile Event in Santa Clara County: A Pre and Post COVID-19 Study.

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Introduction: Dental caries disproportionately affects low-income children, with socioeconomic status influencing oral health outcomes. By highlighting the intersection between socioeconomic factors and dental health, this research will contribute to a body of evidence that can inform targeted interventions. These interventions aim not only to address the immediate dental care needs of children from low-income families but also to tackle the underlying socioeconomic determinants that perpetuate health disparities.

Objectives: This study analyzed how the Free or Reduced Priced Lunch (FRPL) program participation impacts the oral health of school children in Santa Clara County between 2020 and 2023 specifically looking at dental decay and urgent dental care needs before and after the COVID-19 pandemic.

Materials & Methods: We conducted a study using data from the GKAS events, along with publicly available FRPL participation data from the California Department of Education. Statistical analyses, such as proportion tests were employed using STATA to understand the association between FRPL participation and dental health outcomes before and after COVID.

Results & Conclusions: The study revealed a decrease in the total number of participating schools from 53 in 2020 to 46 in 2023 as well as a decrease in students screened during the GKAS event. Visible dental decay increased in high-poverty schools from 29.7% in 2020 to 33.0% in 2023. There were also variations in urgent dental care needs across schools during this period. In 2020, high-poverty schools reported the highest prevalence of dental caries (31.2%) with a significant decrease in urgent dental care needs, dropping from 10.0% to 5.5%. The mid-low poverty group remained stable at 7.2%.

Discussion: The study concluded that socioeconomic status as indicated by FRPL participation plays a role in determining children's oral health outcomes. The COVID-19 crisis made existing inequalities more severe thus emphasizing the importance of public health measures to enhance the availability of services and nutritional assistance for families with low incomes. It is advised to enhance oral health services like GKAS events to address these gaps effectively.

29. Augmented- Reality-Assisted Intraoral Scanning: An Andragogical Study

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Introduction: Augmented Reality (AR) integrates virtual images with the physical environment in real time. AR has the potential to assist in both dental education and procedures through virtual guidance. One procedure that may benefit from AR is intraoral scanning (IOS). Augmented-reality-assisted intraoral scanning (ARIOS) has the potential to improve the efficiency of intraoral scanning procedures by providing direct, chair-side visual feedback via AR and allowing the clinician to view the oral cavity and the digital impression simultaneously.

Objectives: This study aimed to evaluate the effectiveness of ARIOS as an alternative to the current standard IOS with a stationary display. Key objectives included comparing scanning time, image count, and participant experiences between ARIOS and IOS, as well as assessing the impact of andragogical training on operator proficiency.

Materials & Methods: A multi-session within-subject experiment was conducted to compare ARIOS and IOS. Twenty-five dental students participated in the study. Training sessions were done to procure familiarity with both experimental conditions. The trial session consisted of each participant obtaining three sets of optical scans of a typodont under ARIOS and IOS. The time required to complete the scan, and the number of images taken were recorded. Participant feedback was collected by means of entry, exit and NASA-Task Load Index surveys. Accuracy of the digital casts were measured in root mean square error (RMSE).

Results & Conclusions: The study revealed a 7:3 preference for ARIOS in exit surveys. When comparing scanning efficacy between ARIOS and IOS, ARIOS demonstrated a reduction in scanning time—8.5% for the mandibular scan and 10.5% for the maxillary scan—as well as a decrease in image count, with 8.6% fewer mandibular images and 9.3% fewer maxillary images. Scan precision, measured by RMSE, showed no significant difference between ARIOS and IOS. Additionally, andragogical training improved participants' proficiency with ARIOS. Overall, ARIOS outperformed IOS in terms of scanning efficiency, ergonomics, ease of use, and overall workload.

Discussion: The study found that optical impression proficiency was comparable between ARIOS and IOS, while operator experience favored ARIOS. Scanning efficiency with ARIOS showed a decrease in both scanning time and image count compared to IOS, although these differences were not statistically significant. Participants reported less ergonomic strain and lower perceived workload with ARIOS, as indicated by participant surveys and NASA-TLX scores, suggesting that ARIOS offers a more comfortable and efficient scanning experience. This project has currently advanced into a new phase investigation with in vivo trials to further explore these findings.

30. Dental Residents' Knowledge, Beliefs, and Behaviors Related to Eating Disorders

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Introduction: Despite the high incidence of and mortality from eating disorders, most individuals with these conditions are undiagnosed and untreated, causing irreversible harm to their oral cavity and systemic health. Dentists are aptly positioned to detect signs and symptoms of eating disorders and may even be the first healthcare providers to recognize these conditions; however, dentists report feeling unprepared to manage patients with eating disorders.

Objectives: To examine Columbia University/New-York Presbyterian (NYP) dental residents' knowledge, beliefs, self-efficacy, and behaviors in the management of a dental patient with a suspected eating disorder.

Materials & Methods: This cross-sectional, survey-based research invited all Columbia and NYP dental residents (n=110) to participate in an anonymous Qualtrics survey, achieving a 62% participation rate (n=68). The survey instrument was developed using a combination of questions from existing survey tools and new questions. The tool was tested with D4 students. The instrument consisted of 7 background questions, and 26 Likert scale questions assessing self-reported knowledge, beliefs, self-efficacy, and behavioral intent with respect to various management elements of patients with eating disorders in dental practice. Descriptive statistics and linear regression analysis were utilized to analyze findings.

Results & Conclusions: 96% (n=65) of dental residents agreed or strongly agreed that if a dentist recognized signs of an eating disorder, they 'should' raise the topic with the patient. Belief that dentists should raise eating disorders was not associated with intent to engage in this behavior. Both knowledge of how to and self-perceived ability to raise eating disorders with a patient were statistically significantly associated with behavioral intent to raise eating disorders in practice (B=0.284, p=0.009, B= 0.50, p=<0.001). Knowledge of referral options for individuals with eating disorders was associated with the intent to refer a patient with a suspected/known eating disorder for further medical care (B=0.182, p=0.012).

Discussion: Results suggest dentists' knowledge and confidence in their ability to manage patients with eating disorders increases their likelihood of performing care management behaviors in practice. Of note, the belief that dentists are responsible for the management of eating disorders did not translate to an intent to perform management behaviors, indicating that instilling professional responsibility is insufficient in isolation. Dental education designed to increase both knowledge and confidence are key to facilitate the implementation of appropriate management behaviors in practice.

