



**NATIONAL COMMISSION ON RECOGNITION OF DENTAL
SPECIALTIES AND CERTIFYING BOARDS**

**2021 PERIODIC REVIEW
OF DENTAL SPECIALTY EDUCATION AND PRACTICE**

April 2021

Through the Periodic Review of Dental Specialty Education and Practice, the National Commission on Recognition of Dental Specialties and Certifying Boards hoped to gather strategic information that will be of value to the National Commission, the recognized specialty sponsoring organizations, the recognized certifying boards, the profession and the public. The review focuses on changes occurring within the advanced dental education programs, specialty practice environments, board certification, disease trends, technology, and scope of practice. The review also looks at the current environment as well as potential trends for the future and how these trends could impact the public and the profession.

Background: In 1992, the American Dental Association (ADA) House of Delegates adopted Resolution 144H-1992 directing the Periodic Review of Dental Specialty Education and Practice be conducted every ten (10) years beginning in 2001. In 2001 and 2011, the Council on Dental Education and Licensure conducted the review. With the establishment of the National Commission in 2017, the Periodic Review became the responsibility of the National Commission who adopted policy to continue the practice of conducting the review every ten (10) years.

For the 2021 Periodic Review of Dental Specialty Education and Practice, the following specialty sponsoring organizations submitted reports: American Academy of Oral and Maxillofacial Pathology (AAOMP), American Academy of Oral and Maxillofacial Radiology (AAOMR), American Academy of Pediatric Dentistry (AAPD), American Academy of Periodontology (AAP), American Association of Endodontists (AAE), American Association of Orthodontists (AAO), American Association of Public Health Dentistry (AADPH), American College of Prosthodontists (ACP) and American Society of Dentist Anesthesiologists (ASDA).

This summary report is divided into four sections:

- I. General Information and Demographic Data of the Specialties
- II. Major Research Changes and Technology Advances
- III. Trends in Specialty Education
- IV. Changes in Scope of Practice

I. GENERAL INFORMATION AND DEMOGRAPHIC DATA OF THE SPECIALTIES

History of Dental Specialties: As noted in Table 1, in 1947, the ADA formally recognized five (5) dental specialties, oral and maxillofacial surgery, orthodontics (now known as orthodontics and dentofacial orthopedics), pedodontics (now known as pediatric dentistry) periodontics and prosthodontics. Further, the ADA formally recognized oral and maxillofacial pathology in 1949; dental public health in 1950; endodontics in 1963 and oral and maxillofacial radiology in 1999.

The National Commission formally recognized dental anesthesiology in 2019 and oral medicine and orofacial pain in 2020 as dental specialties. Because oral medicine and orofacial pain were recognized during the year the Periodic Review was being conducted, the organizations were exempt from participating.

Table 1. History of the Recognized Dental Specialties and Dental Specialty Certifying Boards

	Year Specialty Recognized	Year Specialty Certifying Board Recognized	Founding Date of Certifying Board
Dental Anesthesiology (ASDA)	2019	2020	1994
Dental Public Health (AADPH)	1950	1951	1950
Endodontics (AAE)	1963	1964	1956
Oral and Maxillofacial Pathology (AAOMP)	1949	1950	1948
Oral and Maxillofacial Radiology (AAOMR)	1999	2000	1979
Oral and Maxillofacial Surgery (AAOMS)	1947	1947	1946
Orthodontics and Dentofacial Orthopedics (AAO)	1947	1950	1929
Pediatric Dentistry (AAPD)	1947	1948	1940
Periodontics (AAP)	1947	1948	1940
Prosthodontics (ACP)	1947	1948	1946

Compliance with the Requirements for Recognition of Dental Specialties: The National Commission requested each of the recognized specialty sponsoring organizations to provide documentation exhibiting that the six (6) *Requirements for Recognition of Dental Specialties* are being met.

American Association of Public Health Dentistry

Requirement 1

- Full membership is for dentists who have either completed a Commission on Dental Accreditation (CODA) accredited advanced education program in dental public health, advanced training in public health (an MPH degree) without formal dental specialty training or who have sufficiently demonstrated experience or interest in dental public health as assessed by the AAPHD and the American Board of Dental Public Health (ABDPH). Only full members are allowed to hold office or vote on issues related to the specialty. The ABDPH was established in 1950 and recognized as the national certifying board in 1951.

Requirement 2

- Educational preparation for dental public health (DPH) includes successful completion of graduate-level coursework in public health, including masters or doctoral level courses in epidemiology, biostatistics, health care policy and management, environmental health, and behavioral sciences. These courses are generally not included in predoctoral dental curricula.

Requirement 3

- Dental Public Health is the only specialty focused on population health. The body of knowledge and skillsets are distinct from those involved in all other dental specialties.

Requirement 4

- A large proportion of DPH specialists are employed in academic or research institutions and are active researchers in the field. DPH specialists were heavily represented among the editors and authors of the upcoming 2021 Surgeon's General Report on Oral Health. The Journal of Public Health Dentistry is among the world's most widely known and recognized peer-reviewed scientific journals in its field. The National Oral Health Conference is the largest and most widely recognized scientific conference that focuses on DPH.

Requirement 5

- Dental Public Health is not a clinical specialty and advanced training does not provide training on specific clinical procedures; however, the specialty directly benefits many aspects of clinical patient care through research, health promotion, surveillance, and policy development. Dental Public Health specialists are leaders in promoting oral health and providing care in underserved populations, thereby reducing the burdens of oral disease in vulnerable populations who face challenges in accessing the oral health care system.

Requirement 6

- Advanced education programs in Dental Public Health are accredited by CODA and are of at least two years in length.

American Association of Endodontists

Requirement 1

- Membership is reflective of the specialty of endodontics. Voting members have completed a CODA-accredited advanced education program in endodontics or were in good standing prior to January 1, 1985. American Board of Endodontics (ABE) is the recognized certifying board for the specialty and has a close working relationship with the American Association of Endodontists (AAE).

Requirement 2

- Endodontics is the only specialty focused on diagnosis, prevention and treatment of pulpal and periradicular diseases.

Requirement 3

- The scope of endodontics requires advanced knowledge and skills separate and distinct from other dental specialties and cannot be accommodated through minimal modification of an existing recognized dental specialty.

Requirement 4

- Endodontics continues to contribute to new knowledge in the field, professional education, research needs and provision of oral health services.

Requirement 5

- The focus of endodontics is saving the natural tooth in a healthy, functional state that can be predictably accomplished with appropriate diagnosis and treatment using all clinical approaches to endodontic care.

Requirement 6

- Currently, 56 CODA-accredited 2-3 year endodontic advanced education programs exist in the United States and there are two (2) programs in Canada.

American Academy of Oral and Maxillofacial Pathology

Requirement 1

- Membership consists of practitioners, educators, residents, dental students, and other individuals holding a professional or doctoral degree in a healthcare discipline or a student enrolled in a biomedical or healthcare program. Only dentists who have completed a CODA-accredited advanced education program in oral and maxillofacial pathology (OMP) and who have achieved Fellowship status in the American Academy of Oral and Maxillofacial Pathology (AAOMP) either by passing the fellowship examination of the American Board of Oral and Maxillofacial Pathology (ABOMP) certifying examination have the privilege of holding office and of voting rights. The ABOMP and the AAOMP work in concert to ensure the continuing competency of oral pathologists through continuing education and certification maintenance

Requirement 2

- The practice of oral and maxillofacial pathology includes research, diagnosis of diseases using clinical, radiographic, microscopic, biochemical or other examinations, and evidence-based management of patients, which is not included or taught at the predoctoral level.

Requirement 3

- Oral and Maxillofacial Pathology is the specialty of dentistry which deals with the nature, identification and management of diseases affecting the oral and maxillofacial region and requires advanced knowledge and skills that are unique, and well beyond those required of any other dental specialty. Such skills and knowledge cannot be achieved through modification, minimal or otherwise, of any other recognized specialty.

Requirement 4

- The field of oral and maxillofacial pathology contains individuals who are recognized worldwide for their expertise in oral and head and neck cancer diagnosis and pathogenesis, medication-related osteonecrosis of the jaw, immune-mediated mucocutaneous diseases, and other pathologic processes and conditions, local and systemic, with influence on the oral-maxillofacial complex. Oral pathologists (including residents) contribute to advances in research that have implications for diagnosis and improved clinical practice.

Requirement 5

- Oral pathologists' training and practice emphasize microscopic interpretation and diagnosis of tissue biopsy specimens submitted by various healthcare providers in dentistry, medicine and surgical specialties. Oral pathologists further bring their unique qualifications into the clinical setting, seeing patients referred by other practitioners of dentistry, medicine and surgery, for diagnosis and management of local and systemic disease processes and lesions manifesting in the oral mucosa and jawbones.

Requirement 6

- Oral and Maxillofacial Pathology has 14 CODA-accredited programs that are a minimum of three (3) years in length.

American Academy of Oral and Maxillofacial Radiology

Requirement 1

- American Academy of Oral and Maxillofacial Radiology (AAOMR) bylaws limits voting privileges and the ability to hold office to members who have completed a CODA-accredited Oral and Maxillofacial Radiology (OMR) advanced education program. The AAOMR has a close working relationship with the American Board of Oral and Maxillofacial Radiology (ABOMR) and both organizations collaborate closely on matters related to education, certification and practice.

Requirement 2

- Oral and Maxillofacial Radiology practice requires in-depth knowledge of all imaging modalities used in healthcare, including CT, MRI, ultrasound and nuclear medicine. It further requires knowledge of radiation physics, biology and safety, and dento-maxillofacial disease pathogenesis that are beyond the education provided in the predoctoral curriculum.

Requirement 3

- The depth and breadth of knowledge of imaging technology and interpretation provided by OMR programs are well beyond that provided by other advanced education programs.

Requirement 4

- Oral and maxillofacial radiologists contribute significantly to multi-disciplinary teams and publish in diverse areas including diagnostic imaging, radiation biology and technology development. Actively educates the dental profession via CE, position statements and national conferences and is involved in promoting safe and effective use of x-rays via collaborations with other organizations.

Requirement 5

- Patient care occurs through diagnostic imaging acquisition and interpretation services. With expanded use of CBCT imaging in dentistry, demand for services has increased.

Requirement 6

- Advanced education programs accredited by CODA are a minimum of two (2) years in length.

American Association of Oral and Maxillofacial Surgeons

Requirement 1

- Governed by an 11-member Board of Trustees composed of five officers, including the president, president-elect, vice president, treasurer and immediate past president, and six trustees, each of whom represents a geographic membership district. Members must complete a CODA-accredited advanced education program to be eligible for membership.

Requirement 2

- Oral and Maxillofacial Surgery (OMS) is the surgical specialty of dentistry with advanced education in diagnosis, surgical intervention and adjunctive treatment of diseases, injuries and defects, involving functional and esthetic aspects of hard and soft tissues of the OMS region that is beyond the education provided in the pre-doctoral curriculum. Oral and Maxillofacial Surgeons are licensed to perform procedures that are also performed by physicians.

Requirement 3

- Oral and maxillofacial surgeons provide a critical component of the contemporary scope of the profession that includes: evaluation, diagnosis, prevention and/or treatment (nonsurgical, surgical or related procedures) of diseased, disordered and/or conditions of the oral cavity, maxillofacial area and/or the adjacent and associated structures and their impact on the human body. Oral and maxillofacial surgeons treat such conditions as problem wisdom teeth (dentoalveolar surgery), facial pain (diagnosis and management of craniofacial disorders), dentofacial/craniofacial abnormalities (correction of skeletal deformities), severe facial injuries (trauma management and esthetic/cosmetic surgery), oral cancer (management of malignant disease in the head and neck), and cleft lip/palate (reconstructive and craniofacial surgery).

Requirement 4

- Through the various research conferences, committee work and research, American Association of Oral and Maxillofacial Surgeons (AAOMS) has collaborated in the development of relationships between oral and maxillofacial surgeons and researchers to bridge the gap between clinical and basic science. AAOMS has researched medication-related osteonecrosis of the jaw (MRONJ) and developed a position paper to inform practitioners, patients and other interested parties on the diagnosis, staging, and management strategies regarding risks and benefits of medications related to osteonecrosis of the jaw. Advances in technology have allowed certified OMSs to utilize an upper airway stimulation device for patients who suffer from obstructive sleep apnea (OSA) and cannot tolerate positive airway pressure treatments.

Requirement 5

- Oral and maxillofacial surgeons are respected and valued members of the health care team. They maintain active staff privileges with local and regional hospitals in their community and practice in a variety of settings including private clinical practice, ambulatory surgical centers and hospitals. OMSs may also be found contributing their talents in academia, military service, or in dental research and industry.

Requirement 6

- Oral and Maxillofacial Surgery advanced education programs are accredited by CODA and are a minimum of four (4) years in length. In addition to their OMS training, whether residents are in an MD-integrated or a single-degree-training program, all residents are required to complete the same surgical training, including the core surgical year.

American Association of Orthodontists

Requirement 1

- Only active American Association of Orthodontists (AAO) members in good standing are eligible to seek or hold office or other elective or appointive positions in the association, or to vote or otherwise participate in the selection of Association officials or the establishment of policies. Membership is reflective of the specialty who complete a CODA-accredited advanced education orthodontic program, pass the National Dental Specialty Examination administered by The Royal College of Dentists of Canada, or successfully complete the educational requirements established by the AAO.

Requirement 2

- The skills and knowledge acquired in an advanced dental education program include the diagnosis, prevention, interception and correction of malocclusion, as well as neuromuscular and skeletal abnormalities of the developing or mature orofacial structures that are beyond the education provided in the predoctoral curriculum.

Requirement 3

- Orthodontics and Dentofacial Orthopedics is the only specialty whose definition specifically addresses the diagnosis, prevention, interception, and correction of malocclusion as well as neuromuscular and skeletal abnormalities of the developing or mature orofacial structures.

