

WHITE PAPER

Transforming Oral Health Care Through Interprofessional Education

A Review and Recommendations

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Authors

CareQuest Institute for Oral Health

Lisa J. Heaton, PhD Science Writer, Analytics and Data Insights CareQuest Institute for Oral Health

Hannah J. Cheung, MPH, MS, RDH Health Sciences Specialist, Analytics and Data Insights

CareQuest Institute for Oral Health

Kelly Schroeder, MS, RDH

Program Evaluation Specialist, Analytics and Data Insights CareQuest Institute for Oral Health

Rebecca Preston, MPH, CHES

Program Manager, Analytics and Data Insights CareQuest Institute for Oral Health

Paige Martin

Science Writer, Analytics and Data Insights CareQuest Institute for Oral Health

Eric P. Tranby, PhD

Director, Analytics and Data Insights CareQuest Institute for Oral Health

White Paper Contributing Authors^a

Elizabeth Alpert, DDS, MPH Instructor in Oral Health Policy and Epidemiology Harvard School of Dental Medicine

Arlet Arratoonian, DDS, MSc, CCOH, FCP

Consultant and Dental Director Family Health Care Center of Greater Los Angeles

Sobia Bilal, BDS, MSc, PhD

Associate Professor, Division of Prevention and Public Health Sciences, Pediatric Dentistry, Director, Interprofessional Education and Collaborative Practice, College of Dentistry University of Illinois Chicago

Leciel Bono, RDH-ER, MS, Ed.D(c), FADHA

Associate Professor, Department Chair and Graduate Program Director Idaho State University

Zachary Brian, FICD, FACD, FNAP

Associate Professor Director, Dentistry in Service to Community Program Director, Program for Oral Health Policy Adams School of Dentistry, University of North Carolina

Patricia Braun, MD, MPH

Professor of Pediatrics University of Colorado School of Medicine

Rachel Doherty, RDHAP, MPH Dental Coordinator, Central Valley Regional Center

Salma Elwazeer, BDS, MDS, MPH, FRSPH, FICD

Assistant Professor, Public Health/Dental Public Health Director of Interprofessional Education Director of Public Health Education Woody L. Hunt School of Dental Medicine Texas Tech Health El Paso

Robin Gatlin, MS, RDH

Assistant Professor, Division of Dental Hygiene Department of Dental Medicine University of New Mexico

Valeriya Hunter, DDS, MHA, TTS

Chief Dental Officer, Hunter Health

Linda M. Kaste, DDS, MS, PhD

Diplomate, American Board of Dental Public Health Professor, Department of Oral Biology University of Illinois Chicago College of Dentistry

Sarah Lindsay Liebkemann, MS, RDH

Assistant Professor, UNC Adams School of Dentistry Director of Communications, Office of Interprofessional Education and Practice University of North Carolina at Chapel Hill

Caroline McLeod, MS, RDH

Program Manager of Value-Based Care CareQuest Institute for Oral Health

Melanie Morris, LCSW

Assistant Professor, Comprehensive Care Tufts University School of Dental Medicine

Martha Mutis, DDS, MPH, EdD, FICD

Chair of Research, Grants, and Development Hispanic Dental Association

Shillpa Naavaal, BDS, MS, MPH

Associate Professor, Pediatric Dentistry and Dental Public Health and Policy Virginia Commonwealth University School of Dentistry

Jessica Owens, DMD, MA

Instructor and Consultant, Office of Academic Affairs University of Las Vegas, Nevada School of Dental Medicine

Richard W. Rubin, DDS, MPH

Assistant Professor, Department of Dental Public Health University of Pittsburgh School of Dental Medicine

Danielle Rulli, DHSc, MS, RDH

Associate Professor and Director, Graduate Dental Hygiene Program, College of Dentistry Director of IPE Faculty Development The Ohio State University Office of Interprofessional Practice and Education The Ohio State University

Scott Tomar, DMD, DrPH

Associate Dean, Division of Prevention and Public Health Sciences Pediatric Dentistry University of Illinois Chicago College of Dentistry

Lance Brendan Young, PhD, MBA Associate Professor, Director of Behavioral Science University of Iowa College of Dentistry

Use Case Contributing Authors^b

Adams School of Dentistry, University of North Carolina at Chapel Hill

Zachary Brian, DMD, MHA, FICD, FACD Roxanne Dsouza-Norwood, EdD, MS, RDH Sarah Lindsay Liebkemann, MS, RDH Heidi McNeilly, MSW Kimberly A. Sanders, PharmD, BCPS Jeffery Stewart, DDS, MS

Harvard School of Dental Medicine

Elizabeth Alpert, DDS, MPH Christine Riedy, PhD, MPH Lisa Thompson, DMD Tien Jiang, DMD, MEd

Hunt School of Dental Medicine at Texas Tech Health El Paso

Salma M. Elwazeer, BDS, MDS, MPH, FRSPH, FICD

Midwestern University Eve B. Hoover, DMSc, PA-C, DFAAPA

NYU Langone Dental Medicine Postdoctoral Residency Programs

Mary E. Northridge, PhD, MPH Mitchell Caponi, MPH Joanne Tzanis, MA Melissa K. James, PhD Margaret K. Mason, DMD, MA Martin Lieberman, DDS, MA

The Ohio State University College of Dentistry

Danielle Rulli, DHSc, MS, RDH Cynthia Dougherty, PhD, MSW, FANP Elizabeth Trolli, MLT

Tufts University School of Dental Medicine

Melanie Morris, LCSW Nadine M. Tassabehji, PhD, RDN, LDN Karin Arsenault, DMD, MPH, FACD, FPFA Kathryn M. Dolan, RDH, MEd Martha Forero, DDS, MS Maria C. Dolce, PhD, RN Aikaterini Papathanasiou, DMD, DDS, MBA, FICD

University of California, San Francisco School of Dentistry Lauren Gritzer, DDS, MPH

University of Colorado Denver Anschutz Medical Campus Raquel Baroni de Carvalho, PhD, MSc, BDS

University of Detroit Mercy School of Dentistry Melanie E. Mayberry, DDS, MS, MPH

University of Florida College of Dentistry Olga Ensz, DMD, MPH

University of Illinois Chicago College of Dentistry Sobia Bilal, BDS, MSc, PhD

University of Iowa College of Dentistry Lance Brendan Young, PhD, MBA

University of Michigan Adrienne Lapidos, PhD Burgunda V. Sweet, PharmD, FASHP Hannah Edwards, MHM

University of Nevada Las Vegas (UNLV) School of Dental Medicine Jessica Owens, DMD, MA

University of New Mexico Health Sciences Robin Gatlin, MS, RDH

University of Pittsburgh School of Dental Medicine Richard W. Rubin, DDS, MPH Nina Markovic, PhD Nyla Balakrishnan, BDS, MPH, MS

University of Texas Health Science Center Houston Khairunisa Hashmani, RDH, EdD

University of Washington School of Dentistry Marilynn Rothen, RDH, MS

Acknowledgements

Anita Duhl Glicken, MSW

Executive Director, National Interprofessional Initiative on Oral Health Associate Dean and Professor Emerita University of Colorado Anschutz School of Medicine

Daniel W. McNeil, PhD

Parker E. Mahan Endowed Professor and Chair Department of Community Dentistry and Behavioral Science University of Florida College of Dentistry

Lisa Sall, MPP

Marketing Manager CareQuest Institute for Oral Health

Brian Schweitzer

Vice President, Analytics and Data Insights CareQuest Institute for Oral Health

- a Listed in alphabetical order by last name
- b Listed in alphabetical order by institution

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Executive Summary

This white paper and accompanying use cases explore the integration of interprofessional education (IPE) in health care, with a particular focus on oral health.

They examine the history, importance, assessment, and challenges of IPE, emphasizing its role in fostering collaborative, patient-centered care. The paper also highlights IPE standards put forth by the Commission on Dental Accreditation (CODA) and the Interprofessional Education Collaborative (IPEC), the diverse health care disciplines involved in IPE, existing barriers to its implementation and assessment, and recommendations for successful and sustainable implementation of IPE programs.

Key Takeaways

- IPE refers to collaborative learning experiences where students from different health care disciplines engage in shared learning. Goals of IPE include enhancing teamwork, improving patient outcomes, and fostering interprofessional understanding.
- Oral health is an essential component of overall health, yet oral health education (i.e., dental and dental hygiene) has historically been isolated from other health care disciplines. Integrating oral health into IPE can address systemic health issues such as diabetes, cardiovascular disease, and respiratory infections, all of which have connections to oral health.

Oral health is an essential component of overall health, yet oral health education (i.e., dental and dental hygiene) has historically been isolated from other health care disciplines.

- IPE engages students from various health care disciplines, promoting collaborative, patient-centered care. Nearly all (96%) dental schools engage in IPE activities. Professions that collaborate with dental and dental hygiene students in IPE activities include, but are not limited to, behavioral health, nursing, pharmacy, physical and occupational therapy, primary care, public health, and social work.
- CODA requires dental and dental hygiene programs to integrate IPE into their curricula to ensure that students graduate with the ability to collaborate effectively within health care teams. IPE is implemented in dental education through various pedagogical methods. Institutions tailor IPE activities to their available resources, faculty training, and program priorities.
- Assessing IPE outcomes is crucial for validating its effectiveness. However, challenges exist in developing and using standardized assessment tools. Several different tools exist to assess various aspects of IPE, and many tools lack robust evidence of reliability and validity. Individual institutions may tailor assessment methods to their own purposes, limiting standardization. CODA allows flexibility in assessment if programs demonstrate competency in communication, teamwork, and patientcentered care.

Through continued efforts, interprofessional education can break down professional silos, enhance patient care, and contribute to the broader health care landscape.

- Logistical and structural barriers to IPE implementation include curriculum restraints such as limited faculty availability and time in the curriculum, scheduling conflicts between health profession schools, and faculty training gaps in implementing IPE. Challenges to assessment and program standardization include lack of consistent use of assessment tools across programs, need for improved psychometric validation of existing tools, and variability in resources across institutions.
- Additional barriers to implementing IPE include resistance to change and lack of familiarity with IPE benefits among faculty and students and professional silos that isolate health professions from one another.

This white paper is accompanied by a collection of use cases describing IPE programs from across 19 academic institutions within the United States. Recommendations from these use cases regarding implementing and sustaining IPE programming include:

- Advocating for centralized university-wide IPE offices with dedicated leadership and resources
- Fostering a culture of IPE within dental schools and other health profession schools
- Investing in interprofessional faculty to shape and sustain IPE programming
- Standardizing IPE curricula and strengthening assessment of learning
- Aligning IPE with workforce development and career readiness

Conclusion

IPE is essential in fostering collaborative, patient-centered health care. Despite structural and logistical barriers, increasing IPE awareness and integration efforts are reshaping how health care professionals work together. This white paper and the accompanying use cases underscore the need for improved assessment tools, increased representation of oral health in IPE research, and flexible, yet standardized, implementation strategies. Through continued efforts, IPE can break down professional silos, enhance patient care, and contribute to the broader health care landscape.



Introduction: What Is Interprofessional Education in Health Care?

Interprofessional education (IPE) is a pioneering method of preparing health care students to deliver integrated and collaborative care by enabling them to "learn about, from, and with each other."¹ Defined broadly, IPE involves bringing together students from various health disciplines which promotes skills in teamwork, communication, and mutual respect.² IPE has gained momentum due to the growing complexity of health care, as well as the recognition of oralsystemic health connections and the shifting burden of illness toward chronic disease management.³ As will be described in greater detail, poor oral health has been linked with several chronic health conditions,⁴ highlighting the critical need for health professionals to collaborate on achieving whole-patient, comprehensive care.

It should be noted at the outset that there is a distinction between *interprofessional* education and *intraprofessional* education. Interprofessional education refers to collaboration with those outside of one's own discipline. Intraprofessional education refers to collaboration with different professionals who share the same discipline.⁵ In the case of dentistry as a discipline, intraprofessional education includes collaborative learning between members of the dental team, including dentists, dental therapists, dental hygienists, dental assistants, and dental staff, among others (Appendix A).

To highlight the importance of IPE in fostering collaboration between health care professionals, imagine a pregnant person experiencing minor gum swelling who has their symptoms dismissed by their primary care physician as a routine hormonal change of pregnancy. The physician prescribes antibiotics without considering a referral to a dentist, overlooking the potential severity of underlying periodontal disease. When physicians do understand risks associated with gum disease and pregnancy outcomes, fear around risks associated with dental care by the physician and/or the patient may still persist.^{6,7} This hypothetical vignette is a cautionary tale about how fragmented care could negatively affect person-centered treatment.

When incorporating oral health in IPE, using a life course model supports consideration of all aspects of a person's health and lifestyle by providing a framework that examines how a person's life is shaped by a variety of factors from birth to death. It considers how age, relationships, life events, social change, and other factors influence a person's development.⁸ Interprofessional education is integral to this "life course" model and the success of early intervention in dentistry, as it fosters collaboration among health care professionals to address oral health as a critical component of overall well-being in a timely manner.

Policy shifts, such as the passage of the Patient Protection and Affordable Care Act (ACA) in 2010,⁹ emphasize team-based care and reinforce IPE's role in improving patient outcomes.¹⁰ Just prior to the passage of the ACA, the Interprofessional Education Collaborative (IPEC) was established in 2009 by six national education associations, including the American Dental Education Association (ADEA).¹¹ IPEC has developed into a collaboration between 22 professional associations that represent most of the health professions educational programs in the United States (US). Over time, this collaboration has identified core competencies in ethics, roles, communication, and teamwork. Updated in 2023, these competencies now incorporate equity and social determinants of health to better address modern health care demands.¹² The Commission on Dental Accreditation (CODA) first established standards requiring oral health students to demonstrate competency in providing patient-centered care through whole-health promotion and collaborating with allied health professionals in 2013, underscoring the importance of collaborative care.^{13, 14} Initiatives like the "Smiles for Life" national oral health curriculum have been instrumental in training over one million health care providers on the relevance of oral health in primary care settings.¹⁵⁻¹⁷ These policy efforts have laid the groundwork for a health care system that embraces comprehensive, integrated care.

The purpose of this white paper is to provide a brief historical context of oral health within IPE, emphasize the importance of incorporating oral health in IPE, describe what other health profession educational programs often collaborate with oral health in IPE activities, describe how IPE activities and programs are often structured and how students' competency in IPE is assessed, review some common barriers and challenges to implementing and sustaining IPE programs, and provide some recommendations for oral health educators and administrators to consider as they develop and/or expand IPE activities at their own institutions. This white paper is also accompanied by use cases from 19 academic institutions across the US that serve as examples of oral health-related IPE programs and activities that are currently ongoing. The hope is that this paper and the accompanying use cases will serve as resources for its readers, highlighting the importance of incorporating oral health into IPE efforts and providing both current examples of such efforts and a foundation upon which future IPE initiatives may be built.

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A Brief Review of the Incorporation of Oral Health into IPE

Examining the history of oral health's inclusion in IPE involves looking at different contexts, including the adoption of evolving language over time as well as the history of health professions and their developments together and separately.

One way to look at language adoption and evolution is via searches of words/terms. For example, by looking at the PubMed search tool offered through the National Library of Medicine (NLM),¹⁸ it is possible to track the origin and use of various Medical Subject Headings (MeSH) terms.¹⁹ The MeSH thesaurus is a hierarchically organized vocabulary produced by the NLM that is used for indexing, cataloging, and searching biomedical and health-related information. MeSH terms include subject headings appearing in MEDLINE/PubMed, the NLM Catalog, and other NLM databases.

Tracking the use of MeSH terms provides a point of reference to contrast the appearance of IPE in peer-reviewed publications listed in PubMed describing dental education versus professional education (Figure 1). "Interprofessional education" was formally approved as a MeSH term in 2021, and so using the MeSH term alone as an indicator of the number of IPE publications may provide a somewhat limited view of how often the IPE concept appears in the literature prior to 2021. Nevertheless, PubMed search results suggest that dental education is not broadly represented in publications on IPE between 2018 and 2024. If the literature searches represented in Figure 1 are restricted to publications with "United States" as a MeSH term, IPE includes 47 publications (only 15% of the publications), with none including dental education. The 11 publications that did include dental education as a MeSH term only account for 1.5% of the IPE publications. This review of the history of IPE as a PubMed MeSH term, albeit not peer-reviewed, suggests that (1) IPE is a recent term (only captured in about the past five years as a MeSH term), (2) dental education is a small part of the big picture of IPE, and (3) a drop in IPE publications appears to correspond to the COVID-19 pandemic timeframe, which might raise questions about which factors affect the implementation of and research published about IPE.



Figure 1: Publication Frequencies by Year for PubMed MeSH Term Searches on Professional Education and Interprofessional Education (IPE) and Dental Education and IPE (as of January 3, 2025)

A more complex way to consider the history of IPE is to look at the histories of the development of health professions and their associated educational and accreditation structures. A detailed history of the development of dentistry, medicine, and other health professions is beyond the scope of this paper but can be found in other valuable resources.^{20, 21} Figure 2 provides a brief look at highlights of this history, focused on the United States and including the establishment of IPEC and several reports calling for the integration of oral health care with other health professions. Additional resources about the establishment and development of IPE and dental education include, but are not limited to, the following:

- "Oral Health in America: Advances and Challenges"²²
- "Is Dentistry at Risk? A Case for Interprofessional Education"³
- "Impact of Oral Health on Interprofessional Collaborative Practice (An Issue of Dental Clinics of North America)²³
- "Integrating Oral and Overall Health Care: Building a Foundation for Interprofessional Education and Collaborative Practice"²⁴
- "Updated User's Guide for the Interprofessional Core Clinical Competencies"²⁵

Figure 2: An Abbreviated Timeline of the Development of IPE in Dental and Other Health Professional Education in the United States (see Appendix B for Figure 2 references)



What Is the Purpose and Importance of Including Oral Health in IPE?

Oral health is integral to overall health. As explained in a recent article in the *Journal of the American Medical Association*, there are numerous oral health conditions (e.g., dry mouth, oral candidiasis) that may be identified by non-dental health care providers or may be caused by medications prescribed by these providers for other systemic diseases.²⁶ Furthermore, poor oral health is linked to many chronic health conditions, as described in more detail below. Historically, other health professionals have had limited training in oral health as well as low awareness of both the oral-systemic link and the value contributed by oral health providers to an individual's systemic health and well-being. IPE helps dismantle these silos that have historically kept oral health excluded from some health spaces.

Integrating oral health into IPE is a strategic necessity, driven by growing recognition of the interconnectedness between oral and systemic health. Oral health is not just an isolated aspect of patient care; it is linked to many systemic conditions, including cardiovascular disease, diabetes, respiratory infections, and adverse pregnancy outcomes. For example, periodontal disease has been associated with an increased risk of cardiovascular events due to systemic inflammation.²⁷ By embedding oral health in IPE curricula, we can ensure that all health care providers understand the critical role oral health plays in overall patient wellness, enabling them to collaborate effectively across disciplines.