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31. Caregiver Pre-visit Sensory Intake Form and Perspective on Child Dental Visit Impact

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Objective: To pilot and evaluate use of a sensory intake form (SIF) for caregivers to share their child's sensory sensitivities with dental providers and facilitate tailored visits.

Materials & Methods: A convenience sample of caregivers of patients seen for periodic exams at an academic medical center community dental clinic completed pre- and post-visit surveys and SIF in English or Spanish. SIFs were given to providers prior to the child's visit to allow visit sensory environment adjustments and sensory tool incorporation. Descriptive analyses were performed using SAS. IRB protocol #AAAU3628.

Results & Conclusions: Fifty-seven caregivers participated. In post-visit surveys 77.2% of caregivers rated their child's dental visit as excellent, compared to 45.6% who anticipated an excellent visit in the pre-visit survey. In pre-visit surveys, 50% of caregivers strongly believed providers could tailor the visit to their child's needs, while after, 79.0% reported the visit was successfully customized. Modifications to enhance patient comfort included dimming lights (6.3%), incorporating music (6.3%), using deep pressure devices (6.3%), providing sensory toys (6.3%), and sunglasses (12.5%). For 9 patients with autism spectrum disorder, 3 caregivers reported a shift in their child's dental experience from "poor" in the past to "good" or "excellent" for the current visit. After sensory modifications, 4 of 9 patients displayed comfortable behaviors with no signs of distress and 3 exhibited only one uncomfortable behavior.

Discussion: Findings highlight the critical role of SIFs in enhancing patient-provider interactions by enabling dental providers to tailor approaches to each child's unique needs, thereby fostering a more positive dental experience.

32. Enhancing Dental Literacy via Various Educational Formats

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Introduction: Limited dental health literacy is a significant barrier to achieving good oral health, particularly in underserved communities such as Washington Heights. The purpose of this study is to determine the impact of a behavioral intervention on oral health attitudes and practices within this population, as well as to identify the most effective educational modality for delivering oral health information. By evaluating pre- and post-intervention knowledge and behavior intentions, this research aims to inform future community-based dental health initiatives and optimize oral health education strategies.

Objectives: The primary objective of this study is to compare the effectiveness of different educational modalities - audio, video, and written materials - on participants' understanding of key oral health topics. These topics include proper brushing and flossing frequencies, the importance of regular dental visits, and the systemic implications of poor oral hygiene. The study also seeks to evaluate how these educational methods influence oral health behavior such as the frequency of brushing, flossing, and dental check-ups.

Materials & Methods: Participants were recruited through flyers posted in various community locations, including Columbia University College of Dental Medicine clinic waiting rooms, the Columbia Community Partnership for Health, and apartment bulletin boards. Word-of-mouth outreach was also utilized. Participants accessed the survey by scanning the QR code on the flyer and completing it via Qualtrics on their mobile devices. Each participant was randomly assigned to receive educational material in one of three formats: audio, video, or written text. Pre- and post-intervention data was collected, with qualitative data analyzed using standard qualitative analytic techniques and quantitative data subjected to statistical analysis.

Results & Conclusions: Though the project is ongoing, 16 complete responses have been collected. Analysis of the collected responses indicates a general improvement in dental knowledge across all intervention groups, with most participants expressing an intention to adopt best oral health practices. However, an increase in dental knowledge did not always translate into behavioral change. Some participants cited barriers to adherence including "cost", "habits are hard", and "practicality".

Discussion: These findings suggest that while educational intervention can enhance oral health literacy, behavioral change requires addressing additional barriers beyond knowledge alone. Further data collection is needed to encompass a broader demographic representation of Washington Heights residents. However, this study highlights the potential for standardizing oral health education delivery and informing best practices for patient education in Washington Heights.

Poorvaja Kolli was supported by the Columbia College of Dental Medicine Summer Research Fellowship.

33. Provider Use of Sensory Intake Form in Child Dental Visit

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Introduction: Sensory sensitivities in pediatric dental patients, particularly those with neurodiverse conditions such as autism spectrum disorder, can present significant challenges for both patients and dental providers. Dental visits are often stressful experiences, and unaddressed sensory sensitivities can exacerbate anxiety and behavioral challenges during these appointments. It is crucial for providers to recognize sensory sensitivities in order to deliver comfortable and effective care to their patients.

Objectives: We seek to investigate the use of a Sensory Intake Form (SIF) to help providers tailor dental visits and enhance patient dental experience.

Materials & Methods: The study evaluated caregivers of a convenience sample of patients undergoing new or periodic exams at Columbia University Pediatric Dentistry Clinic. Caregivers completed SIFs detailing behavioral challenges, sensory sensitivities, dislikes, and calming techniques as well as pre- (demographics, visit expectations) and post-visit (visit perspective) surveys. First- and second-year pediatric dental residents reviewed SIFs completed by patient caregivers and completed post-visit surveys noting patient challenges, form use and usefulness, adjustments made, and Frankl behavior rating.

Results & Conclusions: Thirteen providers participated across 56 unique patient visits. The form was utilized in 23.2% of visits, with nine providers using the form at least once and four providers never using. 31 patients (55.4%) of patients experienced visit challenges. Providers used the SIF to make adjustments in 32.3% of visits with challenges and 12% without. Providers found the form useful in 41.9% of visits with challenges and 24% without. The form was used for 4 of 8 patients with autism spectrum disorder. Of the 4 providers that used the form, 3 found the form useful and one was undecided.

Discussion: Findings suggest the potential for the use of the SIF to guide providers in facilitating tailored visits and addressing patient challenges, notable value for patients with autism spectrum disorder and the need for further research in this area. Further research studying a larger population size, specifically of patients with autism spectrum disorder, is necessary. Focusing on the impact of the sensory intake form in these patients could lead to a better patient experience and less challenging visits for providers.

34. Understanding Botanica use in Upper Manhattan Neighborhoods: A Community Survey and Education Project

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Introduction: Botanicas are natural remedies that are used to manage medical conditions in Upper Manhattan. Despite their cultural significance, many of these remedies pose health risks due to bioactive compounds with pharmacological effects, toxic properties, and drug interactions. This study analyzes the risks of natural remedies used for dental issues in Upper Manhattan to improve patient safety and provider awareness.