Requirement 4

- The AAO Foundation provides support to orthodontic education programs and orthodontic research and has award programs for contributing new knowledge and educational research. The AAO's Practice-Based Research Network Committee works with the National Dental Practice-Based Research Network. The committee conducted an Anterior Open Bite Study in 2016-2018, and from this study, three articles were published in nationally recognized orthodontic journals. Currently, the committee is submitting three studies for the Network's current funding cycle: a Class II study, a cleft palate study and an aligner study.

Requirement 5

- The AAO's Clinical Practice Guideline Review Committee maintains guidelines of clinical care.

Requirement 6

- Orthodontics and Dentofacial Orthopedics has advanced education programs accredited by CODA that are at least 2 years in duration.

American Academy of Pediatric Dentistry

Requirement 1

- The American Academy of Pediatric Dentistry (AAPD) is made up of specialists with CODA-accredited advanced education training and represents pediatric dentistry. Affiliate membership is specified in AAPD Bylaws. The AAPD maintains a close working relationship with the American Board of Pediatric Dentistry (ABPD).

Requirement 2

- Pediatric dentistry is well-defined, requiring knowledge/skills beyond those possessed by dental school graduates.

Requirement 3

- Pediatric dentistry is an age-defined specialty that provides both primary and comprehensive preventive and therapeutic oral care for infants, children and adolescents, including those with special health care needs and to populations not seen by other specialists/general dentists. Like pediatricians and internists in medicine, it provides treatment and health supervision. Application of knowledge and skills is in a developmental, parent-engaged and socially-relevant context.

Requirement 4

- AAPD supports new knowledge and research supported through AAPD journals, the AAPD EBD process and newly-organized IADR Pediatric Dentistry Section, AAPD Reference Manual triennial review process and quinquennial update of the Handbook of Pediatric Dentistry. Presentations at annual sessions, support of fellowship research and symposia support research by the specialty and profession.

Requirement 5

- Pediatric dentistry provides comprehensive surgical and primary health supervision for children including diagnostic, preventive, surgical, restorative care and true primary prevention and developmental supervision from age one through adolescence and for children with and without special health care needs.

Requirement 6

- Pediatric dentistry has advanced education programs accredited by the Commission on Dental Accreditation that are at least two (2) years in length.

American Academy of Periodontology

Requirement 1

- The American Academy of Periodontology (AAP) maintains a membership that is representative of over 90% of periodontists in the United States as well as a significant number of international periodontists. The right to vote and/or hold office is reserved to Active and Life Active members. The Bylaws define Active and Life Active members; both membership categories require the individual to have completed an advanced education program in periodontics that is accredited by CODA. The AAP has a close working relationship with the American Board of Periodontology (ABP).

Requirement 2

- Periodontics is well-defined, requiring knowledge/skills beyond those possessed by dental school graduates.

Requirement 3

- The skills and knowledge required of a periodontist are specific, unique, and well established. The field of periodontology has been advanced through rigorous, empirical research, continuing education, and continuous evolution of training and study.

Requirement 4

- AAP supports rigorous scientific evaluation and studies that regularly contribute new knowledge to the field and regularly supports consumer awareness about the importance of oral health and the role of the periodontist in maintaining oral health and treating disease. The continuing education program supported by AAP is robust and expansive.

Requirement 5

- The advanced training, study, research, education, and collaboration that the AAP engages in is focused on advancing clinical care of patients and improving the understanding of periodontal disease.

Requirement 6

- There are 56 U.S. based CODA-accredited advanced education periodontal programs. Periodontal postdoctoral education programs are all required to be a minimum of 30 months, with virtually all programs now 36 months.

American College of Prosthodontists

Requirement 1

- American College of Prosthodontists (ACP) Members/Fellows are required to complete a CODA-accredited advanced education program in prosthodontics. Members/Fellows have the privilege to hold office and vote. Resident Members are eligible to vote, but not hold office. The ACP has a close working relationship with the American Board of Prosthodontics (ABP).

Requirement 2

- The knowledge and skills acquired in the advanced dental education programs are related to treatment planning, occlusion, fixed and removable prosthodontics, dental implant placement and rehabilitation, maxillofacial prosthetics, biomaterials and patient management are beyond those possessed by dental school graduates.

Requirement 3

- The scope of prosthodontics requires advanced knowledge and skills, separate and distinct from the other recognized specialties in the restoration of oral/orofacial defects. Minimal modification of any other recognized specialty would not provide the necessary advanced training to treat complex prosthodontic patient needs.

Requirement 4

- Research designed and directed by prosthodontists positively impacts oral health services for the public. Prosthodontic journals, such as the Journal of Prosthodontics, publish original research devoted to dental materials, dental technology, diagnosis, advances in the design and use of dental implants and treatment of unique patient conditions. Annual education programs showcase how technological advances in digital dentistry aid diagnosis, prosthesis design and fabrication.

Requirement 5

- Prosthodontists provide health services, including diagnosis, treatment planning, rehabilitation and maintenance of oral health, improved appearance and function of worn, diseased, mutilated or missing teeth and/or orofacial structure in a variety of clinical settings for multiple patient populations.

Requirement 6

- There are currently 48 CODA-accredited prosthodontic programs in the United States and 3 CDAC-accredited prosthodontic programs in Canada. All programs are a minimum of 33 months.

American Society of Dentist Anesthesiologists

Requirement 1

- ASDA membership has increased since 2018 when >60% of dentist anesthesiologists were ASDA members. Active members may vote and are eligible to hold office. The American Dental Board of Anesthesiology was recognized as the certifying board of Dental Anesthesiology in 2020.

Requirement 2

- Deep sedation and general anesthesia are beyond the scope of predoctoral training.

Requirement 3

- Dentist anesthesiologists' advanced knowledge and skills are separate and distinct from those of other recognized dental specialties and cannot be accommodated through minimal modification or combination of currently recognized dental specialties.

Requirement 4

- Dentist anesthesiologists have significantly contributed to the creation and dissemination of new knowledge related to clinical anesthesia care for dental patients including the very young and elderly, and those with special healthcare needs, chronic pain, inability to receive local anesthesia and those undergoing invasive procedures requiring additional anesthesia support. Patient safety and access to care for these often underserved patient populations continue to be focal points. Dentist anesthesiologists also actively participate in the development of guidelines and regulatory initiatives for dental office sedation and anesthesia care.

Requirement 5

- Dentist anesthesiologists provide the full scope of pain and anxiety control for all areas of dental practice, in offices, surgicenters, hospitals and educational institutions, increasing access to care for patients unable to obtain medically necessary dental treatment without advanced anesthesia care.

Requirement 6

- CODA-accredited advanced education programs are three (3) years in duration.

Strategic Planning: In order to understand what each of the recognized specialties envisions as its future role in improving and providing oral health services to the public; each of the recognized specialty sponsoring organizations was requested to provide its organization's mission statement, goals and strategic plan. The organizations were also requested to include a brief summary highlighting the specific areas and efforts undertaken to promote quality in the discipline over the last ten (10) years.

The National Commission found that not all of the recognized specialty sponsoring organizations had developed a formal strategic plan. The recognized specialty sponsoring organizations that did have formal strategic plans provided direction for continued growth and development.

Efforts to Promote Quality in the Discipline: The National Commission requested that each of the recognized specialty sponsoring organizations provide information on the efforts the specialty has undertaken over the past ten (10) years to promote quality in the discipline.

American Association of Public Health Dentistry

Over the past ten (10) years, the AAPHD has worked to improve and promote the quality of public health dentistry by focusing on the application of knowledge and critical thinking in the Dental Public Health curriculum, board examination and continuing education to ensure continued growth of the specialty.

- In 2015, the AAPHD and the American Board of Dental Public Health (ABPHD) convened a working group to review the Dental Public Health competencies, which had been last updated in 1998.
- In 2017, the AAPHD began the process of updating Burt and Eklund's Dentistry, Dental Practice, and the Community, which is a major textbook in dental public health.
- AAPHD has provided multiple opportunities for continuing education through the annual National Oral Health Conference, which has been jointly sponsored by AAPHD and the Association for State and Territorial Dental Directors for over 20 years. An annual symposium is organized by ABDPH. Through a collaboration with AIDPH, the annual colloquium which discusses cutting-edge topics in dental public health. AAPHD also provides several online courses.
- AAPHD's recertification program of diplomates ensures competency with the DPH standards and current areas of dental public health
- The Journal of Public Health Dentistry (JPHD), AAPHD's official scientific journal, continues to be a leading peer-reviewed journal on public health dentistry, promoting the quality of the discipline.

American Association of Endodontists

Over the past ten (10) years, AAE sought to establish and uphold a single standard of care for endodontic treatment, with all root canals completed to the standard of the specialist.

- AAE defined competency in endodontic diagnosis, treatment planning, treatment, and prognosis and developed treatment standards for imaging, access, disinfection, canal preparation, obturation, retreatment, restoration
- AAE developed a mobile case assessment application
- AAE biannually publishes ENDODONTICS: Colleagues for Excellence, provides education on current clinical topics to educate dental students and general practitioners and enables assessment of requirements for quality patient care at the standard of practice.
- AAEF provides care to underserved patients domestically and internationally, and in 2020 will surpass a total of 7,000 patients served and 500 endodontic treatments performed.

Through the efforts of the AAE, AAEF, ABE, and College of Diplomates (COD), quality in the discipline is further promoted via:

- Providing clinical resources: Guide to Clinical Endodontics, Glossary of Endodontic Terms, Guidelines and Position Statements
- Being the premier resource for endodontic continuing education.
- Evaluating board certification protocol, maintaining integrity while streamlining processes, resulting in increased certification rates and providing mentorship and courses to assist endodontists in achieving board certification.
- Supporting endodontic educators' professional development through grants, fellowships, CE, and educator-specific communications and resources
- Advancing the quality of care through clinical research by standardizing a core set of desired patient- and clinician-based outcomes that are intended to drive clinical research and establish an evidence base.

American Academy of Oral and Maxillofacial Pathology

Lifelong learning is a cornerstone of the profession of Oral and Maxillofacial Pathology, especially since a majority of the members serve as dental faculty, actively contributing to professional education by providing foundational and continuing education courses and performing health services as oral pathologists. AAOMP is invested in informing dental and other health care professionals about best practices concerning diseases affecting the oral and maxillofacial region.

The AAOMP:

- Defined the parameters of care through position papers on bisphosphonates and osteonecrosis of the jaw, diagnostic aids used in the detection of oral cancer, policies on excised tissue, oral lichen planus, and is currently tackling diagnostic guidelines for proliferative verrucous leukoplakia.
- Promoted quality within the discipline by surveying the needs of members related to Continuing Education (CE) courses at its annual meetings.
- Invited a diverse array of expert pathologists and respected clinicians to present courses to the Academy with the focus on keeping members abreast of emerging oral/general health issues, innovative methodologies in pathology, and ensuring a broad range of both clinical and surgical pathology.
- Through its Education Committee annually assembles a Continued Competency Assurance examination with challenging clinical, radiographic and microscopy-based cases.
- Maintains a slide-based continued competency program. Members must participate in at least one of these programs annually and take 40 hours of pathology-based CE every two (2) years to maintain board certification.

American Academy of Oral and Maxillofacial Radiology

Over the last several years, AAOMR has invested considerable effort toward enriching the educational content provided at the Annual AAOMR Session, aimed to enhance the level of OMR patient care provided in dentistry.

- Newly incorporated content areas include contemporary head and neck and maxillofacial imaging delivered by world leaders in education and clinical care, Interdisciplinary clinical care in endodontics, TMJ and facial pain, craniofacial imaging and biology, implant treatment planning, orthodontic evaluation and sleep apnea workshops on the role of OMRs in implementing emerging technologies such as CAD-CAM and 3D printing
- Parameters of care: AAOMR provided financial support for drafting of NCRP Report 177: Radiation protection in dentistry and oral and maxillofacial imaging, as well as initiatives to develop and update guidelines for imaging in dentistry. It published position statements on CBCT imaging in implant dentistry, endodontics, and orthodontics, and teleradiology in dentistry, participated on ADA committees to provide recommendations on radiologic equipment and quality control and was a voting member of the Standards Committee on Dental Informatics, an ADA-ANSI committee that develops standards for imaging and health informatics.

American Association of Oral and Maxillofacial Surgeons

AAOMS has developed and implemented high quality professional educational meetings and resources as well as opportunities for lifelong learning to improve and expand the educational continuum through clinical and practice management skills and competencies in a diverse and evolving specialty.

- Published the Parameters of Care, which provides a means for assessing the appropriateness and quality of a selected treatment modality applied to an identified clinical condition in patients treated by oral and maxillofacial surgeons.
- Developed the Dental Anesthesia Incident Reporting System (DAIRS)
- Established the Oral and Maxillofacial Surgery Quality Outcomes Registry (OMSQOR)
- Released a white paper on opioid prescribing recommendations during the national opioid epidemic
- Developed the National Simulation Program to create practical simulation-based training courses and assessments that will measurably increase the safety of sedation administration in oral surgery and dentistry and built a state of the art 2.5 million dollar education and innovation center at its headquarters building.
- Established the Practice Base Research Network, a resource that has allowed oral and maxillofacial surgeons to participate in relevant clinical research projects in their offices, provide data to support the specialty and improve patient outcomes.
- Through various standing committees, conducted literature reviews and developed guidelines highlighting the research conducted and expressing the association's position on various issues such as: Head and Neck Cancer Screening Prevention; Human Papillomavirus Vaccination; Tobacco and Electronic Cigarettes; and Evaluation and Management of Obstructive Sleep Apnea.