Oral health is not just an isolated aspect of patient care; it is linked to many systemic conditions, including cardiovascular disease, diabetes, respiratory infections, and adverse pregnancy outcomes. Despite well-established connections between oral and overall health as described below, many non-dental health care providers receive limited or no formal training on the importance of oral health, resulting in missed opportunities for early intervention and comprehensive care.²⁸ Mills and colleagues demonstrated that exposure to information about oral health during training for health professionals (e.g., pharmacist, physician assistant) not only increases knowledge of these topics but also increases learners' understanding of the importance of future interprofessional collaborations.²⁹ Participation in IPE can also provide information related to oral health and exposure to the variety of professional roles in the dental profession (Appendix A), further emphasizing the need for collaborative care for patients' increasingly complex health care needs. Because these conditions cut across multiple disciplines, IPE can be customized to encompass all types of interdisciplinary learners. Below are some examples of the oral-systemic connection that can be built into dental curricula and/or clinical experiences.

Diabetes and Periodontal Disease

The relationship between periodontal disease and diabetes has been studied extensively and is one of the strongest examples of the oral-systemic connection to date. Connections range from the adverse effects of diabetes on wound healing after oral surgery³⁰ to the more advanced stages of periodontal disease in poorly controlled diabetes.³¹ All health care providers should inform their patients with diabetes about this oral-systemic link. Researchers examined the knowledge, awareness, and behaviors of both dentists and endocrinologists as related to the bidirectional relationship between diabetes and periodontitis.³² They found that both groups recognized the connection between the two diseases, and the vast majority agreed that this interprofessional collaboration should be strengthened. However, dentists more frequently referred their patients with severe periodontitis for an endocrine evaluation than endocrinologists referred their patients with diabetes for dental consults. As diabetes and periodontal disease are two of the most frequently occurring conditions in the US population, with substantial effects on the national and global health care economy, a focus on the oral-systemic connection with these two diseases through interprofessional educational efforts could contribute significantly to improved health care outcomes and subsequent reduction of health care costs.33

Xerostomia/Dry Mouth as a Result of Medication

Oral health professionals know well that saliva has an important protective function for the dentition in addition to its role in the digestive process.³⁴ Xerostomia, often described by patients as "dry mouth," is a complicating outcome of systemic conditions such as Sjögren's syndrome or as a side effect of multiple medications, including chemotherapeutics, antidepressants, and antihypertensive medications.³⁵ Patients receiving head and neck radiation or being treated with immune modulators might also be at risk.²⁶ Dry mouth can contribute to many adverse oral conditions, including increased risk for dental caries, sensations of burning mouth or tongue, issues with dental prostheses, and increased susceptibility to secondary infections, such as candidiasis.³⁵ Patients with substance use disorders might also be at increased risk for dental diseases, including xerostomia, both as a side effect of the medication and due to changes in home care that are often seen in this population.³⁶ As patients affected by xerostomia comprise a wide spectrum, likely receiving care from multiple professionals, disciplines, or fields, IPE can help with the treatment of this condition. Information about the risk factors, dental diseases, and treatment needs related to dry mouth can all be included to improve patient outcomes.

Medications and Gingival Enlargement

All medications carry risks, but often the serious nature of the underlying conditions that they treat means the benefits outweigh the risks. It is well established that several classes of medication are associated with gingival enlargement, often showing an exaggerated response to dental biofilm.³⁷ The medications that can cause this atypical response include the antiepileptic drugs phenytoin and sodium valproate, certain calcium channel–blocking drugs (e.g., nifedipine, verapamil, diltiazem, amlodipine, felodipine), immunoregulating drugs (e.g., cyclosporine), and high-dose oral contraceptives.³⁸ All prescribing health care providers should be aware of this condition so that appropriate information and care coordination can occur with patients who experience this gingival enlargement.

Geriatric Care

A recent study on physicians' and dentists' perceptions of providing care for patients over the age of 80 found that individualized, person-centered treatment that includes collaborative care was a hallmark of what constituted good health care.³⁹ However, these same respondents noted that providing treatment to this patient population in an outpatient setting is difficult due to their unique characteristics, including often-complex medical status, need for care coordination, transportation challenges, and treatment modifications adapted for an individual's physical and cognitive considerations.⁴⁰ The relationship between polypharmacy, dry mouth, and caries, and the importance of a functional dentition to allow for adequate nutrition, are several examples of how oral health can substantially affect overall health and quality of life for older adults.⁴¹

Sleep Apnea

Sleep-related breathing disorders are a collection of conditions that can have serious consequences affecting multiple other systems in the body.⁴² Obstructive sleep apnea is one such condition. Just as it is recommended that oral health professionals screen for this condition as a routine part of care and refer patients for an appropriate workup and diagnosis if indicated, other health care providers should be aware of both the dental consequences and treatment options available for this condition.⁴³ Providing information on obstructive sleep apnea through IPE could help normalize the collaborative care needed for future health care providers.

Emergency Department Visits for Tooth Pain

The hospital-based emergency department (ED) is a vital component of the health care system, offering life-saving care to millions of Americans annually. It is not, however, set up to provide all manner of health care, including comprehensive dental treatment. Dental-related emergency room visits remain a significant burden on the health care system, with nearly two million cases annually in the US, costing approximately \$3.4 billion.⁴⁴ Approximately 1% of ED visits are for toothrelated issues,⁴⁵ with the vast majority of patients unable to receive definitive care in this environment. These visits are often preventable with integrated oral health services in primary care.⁴⁶ According to Oluwatosin and colleagues, most emergency departments are not prepared to deliver dental care, and patients are often discharged with the generic instruction to follow up with a dentist and with palliative prescriptions, often for unneeded antibiotics and narcotics, which can both lead to unintended adverse consequences.⁴⁷ This response might stem from a lack of understanding of dental disease; as Lewis and colleagues noted, most information gathered from ED visits is related to the patient's chief complaint rather than a diagnosis, as the assigned dental diagnoses tend to be nonspecific.⁴⁸ Educating other health care providers on the common tooth-related conditions that lead to ED visits might help improve patient outcomes in a multitude of ways, including the reduction of unnecessary prescriptions and resulting adverse drug reactions. By giving patients more detailed information on their condition and actions they can take, it might also avert future ED visits for the same problem.⁴⁷ ED visits for dental care also provide an

important platform for advocacy, as seeking treatment for a dental condition in our existing medical system highlights the many complications with our current US health care system.⁴⁸

As evidenced by the multiple oral-systemic links described above, the integration of oral health into IPE represents a critical step toward transforming health care delivery. By fostering collaboration among health care professionals and emphasizing the importance of oral-systemic health connections, IPE can break down traditional silos that have separated dental care from general health care. The successful implementation of IPE in dental education and clinical practice settings will require sustained policy advocacy, comprehensive curricular reforms, and a commitment to cultural change across the health care system. As more programs adopt integrated care models, the benefits of IPE will become increasingly evident, and lead to a more collaborative, efficient, and personcentered approach to health care. By fostering collaboration among health care professionals and emphasizing the importance of oral-systemic health connections, IPE can break down traditional silos that have separated dental care from general health care.

Which Health Care Professions Engage with Oral Health in IPE?

IPE convenes students from various health professions, allowing them to learn from and with each other, enhancing their shared knowledge and improving patient outcomes. The Interprofessional Education Collaborative (IPEC), with the American Dental Education Association (ADEA) as one of its founding members, has played a pivotal role in advancing IPE across health professions.⁴⁹ According to IPEC guidelines, as of 2018, 38% of dental schools leveraged these standards to shape their IPE activities.⁵⁰ A survey of 29 dental schools between February and June 2017 revealed that 96% engaged in clinical and nonclinical IPE sessions, though sampling bias may have influenced this result. These sessions predominantly involved medical (90%), pharmacy (76%), and nursing (62%) students.⁵⁰ In 2018, more than 82% of graduating dental students reported interprofessional interactions during their academic careers,⁵¹ with about 68% reporting interactions with nursing, 64% with pharmacy, and 44% with medicine. Physical therapists, public health professionals, and social workers are other examples of health professionals integrated into IPE with dental students.⁵¹

Table 1 lists additional professionals representing fields that may also be included in IPE activities with oral health care students. The following section briefly describes some of the health professionals who represent fields collaborating with oral health care students in IPE activities.

Primary Care Providers / Physicians and Physician Assistants

Primary care typically refers to the maintenance of health and treatment of most common illnesses.⁵² Historically, a family physician has been the patient's primary care provider (PCP), the first contact when scheduling routine examinations or when feeling unwell. Thirty percent of all active US physicians are PCPs, and they can be categorized by specialization: family medicine (39%), internists (38%), geriatricians (2%), and pediatricians (21%). The physician assistant (PA) profession emerged in the 1960s to address a shortage of PCPs.⁵³ Physician assistants diagnose and treat patients, typically under the supervision of a physician.

A shortage of PCPs and the overlap in dental and medical education have led to proposals for an oral health primary care provider (OH-PCP) model in which oral health professionals would provide basic screening and preventive services in addition to managing oral health.^{54, 55} Physicians' involvement in oral health care generally consists of a referral to a dentist.⁵⁶ Similarly, the dentist or dental hygienist may record or notice indicators or elevated risks of hypertension, cardiovascular disease, diabetes, sleep apnea, leukemia, HIV/AIDS, Crohn's disease, irritable bowel syndrome, and others.⁵⁷ Oral health professionals may also coordinate treatment of multiple patient

conditions, which is often the case with polypharmacy. For example, a dentist treating a patient with medication-induced xerostomia may contact the PCP to see if prescribing an alternative medication with fewer side effects may be feasible.⁵⁸ Dental-medical care coordination can also enhance prenatal and palliative care.^{59,60}

Physicians may also provide limited oral health care in emergency departments,^{61,62} and pediatricians may provide children with oral health screenings and fluoride varnish in pediatric clinics.⁶³ Technological advances in diagnosis, including saliva testing and artificial intelligence, suggest that oral health professionals will have more opportunities in the future to refer patients to PCPs for further testing and treatment of systemic illnesses.^{64,65} In general, dentists, physicians, and patients are generally supportive of formal systematic health screenings in dental offices.^{66–68}

Despite structural barriers to collaboration, individual oral health professionals can significantly enhance patient care by identifying their patients' primary care physicians, documenting PCP contact information, and initiating contact with them whenever information could be provided or elicited to facilitate patient care. Interprofessional communication training using evidence-based methods like SBAR (situation-backgroundassessment-recommendation) should be required in dental and hygiene programs.⁶⁹

Behavioral Health Professionals

Behavioral health is an umbrella term that includes mental health and substance use disorders as well as life stressors, stress-related physical symptoms, and suicidal ideation.^{70,71} Several types of providers can fall into the category of behavioral health professionals, including but not limited to: psychologists, psychiatrists, licensed clinical social workers, marriage and family therapists, psychiatric mental health nurses, and physician assistants specializing in psychiatry.⁷² Both in the dental setting and outside it, behavioral health professionals can screen patients for mental health conditions and help manage mental health–related issues such as anxiety and depression.

Behavioral health providers can help patients manage and reduce dental care–related fear and anxiety that can impede the ability to receive preventive and restorative treatment.⁷³⁻⁷⁵ They can also address conditions such as anxiety and depression related to chronic orofacial pain conditions.^{76,77} Behavioral health providers can also screen dental patients for substance use disorders⁷⁸ and can provide both counseling and referrals for these patients as needed. Several dental schools stress the importance of providing their students with training about mental health conditions.⁷⁹ Community Health Workers, such as certified Peer Support Specialists and Peer Recovery Coaches, can provide support, education, and linkages to dental care within behavioral health settings.⁸⁰ Dental educators have published examples of how behavioral health topics can be incorporated into predoctoral^{81,82} and postdoctoral education.⁸³

Nurses

Registered Nurses (RNs) are health care professionals who provide and coordinate care as well as educate patients about health conditions. Their responsibilities include administering medications, monitoring patient health, and collaborating with other health care team members to develop and implement patient care plans.⁸⁴ Nurse Practitioners (NPs) are advanced practice RNs who have completed graduate-level education and are trained to assess patient needs, order and interpret diagnostic tests, initiate and manage treatment plans, and prescribe medications. They can serve as primary care providers specializing in family practice, pediatrics, or geriatrics.⁸⁵

The impact of interprofessional collaboration between dentistry and nursing on oral health is bidirectional. Oral health professionals can learn from NPs about systemic health and how to adopt a more comprehensive care model when treating patients for their oral health needs. For example, the Nurse Practitioner-Dentist (NPD) Model for Primary Care piloted at the Harvard School of Dental Medicine integrated primary care services into an academic dental practice. One of the aims was to help dental students, NP students, and practicing NPs to gain insights into implementing medical-dental integration into practice.^{86,87} Nurses also benefit from learning about oral health care to better educate their patients, especially since health education is a central aspect of nursing. This knowledge is very helpful for RNs and NPs who may consider a career in Federally Qualified Health Centers (FQHCs), where more interprofessional practice collaborations are expected. Bernstein and colleagues conducted interviews with nurse managers, nurse practitioners, and other medical providers who expressed that they did understand the importance of oral health education in preventing oral health problems; however, they felt that they lacked formal training or needed more precise guidelines.⁸⁸ Another study by Dsouza and colleagues demonstrated that interprofessional collaboration between nursing and dental hygiene students significantly improved nursing students' oral health knowledge and confidence in providing preventive education.⁸⁹ After attending some joint sessions, 37% of nursing students performed oral health screenings, and 45% provided counseling during clinical visits. Results from this study underscore that joint training increased willingness to incorporate oral health into nursing practices.⁸⁹

Pharmacists

Pharmacists' expertise includes understanding pharmacological processes, probable side effects, and interactions between drugs,⁹⁰ and their role has expanded significantly over time as health care team members specializing in drug management and patient education. Pharmacists' knowledge of drug categories, mechanisms of action, and potential interactions is essential in dental settings. With a growing number of older adult patients and the increasing prevalence of comorbid diseases, oral health professionals frequently encounter patients with extensive medical histories and polypharmacy.⁹¹ For example, many common medications prescribed to older adults can influence oral health, such as those causing dry mouth. Dry mouth heightens the risk of dental caries and oral infections.⁹² Communicating with pharmacists to better understand these side effects allows oral health professionals to implement preventive measures and tailor treatment strategies. Pharmacists' expertise can also assist in identifying drug-drug interactions (e.g., between local anesthetics, dental sedatives, analgesics, and antibiotics) that could compromise patient safety during dental procedures.93

The benefits of this interdisciplinary approach are evident in studies exploring IPE between pharmacy and dental students. A study published in "Currents in Pharmacy Teaching and Learning" examined the learning results of eight dental and eight pharmacy students paired to work together during their academic training.⁹⁴ There was a positive perception of using IPE among dental and pharmacy students, and students expressed a desire for more frequent collaborative encounters to maximize the educational impact. In another study, Carlisle and Taing reviewed IPE strategies between dental and pharmacy students and emphasized that co-education can distribute responsibilities and encourage teamwork between disciplines and ultimately improve patient outcomes.95 Barraclough et al. evaluated the bidirectional impact of IPE on these two professionals and found that pharmacy professionals felt more confident giving dental advice after shared learning between the two professions was facilitated.⁹⁶ This study also showed that IPE helped change the way professionals relate to one another's roles when it comes to patient care, including the perception that preventive oral health is part of the role of a community pharmacist.⁹⁶ Another study emphasized integrating IPE and the collaborative practice model that was developed by the School of Dentistry and the College of Pharmacy at the University of Minnesota. The authors note that IPE helps address some important primary care needs that could otherwise be missed in the dental clinic settings.97

Physical Therapists / Occupational Therapists

Physical therapists examine, diagnose, and treat individuals who have injuries, chronic conditions, or disabilities throughout all stages of life. They help patients maximize mobility while managing pain, prevent problems with function and fitness, and reduce the need for surgery or prescription drugs.⁹⁸ Occupational therapists assist individuals in being able to engage in everyday activities, such as eating, bathing, and dressing, with the goal of being able to participate in activities that each individual finds meaningful.⁹⁹

Physical therapists collaborate with oral health professionals to manage temporomandibular joint (TMJ) disorders and facial pain.¹⁰⁰ In addition, dexterity and mobility limitations can affect a patient's ability to maintain a consistent oral hygiene routine at home. Early detection of this barrier and referral to a physical therapist may improve preventive home care and reduce oral disease. Occupational therapists can help individuals engage in oral health care at home and are also able to collaborate with oral health professionals in the dental setting. For example, occupational therapists can help oral health professionals understand and provide adaptations for the sensory needs of patients on the autism spectrum.^{101–103} They are also able to assist older patients with modifications to their home hygiene and denture care.¹⁰⁴

Public Health Professionals

Public health is an evidence-based field focused on promoting and protecting the health of individuals, communities, and populations.¹⁰⁵ The following 10 essential functions guide the field: (1) monitoring health status, (2) diagnosing and investigating health issues, (3) informing, educating, and empowering individuals and communities, (4) mobilizing community partnerships, (5) developing policies and plans, (6) enforcing laws and regulations, (7) linking people to necessary services and ensuring access to care, (8) ensuring a competent public health workforce, (9) evaluating health services, and (10) conducting research.¹⁰⁶ Public health professionals work in various settings, including government, business, and the nonprofit sector.

In 1950, the American Dental Association established and recognized Dental Public Health (DPH) as a specialty within dentistry that integrates the principles of public health into dentistry to address population-level oral health needs.¹⁰⁷ DPH provides leadership and expertise in areas such as oral health surveillance, policy development, community-based disease prevention, health promotion, and the maintenance of the dental safety net.^{107, 108} Dentists, dental hygienists, and professionals from various disciplines contribute to DPH by applying expertise in preventive dentistry, epidemiology, biostatistics, behavioral health, health economics, health policy,

and health care administration.¹⁰⁷ Together, they aim to promote oral health equity, enhance access to care, and improve overall health and well-being.

Social Workers

Social work is a values-based profession dedicated to enhancing human well-being and addressing basic needs, with particular attention to the needs and empowerment of individuals who are vulnerable, oppressed, or living in poverty.¹⁰⁹ The core values that drive social work practice include (1) service, (2) social justice, (3) dignity and worth of the person, (4) importance of human relationships, (5) integrity, and (6) competence. Social work practice is defined by a focus on both individual well-being in a social context, as well as the well-being of society.¹⁰⁹ Social workers contribute in various roles across health care settings, schools, mental health counseling, legal settings, nonprofits, and community agencies.

Social workers have been integral in oral health settings since 1917.¹¹⁰ Social workers are instrumental in addressing patients' financial needs, issues with transportation, dental anxiety,

mental health complexities, physical health complexities, and other social needs that have made it difficult for patients to adhere to and complete needed dental treatment.¹¹¹ In dental education, social workers have multifaceted roles, including providing direct clinical care and coordinating patient care, consulting with dental students and faculty to address patients' psychosocial needs, serving as educators on person-centered care and social drivers of health, and working with diverse populations.¹¹² Additionally, they contribute to social work program development and research, enhancing the integration of social work into dental practice and education. Social work has been instrumental in promoting oral health equity, decreasing barriers to dental treatment, improving attendance to dental appointments, and enhancing dental training.¹¹¹⁻¹¹⁴

In addition to the health professions described above, numerous other health professions collaborate interprofessionally in the delivery of oral health care. Table 1 provides a detailed, but not necessarily exhaustive, list of several of those professions and examples of collaboration documented in the research literature.

