

The Allied Dental Professions: Executive Summary

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Abstract: This executive summary for Section 5 of the “Advancing Dental Education in the 21st Century” project addresses the current and future educational systems for dental assisting, dental hygiene, dental therapy, and dental laboratory technology. Nineteen experts prepared six background articles on the educational changes necessary for future roles and practices. The key issues addressed relate to delivery system changes, educational curricula, scopes of practice, regulatory measures, and the public’s oral health. The major finding is that substantial reforms will be needed to adequately prepare allied oral health professionals for the changes anticipated in 2040. A reconsideration of current accreditation guidelines, more flexibility with scopes of practice, and an adherence to rigorous academic programs are essential elements for the future of these professions.

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This executive summary for Section 5 of the “Advancing Dental Education in the 21st Century” project addresses the allied dental professions: dental assisting, dental hygiene, dental therapy, and dental laboratory technology. This summary examines the current status of these professions, forces and trends that affect them, educational challenges they face, and recommendations for how their educational systems will need to change to prepare graduates for 2040. Nineteen authors, selected based on their professional accomplishments and leadership, prepared six articles on these issues (Table 1). Initially in this project, consideration of the allied dental professions was integrated into the sections on dentists (Sections 1 to 4). However, due to the importance of the allied dental professions, the project directors decided to include a separate section for this area.

The focus of the material presented is specific to each profession. For example, some educational programs for dental laboratory technologists and dental assistants are accredited by the Commission on Dental Accreditation (CODA), others are non-accredited, and a substantial part of the workforce for these two professions is trained on-the-job. Conversely, all dental hygienists must graduate from a CODA-accredited program and pass national board examinations to obtain state licensure. After an overview of each allied dental profession, current and future challenges and opportunities for each are

listed. A conclusion section highlights key points that are relevant to all the allied dental professions.

Dental Assisting

The majority of dental assistants work in treatment rooms one-on-one with dentists and patients.¹ They are also responsible for some office management duties, asepsis, reviewing medical/dental histories, charting oral conditions, exposing and processing radiographs, and, in some states, taking impressions, placing and carving restorative materials, and fabricating provisional restorations. Dental assistants’ responsibilities are not uniform across states. Each state’s Dental Practice Act determines the required level of supervision and the delegable functions. Most work under direct supervision.

Approximately 310,000 dental assistants are currently employed in the U.S., and the vast majority (280,000) work in private dental practices.² Although the precise number of dental assistants trained in CODA-accredited programs vs. on-the-job is not known, a large percentage are trained on-the-job.¹ The average full-time solo dentist employs 1.5 dental assistants. Their mean hourly wage is \$17.43, and the mean annual wage is \$36,260. Limited data suggest that dental assistants trained in CODA-accredited programs earn higher salaries than those trained on-the-job. The dental assistant workforce is expected to grow 25% from 2012 to 2022.² This estimate is based

Table 1. Titles and authors of background articles in Section 4 of this project

Title	Author/s
The Evolution of the Dental Assisting Profession	Connie Kracher, Carolyn Breen, Kim McMahon, Lorraine Gagliardi, Cara Miyasaki, Katherine Landsberg, Constance Reed
Strengths and Weakness of the Current Dental Hygiene Educational System	Cheryl Westphal Theile
Preparing the Future Dental Hygiene Workforce: Knowledge, Skills, and Reform	Jacquelyn L. Fried, Hannah L. Maxey, Kathryn Battani, JoAnn R. Gurenlian, Tammi O. Byrd, Ann Brunick
Exploring Current and Future Roles of Non-Dental Professionals: Implications for Dental Hygiene Education	Hannah L. Maxey, Christine Farrell, Anne Gwozdek
Transforming Dental Technology Education: Skills, Knowledge, and Curricular Reform	Anita M. Bobich, Betty L. Mitchell
Dental Therapists as New Oral Health Practitioners: Increasing Access for Underserved Populations	Colleen M. Brickle, Karl D. Self

Note: See references for full citations of these articles and links to them in the online supplement.

on an increase in clinical dentists, a growing population, and an expansion of dental assistant roles.³

Dental assisting education programs are diverse, with substantial variation in curricular content and clinical experiences.¹ Of the 360 dental assisting programs now operating, 273 are CODA-accredited. Most are one year in length. Little is known about non-CODA-accredited programs, but some are located in high schools and in proprietary schools. State educational requirements for certifying dental assistants vary considerably. To obtain certification, licensure, registration, or other credential, some states require standardized competency testing, while others require or accept graduation from a CODA-accredited program. Other states have an entry level or unlicensed dental assistant category with no educational or other requirements.