American Association of Orthodontists

- AAO's Clinical Practice Guidelines are reviewed and revised every three (3) years to incorporate current evidence-based orthodontics research.
- The AAO Library has a qualified library staff to meet the information needs of AAO members. Over the past 10 years, the library staff has conducted over 12,600 mediated searches for members and sent over 22,000 journal articles to members.
- The ABO sets the standard for the highest level of patient care, promotes excellence in orthodontics for all of its certified orthodontists, serves to protect the orthodontic specialty and encourages orthodontists to achieve certification.
- The AAO is a participant in ADA's Dental Quality Alliance (DQA) that uses a collaborative approach to advance performance measurement as a means to improve oral health, patient care and safety through a consensus building approach.
- The AAO offers a wide variety of educational opportunities including live webinars, recorded webinars, and AJO-DO tests. Approximately 2,066 courses have been uploaded to our site since 2011. The number of views has been approximately 106,495. Since January 2019, 562 courses have been added with 81,019 views. All CE courses meet the ADA's CERP guidelines.

American Academy of Pediatric Dentistry

- The AAPD Reference Manual has been in existence for three decades and contains policies, guidelines and best practices that are updated on a triennial cycle. AAPD guidelines are used by most state Medicaid programs and are a part of Bright Futures, the national health supervision guidelines for children. It has been listed on the national quality assurance health guideline repository.
- In 2013, the Evidence-Based Dentistry (EBD) initiative was launched to refine AAPD's commitment to standard setting with evidence per federal requirements. Three (3) EBD clinical practice documents have been published and three (3) more are in development.
- The AAPD provides regular continuing education programs in person and on-line. Members can create a vital educational passport. An annual update on pediatric dentistry assists in making practice EBD-based and contemporary.
- The ABPD assesses continued competency and the AAPD courses and CODA accreditation standards support board certification.
- The majority of pediatric dentists hold hospital staff positions and are required to maintain qualifications.
- AAPD has a standing committee to advance the culture of safety in care of children, most recently creating on-line COVID-19 advice and information. AAPD has partnered with certifying organizations AAASF and the American Academy of Pediatrics to improve sedation safety and OSAP to advance office safety. AAPD is working with the AAOMS on its DAIRS surveillance registry.

American Academy of Periodontology

The AAP is committed to promoting quality in the profession through a multi-faceted approach utilizing scientific innovation, robust continuing education, collaborative efforts among periodontal organizations, and rigorous educational standards and practices.

- The AAP regularly partners with global periodontal organizations to strengthen scientific understanding of the disease. The AAP has held joint workshops with the European Federation of Periodontology (EFP) and collaborates regularly with the Japanese Society of Periodontology and Japanese Academy of Clinical Periodontology.
- AAP continues to support scientific innovation through collaborative work with US partners. The AAP collaborated with the US Centers for Disease Control and Prevention on the NHANES Periodontal Disease Prevalence Study, released a joint statement in 2012 with the American Heart Association and is participating in the Surgeon General's Report on Oral Health (2020).
- The Journal of Periodontology and Clinical Advances in Periodontics (CAP) are standard-bearers for the profession. These publications continue to innovate, including moving to a large publishing house, evaluating editorial positions and securing CAP's indexing in MEDLINE.
- AAP's CE offerings remain a centerpiece of periodontal scientific advancement. CE-based meetings and conferences highlight cutting-edge science for members. CE programming is supplemented by ongoing scientific projects such as the 2011 statement on comprehensive periodontal therapy; position papers and statements on lasers, peri-implant disease, and moderate sedation; and development of Best Evidence Consensus statements that are designed to provide consensus-based guidance on clinical scenarios that may have limited existing evidence.
- AAP maintains a multi-faceted mechanism to ensure the profession is evolving and keeping pace through integrated work with the education community, CODA and the American Board of Periodontology.

American College of Prosthodontists

The ACP continues to host vital CE to address the specialist's needs and provide the latest updates on prosthodontic patient management, techniques, treatments, digital dentistry, implant surgery, private practice management, and the latest evidence-based practices.

- Within the past 10 years, the ACP has created new CE courses such as the Practice Management Course and Digital Dentistry Symposium to address the additional needs of practitioners and help them stay informed of new and emerging trends.
- ACP Position Statements helps guide prosthodontists and the public by clarifying the specialty's position on various topics within dentistry.
- The Prosthodontic Parameters of Care have been updated, reflecting the evolution of the specialty over the past 10 years.
- The ACP offers research grants to prosthodontic students/residents to advance basic scientific and applied clinical knowledge in the specialty. The Sharry Research Competition provides the opportunity for students/residents to be recognized for their completed research during training.
- The ACP assisted with major revisions to the CODA Standards for Prosthodontics that resulted in the addition of competency standards for implant surgery and digital technology. Curriculum and additional resources were developed around competencies, well-defined learning objectives, and an assessment plan with measurable outcomes to help programs effectively implement digital technology into their curriculum and ensure the quality of education.

American Society of Dentist Anesthesiologists

- In 2015, the CODA-accredited advanced education programs increased their complexity. The duration of the programs increased to 36 months.
- In 2018, the ASDA Parameters of Care were revised and ASA Practice Guidelines for Procedural Moderate Sedation and Analgesia were updated. Professional and educational relationships were created with ASA and SAMBA.
- In 2019, ASDA supported AAPD/AAP Guidelines for Monitoring and Management of Pediatric Patients Before, During and After Sedation for Diagnostic and Therapeutic Procedures.
- The ASDA participates in the AASA NACOR database, which is the largest national anesthesia database
- Supports the ASA Anesthesia Patient Safety Foundation and established ASDA Dental Anesthesia Patient Safety Foundation.
- The ASDA participated on the Council for Dental Education and Licensure Committee on Anesthesia for the development of ADA Guidelines for Sedation and Anesthesia education and training
- ASDA provided Interim Guidance For Dentist Anesthesiologists Practicing In The Office-Based Setting During The COVID-19 Pandemic
- The ASDA Education and Research Foundation was established.
- ASDA's Annual Scientific Session offer high-quality CE specific to Dental Anesthesiology
- ASDA's IMPA-Partnership with the AGD provides continuing education in sedation, anesthesia, and pain control
- The ASDA provided continuing education in sedation, anesthesia and pain control for local, national and international organizations, including state component dental societies and dental schools.
- The ASDA initiated model legislation reform, a collaborative effort with a goal of developing safe and fair sedation and anesthesia regulations
- The ASDA is an affiliate sponsor and expert content contribution for the peer-reviewed journal dedicated to pain and anxiety control in dentistry-Anesthesia Progress

Specialty Membership and Certification: The National Commission requested that the recognized specialty sponsoring organizations provide data and overview comments related to membership trends over the past ten (10) years. The National Commission further requested overview comments on future membership trend forecasts for the next ten (10) years.

Table 2 reflects the recognized specialty sponsoring organization's total membership figures over the last ten (10) years, as reported by the organizations.

Table 2. Total Specialty Membership in All Membership Categories 2010-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2019 % Increase/ Decrease
AAPHD	0*	790	841	897	795	876	935	973	727	654	-17%*
AAE	7,219	7,386	7,520	7,692	7,650	7,889	8,015	8,013	8,055	8,099	+12%
AAOMP	580	563	560	573	542	545	560	569	534	531	-8%
AAOMR	291	N/A*	N/A*	397	399	441	298	351	349	377	+30%
AAOMS	7,348	7,429	7,498	7,606	7,737	7,783	7,801	7,849	7,973	8,034	+9%
AAO	16,357	16,643	17,096	17,281	17,758	18,089	18,946	19,014	18,955	19,332	+18%
AAPD	7,686	8,080	8,401	9,062	9,304	9,462	9,737	10,189	10,454	10,598	+38%
AAP	7,028	7,171	7,106	7,143	7,280	7,382	7,114	7,206	7,199	7,363	+5%
ACP	3,383	3,457	3,472	3,703	3,881	3,751	3,898	3,995	4,071	4,124	+22%
ASDA	274	267	261	328	370	384	387	393	356	391	+43%

*AAOMR was unable to retrieve the data for 2011 and 2012

*AAPDH was unable to retrieve data for 2010.

The National Commission noted that while some of the recognized specialty sponsoring organizations had minor fluctuations in total membership over the course of ten (10) years, all but two (2) organizations had an overall increase in membership. Overall, total membership across all the recognized specialty sponsoring organizations increased from 50,166 members in 2010 to 59,503 members in 2019.

With regard to future trends:

- AAE projected a steady and modest growth rate of 0.5% to 2% annually over the next ten (10) years. While roughly 100 members per year transition to Life and Retired membership annually, almost 200 newly graduated endodontists convert to Active membership. Expansion in the International membership category is expected to show the most significant growth in the next decade.
- AAOMR has devoted considerable effort toward membership retention by providing high-quality CE programs and increasing member benefits. It is confident that recruitment and retention efforts will continue to increase the membership numbers.
- AAOMS anticipates continued growth in total membership over the next ten years, as the incoming members from graduating residents will exceed inactivated members.
- AAO noted that consistent, gradual growth is attainable and expected over the next ten (10) years as more orthodontists are entering the market than are exiting.
- AAPD estimated that with current programs training pediatric dentists, there will be 10,600 pediatric dentists in 2030. The pediatric dentist to population ratio, currently 9 FTE/100,000 children, will increase to 14FTE/100,000, but not in all U.S. regions.
- AAP noted that as the advanced education program periodontics see an increase in the number of international students, the diversity of younger membership segments has evolved; however, as these students/residents return to their home countries following graduation, the potential to maintain them as International members is growing.
- ACP noted that as experienced practitioners continue to retire, the ACP is committed to engaging the next generation of prosthodontists as members of the organization, and leaders within the dental community.
- ASDA anticipates an increase in its membership, related to increased interest in the discipline, an increasing number of training programs, and retention of graduates from the training programs.

Membership Based on Gender and Ethnicity 2010-2019: The National Commission requested information on the gender and ethnicity of the membership for each of the recognized specialty sponsoring organizations. Five (5) of the ten (10) recognized specialty sponsoring organizations provided gender information. Further, with relation to ethnicity, one (1) recognized specialty sponsoring organization started tracking the ethnicity of its membership in 2016, one (1) recognized specialty sponsoring organization started tracking the ethnicity of its membership in 2019 and eight (8) of the recognized specialty sponsoring organizations did not track ethnicity. Because very little data was available related to gender and ethnicity from the recognized specialty sponsoring organizations, the data is excluded from this report. The National Commission strongly encourages the recognized specialty sponsoring organizations to start routinely tracking and gender and ethnicity data.

Active Diplomates: The National Commission monitors the recognized dental specialty certifying boards' compliance with the *Requirements for Recognition of National Certifying Boards for Dental Specialists* through annual

reports provided by each of the recognized certifying boards. The National Commission provided each specialty sponsoring organization with certification trend data collected via these annual reports. The National Commission requested that each recognized specialty sponsoring organization review the certification data in collaboration with their respective recognized certifying board and provide comments on significant trends.

The recognized specialty certifying boards are committed to the highest standards of practice including recertification of diplomates, which provides a mechanism to assure these standards are maintained throughout the specialist's career. All of the recognized certifying boards require recertification with each of them determining their process.

Table 3 reflects the number of active diplomates over the last ten (10) years, as reported by the respective certifying boards.

Table 3. Active Diplomates 2009-2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009-2018 % Increase/ Decrease
AAPHD	157	160	159	159	158	146	151	144	164	171	+9%
AAE	815	831	846	904	959	985	1075	1131	1189	1261	+55%
AAOMP	302	306	313	323	328	332	338	344	357	367	+22%
AAOMR	106	113	124	121	131	146	156	174	181	184	+74%
AAOMS	4616	4904	4983	5186	5096	5167	5219	5305	5305	5342	+16%
AAO	5164	5034	4858	4436	3163	3134	3266	3364	3504	3488	-32%
AAPD	2383	2726	3100	3509	4019	4323	4605	5011	5169	5880	+147%
AAP	2381	2506	2544	2648	2766	2598	2687	2782	2926	3047	+28%
ACP	1085	1141	1147	1176	1195	933	970	1011	1026	1058	-2%
ASDA*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*The National Commission did not recognize a certifying board for dental anesthesiology until 2020; therefore, no data was available.

In general, eligibility for board certification is based on the completion of an advanced dental education program accredited by CODA and experience in the field. To achieve diplomate status, all certifying boards require successful completion of a written examination; all but the American Board of Oral and Maxillofacial Pathology (ABOMP) and the American Board of Oral and Maxillofacial Radiology (ABOMR) require successful completion of an oral examination, and five (5) of the nine (9) recognized certifying boards require either a case history presentation or clinical examination.

While not all specialists seek board certification, overall the number of active diplomates increased for all but two (2) of the specialties. The National Commission noted that the number of active diplomates increased from 16,405 in 2009 to 20,798 in 2018, representing a 27% increase.

The National Commission noted a 32% decrease in active diplomats for orthodontics. In March 2005, the ABO announced a one-time offering that ended in July 2007, which allowed all practicing orthodontists who successfully passed the ABO Written Examination to receive an ABO certificate that was valid for 5 years. Within these 5 years, these orthodontists were required to pass the ABO Clinical Examination to remain a Board Certified Diplomate past the 5-year expiration. Many orthodontists signed up for the offer which is why there was a dramatic increase in diplomates from 2005-2007. Unfortunately, many did not follow through; therefore, there was a large decrease in diplomates at the end of 2012.

The National Commission further noted a 2% decrease in active diplomates for prosthodontics. The ACP reported several discrepancies occurred in their active diplomates category, including a philosophical and managerial shift in 2014 which resulted in only active diplomates being reported, where previously the life diplomates were included (2009-2013).