Objectives:

1. Collect data on herbal substances are used in upper Manhattan
2. Asses potential toxicological risks, including adverse drug interactions and side effects, associated with these remedies.
3. Raise awareness of herbal remedies for patient safety.

Materials & Methods: Surveys were collected from community members on the botanicas (herbal remedies) that they currently use. After finding the herbal remedies for dental issues a literature review was conducted. Each remedy was assessed for its intended use, potential toxic exposures, known drug interactions, and reported side effects.

Results & Conclusions: Here is a list of the substances commonly used in the Upper Manhattan population for dental issues that have potential toxic exposures, known drug interactions, or reported side effects.

- **Humphrey's:** Used for teething pain; contains belladonna, which may cause severe anticholinergic effects.
- **Miel de la Rosa:** Used for mouth pain; contains honey, which can cause infant botulism.
- **Anise:** Used for digestive problems and toothaches; high doses may alter P450 metabolism and cause potential drug interactions.
- **Cordial de Monell:** Used for teething pain and colic; contains potassium bromide, which may lead to sedation, respiratory depression, and hypotension.
- **Alumbre (alum stone):** Used for toothaches and infections; may cause hyperkalemia and induction of coagulation.

Discussion: These findings underscore the importance of understanding the risks of herbal remedies in dental care. While these remedies can provide relief for various conditions, being aware of their toxic effects and potential drug interactions is essential for safe use. Moving forward, future initiatives should focus on increasing healthcare provider awareness, improving patient communication, and establishing safer practices for patient care.

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35. Analysis of U.S. State Correctional Oral Health Care Policies for Incarcerated Adults

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Introduction: Incarcerated adults are considered a vulnerable population, with incarceration being associated with elevated rates of physical and oral health conditions compared to the general population. While incarcerated individuals have a legal right to timely medical and dental care, it is unknown what the correctional oral health care policies are and how they may vary by state.

Objectives: This research aims to identify, characterize, and report on information availability online and the extent of dental service coverage in state correctional facilities.

Materials & Methods: State-level correctional policies were obtained using web searches and categorized by extent of information: extensive, moderate, minimal, or none. If not extensive, email (n=21) or phone (n=11) key informant outreach was performed with a single follow-up. Basic dental coverage was categorized as: comprehensive oral exam, periodic recall, prophylaxis, oral hygiene instruction, and emergency services. Covered services were compared with national advocacy guidelines. Differences in information availability were analyzed by χ^2 versus the party of state governor and legislature and t-test for the extent of services by per-capita correctional expenditure and population-adjusted incarceration rate.

Results & Conclusions: Policy information was available for 39 states, for which 18 had extensive, 18 moderate, 3 minimal, and 12 had no information. Most covered services were initial examinations (n=38), emergency service (n=37), routine (basic restorative) services (n=36), and prosthodontic treatment (n=35). Least covered services were prophylaxis (n=20), periodic oral exams (n=16), orthodontic treatment (n=2), and implants (n=0). 33 states comport with national guidelines on timelines for oral examination, 25 with oral hygiene instruction, and 23 for oral screening. Information availability was unrelated to political party of the state governor or legislature (n=50, p=0.12, $\chi^2=2.378$ and n=48, p=0.43, $\chi^2=0.623$, respectively). Coverage of basic services in the 39 reporting states was unrelated to expenditure (p=0.852, t=-0.188) or to incarceration rates (p=0.815, t=-0.235).

Discussion: State-level policy variations exist regarding the availability of information and the extent of services covered. The lack of standardized oral healthcare policies in U.S. state correctional institutions impacts incarcerated individuals' well-being, with limited preventive care increasing reliance on emergency services.

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36. Assessing the Impact of Post-Doctoral Public Health Training on Dentists

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Objectives: This study sought to assess the impact of public health training on the careers of primary care graduate dentists who, between 2008 and 2024, completed federally-sponsored public health training (Master of Public Health or Master of Health Administration) at the Mailman School of Public Health.

Materials & Methods: During October to November 2024, all 32 program completers received a Qualtrics survey comprised of open- and closed-ended questions regarding their demographic characteristics, post-program clinical and non-clinical activities, patient populations served, and payment arrangements accepted (response rate 100%). Using a four-point Likert scale, respondents rated the impact of public health training on their incomes, professional and personal clinical and social activities, knowledge of alternative payment and delivery arrangements, cultural competency, motivational interviewing, and health literacy.

Results & Conclusions: Of all program completers, six came from disadvantaged backgrounds: low-income families (4), children of immigrants (1), and/or underserved areas (1); 31 of 32 pursued primary care dentistry (general: 6, pediatric: 22), or public health dentistry (3). Most (30 of 31) provide clinical care in private practices (17, including 1 in a DMO-affiliated practice) and/or safety net practices (19). Of 29 responders, 28 serve people with special healthcare needs, 26 underserved or marginalized patients, and 25 Medicaid/CHIP patients. Over half focus their practice primarily on vulnerable patients: 21 underserved or marginalized, 18 Medicaid/CHIP, and 17 special needs patients. Those from a disadvantaged background were more likely to serve under-resourced populations as a primary focus of their practice (chi-square=10.79, p=0.001). Reported involvements in non-clinical activities include teaching (17); engagement in community-based or social welfare organizations (19); presenting at professional meetings (19), research (18), leadership in organized dentistry (13), engagement in policy or advocacy (15), administration (16), publishing in peer-reviewed literature (10) and or government service (2). On a 4-point Likert Scale, trainees agreed that public health training “extremely” (4) or “somewhat” (3) likely informed their professional activities (3.8); enhanced their social impact professionally (3.6) and personally (3.1); patient care (3.5); awareness of special needs patients (3.4); knowledge of health literacy, cultural competency, and motivational interviewing (3.4, 3.3, 3.1); knowledge of alternative payment and delivery mechanisms (3.1, 3.3); treating more underserved patients (3.2); changing their careers (3.0).

Discussion: Columbia’s public health training program for primary care dentists positively impacted trainees’ dental careers, clinical care, personal activities, and knowledge of key public health and clinical care concepts. It met the funder’s goals of building primary care capacity, advancing diversity, improving the oral health of underserved populations, and educating trainees about emerging care delivery and financing models.