In 2015, 7,397 individuals were enrolled in CODA-accredited dental assisting programs with the majority attending community or junior colleges (3,519), followed by technical colleges (2,156).¹ Dental assisting educational programs are relatively inexpensive. In part, this is because clinical education often takes place in dental practices, hospitals, or dental schools. In terms of dental assisting faculty, in 2014 the largest cohort based on age was found to be between the ages of 50 and 59, most were white women who worked part-time, and few had advanced degrees.⁴

Challenges identified in dental assisting are the following:

- The marketplace and regulatory system do not distinguish between formally educated and non-formally educated dental assistants.

- A lack of standardized regulation of education and practice across states makes it difficult to advance dental assisting education and the profession.
- Empirical studies are needed to compare the performance of formally and informally educated dental assistants.
- There are inadequate numbers of programs that provide expanded skills and knowledge that lead to certification as expanded function dental assistants.
- There are limited opportunities for career ladder-ing for most graduates of accredited programs.
- Faculty members in educational programs are not diverse, and few faculty members have the credentials associated with academic careers.

Opportunities identified in dental assisting are the following:

- State Dental Practice Acts that define dental as-sistant education, clinical roles, and certification need to be more uniform across states.
- All CODA-accredited programs should offer interested students the advanced knowledge and skills needed to become expanded function dental assistants.
- With the rapid growth of larger dental group practices, all dental assisting students should have clinical experience working in these organizations.
- All interested graduates of CODA-accredited programs should have the opportunity to expand their education in dental assisting or other dental professions.
- Studies are needed to determine the value of em-ploying CODA-accredited program graduates. Finding substantial positive differences would be

a major step forward in developing more standardized educational programs and state regulatory systems and increasing the value the market places on formally trained dental assistants.

- The faculty of CODA-accredited dental assisting programs need to be more diverse and prepared for full-time careers in academic institutions.

Dental Hygiene

Dental hygienists are licensed members of the oral health care team who focus on the primary and secondary prevention of oral diseases and health promotion. Their basic set of services includes screening examinations, risk assessment for oral and systemic disease, data collection and analysis, screenings for head and neck cancers, periodontal debridement (e.g., removing calculus and stains from the teeth), and patient education (e.g., tobacco cessation, diet counselling, recommending oral hygiene care practices).⁵⁻⁷ Other traditional preventive measures include applying sealants and fluorides. In some states, dental hygienists place and carve restorations.

Most dental hygienists are employed in the offices of private practitioners: approximately three-fourths of solo dental practices employ dental hygienists.³ Group dental practices tend to employ more dental hygienists per dentist than solo practices. Most dental hygienists are employed part-time, working 22.5 hours per week for 46 weeks per year.⁵ Dental hygienists also are employed in public and voluntary sector dental clinics, state and municipal health departments, school systems, medical practices, and hospitals. In Colorado, it is legal for dental hygienists to establish dental practices independent of dentists, but few do.⁸ In that state, dental hygienists also work directly with pediatricians.⁵

Currently, there are 185,000 clinically active full and part-time hygienists.⁵ Their average income in private practices is approximately \$70,000/year with considerable variation among geographic locations. There is a widespread perception that there is an oversupply of dental hygienists in many states.

The practice of dental hygiene is typically regulated by state Dental Practice Acts. State dental boards are often comprised primarily of private practicing dentists. Some include dental hygienists and non-dentists, and a few states have a separate dental hygiene board.⁵ In 39 states, dental hygienists can work under indirect/general supervision (dentists not present in the facility) if they are caring for under-

served populations in public settings (e.g., schools and long-term care facilities).

There are 335 dental hygiene education programs; of these, 277 offer a two-year associate's degree only, and the others include the opportunity to obtain a bachelor's degree.⁵ The number of educational programs has risen rapidly over the past 20 years but has stabilized recently. Most dental hygiene programs are located in community colleges, while others are in universities and dental schools. Proprietary programs constitute a small percentage of the total. Prerequisite college coursework for associate degree programs is common, so the total time spent in obtaining an associate's degree is usually three or more years.