Future trends:

- The AAPHD noted the upward trend in the number of certified, active diplomates, and applications received. This is encouraging and speaks well for the future of the specialty. With changes in the healthcare systems and the need for continued surveillance of oral health diseases and conditions, the types of skills and expertise it will require suggest an increased demand for Public Health Dentists.

- The AAOMR noted the number of active diplomates has increased significantly since 2009 and the Academy expects this trend to continue for the foreseeable future, as the number of advanced education programs continues to increase.
- As of January 2020, the ABOMS Certification Maintenance (CM) has changed to a continuous process of learning, self-assessment and testing that occurs over a 10-year period, during which Diplomates must fulfill specified requirements in certain years of the cycle. It is designed to affirm a surgeon's continued competency after certification and contains four areas of assessment.
- The AAO noted that the number of orthodontic specialists seeking and qualifying for board certification has steadily increased over the cited 10-year period and this trend is expected to continue for the foreseeable future. It is anticipated that the majority of orthodontic specialists in North America will have become board certified within the next few years.
- The AAPD supports the ABPD examination process with test-preparation continuing education which is monitored by the ABPD. The trends in certification in terms of numbers bode well for the availability of pediatric dentists who can qualify for the ever-increasing demand for board-certified clinicians in hospitals and third-party programs. The growth in certified pediatric dentists who demonstrate continued competency bodes well for the quality of health care provided to children and persons with SHCN as well as equitable health care to underserved communities.

Certification and Examination Data 2009-2018: The National Commission monitors the recognized dental specialty certifying boards' compliance with the *Requirements for Recognition of National Certifying Boards for Dental Specialists* through annual reports provided by each of the recognized certifying boards. The National Commission provided each recognized specialty sponsoring organization with certification and examination trend data collected via these annual reports. The National Commission requested that each recognized specialty sponsoring organization review the certification and examination data in collaboration with their respective recognized certifying board and provide comments on significant trends.

Table 4 reflects the certification and examination trend data over the last ten (10) years, as reported by the respective recognized certifying boards.

Table 4. Certification and Examination Data 2009-2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	% Increase/Decrease
Dental Anesthesiology*											
Total Number Certified By Examination	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of Acceptable Applications	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DPH											
Total Number Certified By Examination	292	297	299	299	306	317	325	333	345	354	+21%
Number of Acceptable Applications	8	9	10	9	16	12	9	11	14	15	+88%
ENDO											
Total Number Certified by Examination	1,339	1,378	1,420	1,486	1,572	1,621	1,740	1,820	1,905	2,012	+50%
Number of Acceptable Applications	278	248	230	239	232	260	277	305	298	303	+9%

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	% Increase/Decrease
OMP											
Total Number Certified by Examination	433	437	449	461	471	485	499	508	526	541	+25%
Number of Acceptable Applications	9	7	9	14	12	19	19	13	17	20	+122%
OMR											
Total Number Certified by Examination	99	105	112	123	127	137	152	162	180	187	+89%
Number of Acceptable Applications	9	10	23	29	26	32	31	38	32	44	+389%
OMS											
Total Number Certified by Examination	6,811	6,983	6,983	7,340	7,496	7,678	7,869	8,086	8,293	8,472	+24%
Number of Acceptable Applications	530	634	485	751	730	781	949	850	780	832	+57%
ORTHO											
Total Number Certified by Examination	6,930	7,022	7,294	7,610	7,977	7,325	7,528	7,743	7,972	8,187	+18%
Number of Acceptable Applications	387	373	354	397	365	362	391	391	390	384	-0.8%
PEDO											
Total Number Certified by Examination	2,501	2,908	3,322	3,750	4,178	4,532	4,879	5,275	5,761	6,217	+149%
Number of Acceptable Applications	336	377	355	365	333	394	371	467	446	475	+41%
PERIO											
Total Number Certified by Examination	2,705	2,864	2,951	3,112	3,279	3,448	3,609	3,766	3,935	4,809	+78%
Number of Acceptable Applications	383	392	311	415	377	399	385	309	420	424	+11%
PROS											
Total Number Certified by Examination	1,644	1,693	1,728	1,778	1,831	1,896	1,957	2,062	2,097	2,160	+31%
Number of Acceptable Applications	208	253	294	303	298	420	443	455	334	360	+73%

*The National Commission did not recognize a certifying board for dental anesthesiology until 2020; therefore, no data was available.

The National Commission noted that the recognized certifying boards reported some minor fluctuations in the total number of diplomates certified by examination and the number of acceptable applications over the ten (10) period;

however, overall all of the certifying boards showed some significant increases in the total number certified and the number of acceptable applications. The National Commission did note a 0.8% decrease for Orthodontics in the number of acceptable applications over the period but the overall number of acceptable applications remained relatively stable over the ten (10) year period.

Board Eligibility Requirements 2009-2018: The National Commission monitors the recognized dental specialty certifying boards' compliance with the *Requirements for Recognition of National Certifying Boards for Dental Specialists* through annual reports provided by each of the recognized certifying boards. The National Commission provided each recognized specialty sponsoring organization with board eligibility requirement trend data collected via these annual reports. The National Commission requested that each recognized specialty sponsoring organization review the board eligibility data in collaboration with their respective certifying board and provide comments on significant trends.

Table 5 reflects the certification and examination trend data over the last ten (10) years, as reported by the respective certifying boards.

Table 5. Board Eligibility Requirements 2009-2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Dental Anesthesiology <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
Citizenship Requirement	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
State Licensure Requirement	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
Alternate Pathways to Certification	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
Dental Public Health <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	2	2	2	2-3	2-3	2-3	2-3	2-3	2-3	2
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	4	4	4	3-4	3-4	3-4	3-4	3-4	3-4	3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	No
State Licensure Requirement	No	No	No	No	No	No	No	No	No	No
Alternate Pathways to Certification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Endodontics <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3

Endodontics cont:	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	4	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any
State Licensure Requirement	No	No	No	No	No	Yes	No	No	No	No
Alternate Pathways to Certification	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Oral and Maxillofacial Pathology <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	3	3	3	3	3	3	3	3	3	3
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	3	3	3	3	3	3	3	3	3	3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any
State Licensure Requirement	No	No	No	No	No	No	No	No	No	No
Alternate Pathways to Certification	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No Data	Yes
Oral and Maxillofacial Radiology <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any
State Licensure Requirement	No	No	No	No	No	No	No	No	No	No
Alternate Pathways to Certification	No	No	No	No	No	No	No	No	No	No
Oral and Maxillofacial Surgery <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	4	4	4	4	4	4	4	4	4	4-6
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	5	5	5	5	5	5	5	5	5	5

Oral and Maxillofacial Surgery cont:	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any
State Licensure Requirement	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alternate Pathways to Certification	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Orthodontics <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any
State Licensure Requirement	No	No	No	No	No	No	No	No	N/A	N/A
Alternate Pathways to Certification	No	No	No	No	No	No	No	No	No	No
Pediatric Dentistry <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any
State Licensure Requirement	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alternate Pathways to Certification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Periodontics <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	3	3	3	3	3	3	3	3	3	3
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	3	3	3	3	3	3	3	3	3	3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	Any	Any	Any	No
State Licensure Requirement	No	No	No	No	No	No	No	No	No	No
Alternative Pathways to Certification	No	No	No	No	No	No	No	No	No	No

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Prosthodontics <i>Education</i> -Years of Advanced Education in Addition to DDS/DMD Degree	3	3	3	3	3	3	3	3	3	3
<i>Experience</i> -Total Years of Specialty Experience including Advanced Education	3	3	3	3	3	3	3	3	3	3
Citizenship Requirement	Any	Any	Any	Any	Any	Any	No	No	No	N/A
State Licensure Requirement	No	No	No	No	No	No	No	No	No	N/A
Alternate Pathways to Certification	No	No	No	No	No	No	No	No	No	N/A

The National Commission noted that overall the board eligibility requirements have remained fairly consistent over the past ten (10) years. The recognized specialty certifying boards are committed to increasing the number of board-certified specialists and have created eligibility pathways to assist specialists who have practiced for many years and internationally trained specialists who are not graduates of CODA-accredited advanced education programs to pursue diplomate status. The following recognized certifying boards **do not** have alternative pathways to certification oral and maxillofacial radiology, oral and maxillofacial surgery, periodontics and prosthodontics.

Trends:

- The ABE collaborates at least annually with other specialty certifying boards to ensure that they are on track for an equitable application, examination and recertification process. Over the past decade, these processes created improvements for both policies and exams and have helped them to increase our overall number of Board-certified endodontists.
- The ABOMR continues to improve the quality of their exam items based on psychometric data analysis and to strengthen the calibration and intra-and interrater reliability during the grading process. The exams are updated yearly to incorporate new imaging guidelines and technology.
- The AAO’s Board Eligibility Requirements remain the same and it is expected that this condition will remain the same over the next few years. Internationally educated specialists must still meet the specified requirements for certification by the ABO.
- The ABPD and the AAPD work collaboratively to address issues/concerns that may be reported. Monitoring and quality measurement ensure that changes in practice and education will continue to be evaluated in the future. Psychometric analysis and feedback in both formal and informal channels support that the requirements are supporting the specialty’s ability to address oral health needs of the public effectively, using evidence-based guidelines and maximizing quality care.
- Eligibility requirements for periodontists to pursue Board certification have not changed in recent years, and no future changes are anticipated by the ABP. Although not specific to eligible candidates, beginning in 2017, the ABP implemented a new pathway for diplomates certified prior to 2003 to obtain an updated certificate that references certification in periodontology and dental implant surgery.
- A recent change was made to the ABPROS examination eligibility criteria to increase candidate applications by allowing students/residents to challenge two parts of the current four-part examination process upon entering the 3rd year of the program compared to six months before graduation. The ABPROS closely monitors the examination process and pathways to reflect current knowledge, skills and values in the practice of prosthodontics and the approved curricula and standards for postdoctoral education.

II. MAJOR RESEARCH CHANGES AND TECHNOLOGY ADVANCES

The National Commission requested that each recognized specialty organization examine the impact of major dental research and new technology in the specialty over the last decade. Specifically, each organization was requested to list major research changes and technology advances over the last ten (10) years and provide an overview comment on how these changes and advances have affected the practice of the specialty.

American Association of Public Health Dentistry

Major Areas of Research:

- Oral health disparities including social determinants of health and health inequality
- Relationships among oral health and other health conditions
- Interdisciplinary (dental-medical) workforce models to improve the oral health of the community
- Continued research in preventative and alternative approaches to prevention and care

Technology Advances:

- Teledentistry
- Mobile health in the delivery of preventative strategies and management of chronic diseases
- Informatics and data in genomics and precision oral health based on DNA
- Integration of medical and dental Electronic Health Records

Research in oral health disparities and inequities has shifted towards understanding social determinants of health as risk factors for chronic disease and adverse oral health outcomes to gain a better understanding of the forces (such as oral health literacy and cultural competence) at both the community and individual levels. Research and knowledge about the relationships between oral health and other health conditions have been important in integrating oral health and primary care, exploring workforce models incorporating interprofessional collaboration and integration of dental care into primary care. This greater emphasis on dental-medical integration, such as integrating electronic medical and dental records, has led to better management of health for patients and improved access to dental services.

American Association of Endodontists

Major Areas of Research:

- Dental materials specifically bioceramics and nanoparticles
- Pain management with a focus on non-opioid approaches and head and neck pain classifications
- Endodontic microbiology
- Regenerative endodontics and revascularization
- Genetic influences, including host factors (systemic disorders, DNA polymorphisms and epigenetic events), predisposition to pulpal and periapical disease and effect on treatment, and associations between endodontic disease and systemic conditions.
- Dental trauma
- Diagnostic imaging techniques including cone beam CT (CBCT) and magnetic resonance imaging (MRI) for guided surgery and endodontic access
- Vital pulp therapy

Technology Advances:

- Rotary files to facilitate safer and more predictable debridement of the root canal system, superflexible rotary and reciprocating root canal preparation systems based on enhanced properties to improve the outcome of non-surgical root canal therapy and retreatments with emphasis on anatomical canal preparation and dentin preservation
- Canal obturation materials and techniques such as bioceramic sealers and single cone techniques
- Active canal irrigation using sonic energy, negative pressure and lasers
- Imaging modalities including small field CBCT and MR
- Surgical planning and guided endodontics using 3-D printing
- Computer software adapted to orient the operator during access of calcified canals or during surgery to locate and treat the root end in a conservative and precise manner

Research has impacted the specialty by providing more predictable endodontic clinical procedures, better outcomes for surgical and reparative procedures, better management of pain during and following treatment, improved understanding of traumatic dental injuries, enhanced treatment options related to a better understanding of pulp revascularization and endodontic regeneration and improved diagnostic and treatment modalities. These technological advances have prompted the integration of state-of-the-art basic, clinical and translational research approaches to further advance knowledge of the underlying mechanisms and treatment outcomes of endodontic disease. These integrated approaches have the potential to contribute to the development of more effective, patient-centered treatment strategies.

American Academy of Oral and Maxillofacial Pathology

Major Areas of Research:

- Identifying molecular changes predictive of the biologic behavior of OSCCa and its precursor lesions
- Osteonecrosis of the jaws (ONJ) related to bisphosphonate and anti-metabolic agents used in the management of osteoporosis and certain metastatic malignant neoplasms

Technology Advances:

- Next-generation sequencing (NGS) approaches
- Advanced microscopic techniques
- Novel methods to improve analysis of hematoxylin and eosin (H&E) stained slides
- Virtual microscopy
- Application of artificial intelligence in the interpretation of biopsied tissues

Through NGS technology, new tumor types and subtypes have been identified and new genetic mutations have been characterized that have improved not only diagnostics but also the disciplines understanding of the underlying molecular mechanisms related to disease etiopathogenesis. NGS approaches are now used routinely in basic research laboratories and are likely to be used more commonly in clinical settings as they continue to become more affordable. Advanced microscopic techniques, such as super-resolution confocal microscopy, allow for the imaging of tissue in incredible detail. Many technologies have led to an enhanced analysis of H&E-stained tissue biopsies. For example, dual-mode emission and transmission microscopy (DUET) and multispectral analysis tools improve image quality and reduce costs. Together, these improved technologies will continue to revolutionize the development of diagnostics. A tangible example of this is the development of a “simple” device that utilizes fluorescence-based technology to distinguish benign mucosa from cancerous and precancerous lesions. Virtual microscopy is the ability to digitize glass slides and the accompanying improvements in image viewing software, data storage, and sharing of large files. Technologies related to slide digitization have enhanced our ability to share slides of biopsy tissues in a virtual forum.