Table 1: Additional Professions Presenting Opportunities for C	Oral Health Interprofessional Collaboration
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Profession	Collaboration Examples			
Audiologists	 Treating patients with craniofacial anomalies resulting in hearing loss or ear pain^{115, 116} Treating patients with hearing loss or tinnitus^{116, 117} 			
Chiropractors	Alleviating temporomandibular joint disorder (TMD) pain ^{118, 119}			
Nutritionists or Dieticians	 Offering chairside nutrition counseling^{120, 121} Counseling patients with eating disorders¹²² and diabetes¹²³ Addressing nutrition and caries risk in geriatric patients^{124, 125} and patients with obesity¹²⁶ 			
Otolaryngologists/ENTs	 Treating patients with sleep apnea¹²⁷ or head and neck cancers¹²⁸ Planning and executing maxillary sinus elevation¹²⁹ 			
Respiratory Therapists	 Treating sleep apnea¹³⁰ Treating patients with asthma¹³¹ 			
Speech/Language Pathologists	 Treating pediatric patients with feeding impairment,¹³² cleft lip and palate,¹³³ or autism¹⁰¹ Facilitating patients' adaptation to dentures¹³⁴ Treating patients with swallowing disorders¹³⁵ Treating drooling patients¹³⁶ 			
Sports Medicine Physicians / Athletic Coaches	 Providing detailed oral examinations for athletes¹³⁷ Fitting mouth guards for athletes¹³⁸ Treating sports-related dental trauma¹³⁹ 			

What Does IPE Typically Look Like?

Commission on Dental Accreditation (CODA) Accreditation Requirements

To better understand how IPE is implemented in oral health education, and how students' competency in IPE is assessed, it is important to be familiar with the educational standards that require IPE to be included in oral health education. The Commission on Dental Accreditation (CODA) has explicit requirements to include IPE in the accreditation standards for both predoctoral dental and dental hygiene education.^{14, 140} Listed below are the specific standards for both types of educational programs, as well as the intent and examples of each.

Dental Hygiene Program Standards¹⁴⁰

2-15: Graduates must be competent in interprofessional communication, collaboration, and interaction with other members of the health care team to support comprehensive patient care.

Intent:

Students should understand the roles of members of the health care team and have interprofessional educational experiences that involve working with other health care professional students and practitioners. The ability to communicate verbally and in written form is essential to the safe and effective provision of oral health services for diverse populations. Dental hygienists should recognize the cultural influences that affect the delivery of health services to individuals and communities (e.g., health status, health services, and health beliefs).

Examples of evidence to demonstrate compliance with standards may include:

- Student experiences demonstrating the ability to communicate and collaborate effectively with a variety of individuals, groups, and health care providers
- Examples of individual and community-based oral health projects implemented by students during the previous academic year
- Evaluation mechanisms designed to assess knowledge and performance of interdisciplinary communication and collaboration

Predoctoral Dental Education Programs¹⁴

1-9: The dental school must show evidence of interaction with other components of the higher education, health care education, and/or health care delivery systems.

2-20: Graduates must be competent in communicating and collaborating with other members of the health care team to facilitate the provision of health care.

Intent:

In attaining competence, students should understand the roles of different members of the health care team and should have educational experiences, particularly clinical experiences, that involve working with other health care professional students and practitioners. Students should have educational experiences in which they coordinate patient care within the health care system relevant to dentistry.

Examples of evidence to demonstrate compliance with standards may include:

- Readiness for Interprofessional Learning Scale (RIPLS): A 19-item, 5-point Likert scale self-reporting tool that assesses perceptions of health care students' knowledge, skills, and attitudes regarding readiness to learn with other health care professionals. It is divided into three validated subscales: Teamwork/Collaboration, Negative/Positive Professional Identity, and Roles and Responsibility.¹⁴¹
- Interprofessional Attitudes Scale (IPAS): A 27-item, self-reported tool that measures individual students' agreement with statements regarding teamwork roles and responsibilities; person-centered care; interprofessional biases; diversity and ethics; and community centeredness.¹⁴²
- Interprofessional Collaborative Competencies Attainment Survey (ICCAS): A 20-item, self-reported tool measuring skills in communication, collaboration, roles and responsibilities, collaborative patient-and-family– centered approach, conflict measurement/resolution, and team functioning in health care students and practicing clinicians before and after IPE training interventions.^{143, 144}

Implementation of IPE Activities

IPE activities are incredibly diverse by nature, spanning disciplines, academic institutions, and communities on both a local and global scale.¹⁴⁵ These activities can be embedded within curricula and clinic spaces or can be presented as supplementary opportunities. Activity design is typically influenced by the resources and infrastructure in which it takes place. In this section, we will describe a few of the common forms of IPE.

Longitudinal Curriculum, IPE Day, and Episodic Events

"Deliberate Design" is a characteristic recommended by the Health Professions Accreditors Collaborative (HPAC) for effective IPE programming.¹⁴⁵ Deliberate Design is the concept of intentionally integrating IPE learning activities into the existing curriculum in a longitudinal manner so that the students receive developmentally appropriate IPE concepts throughout their professional training. In a longitudinal IPE curriculum, the interprofessional knowledge, skills, and attitudes needed to meet the IPEC Core Competencies are woven throughout the professional student's curriculum and align with their profession-specific content.¹⁴⁵ Difficulties with this approach, delineated in the section on barriers below, generally involve logistical challenges such as scheduling difficulties. In addition, institutional support for IPE is needed to enable curricular alignment and coordination.

In a longitudinal IPE curriculum, the interprofessional knowledge, skills, and attitudes needed to meet the IPEC Core Competencies are woven throughout the professional student's curriculum and align with their professionspecific content. An alternate approach to IPE is hosting an "IPE Day" — the concept of reserving a full day in the academic calendar for health care profession students to join and participate in interprofessional activities together. The limited time required for this approach presents a solution to logistical barriers and may allow for larger-scale collaboration.

A hybrid of these two approaches to IPE exists as well: repeat episodes of interprofessional events that are not fully integrated into the curriculum. While this approach allows easier adoption by new partners, it can be less consistent and sustainable due to staff/partners changes and conflicting schedules. Inconsistent interprofessional partners present difficulty with quality improvement and determining the appropriate leveling of students. In addition, IPE can be perceived as "external" by learners with this approach, which can lower engagement and negatively affect team dynamics.

In-Person and Virtual/Online Learning

Even before the global pandemic of 2020 shifted many programs online, IPE was available in virtual modalities to overcome barriers associated with scale. For example, some programs do not have physical space to simultaneously convene many students from across various health professions, while others may not be physically located near their interprofessional partners. In 2019, HPAC recognized two modalities: in-person learning and collaborative online learning.¹⁴⁵ In-person learning is face-to-face synchronous (occurring at the same time) learning between students or practitioners from different professional backgrounds and includes classroom case discussions, simulations, service learning, and clinical observation/rotations. Collaborative online learning, meanwhile, consists of either synchronous or asynchronous (occurring at different times) online learning between students or practitioners from different professional backgrounds. It can include video conference discussions, mock electronic patient record discussions, telehealth, game-based learning, chat room discussions, and virtual simulations.

Common IPE Teaching Methodologies

A systematic review investigating the teaching and learning approaches related to the implementation of IPE in universities across the world found that problem-based learning (PBL), case-based learning (CBL), and team-based learning (TBL) were the most frequently utilized teaching and learning approaches in IPE.¹⁴⁶ Table 2 provides descriptions of these IPE approaches and other commonly used pedagogical approaches to delivering IPE.

Table 2: Descriptions of Pedagogical Approaches to IPE

Pedagogical Approach	Description
Problem-Based Learning	An active learning approach in which a team of students attempts to solve or understand a clinical or population health problem. Each member of the team has a clear role, and the team is typically guided by a facilitator. ^{146, 147}
Case-Based Learning	An active learning strategy that strives to prepare students for clinical practice by asking groups of students to apply their knowledge to cases. Students discuss elements of the case and use inquiry-based learning methods to think critically and make collaborative decisions. ¹⁴⁸
Team-Based Learning	A structured form of active learning that promotes accountability in large groups of students by breaking them into small teams and utilizing specific steps. Steps include pre-class preparation, readiness assurance testing, problem-solving activities, and immediate feedback. ^{149, 150}
Game-Based Learning	An active learning strategy that engages students and enhances motivation by integrating educational content with interactive gaming elements to create stimulating and effective learning experiences. ¹⁵¹
Simulation- Based Learning	Simulation-enhanced interprofessional education (Sim-IPE) occurs "when participants and facilitators from two or more professions are engaged in a simulated health care experience to achieve shared or linked objectives and outcomes." ¹⁵²

The Importance of Facilitating IPE Activities

Facilitating IPE fosters collaboration, trust, and acceptance of interprofessional practice. Role modeling by facilitators is critical, as it demonstrates interprofessional leadership, allowing students to observe the value of teamwork and shared decision-making.¹⁵³ Creating a supportive, inclusive environment from the outset is essential for student engagement, as it promotes active participation and shared ownership of learning. Small-group debriefing is particularly effective, since it encourages flexible, independent learning while allowing students to interact socially in a meaningful manner. It thus allows the students to share an identity and engage more meaningfully with the material.^{150, 154}

Creating a supportive, inclusive environment from the outset is essential for student engagement, as it promotes active participation and shared ownership of learning.

How Is Competency in IPE Assessed?

Interprofessional Education Collaborative (IPEC) History and Framework

IPEC is a well-established leading organization in health professions education.¹² IPEC has been used for decades to promote IPE implementation for students of health professions by introducing core competencies that are essential in the health care field. IPEC core competencies ensure the proficiency of health professionals in skills that are "essential for the person-centered, community- and population-oriented, interprofessional, collaborative practice."¹¹

IPEC core competencies were initially introduced in 2011 and then updated in 2016. In 2023, the IPEC released its third core competencies report, reflecting more than a decade of work to align IPE with contemporary health care realities.¹² This revised framework embeds recent research, policy, and educational developments, offering a more comprehensive and inclusive approach to frame interprofessional education for health care students. In addition, the revision reinforces the integration between interprofessional education and practice, focusing on lifelong learning and team-based care.¹²

IPEC Core Competencies

The IPEC 2023 framework organizes competencies under four core domains: Values and Ethics, Roles and Responsibilities, Communication, and Teams and Teamwork (Figure 3). These domains integrate the principles of interprofessional collaboration as a foundation for improving individual and population health outcomes. A total of 33 subcompetencies are distributed across the four core competency domains.

The revised IPEC framework provides practical strategies to support interprofessional collaboration in both curricular and co-curricular contexts (Table 3). It offers tools to align learning outcomes with institutions' goals and to address the call for accreditation standards. By highlighting the priority domains, this framework empowers health professionals to respond to emerging challenges in health care while facilitating personcentered and team-based care. Institutions implementing the IPEC competencies have reportedly observed improved results in education and better collaboration among students, thus setting a potential stage for practice-ready workforce development capable of responding to community health needs.

Figure 3: IPEC Core Competencies for Interprofessional Collaborative Practice: Version 3 (2023)



Table 3: IPEC Core Competencies for Interprofessional Collaborative Practice: Version 3 (2023)

Core Competency	# of Subcompetencies	Domain Description		
Values and Ethics	11	Emphasis on respect for diversity of thoughts and opinions, priority of person-centered care, and trust building among team members, patients, and communities		
Roles and Responsibilities	5	Encourages clear communication of roles, effective use of the knowledge and experience of team members, and collaboration for effective health outcomes		
Communication	7	Focused on responsive, respectful, and context-appropriate communication. It serves to create understanding among patients, families, and professionals		
Teams and Teamwork	10	Outlines principles of effective teamwork, including shared decision-making, problem-solving, and equitable practices to ensure safe, efficient, and person-centered care		

How IPEC Core Competencies Are Evaluated

The environment in which IPE is conducted is variable and complex due to the multitude of associated professions, accreditation standards, and activity structures. For this reason, there is a wide variety of instruments that have been used to measure different variables associated with IPE. An assessment tool can be selected based on who is being evaluated, the instrument type, and the content(s) of the instrument (Figure 4).⁵² The National Center for Interprofessional Practice and Education allows champions of IPE to find instruments and tool kits to suit the needs of their interprofessional learning activities.

How CODA Competencies Are Evaluated

Jiang and colleagues conducted a study to assess the scope of IPE practices among dental schools across the nation.⁵⁰ The findings from the national survey revealed a variety of assessment methods among 23 participating dental schools, including the following:

1. OSCE (Objective Structured Clinical Examination) or equivalent (42% of schools)

OSCEs are structured, practical exams designed to simulate real clinical scenarios where students can demonstrate their competency in practice in interprofessional teams, using standardized patients in a controlled environment. These assessments are widely regarded as an effective method for evaluating clinical skills and teamwork.

Figure 4: Elements of an Assessment Tool

Who Is Being Assessed? Individual Team Organization

Instrument Type Self-reported Observer-based

Instrument Content

Attitudes/perceptions Knowledge/skills Collaborative behavior Performance in practice

2. Review of clinical documentation (42%)

This approach evaluates students' ability to document and communicate patient information accurately and effectively across disciplines, reinforcing the importance of collaboration and shared decision-making in patient care.

3. Direct observation in clinical setting (38%)

Direct observation involves faculty members or clinicians observing students interacting with patients and other professionals in clinical scenarios. Direct observation provides a real-life, practical assessment of how students apply IPE principles in patient care.

4. Simulation experiences (28%)

Simulations provide realistic, hands-on opportunities for students to practice IPE in a safe, low-risk environment, thus improving their ability to work within interprofessional teams. Simulation exercises are particularly useful in enhancing communication, clinical reasoning, and decision-making skills in a controlled environment.

5. No assessment of learnings on IPE topics (17%)

The lack of assessment suggests that there is still room for improvement in systematically incorporating and evaluating IPE activities across all dental programs.

6. Written/computer testing (3%)

Written/computer testing could provide evidence of students' conceptual understanding of the core competencies associated with IPE.

7. Portfolios (3%)

Portfolios provide an opportunity for students to capture the evidence of their collaborative work with other health care professionals, highlighting the IPE competencies such as communication and teamwork. Portfolios track students' learning progress and reflections; therefore, they could provide a holistic picture of the students' interprofessional skill development.

Specific IPE Assessment Instruments

Numerous instruments have been developed to measure skills in interprofessional collaboration. Several reviews have assessed these instruments to identify their strengths, weaknesses, and psychometric properties. No reviews focus exclusively on oral health, but the nature of interprofessional practice suggests that a measure used in one health profession should be adaptable to another. In general, the reviews note the proliferation of measurement instruments, the diversity of outcomes measured by different instruments, and the inadequate psychometric support for most of them. In more recent years, however, some assessment instruments have become recognized for their evidence base and have been used more consistently. In a 2010 study, Thannhauser and colleagues reviewed 23 IPE instruments, and determined that only two had reported sufficient psychometric data to justify their use: the readiness for interprofessional learning scale (RIPLS) and the interdisciplinary education perception scale (IEPS).^{141, 155–157} While the RIPLS scale is designed to assess students' readiness to engage in shared health care learning, the IEPS can be used as a pre- and post-assessment of students' attitudes and skills related to IPE.¹⁵⁶

A 2011 review of 33 tools found that most (68.0%) assessed changes in perceptions of IPE.¹⁵⁸ Far fewer measured learner reactions (20.6%) and changes in behavior (9.7%) or knowledge (1.3%). None addressed patient benefits. Largely due to perceived subjectivity, the authors concluded there was no gold standard tool for measuring IPE outcomes.¹⁵⁸

Four years later, a critical appraisal of nine IPE instruments similarly noted their limited psychometric integrity.¹⁵⁹ Specifically, the authors noted, "ceiling effects and lack of scale width contribute to the inability of some instruments to detect change in variables of interest" (p. 386). The authors went on to note that little attention had been given to reliability in any of the instruments reviewed.

In 2017, a systematic review analyzed 36 IPE instruments relevant to pharmacy.¹⁶⁰ The authors used the Kirkpatrick/Barr hierarchical four-level model of IPE assessment (Table 4) in this systematic review in order to evaluate the 36 IPE instruments.¹⁶¹ This model rates IPE-related outcomes at four levels, increasing in terms of breadth of impact. For example, while Level 1 IPE activities require students only to react to the material presented, Level 4 activities provide change in organizational practice and/or benefits to patients.¹⁶¹

Table 4: Kirkpatrick/Barr Hierarchical Model of IPE Assessment

Level 4	Benefits to patients (4b)Change in organizational practice (4a)
Level 3	Behavioral change
Level 2	Knowledge and skill acquisition (2b)Perception and attitude change (2a)
Level 1	• Reaction

The authors reported that most instruments measure behavioral change (Level 3) and that no instrument provides a comprehensive assessment tool.¹⁶⁰ However, the review identified several instruments that could be mapped to pharmacy's IPE accreditation standards. When selecting assessment instruments, oral health programs should similarly determine whether a given instrument's outcome measurements align with their accreditation requirements for IPE. This review also specifically emphasized the need to integrate qualitative assessment of IPE activities to complement quantitative assessment.¹⁶⁰

Consensus Statement on IPE Assessment

In 2017, the first international consensus statement on IPE assessment was published.¹⁶² The statement emerged from a formal discussion and debate at the 2016 Ottawa Conference in Perth, Australia. The statement identified six thematic areas that should be assessed in IPE instruction:

- 1. Role understanding
- 2. Interprofessional communication
- 3. Interprofessional values
- 4. Coordination and collaborative decision-making
- 5. Reflexivity
- 6. Teamwork

The consensus statement also offered guidelines on how to assess learning:

- Minimal requirements include (a) self-assessments of role understanding, and (b) observational assessment of interprofessional interaction in real or simulated clinical contexts.
- 2. Team (vs. individual) performance assessment remains challenging and requires further research.
- 3. Review of reflective journals is a promising method of assessing emotion-focused affective IPE learning.
- Students' critical writing on the effectiveness of their interprofessional teams is similarly promising and may be useful for summative assessment.
- 5. Survey instruments measuring student attitudes and perceptions may be useful for formative assessments but are not recommended for summative assessment.

The consensus statement listed several instruments useful for observers assessing interprofessional collaboration.

- 1. Interprofessional Collaborator Assessment Rubric (ICAR)¹⁶³
- 2. Interprofessional OSCE (iOSCE)¹⁶⁴
- 3. Team OSCE (TOSCE)^{165–167}
- Interprofessional Teamwork Observation and Feedback Tool (iTOFT)^{168, 169}

Finally, a 2021 systematic review examined IPE assessment tools for pre-licensure programs in health care.¹⁷⁰ It identified 39 studies, which were analyzed using the Kirkpatrick/Barr model.¹⁶¹ The most common research design was a pre/post knowledge test and the most common outcome measured was knowledge acquisition, followed by behavior change, benefit to patients, and skill acquisition. None of the studies measured organizational change. Twelve tools reported validity evidence, with behaviors and competencies mapped to the WHO Interprofessional Learning Domains or the IPEC core competencies.^{1, 12} Applying the Joanna Briggs Institute Critical Appraisal of Evidence Effectiveness Tools,¹⁷¹ the authors calculated an average guality score of 70%, which they characterized as good. Moreover, based on their findings, they developed a decision aid for educators seeking an IPE assessment tool. They recommend asking:

- What is the aim of the IPE intervention?
- Who is being assessed?
- What are the domains of interest?
- What tools are available that will measure the achievement of that aim in that context?
- What tools have the most evidence to support their reliability, validity, and scales and scoring?

There is much diversity in IPE assessment methods, and challenges persist in ensuring their consistent use and effective integration. CODA is flexible regarding assessment methods selected by each program, as long as each program is effective in showing students' competency in communication and collaboration with other members of the health care team to ensure effective high-quality person-centered care. Each program designs a specific assessment approach, depending on the nature of the IPE experiences, setting, availability of resources, faculty training, program priorities, and integrated learning opportunities. Although sometimes there is a need for consistency, flexibility in approaches to IPE CODA assessments allows adaptability to the unique needs and contexts of each program.