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37. Deaf Education in Dental Schools

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Introduction: Over 37.5 million Americans identify as Deaf or hard of hearing. Many Deaf people in the United States use American Sign Language (ASL) as their primary method of communication and most dentists are not competent in using this type of communication tool. Additionally, many Deaf people identify as a part of a cultural minority group rather than as disabled, so it is important to provide dental students with a cultural understanding of this group of patients. There are deficiencies in dental school curricula when it comes to preparing their students to treat Deaf patients, which in turn hinders access to dental care for Deaf patients. Many Deaf patients avoid going to the dentist because of this communication barrier, and the first step to addressing this problem is to provide dental students with a background about the Deaf community, and how to best serve the oral health needs of these patients.

Objectives: The goal of this study was to assess the education dental schools provided their students on how to treat Deaf patients.

Materials & Methods: A survey was sent out to the academic deans of 5 dental schools; no responses were received. The survey consisted of 9 multiple choice questions that aimed to elicit how much time each school allocates in their curricula to expose their students to Deaf education, and their methods of teaching their students about the treatment of Deaf patients.

Results & Conclusions: No survey responses were received after contacting the dental schools multiple times; therefore, no conclusions can be drawn based on the survey. A literature review on the subject was also conducted, and the review suggested that there is no dental school in the United States that has a course dedicated specifically to preparing students to adequately treat Deaf patients. Therefore, we feel it is incumbent upon Curricula Committees in United States dental schools to carve out time in their curricula and fill this void in dental education.

Discussion: One may conclude that dentists are not adequately trained to treat Deaf patients and this is due to the lack of Deaf education in dental schools' curricula. It is somewhat prosaic to identify the problem, the difficulty comes in finding the solution. One of the ways to address this problem is to educate dental students about Deaf culture and American Sign Language. One of the most important things for dental students to understand is that many Deaf people identify as part of a cultural minority, rather than a disabled group. Learning about the Deaf community is the first step to a greater cultural awareness, which is needed to provide Deaf patients with proper oral healthcare. Knowing a few basic signs can also go a long way with making Deaf patients feel more comfortable at the dentist. The inability of dentists to communicate adequately with Deaf patients has caused many of them to avoid going to the dentist. It is imperative to address this issue by starting in schools and educating dental students about the treatment of Deaf patients.

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38. Enhancing Education Through Narrative Dentistry: Assessing Student Needs & Preparedness

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Objectives: Narrative Dentistry (ND), adapted from Narrative Medicine, utilizes evidence-based methods to promote and teach humanistic care by enhancing skills such as listening, reflection, communication, and compassion. This study explores opportunities to incorporate ND into dental education by applying its principles to assess how dental students perceive their curriculum, experiences, and preparedness to provide for diverse patient populations.

Materials & Methods: Data was collected from a needs assessment survey developed by an interdisciplinary group of students, faculty, and experts in Narrative Medicine and administered at an urban dental school (N=370). Fundamental principles of Narrative Medicine were captured in the four validated scales that were used in the survey: Active Empathetic Listening Scale (AELS), Self-Reflection and Insight Scale (SRIS), Communication Skills Attitude Scale (CSAS), and Compassion Scale (CS). Students rated the importance of and their preparedness in core skills of listening, reflection, communication, and compassion within the curriculum, along with their perceived readiness to care for diverse patient situations. For missingness and survey non-response, multiple imputation methodology was used. Descriptive statistics were calculated for all study variables. Linear regression models were estimated to explore respondents' perceptions of how well the dental curriculum fosters core skills in their pre-clinical and clinical years.

Results & Conclusions: Respondents (N=187) included predoctoral dental students in their clinical (38.5%) and pre-clinical years (61.5%). Both groups expressed lower preparedness in caring for patients who have experienced interpersonal violence (M=4.64, SD=2.22), have special needs (M=4.68, SD=2.09), or have histories of trauma (M= 4.77, SD=2.25). Significant associations were found between acquiring listening (b=0.86, p<0.01) and communication (b=0.93, p<0.01) skills and students in their clinical years. Reflection and compassion skills did not show such associations.

Discussion: This study identifies opportunities to integrate ND principles and training into the dental curriculum. Infusing ND into the curriculum may contribute to future dental providers' preparation to deliver comprehensive and compassionate care, enhancing oral health outcomes and overall patient and provider well-being.

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39. A Scoping Review of Health Profession Students as Stakeholders in Science Diplomacy

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Introduction: The COVID-19 pandemic highlighted the critical role of science diplomacy (SD) in facilitating global collaboration, particularly in public health, through platforms like GISAID. SD encompasses diplomacy for science, science for diplomacy, and science in diplomacy, with a focus on advancing scientific collaboration. Healthcare professionals, as trusted figures, are key in bridging science and policy. However, communication barriers and institutional misalignment hinder collaboration. Integrating SD into medical education can better equip healthcare professionals to engage in global health policy, address issues like antimicrobial resistance, and take leadership roles in health governance, essential for advancing global health equity and resilience.

Objectives: This review aims to evaluate the integration of SD into medical education by (1) assessing SD's role in global health collaboration and equitable access, (2) reviewing its incorporation into medical curricula, and (3) proposing strategies for its effective integration, including interdisciplinary approaches and institutional partnerships. The review highlights gaps in SD education and seeks to inform curriculum development to equip healthcare professionals with necessary diplomatic competencies for global health challenges.

Materials & Methods: A literature search was conducted in Google Scholar, PubMed, and Frontiers, using keywords such as "international" and "medical education" to identify articles on SD and medical education from January 1, 2000, to July 1, 2024. A total of 59 peer-reviewed articles were included, addressing SD, internationalization in healthcare, and postgraduate medical education. Articles were categorized into three themes: defining SD, its significance, and its presence in medical education.

Results & Conclusion: The review identified 59 articles, revealing a significant gap in the integration of SD into medical curricula, with most articles from high-income countries (HICs) and limited contributions from lower-middle-income countries (LMICs). The COVID-19 pandemic led to increased publications on SD, but research remains fragmented, with a focus on commentaries and qualitative analyses. The findings emphasize SD's potential in enhancing global health but show the need for its formal inclusion in medical education through interdisciplinary courses and experiential learning. Institutional support and cross-sector collaboration are needed to institutionalize SD education and prepare healthcare professionals for global health leadership.