American Academy of Oral and Maxillofacial Radiology

Major Areas of Research:

- Clinical research using CBCT
- Developing MRI and ultrasound for dental use

Technology Advances:

- As darkrooms have phased out, newer CCD, CMOS and PSP sensors with better diagnostic capabilities are exploiting remote, Bluetooth, or Wi-Fi technologies
- Advancement in panoramic radiography allowing better resolution, automatic selection of the ideal focal troughs and superior extraoral bitewing radiographs
- Developing artificial intelligence to streamline the diagnosis of common dental diseases (caries, periodontal bone loss, and periapical lesions)
- Teleradiology

In the last decade, major changes have taken place in the delivery of dental care due to progress in oral and maxillofacial radiology. Widespread availability of CBCT units has changed the way oral and maxillofacial radiologists interact with other practitioners and how all branches of dentistry function and deliver care. CBCT units are now essential equipment in oral surgery, endodontics, implant dentistry and orthodontic offices. In the last decade, several dental PACS systems were introduced to facilitate academic, armed forces, and corporate dental practices. PACS and HIPAA compliant file transfer services have significantly reduced consultation time. Teleradiology is now widely practiced where a dental practitioner can quickly consult with a radiologist.

American Association of Oral and Maxillofacial Surgeons

Major Areas of Research:

- Patient Safety and Surgery Quality, Personalized and Precision Medicine in Pain Management
- Precision Medicine in Head and Neck Oncology
- Business of Innovation in Oral and Maxillofacial Surgery
- Regenerative Medicine for Dentoalveolar Reconstruction
- Medication-related osteonecrosis of the jaw

Technology Advances:

- Upper airway stimulation device for patients who suffer from obstructive sleep apnea (OSA) and for those whom cannot tolerate positive airway pressure treatments
- National Simulation Program to create practical simulation-based training courses and assessments to increase the safety of sedation administration in oral surgery and dentistry

Through the various research conferences, committee work and research, the AAOMS has collaborated in the development of relationships between oral and maxillofacial surgeons and researchers to bridge the gap between clinical and basic science. The goal is to improve the care of oral and maxillofacial surgical patients through the advancement of translational and clinical research. TMD research will identify multidisciplinary approaches necessary to the development and implementation of safe and effective clinical treatments for TMD, as well as strategies to advance TMD research and education. Advances in technology have allowed certified oral and maxillofacial surgeons to utilize upper airway stimulation devices for patients who suffer from obstructive sleep apnea (OSA) and cannot tolerate positive airway pressure treatments.

American Association of Orthodontists

Major Areas of Research:

- Improvements in study design to provide stronger evidence, including more cohort studies and randomized control trials (RCTs)
- Genetic influences on orthodontic tooth movement and facial growth
- Potential methods for accelerating orthodontic tooth movement, including vibration, micro-osteoperforation, and photobiomodulation
- Sleep Disordered Breathing and the effects of orthodontic treatment on airway

Technology Advances:

- Intraoral scanning, 3-D Printing, and fabrication of In-House Aligners
- CBCT Scanners – updating norms and treatment goals using 3-dimensional imaging
- Customized appliances and treatment outcomes, including customized fixed appliances and aligners due to the rapid developments in 3-D scanning and printing
- Teledentistry – utilizing modern technology to remotely monitor treatment and communicate with patients
- Cloud Computing and Network Security

Improved study designs have provided a higher weight of evidence validating multiple orthodontic treatment techniques. The advent of cost-effective, efficient, and patient-friendly intra-oral scanners has revolutionized how practices can acquire 3D data. Combined with the reduced cost of 3-D printing many practices are moving towards customized aligner therapy and customized fixed appliances to truly individualize care to each patient.

American Academy of Pediatric Dentistry

Major Areas of Research:

- Moved from a largely surgical to a comprehensive care model based on research over the last decade
- Evidence-based dentistry
- Created the first pediatric-specific evidence-based clinical guidelines in areas of vital pulp therapy in primary teeth, use of pits and fissure sealants and use of silver diamine fluoride and fluoride varnish for the management of dental caries in children
- Prevention, care compliance, motivational interviewing, and non-surgical address of dental caries
- Integrating patient and provider safety
- Interdisciplinary research to develop standards for practice
- Offering on-line information
- Workforce research to assess the effect of future care models, provider distribution and workforce trends on children's oral health.

Technology Advances:

- Zirconia technology
- New generation composites
- Advanced sedation medications
- Advanced pulpal agents for primary teeth
- Telehealth

AAPD's policies, guidelines and best practices derived from research and its translation are incorporated into most state Medicaid periodicity schedules driving oral health for the underserved. The policies and scientific care recommendations are incorporated into Bright Futures, national guidelines directing health supervision of all children in the U.S. Workforce studies and translation through advocacy into public training of pediatric dentists have helped alter the DMFT distribution positively in children under 5 years of age and encouraged the rational placement of both pediatric dentistry practitioners and faculty. The AAPD Pediatric Oral Health Research and Policy Center is nationally recognized with its focus on access, equity, safety and is a resource for pediatric dental providers along with general dentists, safety-net providers, insurers, and government for pediatric oral health data and the compilation of research and technical briefs.

American Academy of Periodontology

Major Areas of Research:

- In 2017, the AAP adopted a new classification for periodontal and peri-implant diseases and conditions based on new evidence to more reliably diagnose and treat patients. This classification is also expected to enable researchers to investigate etiology, pathogenesis, natural history, and treatment of the diseases and conditions utilizing unified terminology

- Evidenced-based personalized/precision medicine as well as patient-centered therapeutic outcome assessment using patient stratification
- The link between systemic diseases and periodontal and peri-implant diseases and conditions
- Novel anti-inflammatory therapeutics (resolvins) for the treatment of periodontal and peri-implant diseases
- Regenerative medicine and tissue engineering

Technology Advances:

- Advanced diagnostic tools (ultrasound technology, optical coherence tomography)
- Sequencing and artificial intelligence/machine learning technologies for analysis of immunology and microbiology data

The new classification of periodontitis has been a major collective effort at the global scale to support the widespread adoption of personalized medicine in Periodontics. Advances in microbiology and immunology have led to a better understanding of the pathogenesis of periodontal and peri-implant diseases. This knowledge has been harnessed by practitioners to optimize patient care in both diagnosis and therapeutic developments. Analytic technology using computing capabilities has allowed the analysis of massive data sets. Developments in this line of research are expected to enable a more comprehensive understanding of what causes dysbiosis and the relationships between different systemic diseases and oral inflammatory diseases. Periodontal and peri-implant plastic reconstructive procedures have greatly benefited from the introduction of new techniques and materials over the past decade. Tissue engineering-based applications for regenerative purposes have also advanced significantly, with the continuous development of minimally invasive procedures; novel grafting biomaterials, scaffolds, and matrices; molecular-based biologics; and cell-based therapy approaches.

American College of Prosthodontists

Major Areas of Research:

- Dental Materials
 - FDA-approved resins for use in surgical guides and digital dentures
 - Translucent zirconia
 - Nanotechnology/nanoparticles to strengthen acrylic/composites resins
- Genetic and Tissue Engineering
 - Tissue-engineered scaffolds for regeneration of oral tissues
 - Alloplastic grafts (block bone and skin)
 - Growth factors to stimulate bone formation
- Dental Implants
 - Implant design and primary stability
 - Influence of medications and systemic conditions on implant success
 - Utility, survival rates, and complications of CAD/CAM abutments and Ti bases
 - Angled screw channel abutments, loading and torquing protocol
- Clinical Research
 - Survival rates and complications of all-ceramic crowns
 - Clinical behavior of monolithic zirconia full-arch restorations
 - Immediate loading of implants
 - Definition, etiology, and prevalence of peri-implantitis/mucositis
 - Efficacy of the CAMBRA protocol

Technology Advances:

- Intraoral digital surface scans/intraoral scanners and desktop digital scanners, superimposition of digital surface scans with CBCT facilitating implant surgical planning and placement, and scan bodies Implant impressions
- Additive and subtractive manufacturing of dental prostheses with improved accuracy
- CAD software for virtual restoration design and implant placement
- CAD/CAM titanium bars and abutments
- In-office printing and milling prostheses, and printing frameworks for RPD's
- Fabrication of complete dentures using additive and subtractive technologies, and fabrication of ceramic crowns using additive technology
- Improved smile design software

New and improved dental materials, research, and major technological advances have positively influenced clinical practice and applications in fixed, removable, implant and maxillofacial prosthodontics. Improvements in dental materials have contributed to the longevity and esthetics of restorations. Genetics and tissue engineering research on bone formation, and advances in implant surfaces, designs and clinical techniques, have improved surgical and restorative outcomes. Dental implant-related research has focused on the influence of systemic conditions and medications on implant success, improving surgical techniques/applications, restoration designs, biomechanics and

implant assessment tools. Clinical research on prevention, prostheses survival and complications has influenced treatment decisions and improved longevity. Advances in digital technologies have had the greatest impact on the practice of prosthodontics, enhancing diagnosis, treatment planning, presentation, workflow, execution and techniques, interdisciplinary collaboration, patient awareness/education, and the efficient transfer of information.

American Society of Dentist Anesthesiologists

Major Areas of Research:

- New drugs, including Dexmedetomidine, for anesthesia and sedation
- Investigations into the prevalence, incidence, mechanisms and prevention of intraoral fires
- Written guidance for identifying and managing known and suspected COVID dental anesthesia patients
- Local anesthetic liposomes to improve the quality and duration of postoperative dental pain control
- The evaluation of both standard and new local anesthetic delivery systems

Technology Advances:

- Use of high-fidelity simulation training and cognitive aids to enhance the predictability and safety of office-based anesthesia

Dental Anesthesiology is at the forefront of Office Based Anesthesia (OBA) with many of the techniques used and described by dentist anesthesiologists having been adopted by physician anesthesiologists. Modern medications such as dexmedetomidine, liposomal bupivacaine and remifentanyl have aided in the concept of opioid-free anesthesia and enhanced recovery after surgery (ERAS), both of which increase safety and patient satisfaction in OBA. The improvements in high-fidelity simulation have aided in the training and the maintenance of skills and knowledge of emergency situations.

The National Commission was impressed with the extensive, innovative and ground-breaking research the recognized dental specialty sponsoring organizations have undertaken in the past ten (10) years. Without exception, each recognized dental specialty is creating new knowledge and new ways to apply this knowledge, resulting in better patient care.

III. TRENDS IN SPECIALTY EDUCATION

Number of Advanced Dental Education Programs: The National Commission requested that each recognized specialty sponsoring organization review summary data collected over the last ten (10) years regarding the number of advanced education programs, program enrollments and faculty and provide overview comments on past or future education trends.

Table 6 reflects the number of advanced dental education programs, as reported by the American Dental Association's Health Policy Institute.

Table 6. Number of Advanced Dental Education Programs 2009-2019

	2009 -	2010 -	2011 -	2012 -	2013 -	2014 -	2015 -	2016 -	2017 -	2018 -	2019 -	Range
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Dental Anesthesiology	6	9	10	10	9	9	9	9	9	9	9	6-10
Dental Public Health	10	10	12	12	13	15	15	15	15	15	15	10-15
Endodontics	54	54	55	55	56	56	56	56	56	56	55	54-56
Pathology	14	15	14	14	15	16	16	16	14	14	14	14-16
Radiology	5	4	5	6	7	8	8	8	9	9	9	4-9
Oral Surgery	102	103	102	102	101	101	101	102	102	102	101	101-103
Orthodontics	64	65	66	66	66	66	67	68	67	67	67	64-68
Pediatric Dentistry	74	77	77	77	77	77	77	78	80	80	82	74-82
Periodontics	54	54	54	55	55	56	57	58	58	58	58	54-58
Prosthodontics	47	47	47	48	49	49	49	49	50	50	50	47-50
Total Number of Programs by Year	430	438	442	445	448	453	455	459	460	460	460	430-460

The National Commission noted that while there were minor fluctuations in the number of educational programs for some of the disciplines, there was a steady increase in the number of advanced education programs across all of the disciplines. Overall, the number of advanced education programs increased 7% between 2009-2019 from 430 to 460.

Trends:

- Dental Anesthesiology - From 2009 to 2011, the number of programs has held steady. Future growth in the number of programs is anticipated following specialty recognition.
- Dental Public Health - In the past ten (10) years, four (4) new Dental Public Health advanced education programs were accredited.
- Endodontics - Numbers over the last decade indicate a healthy stabilization in the growth in the number of programs. From 2000-2018, the number of programs increased by 17%.
- Oral and Maxillofacial Pathology - As with any specialty dominated by an academic role at dental schools, the report shows a very slight fluctuation in the number of programs across the country. This trend reflects dental deans' and dental schools' desire for the continuation of existing programs and only minor increases in additional training programs throughout the country.
- Oral and Maxillofacial Radiology - Since the last reporting period, the number of advanced education programs has almost doubled.
- Orthodontics -The number of accredited advanced dental education programs in orthodontics increased by 6%.
- Pediatric Dentistry - Continues to grow to meet the demands of the oral health needs of children. Since 2008, the number of pediatric dental training programs increased 11%.
- Periodontics - There was a 7% increase in the number of advanced dental education programs.
- Prosthodontics- The number of accredited advanced education programs increased by 6%.