What Are Some Barriers and Challenges to IPE?

As discussed extensively in this paper, IPE allows for improvement in interprofessional collaboration and patient care. However, several challenges can arise during the development and implementation of IPE programs. Khabeer and colleagues conducted a systematic review summarizing barriers to IPE in dental education. These authors identified barriers including participation, time constraints, mode of teaching, location, curriculum, and resources.¹⁷²

Student Attitudes Toward and Participation in IPE

Student attitudes toward IPE significantly affect its success. Many dental and dental hygiene students perceive IPE as less relevant to their career goals than other coursework, especially when it is not directly tied to licensure requirements or clinical practice. This perception is often rooted in lack of exposure to interprofessional collaboration in clinical settings, leading students to view IPE as a theoretical rather than practical exercise.¹⁷³ Misaligned expectations can further reduce engagement. For example, students may expect IPE sessions to focus on discipline-specific skills rather than broader Resistance [to IPE] highlights an urgent need for cultural change within dental education. To achieve this, students and faculty need to develop skills for teamwork, communication, and conflict resolution that cultivate belief in the importance of interprofessional collaboration. competencies like communication and teamwork. Addressing these misconceptions and introducing IPE in appropriate stages throughout their multi-year curriculum is critical to improving buy-in.

Additionally, resistance to the concept of IPE among oral health students and faculty is significantly rooted in traditional training models that emphasize independent learning over teamwork with other professions. A study conducted by Reilly and colleagues found that after participating in an IPE activity, only pharmacy students reported feeling that shared learning was beneficial to their communication with an interprofessional team. Dental students, meanwhile, felt that shared learning was not beneficial for their interprofessional communication.¹⁵³ This resistance highlights an urgent need for cultural change within dental education. To achieve this, students and faculty need to develop skills for teamwork, communication, and conflict resolution that cultivate belief in the importance of interprofessional collaboration.

Time Constraints in the Dental Curriculum

Scheduling conflicts rank among the most prevalent obstacles to IPE in dentistry. These often stem from the highly demanding nature of dental education, coupled with a lack of alignment in academic calendars between various disciplines. Studies reveal that while some schools in the United States and Canada include IPE, many reported a lack of time given already tight academic schedules.^{50, 174} Challenges related to time constraints can, however, be minimized by offering flexible solutions such as online courses and video conferencing. Palumbo and Bennett showed the success of such approaches; in their study, students from several disciplines responded very positively to an online IPE program on geriatric care.¹⁵⁴ Embedding IPE into existing clinical training sessions is a pragmatic approach, as students can learn collaboratively without extra time required.

Mode of Teaching and Location

Traditionally, reliance on the more traditional in-person classroom-based learning for IPE can be restricted by time, commuting, classroom space, geographic location, and other logistics. Recent innovations in e-learning have provided a practical alternative. As Edelbring and colleagues identified, students preferred online IPE due to flexibility and the ease with which they could participate without the constraints imposed by physical attendance.¹⁷⁵ The adoption of virtual and hybrid models of learning has the potential to make IPE easier and more attractive to oral health students.

Resources

Research suggests that financial support and resource allocation are crucial to enable IPE programs to function effectively.^{176, 177} Well-trained faculty are also necessary in implementing IPE. Virtual learning has recently emerged as an alternative in this regard, demonstrated by Chavis and colleagues,¹⁷⁸ because it saves resources (e.g., physical facilities and manpower) while maintaining the effectiveness of IPE. Furthermore, it is important to have opportunities for continuing IPE education (CIPE) after graduation. Limited CIPE programs and challenges to integrating CIPE into CE can be additional barriers to sustaining and strengthening the foundations laid during professional education.¹⁷⁹

Faculty Engagement and Training

Faculty engagement is crucial to ensuring IPE's success, yet many educators are either unprepared or unwilling to adopt interprofessional teaching methods.¹⁸⁰ Faculty resistance often stems from a lack of familiarity with interprofessional pedagogy, competing demands on time, or a belief that IPE is outside their expertise. Additionally, faculty may perceive IPE as undervalued by leadership, especially if involvement does not contribute to tenure or promotion. Training programs designed to equip faculty with the skills and knowledge to teach in an interprofessional context are often underfunded or unavailable. Without proper support, faculty struggle to create meaningful interprofessional learning opportunities for students, further perpetuating silos.

> The adoption of virtual and hybrid models of learning has the potential to make IPE easier and more attractive to oral health students.

Lack of Standardized IPE Implementation and Assessment Guidelines

Accrediting bodies increasingly emphasize the importance of IPE, but the lack of standardized guidelines for integrating and assessing interprofessional competencies creates inconsistencies across institutions. While accrediting organizations such as CODA require IPE-related standards, implementation varies widely, leading some programs to fall short of meaningful integration.

Assessment of IPE outcomes also pose a significant challenge. Many educators are not prepared to evaluate students' competency in IPE. Unlike traditional clinical skills, interprofessional competencies such as communication, collaboration, and teamwork are more difficult to measure and often rely on subjective evaluation methods such as selfreported surveys or reflective essays.

Institutional Support

Institutional support — or the lack thereof — significantly affects the success of IPE programs. Many dental schools face competing priorities, such as maintaining accreditation, generating clinical revenue, and addressing faculty shortages, which can push IPE to the periphery. Additionally, leadership often lacks awareness of the long-term benefits of IPE, viewing it as an optional or secondary initiative rather than a core element of health professions education. Support from institutional leadership is essential for securing funding, allocating faculty time, and establishing partnerships with other health professions programs.¹⁸⁰ Without such backing, IPE initiatives often remain underdeveloped or and unable to reach their full potential.

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Proximity / Colocation of Health Profession Schools

A key consideration for implementing IPE activities is the physical and institutional proximities of the health professions schools involved. Intraprofessionally, only 32% of dental schools have dental hygiene programs integrated in their programs.¹⁸¹ There is no comprehensive list of academic institutions that contain multiple colocated health profession schools. A lack of colocation of oral health and other health profession programs can serve as a significant barrier to hosting in-person, synchronous IPE activities.¹⁸²

Despite the barriers and challenges involved in developing and implementing IPE activities in dental hygiene and predoctoral dental education programs, such activities are critically important to providing a foundation for interprofessional practice and comprehensive, whole-person care to students across health care professions. Recommendations for how to implement IPE activities within an oral health curriculum can be found in the "Key Takeaways and Recommendations from IPE Use Cases" section of this paper below, and examples of such activities can be found in can be found in the use cases themselves.



Key Takeaways and Recommendations from IPE Use Cases

The collection of IPE use cases outlines IPE programs across 19 different institutions. Most use cases described (15) are described from the perspective of the participating dental schools, and additional experiences include activities with dental hygiene programs (7) and post-doctoral residency programs (2). While cases reported that there were, on average, six health sciences colleges at their institution, the average number of professions included in IPE activities was nine. Dental programs with a limited number of health sciences schools on their campuses express excitement about finding IPE collaborators at other institutions, even when some partners are guite physically distant. Online virtual IPE collaborations increased during the COVID-19 pandemic; in many cases, this format has remained in effect since then to encourage participation and accommodate schedules across schools. Most programs mention basing their work on IPE Core Competencies,¹² with some supplementing these with institution-specific competencies. Additional reported structuring includes LEND, the TeamSTEPPS tool kit, and the Smiles for Life oral health curriculum. More than half of the dental school cases reported that the IPE curriculum takes place throughout all four years of dental school, with all reporting that IPE activities take place for more than one year.

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Assessment/Evaluation Strategies

The use cases present a range of assessment and evaluation strategies schools can employ to measure IPE program effectiveness, their students' learning and collaborative skills, and their program's impact on patient care.

Self-assessment and reflection essays can be employed where students complete pre- and post-activity surveys and reflections, if IPE is embedded in their clinical rotations. These reflections can assess students' growth in areas such as teamwork and understanding of other professionals' roles in oral health care delivery. Pre- and post-IPE surveys could be used for longitudinal programs where students' attitudes and knowledge about interprofessional collaboration can be tracked to see how students' interdisciplinary skills develop over time.

Another evaluation strategy is the Objective Structured Clinical Examination (OSCE). OSCEs are validated examination tools that are used commonly in dental school education including PBL learning.¹⁸³ OSCEs can be used to evaluate students' interactions with the interprofessional team in managing patient cases, either during simulated patient scenarios or in real-life clinical collaborative settings where faculty evaluates students' abilities.

Some scales that programs have used to assess IPE include:

- Readiness for Interprofessional Learning Scale (RIPLS)¹⁴¹
- Interprofessional Socialization Valuing Scale (ISVS)¹⁸⁴
- Students' Perceptions of Interprofessional Clinical Education Revised (SPICE-R2)¹⁸⁵
- Interprofessional Collaborative Competency Attainment Survey (ICCAS)^{143, 144}
- Interdisciplinary Education Perception Scale (IEPS)^{156, 157}

Programming Structure

IPE programs described in the use cases are implemented through various structures depending on each dental school's existing infrastructure. The goal of IPE integration, regardless of its structure, is to ensure that students develop interprofessional competencies alongside their clinical and scientific training.

Longitudinal IPE integration occurs when interprofessional collaboration is reinforced across multiple academic years. In such situations, students participate in interdisciplinary learning experiences either through simulated patient scenarios or didactic coursework that evolve in complexity. For example, the curriculum may have foundational coursework or simulated learning modules in public health, social and behavioral sciences, and ethics during nonclinical years. This foundational learning eventually culminates in advanced clinical practice where students engage in team-based patient care with medical, nursing, and pharmacy peers in real-life clinical settings.

Dental curricula can also incorporate IPE into specific courses or clinical rotations. In this strategy, students engage with faculty and interprofessional peers, learning through shared case discussions, collaborative treatment planning, and joint clinical experiences. Clinical rotations in hospital or community health settings allow dental students to engage with a multidisciplinary health care delivery team — including social workers, nutritionists, behavioral health professionals, and administrative staff — in a single setting during the students' community clinic or hospital rotations.

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Lastly, dental schools can also offer extracurricular or virtual IPE experiences, such as dedicated "IPE days" or seminars, where an interdisciplinary professional team is invited to facilitate and host discussions.

Learner Level

The schools represented in this paper offered a variety of IPE activities ranging from robust, longitudinal programming that progresses through introduction, reinforcement, and practice, to one-off events and volunteer service opportunities. Some of the institutions embed IPE activities within specific courses in their curricula. The cases generally demonstrate a longitudinal participation of predoctoral and dental hygiene students across all years of the curricula. A majority of dental and dental

hygiene students start engagement with IPE in the first year of their health professions education, while other programs include only graduate students or are reserved for advanced dental education program students. Interestingly, some schools prime their students for their IPE journey in collaborative health professions orientations prior to beginning their educational programs. For most use cases, students begin IPE engagement in the first year of their discipline-specific studies, progressing through IPE activities each year, aligned with increased knowledge and clinical engagement.

Interprofessional Partners

Based on the use cases presented, common interprofessional partners in dental education include pharmacists, social workers, physician assistants, nurses, and behavioral health providers.

Pharmacy students and professionals contribute expertise in medication management, particularly in addressing drug interactions and pain management for the geriatric population and supporting dental patients with complex health histories and polypharmacy. Social and community health workers play a critical role in teaching shared decision-making, motivational interviewing, and addressing social drivers of health. Physician assistant students often collaborate with dental students to enhance interdisciplinary treatment planning, particularly in primary care settings. Similarly, osteopathic medicine professionals, especially those in geriatric care teams, help address the unique oral health challenges of elderly patients.

Behavioral health professionals are also essential partners in dental IPE, assisting oral health students in understanding and managing dental anxiety, mental health conditions, and behavioral factors affecting oral health. Many dental schools also emphasize public health and epidemiology training, with some offering courses on intellectual and developmental disabilities (IDD). Schools offering the <u>Ryan White HIV/AIDS</u> <u>Program</u> frequently incorporate social work and behavioral health collaborations to help students address challenges faced by patients with HIV or IDD, such as social stigmas and hesitancy toward dental care.

Many dental school programs offer IPE training that combines virtual learning modules and simulations as well as case-based learning and direct clinical experiences with interprofessional teams that are co-located within the dental schools or the university campus. Some training modules also focus on teaching the value of collaboration, effective communication, leadership, and conflict resolution skills, which prepares dental students for a real-life, comprehensive and team-based approach to patient care.

Institutional Structures for IPE

Logistical challenges are widely recognized as significant barriers to implementing IPE programs across institutions and promoting connections with other health professionals. These challenges often include coordinating IPE activities across multiple health program curricula, finding room to add more to the curricula, securing resources to support programming, and ensuring interprofessional faculty support. One approach to overcoming these barriers is through intentional and strategic structuring of IPE, either at the level of the individual dental school or as part of a broader university-wide commitment to interprofessional education. Institutions have adopted various models to facilitate IPE, ranging from dedicated IPE directors within dental schools to university-level offices that invest, oversee, and support interprofessional curricula across health programs.

The structure of IPE within universities and dental schools plays a crucial role in facilitating collaboration with other health professionals. Schools with dedicated universitywide IPE offices tend to have more robust, integrated, and interdisciplinary collaboration opportunities as they prioritize shared values and investment in interprofessional education. Below are examples of some of the different structural models that support collaboration among health disciplines and address logistical challenges.

> Schools with dedicated university-wide IPE offices tend to have more robust, integrated, and interdisciplinary collaboration opportunities as they prioritize shared values and investment in interprofessional education.

Some institutions house IPE within their dental schools and rely on faculty-driven initiatives to develop collaborations with other health professions:

- Tufts University School of Dental Medicine: A dedicated IPE division in the Department of Comprehensive Care coordinates an IPE rotation and develops partnerships within and beyond the institution. Additional IPE opportunities are created by individual faculty members.
- University of Detroit Mercy School of Dentistry: A dedicated IPE division, developed in 2017, fosters partnerships across different institutions due to its geographic distance from other health science programs.

Other institutions have established centralized IPE offices at the university level, which provide structured, longitudinal collaboration opportunities across multiple health professions:

- University of North Carolina at Chapel Hill: The Office of Interprofessional Education and Practice (OIPEP), established by the provost in 2018, provides structured, longitudinal IPE engagement across all health schools. Each health program has a designated IPE Director who collaborates with the Associate Provost to design, implement, and evaluate interprofessional learning opportunities.
- Hunt School of Dental Medicine: To support its IPE initiatives, the school recruited a dedicated IPE Director responsible for overseeing longitudinal and event-based activities at the dental school. The school also is supported by the institutional Office of IPE (OIPE) that was developed in response to the institution's Quality Enhancement Plan (TECH Ready: Team-based, Effective, Collaborative Healthcare). The OIPE has been instrumental in streamlining the core institutional IPE events, ensuring that all students receive foundational interprofessional education.
- The Ohio State University: The Office of Interprofessional Practice and Education (IPE) serves as a centralized coordinator for the BuckIPE curriculum, integrating IPE across all health professions. Each individual health school designates an IPE Champion, who serves as a liaison between their program and the central IPE office, advising on curriculum, promoting IPE activities, and recruiting faculty facilitators.
- University of California, San Francisco (UCSF): UCSF's IPE framework incorporates school-specific competencies, shared competencies, and traditional

interprofessional education principles. This structured approach fosters meaningful collaboration between health programs while ensuring alignment with broader IPE goals.

- University of Colorado Denver Anschutz Medical Campus: Designed with interprofessional education in mind, this campus promotes interdisciplinary collaboration through shared learning spaces and the Center for Interprofessional Practice and Education Program. Dental students are required to complete both an intraprofessional course within the dental school and a broader interprofessional course with other health disciplines.
- University of Florida (UF): The Office of Interprofessional Education oversees IPE programming and facilitates monthly meetings through the UF IPE Committee. These meetings provide ongoing opportunities for faculty and administrators to collaborate, share resources, and develop new interprofessional learning experiences.
- University of Illinois Chicago: In 2022, the University launched the Center for the Advancement of InterProfessional Practice, Education, and Research. This center underscores the institution's commitment to IPE by supporting a mandatory core course for all students across 13 health professions education programs.
- University of New Mexico (UNM): The Office for Interprofessional Education (IPE) at UNM offers health science students the opportunity to earn an IPE Certificate of Honors. To obtain the certificate, students must complete a required number of interprofessional experiences.
- University of Washington (UW) School of Dentistry: Under the direction of the UW Board of Health Science Deans, the IPE Steering committee representing all health sciences schools collaboratively plans and manages the IPE Core Curriculum. This centralized program ensures alignment across disciplines and participation of all health science training programs.

Some schools have adopted alternative approaches to interprofessional collaboration:

• Harvard School of Dental Medicine: Harvard integrates medical and dental education by requiring dental students to complete shared coursework with Harvard Medical School. Additionally, students participate in Collaborative Interprofessional Education (CIPE) activities at neighboring institutions.

- **Midwestern University:** As an institution composed exclusively of graduate-level health care programs, Midwestern University embeds IPE into its institutional culture. Its curriculum emphasizes team-based, patient-centered care, offering expansive opportunities for interprofessional collaboration across disciplines.
- **NYU Langone Dental Medicine:** This postdoctoral residency program is focused on preparing dentists to function as integral members of patient-centered health care teams. The program receives support from the Health Resources and Services Administration (HRSA) to enhance its interprofessional education efforts.
- University of Iowa College of Dentistry: The College of Dentistry integrates IPE within both its dental school and the broader university structure. The institution's IPE Steering Committee oversees interprofessional coursework and faculty participation, ensuring collaboration across disciplines. Additionally, the dental school employs non-dental health professionals to contribute to IPE initiatives.
- **University of Michigan:** The University of Michigan has developed interprofessional courses that require student participation across multiple health professions, reinforcing interdisciplinary learning and collaboration.
- University of Nevada, Las Vegas (UNLV): As the health campus expands, UNLV has prioritized IPE by incorporating interprofessional activities into clinical education, practice-based courses, dual-degree programs, and community outreach initiatives. Institutional support continues to drive the growth and integration of IPE programming.
- University of Pittsburgh School of Dental Medicine: Dental students at the University of Pittsburgh collaborate across all four years of their curriculum with students from medicine, nursing, pharmacy, social work, and other professions in interprofessional activities focused on patients with special needs and communitybased outreach programs.
- University of Texas Health Science Center Houston: UT Health Houston's predoctoral dental students and dental hygiene students team with nursing students in activities centered on learning how to take vital signs, as well as simulations of community-based poverty and mass casualty incidents.

Novel Programming

Across institutions, IPE takes on diverse and innovative forms, reflecting the unique structures, resources, and priorities of each program, as well as the communities in which each program is situated. Schools offer a range of didactic, clinical, and experiential learning opportunities, ensuring students gain foundational and applied interprofessional collaboration skills. Some programs incorporate longitudinal coursework that spans all four years of dental school, ensuring sustained engagement with interprofessional education and reinforcing collaborative skills over time, while others concentrate these courses in specific years. Unique opportunities to incorporate IPE can include IPE honors programs, dual-degree options, or specialized distinctions in IPE. Institutions have also integrated IPE into real-world clinical and community settings, leveraging service-learning projects and consultation programs that connect students with patients and interdisciplinary teams. IPE programming also spans a variety of health topics and competencies, including social drivers of health, nicotine cessation, medical-dental integration, and fundamental skills in team-based care.