Discussion: Science diplomacy is essential for tackling global challenges like pandemics and climate change but remains underdeveloped in both research and application. Fragmented terminology and a lack of consistent frameworks hinder its advancement. The literature largely consists of case studies and lacks empirical evidence on SD's impact in medical education. Integrating SD into medical curricula through interdisciplinary approaches and experiential learning is crucial for preparing healthcare professionals to engage in global health diplomacy. Despite challenges, efforts are underway to formalize SD education, and enhancing SD research and curricula will better equip healthcare professionals to navigate complex global health issues.

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40. Oral Health Education for Medical Students in Ob/Gyn Rotation

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Objectives: Oral health (OH) is integral to overall and pregnancy health. Medical students and residents do not receive focused education on OH in pregnancy during their obstetrics and gynecology (OB/GYN) clerkships. This project aims to enhance medical student and resident OH knowledge through development and implementation of an educational module.

Materials & Methods: An interactive asynchronous OH educational module was developed following American College of Obstetricians and Gynecologists guidelines and piloted on residents and medical students during the core OB/GYN clerkship. Pre- and post-tests were administered to assess knowledge, comfort, and confidence counseling patients about OH. Descriptive statistics and paired t-tests or Wilcoxon signed-rank tests were used to compare pre- and post-test data.

Results & Conclusions: 34 medical students and 24 residents participated in the study. For medical students, a significant change in the means of the knowledge-based question scores was found between the pre-module and post-module questionnaire, $p < 0.001$, while for residents, no significant change was found, $p = 0.16$. In the post assessment, both medical students and residents reported feeling greater confidence in counseling a patient regarding oral health compared to the pre-assessment, $p < 0.001$ and $p < 0.03$, respectively. While medical students reported greater comfort with their OH knowledge ($p < 0.001$) and were more likely to ask patients about OH ($p < 0.001$) in the pre module compared to the post module, no significant difference in comfort scores or likelihood scores were found for residents, $p = 0.13$ and $p = 0.09$, respectively.

Discussion: This pilot provides a model for integrating OH education into the medical student OB/GYN clerkship curriculum and suggests it effectively enhances students' knowledge, comfort, and confidence in counseling patients about OH. While the educational intervention yielded significant results for medical students, it did not produce significant changes for residents. Future research should assess long-term knowledge retention, the extent to which increased confidence translates into clinical practice, and strategies to improve resident participation.

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Postdoctoral Abstracts

41. Exploring Relationships Between Medication and Supplement Intake and Childhood Caries

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Introduction: Early childhood caries (ECC), characterized by the decay of primary teeth in children under six years of age, is a prevalent, multifactorial disease affecting children worldwide. Its etiology involves complex interactions among host factors, dietary habits, and microbial communities within the oral cavity. Second only to the gut in complexity, the oral microbiome and its diverse ecosystem is influenced by various factors, including diet, environmental exposures, and medication intake. These factors have been shown to influence gut microbial diversity, decreasing heterogeneity and causing imbalances that lead to acute and chronic diseases. Medication and supplement intake may cause dysbiotic events within the microbiomes – antibiotic and drug and vitamin administration, particularly those with high sugar contents, may contribute to imbalances within the oral cavity that favor proliferation of cariogenic bacteria, increasing risk of ECC.

Objectives: To investigate relationships between medication and supplement intake (antibiotics, over-the-counter (OTC) and prescription medications, vitamins) and caries in young children as part of a pilot study exploring associations between oral and gut microbiomes, diet and environmental exposures, and ECC.

Materials & Methods: Twenty-four three-year-old children (ECC=14) and guardians were recruited after routine examinations at Columbia University's Pediatric Dental Clinic. A verbally-administered survey assessed parent-reported behavioral (e.g., diet, medication and supplement use), dental and general health history, demographic, and socio-environmental exposures (e.g., household characteristics, adverse experiences). Clinical data documented per clinic protocol included caries (total dmft/s), plaque (none, moderate, heavy, unknown), and oral hygiene (good, poor, unknown). Data were descriptively analyzed, correlation analyses completed.

Results & Conclusion: Among those with caries, dmft/s ranged 1-26 (mean=8.5, SD=7.95). Most children (62.50%; n=15) had "moderate" plaque levels; 41.67% (n=1) "none"; 33.33% (n=8) had "unknown". Similarly, most had "good" (45.83%; n=11) oral hygiene (n=7, 63.64% with caries); 29.17% (n=7) had "poor" hygiene (n=5, 71.43% with caries); and 25% (n=6) were uncharted and coded as "unknown" (n=2, 33.33% with caries). Over 1/3 of children (34.78%; n=8) reportedly had a history of antibiotic use (n=6, 75% with caries); 17.39% (n=4) prescription medications (n=2, 50% with caries); 73.91% (n=17) OTC (n=9, 52.94% with caries); and 60.87% (n=14) supplements (n=8, 57.14% with caries). No statistically significant associations were found between medication and supplement intake and plaque levels and oral hygiene status. No statistically significant associations were found between caries status and use of antibiotics (p=.265), prescription (p=.772) and OTC medications (p=.560), or supplements (p=.940). Reported medication and supplement use are not significantly associated with differences in caries severity (dmft/s).

Discussion: Though limited by sample size, preliminary findings suggest most preschool-age children have high exposure to pharmacologics - potential relationships in a small subset of a population elucidate the importance of understanding pharmacological impact on oral health in early childhood. Results reaffirm the multifactorial nature of ECC and the importance of addressing caries with consideration to general health.

42. Retrofitting Monolithic Zirconia Crown to Existing Maxillary Obturator Using a Digital Workflow: A Case Report

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Introduction: Maxillary defects due to congenital conditions, trauma, or cancer treatment can affect oral function, speech, aesthetics, and psychological well-being. A maxillary obturator restores separation between the oral and nasal cavities, improving speech, swallowing, and other physiological functions. However, defective restorations or secondary caries in abutment teeth may necessitate retrofitting crowns to maintain patient function. Newly fabricated provisional and definitive crowns can sometimes cause ill-fitting of the existing obturator, which may affect the patient's quality of life.

Objectives: This case report explores treatment options for restoring two defective abutment teeth by retrofitting crowns onto an existing maxillary obturator. It also evaluates the clinical acceptability of using a digital workflow for crown fabrication.