Tuition rates depend on program location and degree conferred. The most expensive programs are in four-year universities and dental schools that provide baccalaureate degrees and in proprietary institutions.⁵ Dental hygiene faculty members are predominantly older white females.⁴ CODA standards require faculty members to hold a degree higher than what the institution grants (e.g., faculty members in associate degree programs must have baccalaureate degrees).⁹

Dental hygiene programs are accredited by CODA, but the accreditation standards do not differentiate between graduates of baccalaureate and associate degree programs.⁸ Although a master's degree in dental hygiene is the profession's terminal degree, efforts are under way to create doctoral programs in dental hygiene.

In terms of curricula, the main problem is that most dental hygiene programs prepare graduates based on the assumption that they will be employed in solo practices and spend most of their time providing prophylaxes.^{5,8} With the current changes taking place in the dental and medical delivery systems, many graduates are not being adequately prepared to take on different clinical and leadership roles in other delivery settings.

Challenges identified in dental hygiene are the following:

- CODA dental hygiene standards do not differentiate between associate and baccalaureate education.
- A baccalaureate degree needs to be the entry level for dental hygiene. Most students require at least three years to complete the associate's degree; with an additional year, students could earn a baccalaureate degree. With this degree, more opportunities for advanced education programs would arise.

- Graduates have had minimal experience providing care in large dental group practices and in community or practice settings with nurses and other health care professionals.
- Many programs need to give greater curricular attention to oral health as part of total health, risk assessment, technological advances, prevention, interprofessional education, cultural competence, vulnerable populations, and community-based learning.
- The dental hygiene profession is economically dependent on one basic service: prophylaxis. If scientists find chemical approaches to reducing calculus or if studies show that low-risk patients need fewer prophylaxes, the demand for dental hygienists in that particular clinical capacity could decline substantially.
- Dental hygiene practice is regulated by dental boards made up mainly of private practice dentists who have a vested interest in maintaining the traditional delivery system.
- Many dental hygiene faculty members are aging and reaching retirement age. A shortage of future faculty members is likely.

Opportunities identified in dental hygiene are the following:

- Mandating an entry-level baccalaureate degree for dental hygienists could increase their employment options and promote career laddering. Also, it will allow the integration of dental hygiene and dental therapy, increasing the value of dental hygienists to dental and medical group practices and community delivery sites.
- The delivery of dental hygiene services is expanding beyond solo dental practices and now includes settings such as group dental and medical practices, schools, hospitals, and long-term care facilities. These delivery sites will eventually become the primary source of dental hygienist employment, especially if the chemical management of dental caries and biofilm management becomes routine. All dental hygiene graduates need to have more clinical, educational, and leadership experience in these settings.
- Working in community settings and medical practices, dental hygienists will need more advanced knowledge and clinical experience in the collection and interpretation of medical and dental data and interfacing with physicians, dentists, and other health care providers. To prepare for practice in these settings, dental hygienists should have some

primary nursing knowledge and skills to increase their value to both medical and dental practices.

- Regulation of the dental hygiene profession should include more dental hygienists and non-dentists concerned with the oral health of the public.
- CODA needs to develop different accreditation standards for associate versus baccalaureate degree dental hygiene programs.
- Dental hygiene faculties need to be more diverse.
- Educators should encourage their students to pursue graduate education and prepare for academic careers in universities.
- Developing advanced degree programs for dental hygienists is imperative.

Dental Therapy

Although a number of states have passed or are considering legislation regarding dental therapists, Minnesota is currently the only state that licenses dental therapists and provides dental therapy educational programs.^{10,11} The first dental therapy educational program grew from a partnership between Metropolitan State University and Normandale Community College. Entry into this program requires dental hygiene licensure and a baccalaureate degree. A licensed dental therapist requires a baccalaureate degree, while a certified advanced dental therapist requires master's level education. Students are eligible to become dental therapists or advanced dental therapists (ADTs), depending on the length of their education. Since the dental therapy scope of practice does not include scaling or prophylaxis, dual-degree practitioners who are both licensed dental hygienists and dental therapists are in great demand.