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Conclusions and Steps for Advancing IPE

Goals of IPE

Further integration of oral health care into the broader health system is a necessary development to reflect the growing evidence showing the interconnectedness of oral health and overall health, the understanding of which is necessary in achieving optimal patient health outcomes. Interprofessional learning opportunities build bidirectional awareness of roles/ responsibilities, shared values/ethics, communication skills, and teams/teamwork.¹² The Commission on Dental Accreditation (CODA) has recognized the value provided by these interprofessional learning activities and has established standards for both dental and dental hygiene students. These standards require demonstration of interprofessional communication and collaboration to ensure effective, high-quality, patient-centered care.¹⁴

IPE programs teach students how to work together and raise awareness of the roles, expertise, and contributions of different health professions within the care team. By learning alongside other health care professionals, students develop a deeper appreciation for the unique skills each profession brings to patient care and are more likely to leverage their colleagues' expertise once they enter the workforce. Expanding beyond educational silos ensures that future health care providers know about, respect, and value each other's roles, leading to stronger collaboration, improved interdisciplinary communication, and ultimately better patient outcomes.

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Barriers to the Implementation of IPE

As noted in some use cases and earlier in this paper, prominent barriers when implementing IPE include students' resistance to participation, time/scheduling constraints, logistical restrictions associated with large groups of in-person learners (travel, geographic location, classroom space, etc.), tight academic schedules, lack of resources such as funding and faculty, absence of proper training and engagement of faculty, inconsistent standards of assessment, lack of institutional support, and discipline-specific cultural attitudes.¹⁷²

Facilitators to the Implementation of IPE

Facilitators to the implementation of IPE need not always be innovative or revolutionary. Frequently, the best solution is a pragmatic one. For example, two of the most common barriers to the implementation of IPE across health professions education are limited time in busy schedules and lack of colocation of different health sciences schools. Using videoconferencing and online offerings or embedding IPE into standing clinical experiences has been shown to be effective facilitators to the implementation of IPE in use cases and in the literature.¹⁸² The offering of virtual IPE experiences also facilitates implementation by eliminating the resource issues including the manpower of faculty facilitators and the need for physical space to host events.

There are several facilitators that best support the delivery of IPE programming for both students and faculty. Identified best-practice facilitators for the student experience include structured orientation, reflection that encourages problem-solving and clinical reasoning skills, focusing on patient-centered care; the use of peer learning, and the flipped

Identified best-practice facilitators for the student experience include structured orientation, reflection that encourages problem-solving and clinical reasoning skills, focusing on patient-centered care, the use of peer learning, and the flipped classroom approach. classroom approach. These facilitators have been shown to promote student engagement in IPE programming. Faculty can further facilitate IPE by understanding their role in IPE activities, creating a safe environment that includes mutual respect, and allowing students to grow by limiting their own input while students take the lead. Faculty should also review and connect the interprofessional concepts and outcomes to the specific session(s) to reinforce student learning.

Finally, feedback and assessment using interprofessional competency frameworks are an imperative component of facilitating successful IPE. Assessments should be transparent and include peer assessment and reflection. These approaches not only allow for outcomes measurement but can also provide valuable information for curriculum and programmatic revisions.

The Future of IPE

The future of IPE is on an upward trajectory, becoming increasingly diverse, innovative, and institutionally supported. With a growing recognition of the value of collaborative care in achieving essential health system goals (e.g., the Quintuple Aim), universities are investing in sustainable programs that connect dental schools with other health professions. These programs have evolved to feature scaffolded, progressive curricula integrating didactic learning with collaborative experiential training, ensuring that students are prepared to work effectively in interdisciplinary teams. However, as health care education evolves, IPE must continuously adapt to global and national challenges, technological advancements, shifting sociopolitical priorities, and the changing landscape of higher education.

The expansion of IPE across universities and health systems reflects a growing institutional commitment to collaboration and team-based care. Increasingly, universities are establishing centralized offices dedicated to supporting, coordinating, and implementing interprofessional education and practice. This shift represents a transition from IPE as an optional or ad hoc initiative to a core curricular requirement embedded across disciplines. The integration of dedicated IPE faculty, administrative leadership, and strategic partnerships with health systems will be essential for sustaining and scaling IPE initiatives. Additionally, as accreditation bodies such as CODA (dental), LCME (medical), ACPE (pharmacy), and CSWE (social work) place greater emphasis on interprofessional competencies, health programs will be incentivized to build more structured, meaningful, and measurable IPE experiences into their curricula.

As the world rapidly evolves, IPE must remain flexible, responsive, and innovative to address emerging challenges and opportunities:

- The COVID-19 pandemic disrupted traditional IPE models and led to innovations in virtual and hybrid interprofessional learning, demonstrating the need for adaptable, technology-driven approaches.
- Artificial intelligence (AI) and digital health are transforming health care, requiring IPE programs to integrate AI-driven decision-making, virtual patient simulations, and telehealth competencies into training models.
- Health care policy and workforce demands continue to shift, shaping how future health professionals collaborate across disciplines. Health care access, Medicaid/Medicare reforms, reproductive rights, and immigration policies will directly influence interprofessional education and practice.
- Higher education is continuously transforming due to financial pressures, changing student demographics, and increasing demand for flexibility, accessibility, and value-driven education.

To remain effective and impactful, IPE must address these challenges and promote innovation in education for health professionals. These steps can ensure that future clinicians and health professionals are prepared to deliver collaborative, patient-centered, and equity-driven care.

Advancing IPE in Dental Education

To fully integrate IPE into dental education, there must be a commitment to structural, cultural, and curricular transformation. Appendix C provides examples of IPE best practices and a tool kit for defining IPE activities within a program. To continue to move forward, the following actions must be prioritized:

- 1. Advocate for centralized university-wide IPE offices with dedicated leadership and resources.
 - To overcome logistical challenges such as scheduling, faculty engagement, and resource allocation, dental schools must advocate for creating centralized IPE offices at the institutional level. These offices should have dedicated staff responsible for
 - a. Coordinating interprofessional curricula across health disciplines,
 - b. Facilitating partnerships between dental schools and other health programs,
 - c. Providing logistical support for IPE activities and programming, and
 - d. Ensuring sustainability by securing funding and administrative backing.

- This investment will also help build the foundation for the value of IPE at the institution.
- 2. Foster a culture of IPE within dental schools.
 - While IPE programming exists, true integration requires cultural change within dental education. Dental faculty must recognize the value of IPE and actively participate in its implementation. This requires embedding IPE into dental training so that students do not view dentistry as separate from the broader health care system but as an integral part of patient-centered, equitable care. Dental education has historically been siloed, but dental professionals must expand their scope and recognize their role in interdisciplinary collaboration.
- 3. Invest in interprofessional faculty to shape and sustain IPE efforts.
 - IPE programs require dedicated faculty trained in interprofessional education who can champion collaboration across disciplines. Dental schools must broaden the degrees and professions of faculty on staff to include non-dental faculty who can provide different perspectives and approaches to care.
- 4. Standardize IPE curricula and strengthen assessment of learning.
 - There is significant variability in how IPE programs are structured and evaluated at dental schools, which can result in different understandings and values placed on their necessity and effectiveness in delivering patient care.
- 5. Align IPE with workforce development and career readiness.
 - As health care moves toward integrated, team-based models of care, dental professionals must be trained to work effectively within these evolving systems.
 Dental schools should collaborate with health systems, community clinics, and policymakers to ensure that IPE prepares students for real-world practice.

To fully integrate IPE into dental education, there must be a commitment to structural, cultural, and curricular transformation.

References

- 1. World Health Organization, *Framework for Action on Interprofessional Education and Collaborative Practice*, Geneva, Switzerland: 2010, https://iris.who.int/bitstream/handle/10665/70185/?sequence=1.
- Ciraj A. Mohammed, R. Anand, and V. Saleena Ummer, "Interprofessional Education (IPE): A Framework for Introducing Teamwork and Collaboration in Health Professions Curriculum," *Medical Journal, Armed Forces India* 77, no. Suppl 1 (February 2021): S16–S21, DOI: 10.1016/j.mjafi.2021.01.012.
- Rebecca S. Wilder, Jean A. O'Donnell, J. Mark Barry, Dominique M. Galli, Foroud F. Hakim, Lavern J. Holyfield, and Miriam R. Robbins, "Is Dentistry at Risk? A Case for Interprofessional Education," *Journal* of Dental Education 72, no. 11 (November 2008): 1231–1237, <u>https://</u> pubmed.ncbi.nlm.nih.gov/18981201/.
- Jukka H. Meurman and Antonio Bascones-Martinez, "Oral Infections and Systemic Health — More Than Just Links to Cardiovascular Diseases," Oral Health and Preventive Dentistry 19, no. 1 (2021): 441–448.
- Aleysha K. Martin, Theresa L. Green, Alexandra L. McCarthy, P. Marcin Sowa, and E-Liisa Laakso, "Healthcare Teams: Terminology, Confusion, and Ramifications," *Journal of Multidisciplinary Healthcare* 15 (April 2022): 765–772, DOI: 10.2147/JMDH.S342197.
- Ajesh George, Simin Shamim, Maree Johnson, Hannah Dahlen, Shilpi Ajwani, Sameer Bhole, and Anthony E. Yeo, "How Do Dental and Prenatal Care Practitioners Perceive Dental Care During Pregnancy? Current Evidence and Implications," *Birth* 39, no. 3 (September 2012): 238–247, DOI: 10.1111/j.1523-536X.2012.00553.x.
- Yasaman Mohammadi Kamalabadi, M. Karen Campbell, Natalie M. Zitoun, and Abbas Jessani, "Unfavourable Beliefs About Oral Health and Safety of Dental Care During Pregnancy: A Systematic Review," *BMC Oral Health* 23, no. 1 (2023): 762, DOI: 10.1186/ s12903-023-03439-4.
- Tina L. Cheng and Barry S. Solomon, "Translating Life Course Theory to Clinical Practice to Address Health Disparities," *Maternal and Child Health Journal* 18, no. 2 (February 2014): 389–395, DOI: 10.1007/ s10995-013-1279-9.
- US Department of Health and Human Services, "About the Affordable Care Act," accessed January 15, 2025, <u>https://www.hhs.gov/</u> healthcare/about-the-aca/index.html.
- Berkeley A. Franz, Daniel Skinner, and John W. Murphy, "Changing Medical Relationships after the ACA: Transforming Perspectives for Population Health," SSM Population Health 2, (November 2016): 834–840, DOI: 10.1016/j.ssmph.2016.10.015.
- 11. Interprofessional Education Collaborative, "About Us," accessed January 15, 2025, <u>https://www.ipecollaborative.org/about-us</u>.
- Interprofessional Education Collaborative, IPEC Core Competencies for Interprofessional Collaborative Practice: Version 3, Washington, DC: 2023. <u>https://www.ipecollaborative.org/assets/core-</u> competencies/IPEC_Core_Competencies_Version_3_2023.pdf.

- Allan J. Formicola, Sandra C. Andrieu, Judith A. Buchanan, Gail Schneider Childs, Micaela Gibbs, Marita R. Inglehart, Elsbeth Kalenderian, Marsha A. Pyle, Kim D'abreu, and Lauren Evans, "Interprofessional Education in US and Canadian Dental Schools: An ADEA Team Study Group Report," *Journal of Dental Education* 76, no. 9 (2012): 1250-1268.
- 14. Commission on Dental Accreditation, "Accreditation Standards for Dental Education Programs," accessed January 15, 2025. <u>https://coda.ada.org/-/media/project/ada-organization/ada/coda/files/predoc_standards.pdf?rev=f8e014de5e534fa0bd995c09ed27e8e3andhash=F4F7AF8C59776FA039114955E7B07305.</u>
- Alan B. Douglass, Wanda Gonsalves, Russell Maier, Hugh Silk, Nancy Stevens, James Tysinger, and A. Stevens Wrightson, "Smiles For Life: A National Oral Health Curriculum for Family Medicine. A Model for Curriculum Development by STFM Groups," *Family Medicine — Kansas City* 39, no. 2 (2007): 88.
- National Interprofessional Initiative on Oral Health, "Smiles for Life," accessed January 18, 2025, <u>https://niioh.org/our-partners/ smiles-for-life/.</u>
- 17. Smiles for Life, "Smiles for Life: A National Oral Health Curriculum," accessed February 8, 2025, https://www.smilesforlifeoralhealth.org/
- 18. National Library of Medicine, "PubMed," accessed January 15, 2025, https://www.ncbi.nlm.nih.gov/pubmed/.
- National Library of Medicine, "Medical Subject Headings (MeSH)," accessed January 15, 2025, <u>https://www.nlm.nih.gov/mesh/</u> meshhome.html.
- 20. Al Spielman, "A Timeline of the History of Dentistry," History of Dentistry and Medicine, accessed January 15, 2025, <u>https://historyofdentistryandmedicine.com/a-timeline-of-the-history-of-dentistry/</u>.
- Lisa Simon, "Overcoming Historical Separation Between Oral and General Health Care: Interprofessional Collaboration for Promoting Health Equity," *AMA Journal of Ethics* 18, no. 9 (September 2016): 941–949, DOI: 10.1001/journalofethics.2016.18.9.pfor1-1609.
- 22. National Institutes of Health, *Oral Health in America: Advances and Challenges*, Bethesda: US Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research, 2021.
- 23. Leslie R. Halpern and Linda M. Kaste (Editors), "Impact of Oral Health on Interprofessional Collaborative Practice," *Dental Clinics of North America* 60, no. 4 (October 2016) ISBN-10:0323463061.
- Richard W. Valachovic, "Integrating Oral and Overall Health Care: Building a Foundation for Interprofessional Education and Collaborative Practice," *Journal of Dental Education* 83, 2 Suppl (February 2019): S19–S22, DOI: 10.21815/JDE.019.038.
- 25. National Network for Oral Health Access, *Updated User's Guide for the Interprofessional Core Clinical Competencies*, Denver, CO: 2024, <u>https://www.nnoha.org/items-2/-updated-user%27s-guide-for-the-</u> interprofessional-core-clinical-competencies.

- Eric T. Stoopler, Alessandro Villa, Mohammed Bindakhil, David L. Ojeda Díaz, and Thomas P. Sollecito, "Common Oral Conditions: A Review," *Journal of the American Medical Association* 331, no. 12 (March 2024): 1045–1054, DOI: 10.1001/jama.2024.0953.
- Yurong Leng, Qinwen Hu, Qin Ling, Xiongda Yao, Menglu Liu, Jiawei Chen, Zhiwei Yan, and Qun Dai, "Periodontal Disease Is Associated with the Risk of Cardiovascular Disease Independent of Sex: A Meta-Analysis," *Frontiers in Cardiovascular Medicine* 10 (February 2023): 1114927, DOI: 10.3389/fcvm.2023.1114927.
- Nadia Laniado, Megan Cloidt, Brian Altonen, and Victor Badner, "Interprofessional Oral Health Collaboration: A Survey of Knowledge and Practice Behaviors of Hospital-Based Primary Care Medical Providers in New York City," Advances in Medical Education and Practice 12 (October 2021): 1211–1218, DOI: 10.2147/AMEP.S332797.
- Denise A. Mills, Anita S. Chu, Andrea Burns, Eve B. Hoover, Jennifer Wild, Gretchen Post, Robyn Sears, Amber Herrick, Deborah Black, Eugenia P. Roberts, and Bradley S. Roberts, "Dental Bite-Sized Bits: A Module for Teaching Common Oral Health Conditions to Multidisciplinary Students," *Medical Science Educator* 33, no. 2 (February 2023): 451–458, DOI: 10.1007/s40670-023-01760-9.
- Shuting Yang, You Li, Chengcheng Liu, Yafei Wu, Zixin Wan, and Daonan Shen, "Pathogenesis and Treatment of Wound Healing in Patients with Diabetes after Tooth Extraction," *Frontiers in Endocrinology* (Lausanne) 13 (September 2022): 949535, DOI: 10.3389/fendo.2022.949535.
- P. M. Preshaw, A. L. Alba, D. Herrera, S. Jepsen, A. Konstantinidis, K. Makrilakis, and R. Taylor, "Periodontitis and Diabetes: A Two-Way Relationship," *Diabetologia* 55, no. 1 (January 2012): 21–31, DOI: 10.1007/s00125-011-2342-y.
- Hanxiao Lin, Hua Zhang, Yuxia Yan, Duan Liu, Ruyi Zhang, Yeungyeung Liu, Pei Chen, Jincai Zhang, and Dongying Xuan, "Knowledge, Awareness, and Behaviors of Endocrinologists and Dentists for the Relationship Between Diabetes and Periodontitis," *Diabetes Research and Clinical Practice* 106, no. 3 (December 2014): 428–434, DOI: 10.1016/j.diabres.2014.09.008.
- Allauddin Siddiqi, S. Zafar, A. Sharma, and A. Quaranta, "Diabetes Mellitus and Periodontal Disease: The Call for Interprofessional Education and Interprofessional Collaborative Care — A Systematic Review of the Literature," *Journal of Interprofessional Care* 36, no. 1 (January-February 2022): 93–101, DOI: 10.1080/13561820.2020.1825354.
- Taissa Vila, Alexandra M. Rizk, Ahmed S. Sultan, and Mary Ann Jabra-Rizk, "The Power of Saliva: Antimicrobial and Beyond," *PLoS Pathogens* 15, no. 11 (November 2014): e1008058, DOI: 10.1371/journal. ppat.1008058.
- James Guggenheimer and Paul A. Moore, "Xerostomia: Etiology, Recognition and Treatment," *The Journal of the American Dental Association* 134, no. 1 (January 2003): 61–69, DOI: 10.14219/jada. archive.2003.0018.
- Hajar Shekarchizadeh, Mohammad R. Khami, Simin Z. Mohebbi, Hamed Ekhtiari, and Jorma I. Virtanen, "Oral Health of Drug Abusers: A Review of Health Effects and Care," *Iranian Journal of Public Health* 42, no. 9 (September 2013): 929–940.