Materials & Methods: The fit and function of the maxillary obturator were assessed, revealing defective crowns on teeth #2 (mesial decay) and #15 (mesial caries). **Tooth #2:** Crown sectioned, caries excavated, root canal therapy performed, composite core buildup, and a provisional crown designed to match the original shape for retrofitting the obturator. **Tooth #15:** Crown sectioned, caries excavated, restored with FUJII II material, chamfer finish preparation performed, and clearance checked with the obturator. A provisional crown was fabricated. **Provisional Adjustment:** Acrylic resin on the provisional crowns was trimmed for clearance with the rest seat, clasps, and minor connectors of the obturator framework. A thin layer of acrylic resin was relined to establish retrofitting contact, and fit was confirmed using Occlude disclosing agent. **Digital Workflow:** Intraoral scans (3Shape TRIOS 3) captured pre-preparation (provisional crowns), abutment teeth, antagonist arch, and bite. A 3D design of the definitive crowns, following the morphology of the provisional crowns, was created and sent to the lab for milling 3% Mol Yttrian monolithic zirconia crowns. **Final Fit:** Crowns were evaluated for margins, proximal contacts, occlusion, and fit with the obturator. A radiograph confirmed proper seating, and the crowns were cemented with Rely X Luting cement.

Results & Conclusions: Acrylic resin provisional crowns and monolithic zirconia crowns were successfully retrofitted onto the maxillary obturator. The digital workflow proved clinically acceptable, efficient, and cost-effective, saving time while maintaining the function of the existing obturator throughout the dental treatment.

Discussion: Managing patients with maxillary obturators requires addressing complications such as caries, defective restorations, and bone loss. This case highlights the use of a digital workflow (CAD/CAM) to fabricate provisional and definitive crowns to retrofit the existing obturator. The process is precise, cost-effective, repeatable, and user-friendly for both clinicians and dental laboratories. It enables patients to maintain essential functions, such as speech and swallowing, throughout treatment.

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43. Dental Students' Experiences Integrating Nutritional Assessment and Counseling in Practice

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Introduction: Collaboration between dietitians and oral health care practitioners is critical for oral health promotion, disease prevention, and intervention (Touger-Decker 2013). Collaboration between dietitians and dental professionals remains uncommon despite various organizations and peer-review articles highlighting the importance of collaboration (Liefers 2021). Currently, students at the College of Dental Medicine (CDM) do not regularly implement nutritional screening or nutritional counseling in their routine examinations or encounters with patients, nor do they routinely collaborate with registered dietitians in clinic.

Objectives: To evaluate dental student's experiences conducting dietary caries risk assessments, setting goals, and making registered dietitian referrals for CDM patients as a course assignment. Findings will inform course improvements and will elucidate barriers to integrating nutritional counseling and dietitian referrals in the dental school teaching clinic.

Materials & Methods: Third-year students (n=98) were recruited to complete an online survey (multiple-choice and open-ended questions) assessing assignment outcomes and experience. Quantitative data and coded qualitative responses were descriptively analyzed.

Results & Conclusions: Of 98 enrolled students, 64 (65.3%) initiated and 28 (28.6%) completed surveys. Patients assessed were mostly female (n=22; 75.9%) with an average age of 34.3 years (range: 11-68; 24% age 18 years or under). Five students referred patients to dietitians. Among barriers to dietitian referrals, time (n=9; 36%) and patient motivation (n=8; 32%) were most cited; no students previously placed referrals. No significant correlations ($p>0.05$) were found between placing a dietitian referral and additional collected variables. In comparing patients who were >18 years vs <18 years, no significant differences ($p>0.05$) were found amongst referral rates, barriers, and in time spent with patients. Significant correlations ($p<0.05$) were found between students who reported no barriers and positive communication with their patient, no barriers and a strong understanding of the diet-caries link, communication barriers and lack of patient interest, and an unclear referral protocol and difficulty completing the assignment. Most students were open to conducting similar interventions in the future; students suggested electronic health record system integration to streamline referral workflow.

Discussion: Similar barriers existed in preventing dental students from referring patients to a registered dietitian and from completing a course assignment doing so. Findings are limited by a low response rate (28.6%) and high survey incompleteness rate (56.2%). Future data collection may include interviews with those who placed referrals to learn more about individual experiences. Future studies may aim to evaluate ways to enhance integration of nutritional counseling and dietitian referrals.

44. Mandibular Reconstruction with Fibula Free Flap and Implant-Retained Prosthesis Following Resection of Multicystic Ameloblastoma: A Case Report

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Introduction: Ameloblastoma is a benign but locally aggressive odontogenic tumor predominantly affecting the mandible. Surgical resection is the primary treatment, requiring subsequent reconstruction to restore esthetics and function. Fibula free flaps represent the gold standard for mandibular reconstruction due to excellent vascularization, reliable bone stock for implant placement, and favorable clinical outcomes.

Objectives:

- Achieve complete surgical removal of multicystic ameloblastoma.
- Restore mandibular continuity and oral function through fibula free flap reconstruction.
- Facilitate esthetic and functional rehabilitation using dental implants and prosthesis.

Materials & Methods: An 18-year-old female presented with multicystic ameloblastoma of the right mandible. A multidisciplinary surgical approach included segmental mandibulectomy via transcervical access, neck dissection, and immediate reconstruction utilizing a left fibula osteocutaneous free flap (9 cm bone segment with 6x8 cm skin paddle). Five Nobel Replace dental implants were inserted into the fibula flap intraoperatively. Microvascular anastomosis was performed between the peroneal artery and facial artery with vein couplers for venous anastomosis. A provisional PMMA prosthesis was fabricated immediately post-surgery, with subsequent soft-tissue revision procedures (vestibuloplasty, split-thickness skin graft) to enhance peri-implant tissue health and facilitate prosthetic rehabilitation.

Results & Conclusions: Mandibular reconstruction with the fibula free flap provided immediate bone continuity, effective soft tissue coverage, and optimal implant positioning. Clinical and radiographic outcomes confirmed stable integration and vascular perfusion of the flap. Prosthetic rehabilitation with an implant-retained prosthesis significantly improved the patient's esthetics and masticatory function. Secondary soft-tissue procedures addressed peri-implant health, improving hygiene maintenance and patient satisfaction. Early implant placement during initial reconstruction decreased overall treatment duration and complexity.

Discussion: Fibula free flap reconstruction effectively restores form, function, and quality of life following extensive mandibular resection for ameloblastoma. Strategic interdisciplinary collaboration between oral surgery and prosthodontics significantly enhances clinical outcomes. Limitations include the need for secondary surgical revisions. Future considerations involve standardized peri-implant soft tissue management protocols to minimize postoperative complications and improve prosthetic longevity.