The University of Minnesota's School of Dentistry discontinued its stand-alone master's-level dental therapy program in fall 2016.¹⁰ It incorporated that program into its dental hygiene curriculum, creating a dual-degree program. Dual-degree students earn a Bachelor of Science degree in dental hygiene, then continue for one additional year and earn a Master's in Dental Therapy. In the Metropolitan State University and Normandale Community College partnership program, applicants must have current dental hygiene licensure, a restorative functions course, and a baccalaureate degree. Students graduate with a Master's of Science in Advanced Dental Therapy. Upon graduation, students are eligible to become licensed dental therapists and are credentialed as ADTs after 2000 hours of clinical practice.

In 2015, CODA adopted accreditation standards for dental therapy programs that will promote consistency in these educational programs across states.¹² These standards enable dental assistants and dental hygienists to receive advanced standing. As a general legislative trend, it appears to me that some states view dental hygiene licensure as a foundation for dental therapy curricula.

In Minnesota, both dental therapists and ADTs are required to have 50% or more low-income patients and/or practice in a dental health professional shortage area.¹⁰ To date, there are 68 dental therapists and 31 credentialed ADTs in Minnesota who practice in over 20 rural and urban counties.¹³ Delivery settings include Federally Qualified Health Centers (FQHCs), schools, hospitals, and solo and group private practices.¹⁰

A related type of program is the Alaska Native Tribal Health Consortium (ANTHC) Dental Health Aide Therapist (DHAT) program.¹⁰ This two-year program provides students with the education and training necessary to practice in remote areas of Alaska. The ANTHC works in partnership with the University of Washington MEDEX program, a regional physician assistant training program, to administer the first year of the DHAT program. In year two, students begin a 12-month clinical rotation in community clinics. After completion of their program, DHATs obtain certification from the Alaska Community Health Aide Program Certification Board. They are then employed to provide general dental care in Alaska Native communities under the general supervision of a dentist. Written standing orders define their scope of practice.

Assessments of these programs in both Alaska and Minnesota have been positive. An evaluation of the Alaska program found that DHATs were providing services within their scope of work safely and appropriately and were well accepted with high patient satisfaction.¹⁰ A 2014 Minnesota study concluded that dental therapists increased underserved patients' access to dental care; improved the quality of care; decreased travel and wait times for patients; reduced operating expenses; increased productivity; lowered patient appointment failure rates; and improved patient satisfaction.

Although these initial studies are promising, dental therapy is at an early stage of development, and it is too soon to estimate its long-term impact. Several therapy models may evolve for different communities and clinical settings. Accordingly, the

CODA standards include both stand-alone and dual-degree therapist tracks.¹² Most likely, it will be at least another ten years before 50% of states accept therapists, so assessing their potential national impact in 2040 is difficult.

Challenges identified in dental therapy are the following:

- Dental therapy education and practice are currently permitted in only a limited number of states, although that number is growing.
- It is unclear what model(s) of dental therapy will develop for different communities and clinical settings.
- The regulation and payment for dental therapy services are still in development.
- The preparation of dentists and other health care providers to work with dental therapists has not received adequate attention.
- The long-term impact of dental therapists on access and oral health disparities is unknown but initial data appear promising.

Opportunities identified in dental therapy are the following:

- There are many educational and financial advantages to integrating the education of dental therapists and dental hygienists in four-year bachelor degree programs.
- Dental hygienists-therapists are likely to have a greater impact delivering care to underserved patients in community-based clinical settings than in traditional solo practices.
- All dental graduates should have experience working with dental therapists.
- The long-term impact of dual-degree dental therapists on the supply of dental services and the need for dentists requires careful monitoring.
- Comparisons of the economic benefits of dental therapists' and dentists' service delivery are needed.

Dental Laboratory Technology

Dental laboratory technology is a core allied dental profession supporting the practice of dentistry. By definition, it is the art and science of fabricating corrective devices and replacements for natural teeth.¹⁴ Of the two types of professionals working in dental technology, restorative dental technologists are formally educated, while dental technicians are

trained on-the-job. The five major laboratory services are fixed prostheses (e.g., ceramics and crown and bridge); removable prostheses (e.g., removable full and partial dentures); maxillofacial prostheses (e.g., ocular and craniofacial); orthodontics and auxiliary (e.g., orthodontics appliances, sleep apnea devices, mouth guards); and implant prostheses.