- Vipin Bharti and Chhaya Bansal, "Drug-Induced Gingival Overgrowth: The Nemesis of Gingiva Unravelled," *Journal of Indian Society of Periodontology* 17, no. 2 (March–April 2013): 182–187, DOI: 10.4103/0972-124X.113066.
- Shinya Murakami, Brian L. Mealey, Angelo Mariotti, and Iain L.C. Chapple, "Dental Plaque–Induced Gingival Conditions," *Journal of Clinical Periodontology* 45, no. S20 (June 2018): S17–S27, <u>https://</u> onlinelibrary.wiley.com/doi/full/10.1111/jcpe.12937.
- Angélique Herrler, Lisa Valerius, Anna Greta Barbe, Vera Vennedey, and Stephanie Stock, "Providing Ambulatory Healthcare for People Aged 80 and Over: Views and Perspectives of Physicians and Dentists from a Qualitative Survey," *PLOS One* 17, no. 8 (August 2022): e0272866, DOI: 10.1371/journal.pone.0272866.
- Marte-Mari Uhlen-Strand, Ewa Alicja Szyszko Hovden, Falk Schwendicke, Vibeke Elise Ansteinsson, Ibrahimu Mdala, and Rasa Skudutyte-Rysstad, "Dental Care for Older Adults in Home Health Care Services — Practices, Perceived Knowledge and Challenges among Norwegian Dentists and Dental Hygienists," *BMC Oral Health* 23 (2023): 222, <u>https://link.springer.com/content/pdf/10.1186/s12903-023-02951-x.pdf</u>.
- William Murray Thomson, Moira B. Smith, Catherine A. Ferguson, and Geraldine Moses, "The Challenge of Medication-Induced Dry Mouth in Residential Aged Care," *Pharmacy (Basel)* 9, no. 4 (October 2021): 162, DOI: 10.3390/pharmacy9040162.
- Carlos Zamarron, Vanesa García Paz, and Alberto Riveiro, "Obstructive Sleep Apnea Syndrome Is a Systemic Disease. Current Evidence," *European Journal of Internal Medicine* 19, no. 6 (October 2008): 390–398, DOI: 10.1016/j.ejim.2007.12.006.
- Kelly R. Magliocca and Joseph I. Helman, "Obstructive Sleep Apnea: Diagnosis, Medical Management and Dental Implications," *The Journal of the American Dental Association* 136, no. 8 (August 2005): 1121–1129, DOI: 10.14219/jada.archive.2005.0316.
- CareQuest Institute for Oral Health, Recent Trends in Hospital Emergency Department Visits for Non-Traumatic Dental Conditions, Boston, MA: 2022, <u>https://www.carequest.org/system/files/</u> <u>CareQuest_Institute_Recent-Trends-in-Hospital-ED-Visits_6.7.22_</u> <u>FINAL.pdf.</u>
- 45. Veerasathpurush Allareddy, Sankeerth Rampa, Min Kyeong Lee, Veerajalandhar Allareddy, and Romesh P. Nalliah, "Hospital-Based Emergency Department Visits Involving Dental Conditions: Profile and Predictors of Poor Outcomes and Resource Utilization," *The Journal of the American Dental Association* 145, no. 4 (April 2014): 331–337, DOI: 10.14219/jada.2014.7.
- Thomas Wall and Kamyar Nasseh, Dental-Related Emergency Department Visits on the Increase in the United States, Health Policy Institute, American Dental Association, 2013. <u>https://www.mass.gov/</u> doc/hpibrief05131/download.
- Ayotunde Oluwatosin, Brandon Trop, Kaitlin Kreuser, Xhesika Topalli, Tyler Sadilek, Katie Wilk, Thomas Sapp, Thomas Peterson, Lindsey Ouellette, and Jeffrey S. Jones, "Antibiotic and Opioid Prescribing for Simple Toothache in the Emergency Department," *The American Journal of Emergency Medicine* 60 (October 2022): 220–222, DOI: 10.1016/j.ajem.2022.07.010.

- Charlotte W. Lewis, Christy M. McKinney, Helen H. Lee, Molly L. Melbye, and Tessa C. Rue, "Visits to US Emergency Departments by 20- to 29-Year-Olds with Toothache During 2001–2010," *The Journal* of the American Dental Association 146, no. 5 (May 2015): 295–302. e2, DOI: 10.1016/j.adaj.2015.01.013.
- Alexandra J. Coleman, Gabrielle Maria Finn, and Brian Nattress, "Interprofessional Education in Dentistry," *British Dental Journal* 225 (2018): 257–262, DOI: 10.1038/sj.bdj.2018.547.
- Tien Jiang, Mary A. Tavares, Shenam H. Ticku, Christine A. Riedy, Hugh J. Silk, Kate M. Sullivan, and Judith A. Savageau, "Interprofessional Education in Dental Schools: Results of a National Survey," *Journal of Interprofessional Education and Practice* 18 (March 2020): 100256, DOI: 10.1016/j.xjep.2019.04.001.
- Omar A. Contreras, Jeffery Stewart, Denice Stewart, and Richard W. Valachovic, Interprofessional Education and Practice — An Imperative to Optimize and Advance Oral and Overall Health, Washington, DC: American Dental Education Association, 2018. <u>https://www. adea.org/docs/default-source/uploadedfiles/uploadedfiles/adea/ content-conversion/policy-advocacy/white-papers/adea-policybriefinterprofessionaledu-final.pdf?sfvrsn=394c316a_0.
 </u>
- 52. Committee on Measuring the Impact of Interprofessional Education on Collaborative Practice and Patient Outcomes, *Measuring the Impact of Interprofessional Education on Collaborative Practice and Patient Outcomes* (Washington, DC: National Academies Press, 2015). https://www.ncbi.nlm.nih.gov/books/NBK338361/.
- James F. Cawley, Elisabeth Cawthon, and Roderick S. Hooker, "Origins of the Physician Assistant Movement in the United States," JAAPA 25, no. 12 (December 2012): 36–40, DOI: 10.1097/01720610-201212000-00008.
- Michael Glick and Barbara L. Greenberg, "The Role of Oral Health Care Professionals in Providing Medical Services," *Journal of Dental Education* 81, no. 8 (August 2017): eS180-eS185, DOI: 10.21815/ JDE.017.025.
- Sara C. Gordon, Linda M. Kaste, Wendy E. Mouradian, Phyllis L. Beemsterboer, Joel H. Berg, and Carol Anne Murdoch-Kinch, "Dentists as Primary Care Providers: Expert Opinion on Predoctoral Competencies," *Frontiers in Dental Medicine* 2 (November 2021): 703958, DOI: 10.3389/fdmed.2021.703958.
- 56. Guangzhao Guan, Amanda Lim, HuiYee Sim, YeYan Khor, and Li Mei, "Interprofessional Communication Between General Dental Practitioners and General Medical Practitioners: A Qualitative Study," *Journal of Primary Health Care* (2024), DOI: https://doi.org/10.1071/ HC24071.
- Kathryn A. Atchison, R. Gary Rozier, and Jane A. Weintraub, "Integration of Oral Health and Primary Care: Communication, Coordination and Referral," *NAM Perspectives*, National Academy of Medicine, Washington, DC, DOI: 10.31478/201810e.
- V. Visvanathan and P. Nix, "Managing the Patient Presenting with Xerostomia: A Review," International Journal of Clinical Practice 64, no. 3 (February 2010): 404–407, DOI: 10.1111/j.1742-1241.2009.02132.x.
- Abiola Adeniyi, Leeann Donnelly, Patricia Janssen, Cecilia Jevitt, Michael Siarkowski, and Mario Brondani, "Integrating Oral Health into Prenatal Care: A Scoping Review," *Journal of Integrated Care* 28, no. 3 (May 2020): 291–310, DOI: 10.1108/JICA-09-2019-0041.

- Frank Lobbezoo, Merel C. Verhoeff, Ghizlane Aarab, Bettina S. Husebø, Willem van der Torre, and Catherine M.C. Volgenant, "The Contribution of Palliative Oral Health Care to Dying with Dignity," *Journal of the American Dental Association* 154, no. 1 (January 2023): 3–5, DOI: 10.1016/j.adaj.2022.08.015.
- 61. Uma Kelekar and Shillpa Naavaal, "Dental Visits and Associated Emergency Department–Charges in the United States: Nationwide Emergency Department Sample, 2014," *Journal of the American Dental Association* 150, no. 4 (April 2019): 305–312.e1, DOI: 10.1016/j. adaj.2018.11.021.
- 62. Jacqueline R. Van Malsen, Rafael Figueiredo, Heidi Rabie, and Sharon M. Compton, "Factors Associated with Emergency Department Use for Non-Traumatic Dental Problems: Scoping Review," *Journal of the Canadian Dental Association* 84, no. j3 (March 2019).
- Ashley M. Kranz, Yuji Mizushima, Andrew W. Dick, Kimberley H. Geissler, and Tadeja Gracner, "Affordable Care Act's Preventive Services Coverage Mandate and Receipt of Fluoride Varnish," *Pediatrics* 154, no. 5 (November 2024): e2024066638, DOI: 10.1542/ peds.2024-066638.
- 64. Rabia Sannam Khan, Zohaib Khurshid, and Faris Yahya Ibrahim Asiri, "Advancing Point-of-Care (PoC) Testing Using Human Saliva as Liquid Biopsy," *Diagnostics 7*, no. 3 (July 2017): 39, DOI: 10.3390/ diagnostics7030039.
- Yogesh Kumar, Apeksha Koul, Ruchi Singla, and Muhammad Fazal Ijaz, "Artificial Intelligence in Disease Diagnosis: A Systematic Literature Review, Synthesizing Framework and Future Research Agenda," *Journal of Ambient Intelligence and Humanized Computing* 14, no. 7 (2023): 8459–8486, DOI: 10.1007/s12652-021-03612-z.
- Barbara L. Greenberg, Michael Glick, Julie Frantsve-Hawley, and Mel L. Kantor, "Dentists' Attitudes Toward Chairside Screening for Medical Conditions," *Journal of the American Dental Association* 141, no. 1 (January 2010): 52–62, DOI: 10.14219/jada.archive.2010.0021.
- Barbara L. Greenberg, Mel L. Kantor, Shuying S. Jiang, and Michael Glick, "Patients' Attitudes Toward Screening for Medical Conditions in a Dental Setting," *Journal of Public Health Dentistry* 72, no. 1 (Winter 2012): 28–35, DOI: 10.1111/j.1752-7325.2011.00280.x.
- Barbara L. Greenberg, Pauline A. Thomas, Michael Glick, and Mel L. Kantor, "Physicians' Attitudes Toward Medical Screening in a Dental Setting," *Journal of Public Health Dentistry* 75, no. 3 (Summer 2015): 225–233, DOI: 10.1111/jphd.12093.
- Martin Müller, Jonas Jürgens, Marcus Redaèlli, Karsten Klingberg, Wolf E. Hautz, and Stephanie Stock, "Impact of the Communication and Patient Hand-Off Tool SBAR on Patient Safety: A Systematic Review," *BMJ Open* 8, no. 8 (August 2018): e022202, DOI: 10.1136/ bmjopen-2018-022202.
- 70. "About Behavioral Health," Centers for Disease Control and Prevention, accessed January 18, 2025, <u>https://www.cdc.gov/mental-health/about/about-behavioral-health.html</u>.
- "What Is Behavioral Health?," American Medical Association, accessed January 18, 2025, <u>https://www.ama-assn.org/delivering-care/</u> public-health/what-behavioral-health.

- 72. "Mental Health Providers: Tips on Finding One," Mayo Clinic, accessed January 18, 2025, <u>https://www.mayoclinic.org/diseases-</u> <u>conditions/mental-illness/in-depth/mental-health-providers/</u> art-20045530.
- Dina Gordon, Richard G. Heimberg, Marisol Tellez, and Amid I. Ismail, "A Critical Review of Approaches to the Treatment of Dental Anxiety in Adults," *Journal of Anxiety Disorders* 27, no. 4 (May 2013): 365–378, DOI: 10.1016/j.janxdis.2013.04.002.
- Pauline McGoldrick, Joyce Levitt, Ad de Jongh, Andrew Mason, and Dafydd Evans, "Referrals to a Secondary Care Dental Clinic for Anxious Adult Patients: Implications for Treatment," *British Dental Journal* 191, no. 12 (December 2001): 686–688, DOI: 10.1038/ sj.bdj.4801270.
- Ulla Wide Boman, Viktor Carlsson, Maria Westin, and Magnus Hakeberg, "Psychological Treatment of Dental Anxiety among Adults: A Systematic Review," *European Journal of Oral Sciences* 121, no. 3pt2 (June 2013): 225–234, DOI: 10.1111/eos.12032.
- John L. Reeves II and Robert L. Merrill, "The Complex Orofacial Pain Patient: A Case for Collaboration Between the Orofacial Pain Dentist and the Clinical Health Psychologist." In Roger Kessler and Dale Stafford (eds.), *Collaborative Medicine Case Studies* (Springer Nature: 2008), 217–254.
- Kelly M. Wawrzyniak, Naila Ahmed, Ronald J. Kulich, and Shuchi Dhadwal, "Interprofessional Management of Chronic Orofacial Pain: A Topic Review, Steps to Improve Collaborative Care, and a Case Example," *Journal of the California Dental Association* 52, no. 1 (2024): 2313779, DOI: 10.1080/19424396.2024.2313779.
- Archana Viswanath, Antje M. Barreveld, and Matthew Fortino, "Assessment and Management of the High-Risk Dental Patient with Active Substance Use Disorder," *Dental Clinics of North America* 64, no. 3 (July 2020): 547–558, DOI: 10.1016/j.cden.2020.02.004.
- 79. Nathan P. Culmer, Todd Brenton Smith, M. Blake Berryhill, JoAnn Gurenlian, Lance Simpson, Shawnna Ogden, Jonathan Parrish, Lacey Ryan, Nicole White, Merrill Bettis, and Charlotte Greenwood, "Mental Health Screening and Referral to Treatment in Dental Practices: A Scoping Review," *Journal of Dental Education* 88, no. 4 (April 2024): 445–460, DOI: 10.1002/jdd.13444.
- Adrienne Lapidos, James Henderson, Jennifer Cullen, Sara Pasiak, Merton Hershberger, and Danielle Rulli, "Oral Health Recovery: Randomized Evaluation of an Oral-Behavioral Health Integration Approach," JDR Clinical and Translational Research 9, no. 1_suppl (2024): 59S-69S.
- Adrienne Lapidos, Rachael Matulis, Sarah Neil Mockridge, and Danielle Rulli, "Behavioral Health in Dental Settings: Resources to Support Integration," *Journal of the California Dental Association* 52, no. 1 (2024), DOI: 10.1080/19424396.2024.2353739.
- Tamanna Tiwari and Cameron L. Randall, "A Framework for the Integration of Behavioral Health and Oral Health in Predoctoral Dental Education," *Journal of the California Dental Association* 52, no. 1 (2024), DOI: 10.1080/19424396.2024.2353747.
- Shenam Ticku, Tien Jiang, Hesham Alhazmi, Nora Alamer, Robin A. Harvan, and Christine A. Riedy, "Behavioral Health Within Primary Care Postgraduate Dental Curricula: A Mixed Methods Study," *Annals* of Family Medicine 21, Suppl 2 (February 2023): S4–S13.

- 84. "Registered Nurse (RN) Job Description," American Association of Managed Care Nurses, accessed January 18, 2025, <u>https://careers.</u> aamcn.org/career/registered-nurse-rn/job-descriptions.
- 85. "Certified Nurse Practitioner Job Description," American Association of Managed Care Nurses, accessed January 18, 2025, <u>https://careers.</u> <u>aamcn.org/career/certified-nurse-practitioner/job-descriptions.</u>
- Elizabeth M. Alpert, Michael A. Friedman, Tara T. Zhou, Claudia C. Guillen, Luis Lopez, and Jane R. Barrow, "Interprofessional Education and Experiential Learning: The Nurse Practitioner-Dentist Collaborative Practice Model," *Journal of Dental Education* (January 2025), DOI: 10.1002/jdd.13825.
- Maria C. Dolce, Jane Barrow, Ashiana Jivraj, Dalton Pham, and John D. Da Silva, "Interprofessional Value-Based Health Care: Nurse Practitioner-Dentist Model," *Journal of Public Health Dentistry* 80, Suppl 2 (September 2020): S44–S49, DOI: 10.1111/jphd.12419.
- Judith Bernstein, Christina Gebel, Clemencia Vargas, Paul Geltman, Ashley Walter, Raul Garcia, and Norman Tinanoff, "Listening to Paediatric Primary Care Nurses: A Qualitative Study of the Potential for Interprofessional Oral Health Practice in Six Federally Qualified Health Centres in Massachusetts and Maryland," *BMJ Open* 7, no. 3 (March 2017): e014124, DOI: 10.1136/bmjopen-2016-014124.
- Roxanne Dsouza, Rocio Quinonez, Sara Hubbell, and Jennifer Brame, "Promoting Oral Health in Nursing Education through Interprofessional Collaborative Practice: A Quasi-Experimental Survey Study Design," *Nurse Education Today* 82 (November 2019): 93–98, DOI: 10.1016/j.nedt.2019.07.010.
- 90. "Pharmacist," Mayo Clinic College of Medicine and Science, accessed January 18, 2025, <u>https://college.mayo.edu/academics/</u> explore-health-care-careers/careers-a-z/pharmacist/.
- 91. "Aging and Dental Health," American Dental Association, accessed January 18, 2025, <u>https://www.ada.org/resources/ada-library/</u> <u>oral-health-topics/aging-and-dental-health.</u>
- 92. "Xerostomia (Dry Mouth)," American Dental Association, accessed January 18, 2025, https://www.ada.org/resources/ada-library/ oral-health-topics/xerostomia.
- Kalin L. Johnson, Kevin T. Fuji, Joseph V. Franco, Shana Castillo, Karen O'Brien, and Kimberley J. Begley, "A Pharmacist's Role in a Dental Clinic: Establishing a Collaborative and Interprofessional Education Site," *Innovations in Pharmacy* 9, no. 4 (November 2018), DOI: 10.24926/iip.v9i4.1382.
- 94. Jacob Dresser, Abdullah Barazanchi, Alison Meldrum, Carlo Marra, and Kyle John Wilby, "Identifying Perceptions and Themed Learning Outcomes Between Pharmacy and Dentistry Students Through Interprofessional Education and Collaboration in the Dental Clinic," *Currents in Pharmacy Teaching and Learning* 13, no. 7 (July 2021): 843–847, DOI: 10.1016/j.cptl.2021.03.012.
- Cathryn Carlisle and M-W Taing, "Interprofessional Education Between Dentistry and Pharmacy Students: Delivery, Barriers and Facilitating Implementation," *Australian Dental Journal* 66, no. 4 (December 2021): 351–357, DOI: 10.1111/adj.12856.
- Caroline Barraclough, Jalpa Patel, Lesley Grimes, and Matthew Shaw, "Interprofessional Learning for Dental and Pharmacy Professionals: Learning Together Changes How You Work Together," *British Dental Journal* 233 (2022): 45–51, DOI: 10.1038/s41415-022-4402-8.