Enrollment in Advanced Dental Education Programs: The National Commission requested that each recognized specialty sponsoring organization review summary data collected over the last ten (10) years regarding enrollment in the advanced education programs and provide overview comments on past or future education trends.

Table 7 reflects the enrollment in advanced dental education programs over the last ten (10) years, as reported by the American Dental Association's Health Policy Institute.

Table 7. Enrollment in Advanced Dental Education Programs 2009-2019

	2009 -	2010 -	2011 -	2012 -	2013 -	2014 -	2015 -	2016 -	2017 -	2018 -	2019 -	Range
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Dental Anesthesiology	25	35	43	63	66	69	81	76	87	79		25-79
Public Health	44	32	42	46	48	59	64	62	65	62		44-65
Endodontics	433	448	446	455	454	472	464	473	472	477		433-477
Pathology	40	42	47	52	53	48	48	44	52	56		40-56
Radiology	31	31	32	41	42	43	47	48	50	55		31-55
Oral Surgery	1040	1081	1081	1118	1131	1150	1170	1195	1199	1208		1040-1208
Orthodontics	931	949	974	991	1010	1008	1023	1043	1064	1080		931-1080
Pediatric Dentistry	733	763	803	823	844	879	900	921	940	955		733-955
Periodontics	541	544	541	550	556	563	551	565	568	575		541-575
Prosthodontics	455	455	453	467	459	463	463	467	477	496		455-496
Total Enrollment Per Year	4273	4380	4462	4606	4663	4754	4811	4894	4974	5043		

The National Commission noted that enrollment in all of the advanced education programs increased by 18% from 4,273 to 5,043 total students/residents. Notable is the 216% increase in enrollment in dental anesthesiology advanced education programs. The National Commission further noted a 17% decrease in enrollment in the oral and maxillofacial pathology programs from 2013-2017.

Trends:

- Dental Anesthesiology - Total enrollment numbers have steadily increased, due in part to the increased duration of programs from 2 to 3 years
- Dental Public Health- In the last the past ten years, four (4) new Dental Public Health advanced education programs were accredited.
- Endodontics - Numbers over the last decade indicate a healthy stabilization in the growth in the number of enrollments, which increased 16%.
- Oral and Maxillofacial Radiology is concerned that financial restrictions at higher education institutions due to the COVID-19 pandemic may challenge the growth in the number of programs. However, they do not anticipate a significant negative impact on our increasing numbers of graduates.
- Orthodontics - The total number of enrolled students/residents per year increased by 20%.
- Pediatric Dentistry found that if current graduation and retirement trends continue, the number of full-time pediatric dentists is expected to increase from 9 to 14 per 100,000 children by 2030.
- Periodontics - Overall, the status of advanced education in periodontics remains stable with modest growth in the number of graduates over the last ten (10) years. This trend is projected to continue in the coming years.
- Prosthodontics - Enrollment increased by 10%, while the applicants per program have increased by 60% per the 2018-19 HPI Survey of Advanced Dental Education.

Advanced Education Program Directors: The National Commission requested that each recognized specialty sponsoring organization review summary data collected over the last ten (10) years regarding the percentage of advanced education program directors that are full-time and the number of program directors and provide overview comments on past or future trends regarding this information.

Table 8 reflects the percentage of full-time program directors in the advanced dental education programs over the last ten (10) years, as reported by the American Dental Association's Health Policy Institute.

Table 8. Percentage of Program Directors That Are Full-Time 2009-2010

	2009 - 2010	2010 - 2011	2011 - 2012	2012 - 2013	2013 - 2014	2014 - 2015	2015 - 2016	2016 - 2017	2017 - 2018	2018 - 2019
Dental Anesthesiology	67%	67%	40%	50%	44%	56%	56%	56%	44%	67%
Public Health	100%	90%	92%	83%	85%	87%	87%	87%	80%	80%
Endodontics	98%	98%	98%	100%	100%	100%	98%	98%	98%	100%
Pathology	100%	100%	100%	100%	100%	100%	93%	93%	86%	93%
Radiology	100%	100%	100%	100%	100%	100%	100%	100%	100%	89%
Oral Surgery	99%	100%	100%	99%	100%	100%	100%	100%	100%	100%
Orthodontics	92%	89%	89%	88%	88%	88%	91%	93%	91%	91%
Pediatric Dentistry	89%	86%	83%	86%	87%	84%	90%	91%	89%	87%
Periodontics	98%	98%	98%	96%	96%	98%	96%	98%	100%	98%
Prosthodontics	94%	96%	94%	96%	96%	94%	94%	96%	96%	96%

The National Commission is aware of concerns in the dental community related to faculty shortages and the need for full-time program directors. Existing and projected faculty shortages have and will continue to plague all of the advanced dental education programs. With the continued growth of new dental schools across the nation, the number of advanced dental education programs is expected to grow, increasing the projected shortage of qualified faculty.

Trends:

- Endodontics - Challenges in recruitment and retention of qualified educators continue and the AAE has continued to prioritize this issue by supporting legislation that incentivizes specialists to return to academia.
- Oral and Maxillofacial Radiology - The number of ABOMR-certified radiologists has increased, and it is anticipated that the trend for an increase in the number of programs and/or enrollees will continue.
- Oral and Maxillofacial Surgery - Over the last several years, some of the oral and maxillofacial surgery residency programs have promoted junior faculty, who have recently obtained board certification, to the role of the program director. AAOMS anticipates, with junior faculty acquiring leadership and administrative roles within oral and maxillofacial surgery programs, the specialty will have a strong future of remaining compliant with the accreditation standards that all programs be administrated by a board-certified program director.

- Orthodontics – There is a growing trend is retired private practitioners starting second careers as full-time faculty.
- Pediatric Dentistry - Approximately 13% of program directors are in part-time academic positions. This is problematic as a full-time, on-site, engaged program director is essential for the adequate training of pediatric dental students/residents. Challenges in recruiting full-time pediatric dental faculty stem from the student-loan burden incurred by new graduates and the lower salary earned in academics versus private practice.
- Periodontics - Potential concerns for the future of advanced education include the number of qualified faculty, decreases in funding, increases in tuition, and the increased burden on the education system due to expanded requirements for infection control. The COVID-19 pandemic has exposed challenges in dental education and the practice of dentistry in general. Stricter personal protective equipment requirements, patient concerns about the safety of care, the overall priority given to care by patients with decreased discretionary income, and the increased workload of the faculty have the potential to impact clinical education. A potential positive from the COVID-19 pandemic is a shift towards smaller student cohorts and more individualized teaching. While this may not be a permanent change, it currently provides benefits for student education.

Board-Certified Program Directors: The National Commission requested that each recognized specialty sponsoring organization review summary data collected over the last ten (10) years regarding the percentage of board-certified program directors and provide overview comments on past or future trends regarding this information.

Table 9 reflects the percentage of board-certified program directors in the advanced dental education programs over the last ten (10) years, as reported by the American Dental Association’s Health Policy Institute.

Table 9. Percentage of Program Directors That Are Board-Certified 2009-2018

	2009 -	2010 -	2011 -	2012 -	2013 -	2014 -	2015 -	2016 -	2017 -	2018 -
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Dental Anesthesiology	100%	90%	90%	90%	100%	100%	100%	100%	67%	100%
Dental Public Health	100%	100%	100%	100%	100%	93%	93%	100%	100%	100%
Endodontics	91%	92%	93%	96%	96%	98%	100%	96%	98%	98%
Pathology	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Radiology	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Oral Surgery	100%	100%	100%	100%	100%	100%	100%	99%	99%	100%
Orthodontics	98%	97%	97%	95%	94%	92%	97%	97%	99%	99%
Pediatric Dentistry	91%	92%	95%	96%	95%	95%	96%	97%	96%	99%
Periodontics	93%	96%	96%	96%	98%	98%	98%	98%	97%	98%
Prosthodontics	100%	100%	100%	100%	100%	98%	96%	96%	98%	100%

The National Commission noted that overall the number of board-certified program directors in the advanced dental education programs is close to or at 100%, which shows that the advanced education programs are attracting highly qualified board-certified program directors. The National Commission recognizes the challenges facing the advanced dental education programs in meeting faculty shortages.

Trends:

- Dental Public Health - All program directors, full-time and part-time, are required to be board-certified.
- Oral and Maxillofacial Radiology believes that the expanding pool of ABOMR-certified individuals will be adequate to take on positions of program director created by the opening of new programs as well as by attrition.
- Oral and Maxillofacial Surgery- The current Accreditation Standards for Advanced Dental Education Programs in Oral and Maxillofacial Surgery accreditation standards require that the program must be administered by a director who is board-certified.
- Pediatric Dentistry - The increase in board-certified program directors has been facilitated by changes in the board-certification process, enacted in 2005, allowing a candidate to achieve certification in approximately 18 months through a written qualifying exam followed by an oral clinical exam.
- Orthodontics - An increasing number of full-time faculty are trained outside of North America who are not eligible for board certification.

- Periodontics - The expectation for the next ten (10) years is that the number of Board-certified program directors will continue to remain consistently close to 100%.
- Prosthodontics - The current Accreditation Standards for Advanced Dental Education Programs in Prosthodontics require program directors appointed after 1997 to be board-certified.

IV. CHANGES IN SCOPE OF PRACTICE

Incidence and/or Prevalence of Major Conditions Routinely Diagnosed and/or Treated by Practitioners in the Specialty: The National Commission requested that each recognized specialty sponsoring organization highlight recent epidemiological data or studies that establish the incidence and/or prevalence of major conditions routinely diagnosed and/or treated by practitioners in the specialty and describe how these changes have affected the practice of the specialty.

American Association of Public Health Dentistry

The practice of Dental Public Health (DPH) involves thorough knowledge of the epidemiology of all oral and craniofacial diseases and conditions, their risk factors, indicators, and determinants at the individual and population levels. The DPH specialist obtains, analyzes, and reports the epidemiologic data all other dental specialties diagnose, prevent, and treat throughout the life course of an individual. These include dental caries, periodontal diseases, oral cancer, and craniofacial anomalies. Despite advances in disease prevention, DPH practitioners are needed to address disparities and social determinants of health to identify strategies, reduce gaps, and move toward oral health equity. Dental Public Health plays essential roles in the design, implementation, and analysis of national health surveys, such as NHANES, to advance understandings of health status, interactions between systemic health and oral health, and access to dental care. The specialty also works with state and local health departments to implement and improve state- and county-based oral health surveillance systems.

Epidemiological data collected and analyzed provide the basis for expanded roles for dentists, including DPH specialists, in addressing health problems. For example, the marked increase in oropharyngeal cancer incidence has led to expanded roles for dentists in promoting and delivering HPV vaccination for their patients. Data showing very high expenditures for emergency department visits for non-traumatic dental conditions have led DPH practitioners to work with payers and hospitals to reduce those visits.

American Association of Endodontists

The major conditions routinely diagnosed and/or treated by endodontists continue to be pulpal and periapical disease. These conditions are the result of caries, dental trauma, periodontal disease, extensive restorations, tooth fractures, or compromised host factors. Several studies indicate that the prevalence of apical lesions related to at least one tooth in the adult population varies by country. The incidence of dental injuries has remained stable over the past 25 years. The most recent study has estimated that up to 30% of all 18-year-old have sustained some type of injury to their teeth. According to a recent study, one billion people have sustained a dental injury, ranking fifth on the list of main chronic diseases and injuries, after caries, headache, anemia and hearing loss. Tooth fracture has been described as a major problem in dentistry. For vertical root fractures in endodontically treated teeth, there is an overall prevalence of 11%. There is a 6.8% incidence of cracked teeth in an endodontic specialty practice. Another condition diagnosed and treated by endodontists is maxillary sinusitis of endodontic origin. Odontogenic sinusitis causes nearly 50% of all unilateral sinus disease with maxillary sinus opacification.

American Academy of Oral and Maxillofacial Pathology

Oral cavity and oropharyngeal squamous cell carcinoma together represent a major cause of morbidity and mortality, with an estimated 53,260 new cases and 10,750 deaths in the United States in 2020. Age-adjusted rates of new cases and deaths continue to increase. Oral and maxillofacial pathologists have a unique understanding of the clinical and histopathologic presentation and its precursor lesions and are responsible for educating dentists, dental specialists and other health care professionals on the early diagnosis. Through ongoing research aimed at identifying molecular changes predictive of the biologic behavior, oral and maxillofacial pathologists continue to lead prospective studies that will guide treatment decisions and inform dental and medical colleagues and the public about the strengths and limitations of oral cancer screening tools. Oral and Maxillofacial Pathologists continue to play a leading role in understanding the risk factors, presentation and pathogenesis of osteonecrosis of the jaws (ONJ) related to bisphosphonate and anti-metabolic agents used in the management of osteoporosis and certain metastatic malignant neoplasms.

American Academy of Oral and Maxillofacial Radiology

The practice of oral and maxillofacial radiology has markedly changed over the last decade. Oral and Maxillofacial Radiologists encounter a broad spectrum of diseases and conditions including jaw pathoses, odontogenic inflammations, TMJ disorders, sleep disorders, dental and craniofacial anomalies and implant treatment planning. Affordable high-resolution point-of-service CBCT imaging has increased almost 11% per year. The FDA's NEXT 2017

survey estimates that there are approximately 5,500 CBCT units in the US, with more than 4 million examinations performed annually. Dentists seek radiology consultations to opine on CBCT examinations/scans which often encompass anatomic areas outside the dentoalveolar region (paranasal sinuses, cranium and cervical spine). The trending increase in “digital dentistry” will also shape the scope of OMR practice, requiring expertise on the imaging aspects of such technologies. The emerging field of artificial intelligence and machine-learning will impact the practice of oral and maxillofacial radiology and increase efficiency and allow better use of imaging data in clinical decision making.