Most CODA-accredited restorative dental technology education programs are in community colleges or technical schools, with a few in four-year university programs.¹⁴ There are another 21 education programs that are not CODA-accredited. Approximately 50% of technologists graduated from a CODA-accredited program. Educational standards for restorative technology programs are in a state of flux as CODA standards are being revised. With major advances in digital technology, programs are hard pressed to add CAD/CAM and 3-D computer generative technologies to their curricula because of the expense and the need for faculty trained to use them.

With the increased emphasis on digital technology, competition from overseas laboratories, the dramatic decline in missing teeth in upper income populations, and business consolidation, the laboratory business has experienced major changes.¹⁴ The number of independent laboratories continues to decline, and thus, fewer students are graduating from CODA-accredited programs. In 2015, only 209 students graduated from 17 CODA-accredited programs. These trends are likely to continue, which will be a major challenge for restorative dental technologist education programs if they become too small to operate effectively. On the positive side, some evidence suggests that graduates of CODA-accredited programs are in higher demand and receive higher salaries than technologists trained on-the-job. Also, the demand for partial dentures may increase if the Medicaid system covers more adults and provides coverage for removable prostheses.

The limited size of the dental laboratory education system and the small number of graduates will impact the practice of dentistry. Accredited programs need to teach skills that cannot be offered on-the-job. Funding for major technological equipment may be secured through corporate liaisons and support from dental practices. Programs may also be able to work with dental practices and commercial laboratories for experiential learning.

Challenges identified in dental laboratory technology are the following:

- The size of the laboratory labor force will decrease, but at the same time more skilled and knowledgeable staff are needed.
 - The limited number of CODA-accredited programs and the relatively small number of graduates per year threaten the basic structure of the current educational system.
 - The need for traditional laboratory skills will slowly decline, and the need for advanced computer manufacturing skills will increase. The curricula of CODA-accredited programs will need significant revisions to accommodate changing laboratory knowledge and skills.
 - Most CODA-accredited programs cannot afford the digital technology needed to train students, and few have faculty members trained to use the new technology.
 - CODA-accredited programs need to distinguish their graduates from those trained on-the-job. The current two-track system interferes with establishing high-level practice standards and professional status.
 - Some restorative technology graduates need experience with dentists in providing direct patient care.
 - New and less expensive methods are needed to replace missing teeth. This is ultimately the best way to increase demand for prosthetic services and to improve the oral health of the public.
- Opportunities identified in dental laboratory technology are the following:
- The curricula of CODA-accredited restorative dental technology programs should be revised to provide students the knowledge and skills needed to use new digital manufacturing processes.
 - An elective track for students interested in working with dentists in direct patient care should be developed.
 - Four-year programs leading to a bachelor's degree should be required for CODA-accredited programs. This model is currently operational.
 - As the need for restorative technologists declines, the feasibility of merging the education of technologists with other dental or allied professions should be examined.
 - Adult dental Medicaid enrollment should be increased and cover basic removable prostheses. Dental care should also become a basic Medicare benefit.
 - Less expensive methods for replacing missing teeth need to be developed.

Conclusion

Several key forces will influence the future of the allied dental professions. First, the rapid growth of large dental group practices and especially those that operate under global budgets will bolster employment of all allied dental professionals. Compared to solo practices, these organizations have both the management capability and financial incentives to use allied dental personnel to their full capabilities. Second, as large medical and dental group practices expand delivery sites into the community, many sites will offer both medical and dental care (e.g., schools, nursing homes). Under these conditions, the roles of allied dental personnel are likely to expand into some areas of primary medical care. Dental hygienists, dental therapists, and dental assistants are likely to have major roles in community settings. Third, more new technologies are becoming available that will treat caries and other common oral diseases chemically rather than surgically. The use of salivary diagnostics for detection of systemic disease will also increase. This emphasis on technology will provide new opportunities for the allied dental professions to provide care in non-traditional settings under less restricted supervision by dentists and physicians. CODA needs to develop accreditation standards that adapt to these changes, and oral health professionals must advocate for needed revisions. With new standards, allied dental educational programs then will have a framework in place to create robust educational programs that prepare graduates for new roles in 2040.

Editor's Disclosure

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