- Grishondra L. Branch-Mays, Amy L. Pittenger, Kristyn Williamson, Anna Milone, Emily Hein, and Todd Thierer, "An Interprofessional Education and Collaborative Practice Model for Dentistry and Pharmacy," *Journal of Dental Education* 81, no. 12 (December 2017): 1413–1420, DOI: 10.21815/JDE.017.101.
- "Becoming a Physical Therapist," American Physical Therapy Association, accessed January 18, 2025, <u>https://www.apta.org/</u> your-career/careers-in-physical-therapy/becoming-a-pt.
- 99. "What Is Occupational Therapy?," American Occupational Therapy Association, accessed January 19, 2025, <u>https://www.aota.org/about/</u> <u>what-is-ot</u>.
- 100. Cesar Fernández-de-Las-Peñas and Harry von Piekartz, "Clinical Reasoning for the Examination and Physical Therapy Treatment of Temporomandibular Disorders (TMD): A Narrative Literature Review," *Journal of Clinical Medicine* 9, no. 11 (Nov 2020): 3686, DOI: 10.3390/ jcm9113686.
- 101. Vrushali Sameer Junnarkar, Huei Jinn Tong, Kamal Maher Batra Hanna, Ramkumar Aishworiya, and Monty Duggal, "Occupational and Speech Therapists' Perceptions of Their Role in Dental Care for Children with Autism Spectrum Disorder: A Qualitative Exploration," *International Journal of Paediatric Dentistry* 32, no. 6 (November 2022): 865–876, DOI: 10.1111/ipd.13009.
- 102. Dominique H. Como, Leah I. Stein Duker, José C. Polido, and Sharon A. Cermak, "Oral Health and Autism Spectrum Disorders: A Unique Collaboration Between Dentistry and Occupational Therapy," International Journal of Environmental Research and Public Health 18, no. 1 (2020): 135, DOI: 10.3390/ijerph18010135.
- S. Venner, J. Erwin, Robert Witton, and Martha Paisi, "A Partnership Between Occupational Therapy and Dentistry," *British Dental Journal* 234, no. 6 (March 2023): 360, DOI: 10.1038/s41415-023-5700-5.
- 104. Fleurange Bellomo, Frédérique de Preux, Jean-Pierre Chung, Noëlle Julien, Ejvind Budtz-Jørgensen, and Frauke Müller, "The Advantages of Occupational Therapy in Oral Hygiene Measures for Institutionalised Elderly Adults," *Gerodontology* 22, no. 1 (March 2005): 24–31, DOI: 10.1111/j.1741-2358.2004.00047.x.
- 105. "What Is Public Health?," American Public Health Association, accessed January 18, 2025, https://apha.org/what-is-public-health.
- 106. Peter F. Edemekong and Steven Tenny, *Public Health*, Treasure Island, FL: StatPearls Publishing, 2025.
- 107. Astha Singhal, Susan C. McKernan, and Woosung Sohn, "Dental Public Health Practice, Infrastructure, and Workforce in the United States," *Dental Clinics of North America* 62, no. 2 (April 2018): 155–175, DOI: 10.1016/j.cden.2017.11.001.
- 108. Homa Amini, Jonathan D. Shenkin, and Donald L. Chi, "11—Dental Public Health Issues in Pediatric Dentistry," *Pediatric Dentistry: Infancy Through Adolescence (Sixth Edition)*, 2019, 159–168.e2.
- 109. "Code of Ethics," National Association of Social Workers, accessed January 18, 2025, <u>https://www.socialworkers.org/About/Ethics/</u> <u>Code-of-Ethics/Code-of-Ethics-English.</u>
- Maggie Petrosky, Lenora A. Colaruotolo, Ronald J. Billings, and Cyril Meyerowitz, "The Integration of Social Work into a Postgraduate Dental Training Program: A Fifteen-Year Perspective," *Journal of Dental Education* 73, no. 6 (June 2009): 656–664.

- Joan M. Doris, Elaine Davis, Cynthia Du Pont, and Britt Holdaway, "Social Work in Dentistry: The CARES Model for Improving Patient Retention and Access to Care," *Dental Clinics of North America* 53, no. 3 (July 2009): 549–559, DOI: 10.1016/j.cden.2009.03.003.
- Lisa de Saxe Zerden, Melanie Morris, and Jamie Burgess-Flowers, "Oral Health and Social Work Integration: Advancing Social Workers' Roles in Dental Education," *Health and Social Work* 48, no. 1 (January 2023): 43–53, DOI: 10.1093/hsw/hlac038.
- Elisabeth A. Purkis, Brittaney Hill, Marcio A. da Fonseca, and Clark M. Stanford, "Integrating an Innovative Social Work Practice into a Pediatric Dental Residency Program," *Journal of Social Work* 23, no. 2 (2023): 317–333, DOI: 10.1177/14680173221143647.
- Rona L. Levy and Barbara Yoshida, "The Measurement of the Effect of Social Work on the Enhancement of Dental Student Training," Social Work in Health Care 6, no. 2 (1981): 33–38.
- Harold C. Slavkin, Pedro A. Sanchez-Lara, Yang Chai, and Mark Urata, "A Model for Interprofessional Health Care: Lessons Learned from Craniofacial Teams," *Journal of the California Dental Association* 42, no. 9 (September 2014): 637–644.
- 116. Brittany A. Klein, Jane A. Weintraub, Jennifer L. Brame, Vicki Kowlowitz, Nancy M. McKenna, and Katharine Ciarrocca, "Audiology and Oral Health Professional Students: An Interprofessional Education Collaboration," *Journal of Dental Education* 84, no. 9 (September 2020): 983–990, DOI: 10.1002/jdd.12175.
- 117. Craig W. Newman and Sharon A. Sandridge, "Care Path for Patients with Tinnitus: An Interprofessional Collaborative Model," *Perspectives of the ASHA Special Interest Groups* 1, no. 7 (March 2016): 24–42, DOI: 10.1044/persp1.SIG7.24.
- 118. James W. DeVocht, Christine M. Goertz, Maria A. Hondras, Cynthia R. Long, Wally Schaeffer, Lauren Thomann, Michael Spector, and Clark M. Stanford, "A Pilot Study of a Chiropractic Intervention for Management of Chronic Myofascial Temporomandibular Disorder," *Journal of the American Dental Association* 144, no. 10 (2013): 1154–1163, DOI: 10.14219/jada.archive.2013.0034.
- Steven L. Kraus, Steven D. Bender, and Janey Prodoehl, "Muscle-Based Conditions," in *Temporomandibular Disorders: A Translational Approach From Basic Science to Clinical Applicability* (Springer International, 2017), 141–171.
- M. Iriti, G. Spallino, R. Franchini, M. Rigoni, P. Muti, G. Lodi, A. Sardella, and E.M. Varoni, "Survey on Patients' Attitude Towards the Nutritional Counselling in the Dental Setting," *BDJ Open* 10, no. 1 (2024): 47, DOI: 10.1038/s41405-024-00229-0.
- 121. Jessica R.L. Lieffers, Amanda Gonçalves Troyack Vanzan, Janine Rover de Mello, and Allison Cammer, "Nutrition Care Practices of Dietitians and Oral Health Professionals for Oral Health Conditions: A Scoping Review," *Nutrients* 13, no. 10 (October 2021): 3588, DOI: 10.3390/nu13103588.
- 122. Tiffany Patterson-Norrie, Lucie Ramjan, Mariana S. Sousa, and Ajesh George, "Dietitians' Experiences of Providing Oral Health Promotion to Clients with an Eating Disorder: A Qualitative Study," *International Journal of Environmental Research and Public Health* 19, no. 21 (October 2022): 14193, DOI: 10.3390/ijerph192114193.

- 123. Shawnda M. Schroeder, Collette Adamsen, and Robin Besse, "The Relationship Between Diabetes and Oral Health Status, and Dental Visits among American Indian, Alaska Native, and Native Hawaiian Elders," *Journal of the American Dental Association* 152, no. 4 (April 2021): 293–301, DOI: 10.1016/j.adaj.2020.12.008.
- Patricia B. Bonwell, Pamela L. Parsons, Al M. Best, and Sabrina Hise,
 "An Interprofessional Educational Approach to Oral Health Care in the Geriatric Population," *Gerontology and Geriatrics Education* 35, no. 2 (October 2013): 182–199, DOI: 10.1080/02701960.2013.827572.
- 125. Vanessa R.Y. Hollaar, Elke Naumann, Elizabeth B. Haverkort, Katarina Jerković-Ćosić, Wilhelmina E. Kok, and Marian A.E. de van der Schueren, "Success Factors and Barriers in Interprofessional Collaboration between Dental Hygienists and Dietitians in Community-Dwelling Older People: Focus Group Interviews," International Journal of Dental Hygiene 22, no. 2 (May 2024): 321–328, DOI: 10.1111/idh.12774.
- 126. Kathrin Eliot, Patricia Cuff, Gina Firnhaber, and Kathryn M. Kolasa, "Interprofessional Obesity Treatment: An Exploration of Current Literature and Practice," *Journal of Interprofessional Education* and Practice 25, no. 10 (October 2021): 100475, DOI: 10.1016/j. xjep.2021.100475.
- Kenny P. Pang and Edward B. Pang, "Upper Airway Resistance Syndrome: A Combined ENT and Dental Approach," *Current Otorhinolaryngology Reports* 9, no. 8 (September 2021): 254–259, DOI: 10.1007/s40136-021-00354-6.
- 128. Larissa Nekhlyudov, Christina Lacchetti, Nancy B. Davis, Thomas Q. Garvey, David P. Goldstein, J. Chris Nunnink, Jose I. Ruades Ninfea, Andrew L. Salner, Talya Salz, and Lillian L. Siu, "Head and Neck Cancer Survivorship Care Guideline: American Society of Clinical Oncology Clinical Practice Guideline Endorsement of the American Cancer Society Guideline," *Journal of Clinical Oncology* 35, no. 14 (May 2017): 1606–1621, DOI: 10.1200/JCO.2016.71.8478.
- 129. John R. Craig, Alberto Maria Saibene, Elena Giulia Felisati, and Giovanni Felisati, "Collaboration between Otolaryngologists and Oral Surgeons in Maxillary Sinus Elevation Planning," *Clinical Implant Dentistry and Related Research* 26, no. 6 (December 2024): 1181–1189, DOI: 10.1111/cid.13385.
- Kannan Ramar, Leslie C. Dort, Sheri G. Katz, Christopher J. Lettieri, Christopher G. Harrod, Sherene M. Thomas, and Ronald D. Chervin, "Clinical Practice Guideline for the Treatment of Obstructive Sleep Apnea and Snoring with Oral Appliance Therapy: An Update for 2015," *Journal of Clinical Sleep Medicine* 11, no. 7 (July 2015): 773–827, DOI: 10.5664/jcsm.4858.
- 131. Federica Gani, Marco Caminati, Fabio Bellavia, Andrea Baroso, Paolo Faccioni, Paolo Pancera, Veronica Batani, and Gianenrico Senna, "Oral Health in Asthmatic Patients: A Review — Asthma and Its Therapy May Impact on Oral Health," *Clinical and Molecular Allergy* 18, no. 1 (November 2020): 22, DOI: 10.1186/s12948-020-00137-2.
- Nora Fayed, Glenn Berall, Louise Dix, and Peter Judd, "A Dynamic and Comprehensive Practice Model of Paediatric Feeding Practice," *International Journal of Therapy and Rehabilitation* 14, no. 1 (2013): 7–15, DOI: 10.12968/ijtr.2007.14.1.22628.
- 133. Matthew K. Geneser and Veerasathpurush Allareddy, "Cleft Lip and Palate," in *Pediatric Dentistry: Infancy Through Adolescence (Sixth Edition)* (Elsevier, 2019).

- 134. Ingrid Andrade Meira, Lorena Tavares Gama, Daniela Almeida Prado-Tozzi, Mayara Abreu Pinheiro, and Renata Cunha Matheus Rodrigues Garcia, "Speech in Implant-Supported and Removable Complete Denture Wearers: A Systematic Review," *The Journal of Prosthetic Dentistry* 128, no. 6 (December 2022): 1230–1238, DOI: 10.1016/j. prosdent.2021.03.006.
- 135. Paula Leslie, Ingrid Scholten, and Soenke Stanschus, "International Multidisciplinary Perspectives on Swallowing," *Perspectives on Swallowing and Swallowing Disorders (Dysphagia)* 13, no. 2 (June 2004): 7–18, DOI: 10.1044/sasd13.2.7.
- 136. William S. Crysdale, Janice Greenberg, Ruth Koheil, and Rod Moran, "The Drooling Patient: Team Evaluation and Management," International Journal of Pediatric Otorhinolaryngology 9, no. 3 (August 1985): 241–248, DOI: 10.1016/S0165-5876(85)80040-9.
- 137. Athanasios Stamos, Marc Engels-Deutsch, Sophie Cantamessa, Jean-Luc Dartevelle, Thierry Crouzette, John Haughey, Flavia Del Grosso, Stavros Avgerinos, Tilman Fritsch, Alessandro Nanussi, Florian Trombowsky, Markus Striegel, Mike Salyzyn, Jim Whitehead, Hans Stasiuk, Emilio Canal, Enrique Amy, Mark Roettger, and Christos Rahiotis, "A Suggested Universal Protocol for Dental Examination in Sports," Dental Traumatology 39, no. 6 (December 2023): 521–530, DOI: 10.1111/edt.12863.
- Eliot J. Young, C. Roger Macias, and Lindsay Stephens, "Common Dental Injury Management in Athletes," *Sports Health* 7, no. 3 (May 2015): 250–255, DOI: 10.1177/1941738113486077.
- Naveen Kumar Ramagoni, Vijaya Kumar Singamaneni, Saketh Rama Rao, and Jamini Karthikeyan, "Sports Dentistry: A Review," *Journal of International Society of Preventive and Community Dentistry* 4, Suppl 3 (December 2014): S139–S146, DOI: 10.4103/2231-0762.149019.
- 140. Commission on Dental Accreditation, Accreditation Standards for Dental Hygiene Education Programs, Chicago, IL: 2023, <u>https://coda.ada.org/-/media/project/ada-organization/ada/coda/files/dental_hygiene_standards.pdf?rev=aa609ad18b504e9f9cc63f0b3715</u>a5fdandhash=67CB76127017AD98CF8D62088168EA58.
- Juliann Binienda, "Critical Synthesis Package: Readiness for Interprofessional Learning Scale (RIPLS)," *MedEdPORTAL* 11 (November 2015): 10274, DOI: 10.15766/mep_2374-8265.10274.
- Jeffrey Norris, Joan G. Carpenter, Jacqueline Eaton, Jia-Wen Guo, Madeline Lassche, Marjorie A. Pett, and Donald K. Blumenthal, "The Development and Validation of the Interprofessional Attitudes Scale: Assessing the Interprofessional Attitudes of Students in the Health Professions," *Academic Medicine* 90, no. 10 (October 2015): 1394–1400, DOI: 10.1097/ACM.000000000000764.
- 143. Douglas Archibald, David Trumpower, and Colla J. MacDonald,
 "Validation of the Interprofessional Collaborative Competency Attainment Survey (ICCAS)," *Journal of Interprofessional Care* 28, no. 6 (November 2014): 553–558, DOI: 10.3109/13561820.2014.917407.
- 144. Connie C. Schmitz, David M. Radosevich, Paul Jardine, Colla J. MacDonald, David Trumpower, and Douglas Archibald, "The Interprofessional Collaborative Competency Attainment Survey (ICCAS): A Replication Validation Study," *Journal of Interprofessional Care* 31, no. 1 (January 2017): 28–34, DOI: 10.1080/13561820.2016.1233096.

- 145. Health Professions Accreditors Collaborative, Guidance on Developing Quality Interprofessional Education for the Health Professions, Chicago, IL: 2019, <u>https://healthprofessionsaccreditors.</u> org/wp-content/uploads/2019/02/HPACGuidance02-01-19.pdf.
- 146. Marwh Gassim Aldriwesh, Sarah Mohammed Alyousif, and Nouf Sulaiman Alharbi, "Undergraduate-Level Teaching and Learning Approaches for Interprofessional Education in the Health Professions: A Systematic Review," *BMC Medical Education* 22, no. 14 (2022): 1–14, DOI: 10.1186/s12909-021-03073-0.
- 147. Mohammed Azzahrani, "Problem-Based Learning for Interprofessional Education: A Review of the Concept and Its Application in a Geriatric Team," *Cureus* 16, no. 6 (June 2024): e63055, DOI: 10.7759/ cureus.63055.
- 148. Endang Lestari, Dian A. Rahmawatie, and Catur L. Wulandari, "Does Online Interprofessional Case-Based Learning Facilitate Collaborative Knowledge Construction?," *Journal of Multidisciplinary Healthcare* 16 (January 2023): 85–99, DOI: 10.2147/JMDH.S391997.
- Marijean Buhse and Carol Della Ratta, "Enhancing Interprofessional Education with Team-Based Learning," Nurse Educator 42, no. 5 (September/October 2017): 240–244, DOI: 10.1097/ NNE.00000000000370.
- Annette Burgess, Christie van Diggele, Chris Roberts, and Craig Mellis, "Team-Based Learning: Design, Facilitation, and Participation," *BMC Medical Education* 20, Suppl 2 (December 2020): 461, DOI: 10.1186/ s12909-020-02287-y.
- 151. Young Gyu Kwon, Myeong Namgung, Song Hee Park, Mi Kyung Kim, Sun Jung Myung, Eun Kyung Eo, and Chan Woong Kim, "Impact of a Game-Based Interprofessional Education Program on Medical Students' Perceptions: A Text Network Analysis Using Essays," BMC Medical Education 24, no. 1 (August 2024): 898, DOI: 10.1186/ s12909-024-05893-2.
- Neena A. Xavier and Michelle R. Brown, "Interprofessional Education in a Simulation Setting," Treasure Island (FL): StatPearls Publishing, 2025.
- 153. Jo Marie Reilly, María P. Aranda, Freddi Segal-Gidan, Ashley Halle, Phuu Pwint Han, Patricia Harris, Katie Jordan, Roseann Mulligan, Cheryl Resnik, Kai-Ya Tsai, Brad Williams, and Michael R. Cousineau, "Assessment of Student Interprofessional Education (IPE) Training for Team-Based Geriatric Home Care: Does IPE Training Change Students' Knowledge and Attitudes?," *Home Health Care Services Quarterly* 33, no. 4 (2014):177–193, DOI: 10.1080/01621424.2014.968502.
- 154. Mary Val Palumbo and Darcy Nora Bennett, "Online Video Conferencing: A Promising Innovation in Interprofessional Education," *Journal of Allied Health* 45, no. 3 (Fall 2016): 230–233.
- 155. Glennys Parsell and John Bligh, "The Development of a Questionnaire to Assess the Readiness of Health Care Students for Interprofessional Learning (RIPLS)," *Medical Education* 33, no. 2 (February 1999): 95–100, DOI: 10.1046/j.1365-2923.1999.00298.x.
- 156. Jennifer Thannhauser, Shelly Russell-Mayhew, and Catherine Scott, "Measures of Interprofessional Education and Collaboration," *Journal of Interprofessional Care* 24, no. 4 (July 2010): 336–349, DOI: 10.3109/13561820903442903.