45. Influence of implant-tooth proximity on incidence of caries in teeth adjacent to implants

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Introduction: Although there are widely accepted guidelines for a minimum tooth-implant distance (TID) when placing an implant, there is no set maximum TID. Recent studies have shown a correlation between large TID and increased caries risk. There is a lack of literature defining the maximum TID and identifying any impacting factors. Furthermore, determining the concomitant risk factors may help clinicians apply changes in the surgical protocol as well as employ high risk follow up protocols for patients.

Objectives: The purpose of this study is to evaluate the incidence of caries and peri-implant disease as related to (1) the horizontal distance from the implant to the adjacent tooth as measured at the level of the alveolar crest, (2) the vertical distance from the apical prosthetic contact area to the implant platform, and (3) the presence of an existing restoration on the adjacent tooth. This study is a retrospective radiographic and electronic medical records (EMR) analysis that serves as a follow up to a previous study by Smith et al (2020). We hypothesize that the vertical and horizontal distances between an implant and an adjacent tooth are linearly related to the development of caries.

Materials & Methods: Using EMR (Epic, Epic Systems, Verona, MI) we identified subjects previously treated at Columbia University College of Dental Medicine (CDM) for posterior implant placement adjacent to posterior natural dentition. Radiographs were analyzed utilizing the built-in measurement tool in medical imaging software (MiPACS, medicor imaging, Charlotte, NC). The initial radiographs were used to attain the (1) horizontal distance from the abutment/platform connection to the adjacent tooth root as measured at the alveolar crest; (2) vertical distance from the apical portion of the prosthetic contact area to the implant platform; (3) presence or absence of previous restoration on adjacent proximal tooth surface. All radiographs were analyzed for caries development on adjacent teeth by two examiners.

Results & Conclusions: Of the 184 analyzed samples, the majority have a TID of 2-3.9 mm with a 9.57% decay rate. Surprisingly, samples with a lower (0-1.9 mm) TID displayed an increased rate of caries at 28.57%. This rate may be skewed due to low sample size, since only 6 samples fit into this category of TID. Sites with a TID of 4.0 mm and greater displayed 8% of caries. It may still be premature to reach any conclusions regarding future guidelines due to low sample size and short follow up time. Further analysis will be necessary to obtain a larger sample size, and longer follow up times in order to reach a more definitive conclusion.

Discussion: Retrospective EMR studies have inherent bias, and this study is no exception. Additionally, the EMR system at CDM was recently updated, resulting in limited follow up on implant placement, and therefore limiting our sample size. Furthermore, the population at CDM is not a varied demographic and may also present with bias.

46. Evaluating Radiographic Tool Concordance for Crown Sizing and Associated Clinical Outcomes

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Introduction: Accurate selection of preformed metal crown (PMC) size is traditionally based on visual estimation, a method reliant on clinician experience. Helder et al. developed a PMC sizing guide utilizing digital radiographic measurements of the mesiodistal width of primary molars.

Objectives: To evaluate the accuracy of Helder's PMC prediction guide within a unique population at a large teaching hospital in Washington Heights, NY. Additionally, the study explored demographic influences on crown sizing and assessed correlations between crown size concordance (matched/non-matched) and clinical outcomes (ideal/non-ideal).

Materials & Methods: A chart review of 111 patients (ages 2–8) who received PMCs (ADA code 2930) at the pediatric dental clinic in July 2020. Data collected included bitewing radiographs, demographic information, resident provider level, and clinical outcomes from recall visits. Radiographic measurements followed Helder's protocol using MiPACS imaging software. Predicted crown sizes were compared to those actually placed, with size concordance classified dichotomously (matched/non-matched). Chi-square tests assessed associations between demographic factors, provider level, and prediction accuracy. Fisher's exact tests evaluated relationships between crown size matching and clinical outcomes (e.g., crown size, seating issues, and abscess formation).

Results & Conclusions: The mean patient age was 5.9 years (range: 3–11 years). Over half of the sample were male (59.4%, n=66), and 70.9% (n=78) identified as Hispanic. Predicted crown sizes matched actual placements in 92.5% of coronal and 87% of cervical measurements. No significant associations were observed between crown matching and ethnicity, sex, or provider level.

Discussion: Non-matched crowns were more frequently oversized, improperly seated, or associated with documented abscess formation. Intra-class correlation coefficients indicated strong reliability for both coronal (0.98) and cervical (0.96) measurements. Helder's prediction tool demonstrated favorability in crown size selection with no significant demographic influences. Further studies may help refine its application in diverse clinical settings.

47. Exploring Associations Between Physical Activity and Early Childhood Caries Status

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Introduction: Early childhood caries (ECC) is a preventable disease with major public health implications. Obesity and dental caries share common risk factors like diet and socioeconomic status. Studies link excessive screen time to higher BMI and increased caries risk. Screen time reduces physical activity, raises calorie intake, and affects metabolism. Active children benefit from better fitness, stronger bones, improved mood, and enhanced cognition. Children's activity patterns vary, combining moderate-vigorous and light-intensity movements. Parental behaviors and the home environment also influence children's activity, screen time, and diet.

Objectives: This pilot study explores the relationship between physical activity and ECC as part of a broader investigation into the links between the oral and gut microbiomes, nutrition, and oral health.

Materials & Methods: We recruited 24 children (36-47 months) and their parents/caregivers (14 with ECC) from Columbia University's pediatric dental clinic. A verbal survey collected bio-behavioral data (e.g., height/weight, physical activity frequency, screentime), while clinical measures included caries (dmft/dfs) and oral hygiene status (poor, good, unknown). Biospecimens (plaque, saliva, stool) were collected for analysis.

Results & Conclusions: No children had medical conditions affecting physical activity. Oral hygiene was reported as good in 46% (n=11), poor in 29% (n=7), and unknown in 25% (n=6). Average daily screen time over the past 30 days was 2.6 hours (range: 0–5) for TV/videos and 1.9 hours (range: 0–5) for computer games. Average daily Computer/Games hours was lower in the caries group at 1.62 hours per day vs. 2 hours in the caries-free group (p-value=0.52). Among those with caries who reported computer/game use, mean dmfs was 3.4. Children engaged in physical activity an average of 5.4 days per week in the caries group and 5.5 days per week in the caries-free group (p=0.92). Among children with caries, the mean dfs score was 8.5 (range: 1–26). Compared to peers, 40.9% (n=9) of parents responded their child's physical activity level was about the same; 40.9% (n=9) more; and 18.2% (n=4) a lot more active. Mean dmfs was 6.2 in the *about the same* group; 5.2 in the *more active* group; and 2 in the *a lot more active* group. On average, children engaged in ≥60 minutes of physical activity on 5 days in the past week (range: 2–7).