American Association of Oral and Maxillofacial Surgeons

Advances in technology and virtual planning have been validated to improve patient outcomes and efficiency in the surgical correction of dentofacial deformities and oncologic defects. Advances in hard and soft tissue regenerative technology have led to explosive growth in the understanding and development of techniques to reconstruct congenital and acquired defects of the oral and maxillofacial region that were previously not possible. Personalized medicine in the era of biotechnology allows for individualized treatment specific to the genotype of both benign and malignant diseases. Much focus is on pain management and understanding the influence of one enzyme, CYP2D6, and its significant variability on patient response to opioids, understanding the advantages and disadvantages of opioid use in temporomandibular joint pain and understanding the potential benefit of personalized pharmacogenetics pain management. Initial results of a prospective study of subjects undergoing third molar removal revealed significantly less opioid requirement for those that were extensive metabolizers compared to those that were partial metabolizers. In addition, partial metabolizers had more adverse opioid effects. The potential to use testing to identify genetic variations among individuals may provide the opportunity to personalize post-operative pain management to obtain an optimal patient response and minimize adverse effects.

American Association of Orthodontists

Orthodontists principally diagnose and treat individuals with varying degrees of malocclusion and related skeletal and structural discrepancies within the jaws. The World Health Organization estimates malocclusions as the third most prevalent oral health problem, following dental caries and periodontal diseases. Recent surveys have demonstrated that the prevalence of malocclusion in the general population is approximately: Class I 74%; Class II 21%; and Class III 5%. Orthodontists have traditionally employed a variety of treatment strategies, appliances, and techniques to treat these various types of malocclusions. While treatment strategies and techniques will continue to evolve, there is a need for large orthodontic practice-based studies to help practitioners determine successful treatment options. For example, in 2013 the AAO, through the National Dental Practice Based Research Network, had a practice-based study funded on adult anterior open bite. This study highlighted how practitioners treat anterior open bite and what treatment options were successful. Information was disseminated through journal articles, and a conference dedicated to the topic was held in February 2020. A similar conference was convened in February 2019 on the topic of Sleep Apnea and Orthodontics which resulted in the creation of a white paper on the topic.

American Academy of Pediatric Dentistry

Pediatric dentistry remains the specialty addressing oral health and dental caries in infants, children and adolescents. Pediatric dental populations are skewed to younger ages, as pediatric dentists are willing to see infants and toddlers and skilled at implementing professionally accepted early childhood oral health measures. A segment of pediatric practice is creating a dental home, risk assessment, and well-child oral health supervision from the first year of life. Early oral health care hasn't been embraced by the general dental or pediatric medical community and likely will remain a focus of pediatric dentistry. Recent U.S. caries prevalence data confirm its persistence, increase with age, and disproportionate affliction in poor and minority populations. Early childhood caries plagues U.S. children with 1 in 10 under 5 years experiencing caries-related pain and needing advanced behavioral guidance skills of pediatric dentists, which will likely continue through the next decade. Pediatric dentists disproportionately see Medicaid children (>70%), manage their oral conditions and will likely continue to be the main source of care and health equity. General anesthesia care of children has increased with penetration of caries into younger children. Most pediatric dentists report hospital care as part of their practice. Sedation has increased due to denial of access to operating room access; pediatric dentists provide this service by virtue of their training and ability to secure licensure/certification. The percentage of children with special health care needs is growing with 100% of pediatric dentists caring for children with special needs as well as many adults with special needs.

American Academy of Periodontology

It has been estimated that ~42% of the US population aged 30 to 70 years exhibit some degree of periodontitis; 34.4% of the population have mild to moderate periodontitis (Stage I and II, Grade A and B); and 7.8% have severe periodontitis (Stage III and IV, Grade A, B, or C). Further, ~60% of adults aged 65 years and older have periodontitis. Based on U.S. Census data from 2013-2017 these percentages translate to ~33.4 million and ~6 million people with mild/moderate and severe periodontitis, respectively. Gingival recession is also highly prevalent in the U.S. population. Recent investigations have indicated a thin gingival phenotype is associated with diminished thickness of underlying bone and increased risk of recession and a thick phenotype appears more resistant to recession. Further,

the extent and severity of peri-implant diseases are influenced by different etiologic and predisposing factors. The average prevalence of peri-implant mucositis at the patient level is ~47% and at the implant level ~38%. The prevalence of peri-implantitis on a patient basis averages ~27% and on an implant basis ~18%. Undiagnosed, untreated, or inappropriately treated periodontal and peri-implant diseases in the U.S. have become a significant public health issue, particularly considering various associations of periodontitis on systemic health. There are also concerns regarding social gradients of disease where economically disadvantaged individuals have limited access to advanced therapies to treat these diseases. Epidemiologic studies have shown 11% of the world's population is over 60 years of age; this is projected to increase to 22% by 2050. With the aging population comes an increase in root caries and periodontitis.

American College of Prosthodontists

Prosthodontists diagnose dental diseases, oral manifestations of systemic/autoimmune diseases, and coordinating with medical/dental specialists to perform complex reconstructions. Edentulism remains a public health problem worldwide. In the U.S., the number of edentulous individuals is 9 million with 25% of adults over 60 years of age missing at least one tooth. Tooth loss may be congenital (oligodontia, ED, AI) or acquired (dental diseases, trauma, cancer, systemic diseases with oral manifestations). Prosthodontists diagnose and plan implant prostheses, place and restore dental implants and manage related complications. Prosthodontists treat dentate patients who exhibit root caries secondary to xerostomia, tooth wear, TMJ/TMD, and sleep apnea. The highest prevalence of erosive tooth wear is found in North America. Prosthodontists have in-depth knowledge in biomaterials and occlusion to diagnose, treat, and maintain these patients. Oral cancer patient demographics are changing due to the influence of HPV-related cancers, especially in younger patients. The prevalence is significantly reduced in vaccinated patients, but the overall effect is modest due to low patient participation. Risk factors still include age, tobacco use, and alcohol consumption. Prosthodontists are uniquely qualified with their training and expertise to treat the prosthetic needs of head and neck cancer patients.

American Society of Dentist Anesthesiologists

Dental anxiety continues to be the strongest predictor of patient pain during general dental procedures. A 2018 survey of practice patterns for dentist anesthesiologists identified anesthesia for pediatric dentistry as the most commonly-provided service, followed by anesthesia for oral surgical procedures and anesthesia for patients with special health care needs. The provision of office-based anesthesia for pediatric dentistry and patients with special health care needs is particularly important for increasing access to dental care for underserved populations. In 2012, the Pediatric Oral Health Research and Policy Center declared general anesthesia for the treatment of early childhood caries an essential health benefit for United States citizens. A 2011 examination of the capacity of the U.S. dental care system to treat children with special health care needs concluded the capacity to care for this population is extremely limited. The demand for dentist anesthesiologists to assist dentists in meeting the needs of these populations is well-documented, and access to care for these individuals continues to be a focus of the specialty.

Principle Health Services Provided to the Public and Where the Services are Customarily Provided: The National Commission requested that each specialty sponsoring organization identify the principal health services provided to the public by individuals in the area of practice and whether this has changed in the past ten (10) years. Further, the National Commission requested that each specialty sponsoring organization identify the setting(s) in which these services are customarily provided and whether this has changed in the past ten (10) years.

American Association of Public Health Dentistry

The principal health services provided include research, education, health service administration, policy/program development and quality assessment services. DPH specialists prevent oral diseases, work to reduce oral health inequities and provide oral health expertise within the core public health activities of assessment, policy development, and assurance. DPH specialists are involved in conducting public health surveillance for oral diseases and conditions and disseminating the findings to policymakers and the public. Such activities result in the development and evaluation of community-based oral health program, guidance for oral health advocacy (community water fluoridation and workforce models) and stimulation of research on effective interventions for high-risk populations (Native Americans, low socioeconomic status families, and nursing home residents). DPH specialists lead the creation of population-based oral health promotion and prevention strategies that are implemented at the community level. These include school-based oral health prevention programs (sealants and fluoride varnish); promotion of HPV vaccine for adolescents to prevent oropharyngeal cancer; development of protocols to improve oral hygiene in long-term care facilities; development of protocols for mobile dentistry and teledentistry; and development of materials on the use of tobacco and e-cigarettes, opioid prescribing by dentists, and sugar consumption. DPH plays a critical role in oral health coalitions and community partnerships to reduce the burden of oral diseases.

American Association of Endodontists

The principal health services provided to the public by endodontists continue to be non-surgical root canal treatments and endodontic retreatments. Additionally, endodontists provide various surgical procedures, including surgical repair of root resorption (internal and external), apexification, apicoectomies, bone grafts in conjunction with periradicular surgeries, guided tissue regeneration, root generation, re-implantation (including splinting), auto-transplantation, root submersion, decoronation, dental implants, hemisections and various associated procedures. With a commitment to saving natural teeth, the last ten (10) years have seen an increased commitment to maintaining the vitality of as much of the dental pulp as possible, with pulpotomies and other vital pulp therapies (VPT). Moreover, regenerative endodontics, or the “idea that one can replace damaged structures and regain functionality in previously necrotic and infected root canal systems” has seen significant advancements over the last decade. Endodontists also increasingly provide diagnoses of cracked teeth and non-odontogenic diagnoses, for example, in the event of trigeminal neuralgia, TMD, and myofascial conditions.

According to a 2015 report in the Journal of the American Dental Association, 13.5% of dentists worked in small group practices and 10.2% worked in large group practices. The report further showed that 11.4% of solo practitioners were oral surgeons, endodontists, or orthodontists. A 2019 survey of AAE members found that the most common practice settings were private practice/solo (37%) or endodontic group practice (21%), followed by dental school faculty (15%). Relatively few endodontists practiced in other settings: multi-specialty group practice-private (5%); military/government practice (3%); independent contractor (2%); multi-specialty group practice-corporate (2%); or some other setting (4%). Since the 2013 survey of AAE members, changes to practice settings of endodontists have been small. The proportion who are solo private practice (38% in 2013) has changed only slightly, while fewer today are in an endodontic group practice (21% in 2013) or are independent contractors (2% now, 5% in 2013), and more are dental school faculty members (12% in 2013).

American Academy of Oral and Maxillofacial Pathology

Historically, the principal health services oral pathologists have engaged in include practicing clinical oral pathology primarily in the dental school faculty practice setting, and participation in oral pathology biopsy services, based either in dental or medical school laboratories, or affiliated hospital settings. However, the settings for these services have been expanding. During the last ten (10) years, some seasoned dental faculty and some recent graduates of oral pathology residencies who have been unwilling or unable to secure dental faculty positions have ventured into the private practice arena either full or part-time, providing clinical oral pathology services. Some oral pathologists set up their private biopsy services, and a few participate in private pathology laboratory services, including large multispecialty group pathology laboratories. Increasingly, graduates of oral pathology residencies have opted for additional training in head and neck pathology and research through fellowships based in hospital pathology departments.

In a 2018 AAOMP Laboratory Services survey, oral pathologists reported that their services and laboratories were based in dental schools (51.28%), hospital/medical centers (7.69%), medical schools (5.13%), or private or non-hospital laboratories (35.90%). Notably, the percentage of pathologists practicing in private or non-hospital laboratories as independent proprietors or affiliates with private corporations has increased significantly during the past ten (10) years (14.3% in 2009, 35.90% in 2018). This shift towards the private sector is likely related to several factors, including changes in insurance reimbursement and increasing constraints associated with practice in academic and hospital venues. The AAOMP’s Fall 2019 manpower survey of the specialty revealed 73% of oral pathologists are primarily employed as full- or part-time dental school faculty involved in teaching predoctoral students and residents. Many also participate in and/or direct school-based biopsy services and clinical oral pathology faculty practices. Roughly 18% have appointments as medical school faculty, and about 35% of oral pathologists’ practices are either in hospital-associated, independent non-hospital practices or within corporate pathology practices. A small but significant percentage of oral pathologists are based in the military (Army, 2%; Navy, 1%, Air Force, 0.35%). About 22% of oral pathologists are based in research facilities.

American Academy of Oral and Maxillofacial Radiology

The welfare of the public is a serious concern and important responsibility for the AAOMR. Ionizing radiation is the primary tool used by oral and maxillofacial radiologists and the detrimental effects of diagnostic radiation are seen in the population decades later. Dental offices use ionizing radiation daily, leaving a major footprint on public health. In the past ten (10) years, OMR specialists and the AAOMR have taken multiple approaches to decrease radiation exposure and to mitigate the effects on the public. AAOMR promotes education and research on the application of non-invasive imaging methods, including MRI and ultrasound. Oral and Maxillofacial Radiologists are improving the health of the public by assisting other dental practitioners with appropriate diagnoses of and management options for complex diseases.

Patient care is provided in various settings including academic institutions, hospitals and private practices. In general, practices offer imaging services as well as consultative radiology services, often by teleradiology. OMR services have

significantly increased in number and scope, which is in part, reflective of the expanded use of CBCT imaging, include endodontic diagnosis and treatment planning, implant treatment planning, and TMJ imaging. The workflow and physical configuration of radiological facilities have changed markedly in the last decade. The increasing application of digital technologies has eliminated the need for darkrooms and chemical processing, changing the traditional landscape of radiologic facilities. With handheld x-ray units, radiographic examinations are being done in operating rooms in hospitals, nursing homes or in areas of disaster. Traditional imaging projections (lateral skull, Waters' sinus view, tomography, etc.) have been largely replaced by CBCT. The demand for OMR services has markedly increased in recent years. For example, radiology reporting services at a leading corporate provider increased more than 100% between 2015 and 2019.