- 157. Richard M. Luecht, Mary K. Madsen, Mary P. Taugher, and Bonnie J. Petterson, "Assessing Professional Perceptions: Design and Validation of an Interdisciplinary Education Perception Scale," *Journal of Allied Health* 19, no. 2 (February 1990): 181–191.
- 158. Caitlin Gillan, Emily Lovrics, Elise Halpern, David Wiljer, and Nicole Harnett, "The Evaluation of Learner Outcomes in Interprofessional Continuing Education: A Literature Review and an Analysis of Survey Instruments," *Medical Teacher* 33, no. 9 (2011): e461–470, DOI: 10.3109/0142159X.2011.587915.
- 159. Matthew Oates and Megan Davidson, "A Critical Appraisal of Instruments to Measure Outcomes of Interprofessional Education," *Medical Education* 49, no. 4 (April 2015): 386–398, DOI: 10.1111/ medu.12681.
- 160. Sarah Shrader, Michelle Z. Farland, Jennifer Danielson, Brigitte Sicat, and Elena M. Umland, "A Systematic Review of Assessment Tools Measuring Interprofessional Education Outcomes Relevant to Pharmacy Education," *American Journal of Pharmacy Education* 81, no. 6 (August 2017): 119, DOI: 10.5688/ajpe816119.
- 161. Hugh Barr, Ivan Koppel, Scott Reeves, Marilyn Hammick, and Della Freeth, *Effective Interprofessional Education: Argument, Assumption and Evidence* (Hoboken, NJ: Blackwell Publishing Ltd, 2005).
- 162. Gary D. Rogers, Jill E. Thistlethwaite, Elizabeth S. Anderson, Madeline Abrandt Dahlgren, Ruby E. Grymonpre, Monica Moran, and Dujeepa Samarasekera, "International Consensus Statement on the Assessment of Interprofessional Learning Outcomes," *Medical Teacher* 39, no. 4 (April 2017): 347–359, DOI: 10.1080/0142159X.2017.1270441.
- 163. Vernon Curran, Ann Hollett, Lynn M. Casimiro, Patricia McCarthy, Valerie Banfield, Pippa Hall, Kelly Lackie, Ivy Oandasan, Brian Simmons, and Susan Wagner, "Development and Validation of the Interprofessional Collaborator Assessment Rubric (ICAR)," *Journal* of Interprofessional Care 25, no. 5 (September 2011): 339–344, DOI: 10.3109/13561820.2011.589542.
- 164. Brian Simmons, Eileen Egan-Lee, Susan J. Wagner, Martina Esdaile, Lindsay Baker, and Scott Reeves, "Assessment of Interprofessional Learning: The Design of an Interprofessional Objective Structured Clinical Examination (iOSCE) Approach," *Journal of Interprofessional Care* 25, no. 1 (January 2011): 73–74, DOI: 10.3109/13561820.2010.483746.
- 165. Pippa Hall, Denise Marshall, Lynda Weaver, Anne Boyle, and Alan Taniguchi, "A Method to Enhance Student Teams in Palliative Care: Piloting the McMaster-Ottawa Team Observed Structured Clinical Encounter," *Journal of Palliative Medicine* 14, no. 6 (June 2011): 744–750, DOI: 10.1089/jpm.2010.0295.
- 166. Patricia Solomon, Denise Marshall, Anne Boyle, Sheri Burns, Lynn M. Casimiro, Pippa Hall, and Lynda Weaver, "Establishing Face and Content Validity of the McMaster-Ottawa Team Observed Structured Clinical Encounter (TOSCE)," *Journal of Interprofessional Care* 25, no. 4 (July 2011): 302–304, DOI: 10.3109/13561820.2011.571353.
- 167. Ian Symonds, Lindsay Cullen, and Diane Fraser, "Evaluation of a Formative Interprofessional Team Objective Structured Clinical Examination (ITOSCE): A Method of Shared Learning in Maternity Education," *Medical Teacher* 25, no. 1 (January 2003): 38–41, DOI: 10.1080/0142159021000061404.

- 168. Australia iTOFT Consortium, Work-Based Assessment of Teamwork: An Interprofessional Approach, Office for Learning and Teaching Australian Government, Canberra, Australia: 2015, <u>https://practiceedportal.health.ubc.ca/wp-content/uploads/2017/05/iTOFT-Work-Based-Approach-on-Teamwork.pdf.</u>
- 169. Jill Thistlethwaite, Kathy Dallest, Monica Moran, Roger Dunston, Chris Roberts, Diann Eley, Fiona Bogossian, Dawn Forman, Lesley Bainbridge, Donna Drynan, and Sue Fyfe, "Introducing the Individual Teamwork Observation and Feedback Tool (iTOFT): Development and Description of a New Interprofessional Teamwork Measure," *Journal of Interprofessional Care* 30, no. 4 (July 2016): 526–528, DOI: 10.3109/13561820.2016.1169262.
- 170. Hailah Almoghirah, Hamde Nazar, and Jan Illing, "Assessment Tools in Pre-Licensure Interprofessional Education: A Systematic Review, Quality Appraisal and Narrative Synthesis," *Medical Education* 55, no. 7 (July 2021): 795–807, DOI: 10.1111/medu.14453.
- 171. "Critical Appraisal Tools," JBI, accessed January 19, 2025, <u>https://jbi.</u> global/critical-appraisal-tools.
- 172. Abdul Khabeer and Muhammad A. Faridi, "Interprofessional Education in Dentistry: Exploring the Current Status and Barriers in the United States and Canada," *Cureus* 16, no. 10 (October 2024): e72768, DOI: 10.7759/cureus.72768.
- Cynthia L. Stull and Christine M. Blue, "Examining the Influence of Professional Identity Formation on the Attitudes of Students Towards Interprofessional Collaboration," *Journal of Interprofessional Care* 30, no. 1 (2016): 90–96, DOI: 10.3109/13561820.2015.1066318.
- Brígida F.S. de Mendonça, Raquel B. de Carvalho, and Karina T.S. Pacheco, "Interprofessional Education in Undergraduate Dental Curricula: A Systematic Review," *Journal of Dental Education* 88, no. 5 (May 2024): 554–566, DOI: 10.1002/jdd.13464.
- 175. Samuel Edelbring, Eva Broberger, Susanna Sandelius, Jessica Norberg, and Desiree Wiegleb Edström, "Flexible Interprofessional Student Encounters Based on Virtual Patients: A Contribution to an Interprofessional Strategy," *Journal of Interprofessional Care* 36, no. 2 (March–April 2022): 310–317, DOI: 10.1080/13561820.2021.1893287.
- 176. Jan Fook, Lynda D'Avray, Caroline Norrie, Maria Psoinos, Bryony Lamb, and Fiona Ross, "Taking the Long View: Exploring the Development of Interprofessional Education," *Journal of Interprofessional Care* 27, no. 4 (July 2013): 286–291, DOI: 10.3109/13561820.2012.759911.
- 177. Ingrid Gilles, Séverine S. Filliettaz, Peter Berchtold, and Isabelle Peytremann-Bridevaux, "Financial Barriers Decrease Benefits of Interprofessional Collaboration Within Integrated Care Programs: Results of a Nationwide Survey," *International Journal of Integrated Care* 20, no. 1 (March 2020): 10, DOI: 10.5334/ijic.4649.
- 178. Sydnee E. Chavis, Fotini V. Anagnostopoulos-King, Sheryl L. Syme, Sharon Varlotta, Kate E. Noonan, and Heather B. Congdon, "In-Person to Virtual Interprofessional Education: Teamwork Attitudes and Skills among Dental and Dental Hygiene Students," *Journal of Dental Education* 88, no. 11 (November 2024): 1481–1489, DOI: 10.1002/ jdd.13636.
- 179. John A. Owen and Madeline H. Schmitt, "Integrating Interprofessional Education into Continuing Education: A Planning Process for Continuing Interprofessional Education Programs," *The Journal of Continuing Education in the Health Professions* 33, no. 2 (Spring 2013): 109–117, DOI: 10.1002/chp.21173.

- 180. Amy V. Blue, Maralynne Mitcham, Thomas Smith, John Raymond, and Raymond Greenberg, "Changing the Future of Health Professions: Embedding Interprofessional Education Within an Academic Health Center," Academic Medicine 85, no. 8 (August 2010): 1290–1295, DOI: 10.1097/ACM.0b013e3181e53e07.
- Leslie R. Halpern, Linda M. Kaste, and Janet H. Southerland, "The 'I' in Diversity, Equity, and Inclusion: The Challenge of Inclusivity in Dentistry," *Dental Clinics of North America* 69, no. 1 (January 2025):1–15. DOI: 10.1016/j.cden.2024.08.006.
- 182. Kathryn Hayward, Marion Brown, Noel Pendergast, Marc Nicholson, Joanne Newell, Tammy Fancy, and Hannah Cameron, "IPE via Online Education: Pedagogical Pathways Spanning the Distance," *Journal* of Interprofessional Education and Practice 24 (2021): 100447, DOI: 10.1016/j.xjep.2021.100447.
- 183. Mohammad Ramadan Rayyan, "The Use of Objective Structured Clinical Examination in Dental Education — A Narrative Review," *Frontiers in Oral Health* 5 (2024): 1336677, DOI: 10.3389/ froh.2024.1336677.
- 184. Gillian King, Lynn Shaw, Carole A. Orchard, and Stacy Miller, "The Interprofessional Socialization and Valuing Scale: A Tool for Evaluating the Shift Toward Collaborative Care Approaches in Health Care Settings," Work 35, no. 1 (2010): 77–85.
- Jo Ann L. Nicoteri, "Evaluating an Interprofessional Activity with the SPICE-R2," *The Journal for Nurse Practitioners* 19, no. 9 (2023): 104736, DOI: 10.1016/j.nurpra.2023.104736.

Appendices

Oral Health Profession	Scope of Practice
Dentists	Performs all the dental therapist tasks unsupervised, plus the following:Administering anestheticPrescribing medications
Dental Therapists	 Varies by state. All dental hygienist tasks, and may include the following, under dentist's supervision: Scaling Teeth whitening Extracting teeth Placing crowns Taking impressions and manufacturing dentures
Dental Hygienists	 All dental assistant tasks, plus the following: Documenting health history Cleaning and polishing teeth Applying sealants and fluoride varnish
Dental Assistants	 Preparing the work area Sterilizing instruments Assisting during procedures Taking vital signs Taking radiographs Providing oral hygiene instruction
Dental Staff	 Depends on the job description, but may include: Scheduling appointments Receiving patients Maintaining the facilities Financial operations, including bookkeeping, billing, payroll, etc. Marketing and social media management

Appendix A. Professions Collaborating Intraprofessionally in Oral Health

Appendix B. References for Figure 2

("An Abbreviated Timeline of the Development of IPE in Dental and Other Health Professional Education in the United States")

- A. "Brief Histories of the Schools of the University of Pennsylvania," Penn Libraries, accessed January 18, 2025, <u>https://archives.upenn.edu/exhibits/penn-history/school-histories/medicine/</u>.
- B. "From the Collections: America's First College of Pharmacy Now Part of St. Joseph's University — American Institute of the History of Pharmacy," American Institute of the History of Pharmacy, accessed January 18, 2025, <u>https://aihp.org/</u> <u>from-the-collections-americas-first-college-of-pharmacynow-part-of-st-josephs-university/.</u>
- C. "History of Dentistry," American Dental Association, accessed February 8, 2025, <u>https://www.ada.org/resources/</u> ada-library/dental-history.
- D. "History," Harvard School of Dental Medicine, accessed January 18, 2025, <u>https://www.hsdm.harvard.edu/history</u>.
- E. "History of ATSU," A.T. Still University, accessed January 18, 2025, <u>https://www.atsu.edu/about-atsu/history</u>.
- F. Alfred C. Fones, "The Origin and History of the Dental Hygienist Movement," *The Journal of the American Dental Association* (1922) 13, no. 12 (1926): 1809–1821.
- G. "National Institute of Dental and Craniofacial Research (NIDCR)," National Institutes of Health, accessed January 18, 2025, <u>https://www.nih.gov/about-nih/what-we-do/</u><u>nih-almanac/national-institute-dental-craniofacial-research-</u>nidcr.
- H. "Smoking and Health," US Department of Health, Education, and Welfare (National Library of Medicine), accessed February 8, 2025, <u>https://profiles.nlm.nih.gov/</u> spotlight/nn/catalog/nlm:nlmuid-101584932X202-doc.
- I. "Medicare and Medicaid: The Past as Prologue," Centers for Medicare and Medicaid Services, accessed January 18, 2025, <u>https://www.cms.gov/research-statistics-data-and-systems/</u> <u>research/healthcarefinancingreview/list-of-past-articles-</u> items/cms1199298.
- J. "Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention (1979)," National Library of Medicine Profiles in Sciences, accessed January 18, 2015, <u>https://files.eric.ed.gov/fulltext/ED186357.pdf</u>.
- K. Marilyn J. Field (ed.), "Dental Education at the Crossroads: Challenges and Change (1995)," National Academies Press, accessed February 8, 2025, <u>https://nap.nationalacademies.</u> org/read/4925/chapter/1.

- L. "Crossing the Quality Chasm: A New Health System for the 21st Century (2001)," Committee on Quality of Health Care in America, accessed February 8, 2025, <u>https://www.ncbi.nlm.</u> nih.gov/books/NBK222274/.
- M. Ann C. Greiner and Elisa Knebel (eds.), Health Professions Education: A Bridge to Quality, Washington, DC: National Academies Press, 2003.
- N. Alan B. Douglass, Wanda Gonsalves, Russell Maier, Hugh Silk, Nancy Stevens, James Tysinger, and A. Stevens Wrightson, "Smiles for Life: A National Oral Health Curriculum for Family Medicine — A Model for Curriculum Development by STFM Groups," *Family Medicine — Kansas City* 39, no. 2 (2007): 88.
- O. "About Us," Interprofessional Education Collaborative, accessed January 15, 2025, <u>https://www.ipecollaborative.org/about-us</u>.
- P. "Core Competencies for Interprofessional Collaborative Practice: Report of an Expert Panel," Interprofessional Education Collaborative Expert Panel, accessed January 15, 2025, <u>https://www.ipecollaborative.org/assets/core-</u> <u>competencies/IPEC_Core_Competencies_Version_3_2023.</u> <u>pdf</u>.
- Q. "Integration of Oral Health and Primary Care Practice," US Department of Health and Human Services, accessed January 18, 2015, <u>https://www.hrsa.gov/sites/default/files/ hrsa/oral-health/integration-oral-health.pdf</u>.
- R. Judith Haber, Erin Hartnett, Kenneth Allen, Donna Hallas, Caroline Dorsen, Julia Lange-Kessler, Madeleine Lloyd, Edwidge Thomas, and Dorothy Wholihan, "Putting the Mouth Back in the Head: HEENT to HEENOT," *American Journal of Public Health* 105, no. 3 (Mar): 437–441.
- S. Tien Jiang, Mary A. Tavares, Shenam H. Ticku, Christine A. Riedy, Hugh J. Silk, Kate M. Sullivan, and Judith A. Savageau, "Interprofessional Education in Dental Schools: Results of a National Survey," *Journal of Interprofessional Education and Practice* 18, no. (2019): 100256, DOI: 10.1016/j. xjep.2019.04.001.
- T. Interprofessional Education Collaborative, *IPEC Core Competencies for Interprofessional Collaborative Practice: Version 3*, Washington, DC: 2023. <u>https://www.</u> <u>ipecollaborative.org/assets/corecompetencies/IPEC_Core_</u> <u>Competencies_Version_3_2023.pdf</u>.

Appendix C: IPE Best Practices and Tool Kit

The four identified domain competency areas for interprofessional education (IPE) were published in 2011 by the national Interprofessional Education Collaborative expert panel.^a The seminal work was entitled *Core Competencies for Interprofessional Collaborative Practice*.^b

The report was a foundational IPE document that laid a solid foundation for achieving high-quality, safe, universally accessible, and patient-centered care through the following four competencies:^{a,b}

- Teamwork and team-based practice
- Communication practices
- Values and ethics
- Roles and responsibilities

These four competencies are nested within the context of academic departments, schools/areas, and academic institutions and take into consideration the allies and stakeholders invested in an IPE program (including students, faculty, school and institution leadership, patients, and the community in which all are situated; see Figure 5).

When implementing an IPE program, the following areas should be considered:

- Department and institutional leadership
- Funding/financing
- Infrastructure

Figure 5. IPE Competencies Within the Larger Institutional and Community Context



- Partnerships across health profession schools
- Faculty affairs administration
- Curricular affairs administration
- IPEC competency framework^c

In addition to considering the areas listed above, those implementing an IPE program are recommended to include the following components (see Figure 6):

- Appoint/identify institutional leaders for the IPE program.^{de,f}
- Develop an institution/school conceptual IPE model (including responsible area, person, team, workflows, budget, assessment).^{d,e}
- Develop an IPE institutional chart that defines the institution(s), school(s), area(s)/department(s), and course(s) responsible and involved.^{dg}
- Build and describe a collaborative team with IPE partners and stakeholders in other institutions/schools/areas, and roles/responsibilities in each curriculum/course/activity.^{b,d}
- Create a timeline for the IPE plan/curriculum included in the IPE tool kit.^{a,b,d}
- Establish ground rules and guidelines for authorship, roles, and communication in each curriculum/course/ activity.^{a,b,d}
- Determine learning objectives within the schools' curricula (Figure 6).^{a,b,d}
- Definition of IPE competencies such as values, ethics, roles, responsibilities, communication, and teamwork in each activity defined within the IPE program (Figure 6).^{b,d}
- Use real-world examples and share examples of successful team-based care models.^{b,dg}
- Provide assessment tools to evaluate students' level of collaboration and professionalism.^{a,b,d}
- Evaluate activities through regular check-ins, regular meetings to discuss progress, challenges, and changes with IPE teams.^{b,d}
- Include reflections on learning by interprofessional learners, encouraging them to reflect on what they have learned from other professionals.^{b,d,h}
- Include problem-based, case-based, team-based, game-based, and simulation-based activities, describing objectives, responsibilities, and dynamics based on tool kit template (Figure 6).^{abd}

Figure 6. Tool Kit Template for Defining IPE Activities

Tool Kit Template for Defining IPE Activities					
Activity title					
Activity description (general)					
Type of activity (check all that apply)	Didactic — team-based	Didactic — problem-based		Didactic — game-based	
	□ Simulation	Community		Clinical	
Authors (name, position, school/area)					
Learning objectives					
IPE competency involved	Communication		□ Roles and Responsibilities		
(check all that apply)	Ethics and Values		□ Teamwork		
	Setting:				
	Student professions involved:				
Design of the	Other potential disciplines:				
learning experience	Number of students:				
	Number of professionals (faculty):				
	Facilitator team:				
Responsible contact person					

Appendix C References

- a. Margaret Slusser, Luis I. Garcia, Carole-Rae Reed, and Patricia Quinn McGinnis, *Foundations of Interprofessional Collaborative Practice in Health Care* (St. Louis: Elsevier Health Sciences, 2018).
- Nassrine Noureddine, Darla K. Hagge, and William Ofstad, Interprofessional Education Toolkit: Practical Strategies for Program Design, Implementation, and Assessment (San Diego: Plural Publishing, 2021).
- Interprofessional Education Collaborative, IPEC Core Competencies for Interprofessional Collaborative Practice: Version 3, Washington, DC: 2023. <u>https://www.ipecollaborative.org/assets/core-competencies/ IPEC Core Competencies Version 3 2023.pdf.</u>
- d. Joseph A. Zorek, Kelly Ragucci, Jens Eickhoff, Ghaidaa Najjar, James Ballard, Amy V. Blue, Laura Bronstein, Alan Dow, Tina P. Gunaldo, Heather Hageman, Kelly Karpa, Barret Michalec, Devin Nickol, Janice Odiaga, Patricia Ohtake, Andrea Pfeifle, Janet H. Southerland, Frances Vlasses, Veronica Young, and Meg Zomorodi, "Development and Validation of the IPEC Institutional Assessment Instrument." *Journal* of Interprofessional Education and Practice 29 (2022): 100553, DOI: 10.1016/j.xjep.2022.100553.

- e. Global Forum on Innovation in Health Professional Education, Board on Global Health, Institute of Medicine, Interprofessional Education for Collaboration: Learning How to Improve Health from Interprofessional Models Across the Continuum of Education to Practice: Workshop Summary (Washington, DC: National Academies Press, 2013).
- f. World Health Organization, *Framework for Action on Interprofessional Education and Collaborative Practice*, Geneva, Switzerland: 2010, https://iris.who.int/bitstream/handle/10665/70185/?sequence=1.
- g. Leslie Walter Hall and Brenda K. Zierler, "Interprofessional Education and Practice Guide No. 1: Developing Faculty to Effectively Facilitate Interprofessional Education," *Journal of Interprofessional Care* 29, no. 1 (2015): 3–7, DOI: 10.3109/13561820.2014.937483.
- h. Chulani Herath, Yangfeng Zhou, Yong Gan, Naomie Nakandawire, Yanghong Gong, and Zuxun Lu, "A Comparative Study of Interprofessional Education in Global Health Care: A Systematic Review," *Medicine* 96, no. 38 (2017): e7336, DOI: 10.1097/ MD.000000000007336.

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