Discussion: Although many children were physically active, most also spent significant time on screens. While physical activity and screen time may not directly impact ECC, they can influence overall health, which can affect dental health. Educating parents about the connection between physical activity and ECC may encourage healthier habits. Additionally, providing chairside counseling about snacking during screen time could help reduce the risk of both caries and obesity. These findings highlight the importance of dental providers promoting overall health and preventing multiple health concerns as part of patient care.

48. Dental and Postdoctoral Student Utilization of Electronic Health Record-Embedded Patient Education Information: Awareness, Attitudes, and Barriers

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Introduction: Patient education is a fundamental component of evidence-based dental practice, enhancing patient comprehension, adherence, and clinical outcomes. The integration of electronic health record (EHR)-embedded patient education information (PEI) offers a structured, scalable approach to delivering written educational materials; however, its adoption among dental and postdoctoral students remains inconsistent. Despite the widespread implementation of EHR systems in academic settings, the degree to which students leverage these tools for patient education and the barriers they encounter remains poorly characterized. A better understanding of student awareness, attitudes, and system-level constraints is essential for refining curricular strategies and optimizing PEI utilization in clinical workflows.

Objectives: This study evaluates students' knowledge, perceptions, and utilization of EHR-embedded PEI, with a focus on identifying demographic and training-related predictors of adoption.

Materials & Methods: A cross-sectional survey was distributed to 3rd- and 4th-year dental students and postdoctoral students (n=75) at Columbia University College of Dental Medicine. The instrument assessed familiarity with EHR-embedded PEI (content, location), recall of formal training, perceived clinical utility, self-reported usage patterns, and barriers to implementation. Descriptive and inferential statistical analyses, including Fisher's Exact Test and chi-square analyses, were employed to assess differences by demographic variables, training stage, and specialty.

Results & Conclusions: Among the 75 respondents (67% dental students, 33% postdoctoral students), 94% endorsed the importance of patient education, and 93% believed written PEI would benefit patients (49% "a lot," 44% "somewhat"). However, only 6 (9%) reported having provided written materials via EHR. Awareness was limited: 71% were unaware of EHR's PEI functionality, only 17% correctly identified its location, and 89% did not recall any EHR-specific training. Postdoctoral students (27%) were significantly more likely than dental students (0%) to have utilized PEI in clinical practice (p=.0007). Notably, among those who had completed EHR training, recall of PEI content was strongly associated with utilization (43% vs. 5%, p<0.01). The most frequently cited barriers included difficulty locating PEI within EHR (n=55), time constraints during patient encounters (n=33), language barriers (n=24), limited access to printing (n=15), and uncertainty regarding patient interest (n=14).

Discussion: Despite strong recognition of patient education's importance, awareness and utilization of EHR-embedded PEI remain low, with workflow and structural barriers impeding adoption. Postdoctoral students were significantly more likely than dental students to use PEI, suggesting clinical experience may influence utilization. To enhance PEI adoption, recommended strategies include integrating Epic reminders into daily workflows, improving Epic training modules, providing quick-reference guides, and encouraging faculty engagement in reinforcing PEI use. These measures can bridge the gap between knowledge and implementation, ultimately improving patient comprehension, adherence, and oral health outcomes.

49. Ultrasound Evaluation of Orthodontic-Induced Alveolar Bone Loss: A Pilot Study The Novel Use of Ultrasound in Analyzing Temporal Alveolar Bone Changes in Patients Undergoing Clear Aligner Therapy

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Introduction: Bone change is necessary for orthodontic tooth movement, but can lead to unintended periodontal side effects such as bone loss and gingival recession. Current research has observed the bone changes before and after treatment, but there are limited studies examining the temporal nature of bone changes because the gold standard for measuring bone is with CBCT, but this imaging modality has high levels of radiation. On the other hand, ultrasound sonography is non-invasive, radiation free, and has been shown to be as accurate as both CBCT and direct surgical measurements in determining bone level and thickness.

Objectives: The objective of this prospective pilot study was to observe orthodontic patients at Columbia University's orthodontic clinic undergoing orthodontic treatment via clear aligner therapy and to utilize ultrasound sonography to quantify the amount of vertical bone change on the facial surface of the mandibular anterior teeth at baseline and every 3 months for the duration of treatment.

Materials & Methods: For this pilot study, 30 patients were included in baseline analysis, 20 at the 3-month timepoint, 16 at the 6-month timepoint, and 8 at the 9-month timepoint. Patients were stratified into the crowding group (>3mm) or non-crowding group (\leq 3mm) depending on their initial mandibular anterior crowding. Ultrasound sonography was used to measure alveolar bone height from the cemento-enamel junction (CEJ) to the facial crestal bone of the mandibular incisors at baseline and every 3 months for the duration of treatment. Data were averaged across incisors at each timepoint and analyzed using t-tests and linear regression to evaluate the influence of crowding and prescribed tooth movements on bone height change.

Results & Conclusions: Alveolar bone significantly decreased in the beginning of treatment ($p < 0.0001$) and significantly improved back to baseline or beyond as treatment progressed. At the 6-month timepoint, a statistically significant difference in alveolar bone loss between the crowding and non-crowding groups was observed ($p = 0.0015$). Also at the 6-month timepoint, a moderate correlation was found in a linear regression comparing the severity of initial crowding and the amount of prescribed buccal tooth movement to the amount of alveolar bone height change ($R^2 = 0.28$ and $R^2 = 0.34$, respectively).

Discussion: Alveolar bone remodeling during clear aligner treatment demonstrates an initial decrease in the height of alveolar bone, with recovery over time. Greater initial crowding and increased prescribed buccal movements are correlated with prolonged bone remodeling and higher risk of vertical bone loss. Ultrasonography proves to be an effective tool for non-invasive assessment of bone changes and has a role in precision orthodontics, allowing for individualized treatment planning and retention strategies based on bone remodeling timelines, which may help minimize periodontal risks.

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