American Association of Oral and Maxillofacial Surgeons

Oral and Maxillofacial Surgeons are competent to perform a wide variety of diagnostic and surgical procedures for the comprehensive management of the diseases, injuries and defects involving both the functional and cosmetic aspects of the hard and soft tissues of the oral, maxillofacial and head and neck regions. Dentoalveolar surgery has not experienced any significant changes in technique, skills and management. It remains a steady component of oral and maxillofacial surgery practice. Third molar management has been studied for the past 20 years in a prospective study relative to the timing of removal. Anesthesia continues to be an important area of oral and maxillofacial surgery practice. Oral and Maxillofacial Surgeons provide the majority of office-based dental anesthesia care in the country. During 2018, anesthesia services were delivered to 4,048,697 individuals insured by private dental insurance in the United States. Of all moderate and deep sedation/general anesthesia (DS/GA) cases performed in 2018 (1,764,588), 80% were delivered by oral and maxillofacial surgeons (1,423,249). Oral and Maxillofacial Surgeons place dental and craniomaxillofacial implants in the pediatric patient, treat cleft and craniofacial anomalies conditions; provide trauma patient rehabilitation; use irradiated bone; perform ridge augmentation with the use of absorbable pins and membrane, place immediate implants and reconstruct severely resorbed maxilla with bone grafting and osseointegrated implants. Early awareness and early detection reduce the risks associated with oral cancer and an increasing number of patients are referred to oral and maxillofacial surgeons for treatment. Surgeons also treat obstructive sleep apnea caused by craniofacial syndromes, complications of pharyngeal flap surgery and obesity.

Oral and maxillofacial surgery services continue to be provided in the inpatient and outpatient facilities. Medically compromised patients and select OMS procedures continue to be provided in the hospital. Oral and Maxillofacial Surgeons continue to provide a similar number of services and procedures in the ambulatory and office setting as that reported in 2011. Technological advancements in the last ten (10) years have dramatically altered the delivery of health care services. These services may involve several modalities, including the following: live video, store-and-forward transmission of healthcare information, remote patient monitoring, mobile health and mail-order treatment through the internet. With judicious application, many patients are now able to receive remote treatment from healthcare providers, granting access to much-needed care and services previously out of reach.

American Association of Orthodontists

Orthodontists require in-depth knowledge of craniofacial growth and development to provide services to diagnose, intercept, and correct malocclusions in the developing or mature orofacial structures. Traditionally children and adolescents have been the focus of orthodontic care, but recently there has been an increase in the number of adults initiating treatment because much has changed in the way orthodontic needs are identified and services are delivered. More efficient materials enhanced through technology like 3D digital scanning and printing, aligner therapy, computer customized lingual brackets and wires, photography, videography and social media have put an ever-greater emphasis on the importance of facial esthetics. Adults are living longer and appreciate the quality of life afforded by healthy teeth. Orthodontists are playing an important role in helping them maintain their dentition into their golden years. The biomechanical predictability of certain tooth and bone movements has also improved over the past ten (10) years. Techniques such as mini-screw aided maxillary expansion or other mini-screw and bone plate uses have prevented the need for orthognathic surgery in cases that previously required it. Aligners have improved the orthodontist's ease in intruding teeth, useful in closing anterior open bites. Lastly, orthodontists have begun to play a role in screening patients for signs of airway deficiencies and sleep-disordered breathing.

Historically, most orthodontists worked in single-doctor private practices. However, over the last ten (10) years, there has been significant growth of large multi-specialty group practices and corporate dental service organizations (DSO). According to the McGill Advisory, from the years 2011 to 2015, there was almost a 100% increase in the number of offices belonging to the four largest DSOs; this number grew from 1065 to 1967. A 2010 survey of graduating orthodontic students/residents showed only 26% were interested in working as an associate. When the same question was asked in 2018, 68% were looking for opportunities in either a DSO or as a private practice associate.

American Academy of Pediatric Dentistry

Pediatric dentists oversee health supervision as a dental home for children and work with generalists and specialists, like orthodontists and oral and maxillofacial surgeons, to provide comprehensive care. Scope of practice includes

most accepted dental procedures relative to and appropriate for children, provided in a developmental context in conjunction with other specialists as indicated. Pediatric dentists are often first responders to dental trauma in children and work with dental specialists to deal with advanced behavior needs that occur with many of these injuries. This has resulted in better long-term management including identification of systemic co-morbidities and trauma-preventive interventions.

Most pediatric dentistry occurs in private practices largely in urban and suburban communities. There has been a trend in having more than one pediatric dentist in a practice, which has: (1) fostered extension of existing practices into underserved populations; (2) permitted seamless operation of a model of primary care through specialty practice which creates a dental home for children as well as fosters advanced behavior guidance opportunities, such as general anesthesia and in-office sedation; (3) supported a critical economic base to allow engagement of families depending upon governmental coverage; (4) created practices with patient populations sizable enough to support other community specialists in dentistry; and (5) provided centers for referral in areas where pediatric specialty care for CSHCN and children with extensive caries requiring advanced behavior guidance cannot find services. Pediatric dentists are likely to maintain hospital staff membership and provide services in institutional settings, acting as the oral health component of comprehensive care models for children in major health systems. Pediatric dentistry, like general dentistry, is being engaged by larger group practices and community health centers to complete a family-oriented, whole-patient care model which endeavors to provide a full range of services.

American Academy of Periodontology

The principal health services provided by periodontists include: (1) diagnosis, assessment for future risk and treatment of diseases and conditions that affect the periodontium, including periodontitis, and the peri-implant tissues; (2) correction of bone and soft tissue defects to achieve and/or enhance esthetic and functional outcomes, often in the context of multidisciplinary care; (3) implant site development and surgical placement of dental implants to replace missing teeth or provide anchorage for prosthetic and orthodontic purposes; and (4) promotion of stable long-term dental, periodontal, peri-implant, and systemic health through personalized preventive maintenance care programs.

Periodontitis is one of the most prevalent diseases in humans and is currently viewed as an oral inflammatory disease of microbial origin with biological links to many systemic conditions including diabetes, cardiovascular disease, adverse pregnancy outcomes, and others. Collaboration with physicians and other health care providers has grown in the past decade and is expected to continue to increase. Such expansion has allowed periodontists to adopt an integrated approach to personalized periodontal and peri-implant care, which translates into a direct benefit for patients' overall health. Advances in the diagnosis of periodontal and peri-implant diseases and patient risk assessment have enabled clinicians to communicate efficiently with other health care professionals and patients to establish personalized treatment plans. Improvements in the armamentarium, biomaterials, and advanced minimally invasive surgical techniques have expanded the options available to treat patients, which has enhanced the delivery and quality of patient care. Computer-assisted diagnosis, treatment planning, and surgical interventions have allowed better quality care with less risk for adverse outcomes in the management of periodontal and peri-implant conditions. Regenerative therapies have expanded to include novel bioresorbable or image-based scaffolds and materials derived from autogenous (cell-based therapies) and exogenous sources. Such therapies have been used to treat inflammation-derived destructive conditions affecting the tissues supporting teeth and dental implants, as well as edentulous areas for implant site development.

Periodontists have historically provided the majority of their services in a clinical office setting. The Academy's Practice Profile Survey, published in 2003, shows an overwhelming majority (96.5%) of the procedures performed by members are done so in the periodontal office. The survey also showed a slight increase since 1998 (0.3% to 1.7%) in members performing procedures in another professional setting that may be due to members moving towards group practices or itinerant practice styles. The emergence of dental service organizations in recent years has likely affected these patterns.

American College of Prosthodontists

The principal health services provided by prosthodontists are the diagnosis, treatment planning, rehabilitation and maintenance of oral health and improving the appearance of worn, diseased, mutilated and/or missing teeth and orofacial structures. Prosthodontists use a systematic diagnostic approach to determine appropriate treatment recommendations for patients exhibiting occlusal disease, bruxism, caries, xerostomia, trauma, edentulism, cancer and many other oral diseases. During rehabilitation, peri-implant disease assessment and CAMBRA-influenced treatment protocols may lead to improved patient outcomes. Prosthetically-driven treatment planning often guides interdisciplinary treatment providing esthetic smile enhancements, full mouth reconstructions, implant rehabilitations and maxillofacial prosthetic therapies. Dramatic improvements in digital technologies, materials, and techniques have increased the efficiency and effectiveness of treatment delivery. In-office CBCT, digital radiography and photography,

intraoral scanners, tactile force measurement and pressure mapping and CAD/CAM software have streamlined the diagnostic and planning processes, providing seamless integration to improve treatment presentation (digital smile design), patient awareness/education as well as improved workflows for interdisciplinary collaboration through the internet and cloud-based services. Additive and subtractive manufacturing has greatly influenced guided implant surgery and restoration fabrication by simplifying workflows leading to decreased time to prosthetic rehabilitation completion. Semi-crystalline polymer esthetic and strength improvements, PEEK utilization and increased zirconia applications have been witnessed in prosthetic rehabilitations. Zirconia implants provide an esthetic and biocompatible alternative to titanium. CAD/CAM titanium bars/abutments have improved the accessibility and interchangeability of components for complex implant reconstructions. Biological growth factors are used to stimulate bone formation and decrease healing times.

Prosthodontists practice in a variety of settings including solo private practice, group private practice, hospitals, Dental Service Organizations (DSO), DSO-Managed Group Practices (DMGP), Federal Services, universities/academic settings and charitable outreach activities. A recent study of private practice prosthodontists reported that 60.1% of prosthodontists were sole proprietors, 12.2% partners, 20.8% were employees, and 6.9% independent contractors. This differs from the 2007 publication where it was reported that 75.7% were sole proprietors, 15.3% partners, 6.3% employees, and 2.8% independent contractors.

American Society of Dentist Anesthesiologists

The principal health services provided by dentist anesthesiologists are anesthesia and sedation care, provided in collaboration with a dentist or surgeon. Safe, efficient and accessible sedation and anesthesia services have enabled access to dental care and improved oral health for many patients who could not receive care otherwise. This is particularly important for the very young, patients with special needs and for patients with high fears and anxiety related to dental and oral surgical treatment. Without access to anesthesia services, many of these patients would continue to suffer from untreated dental disease.

Dentist anesthesiologists practice, teach and conduct research in a variety of settings, including dental offices, dental schools, surgery centers, hospitals and major academic centers. Most dentist anesthesiologists provide office-based, mobile anesthesia and sedation care. The anesthesiologist transports the necessary equipment and medications to dental offices for the planned dental or oral surgical treatment. In doing so, the dentist anesthesiologist works collaboratively with dentist colleagues to provide much-needed care for patients who may otherwise be unable to receive dental treatment. Interest in office-based anesthesia has been growing and dental office-based sedation/anesthesia is no exception. It is anticipated that the dental office will continue to be the primary setting for dentist anesthesiologists.

Conclusions: In reviewing all of the information submitted by each of the recognized specialty sponsoring organizations for the 2021 Periodic Review of Dental Specialty Education and Practice, the National Commission concluded that each specialty is unique. However, the information submitted demonstrates that the specialties also share common concerns.

Faculty Shortage: Unfilled faculty positions, resignations, retirements and projected retirements, and the shortage of graduating students/residents having an interest in academia as a career poses a threat to the dental workforce in the coming years. Faculty shortages at dental schools across the country may compromise student/resident learning at a time when the public need for dentists continues to grow. Faculty loan repayment is crucial to recruiting and retaining dental faculty due to the student loan debt burden and income disparity between academic positions and private practice.

Financial Restrictions due to COVID-19 Pandemic: Potential concerns for the future of advanced education include the number of qualified faculty, decreased funding, increased tuition and increased burden on the education system due to expanded requirements for infection control. The COVID-19 pandemic has exposed challenges in dental education and the practice of dentistry in general. Stricter personal protective equipment requirements, patient concerns about the safety of care, the overall priority given to care by patients with decreased discretionary income, and the increased workload of the faculty have the potential to impact clinical education.

Final Comments: The National Commission wishes to acknowledge the cooperation, participation and contributions of the recognized dental specialty sponsoring organizations and the recognized certifying boards for dental specialists in providing critical information for the 2021 Periodic Review of Specialty Education and Practice.

The recognized dental specialty sponsoring organizations and recognized certifying boards provided valuable information that is beneficial to the profession. The format of the 2021 Periodic Review of Specialty Education and Practice served to facilitate each recognized dental sponsoring organization's internal review by highlighting specific areas of growth and accomplishments over the past decade and provided the opportunity for each organization to

note ongoing and future challenges. In broader terms, the format of the review allowed the organizations to note past and future trends, new research and cross-cutting issues such as faculty shortages, potential membership and program enrollment increases/decreases and efforts to increase the number of board-certified specialists.

After thoroughly reviewing all of the information submitted by the recognized dental specialty sponsoring organizations, the National Commission believes that all of the sponsoring organizations have documented evidence that they continue to be in a healthy and viable state. From the information provided related to each specialty's scope of practice, the National Commission concludes that there continues to be a need and demand by the public for the recognized specialties' oral health services. The National Commission believes that over the past decade, the recognized dental specialties have demonstrated ongoing efforts to improve the quality of advanced dental education, research, practice and oral health care services.

Recognition Status of the Recognized Dental Specialty Sponsoring Organizations

American Academy of Oral and Maxillofacial Pathology	Recognition
American Academy of Oral and Maxillofacial Radiology	Recognition
American Academy of Pediatric Dentistry	Recognition
American Academy of Periodontology	Recognition
American Association of Endodontists	Recognition
American Association of Oral and Maxillofacial Surgeons	Recognition
American Association of Orthodontists	Recognition
American Association of Public Health Dentistry	Recognition
American College of Prosthodontists	Recognition
American Society of Dentist Anesthesiologists	Recognition