Emerging Allied Dental Workforce Models: Considerations for Academic Dental Institutions

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Abstract: The U.S. surgeon general defined the national oral health care crisis in 2001 in *Oral Health in America: A Report of the Surgeon General.* The report concluded that the public infrastructure for oral health is not sufficient to meet the needs of disadvantaged groups and is disproportionately available depending upon certain racial, ethnic, and socioeconomic factors within the U.S. population. Now, several new workforce models are emerging that attempt to address shortcomings in the oral health care workforce. Access to oral health care is the most critical issue driving these new workforce models. Currently, three midlevel dental workforce models dominate the debate. The purpose of this report is to describe these models and their stage of development to assist the dental education community in preparing for the education of these new providers. The models are 1) the advanced dental hygiene practitioner; 2) the community dental health coordinator; and 3) the dental health aide therapist.

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Key words: midlevel dental health professionals, dental public health, dental workforce, oral health care for the underserved

The landmark 2001 publication *Oral Health in America: A Report of the Surgeon General* concluded that the public infrastructure for oral health is not sufficient to meet the needs of disadvantaged groups. The report also states that dental care is disproportionately available in this country depending upon the racial, ethnic, and socioeconomic status of certain populations.[1] Native Americans, Mexican Americans, and non-Hispanic black populations are far more likely to have untreated dental caries than non-Hispanic whites.[2]

The health of low-income, underserved populations including millions of low-income children is at stake because of the extensive disparities in their oral and medical health care. This tragedy was demonstrated recently in a story that first appeared nationally in the *Washington Post* describing the death of twelve-year-old Deamonte Driver of Maryland.[3] Driver died of complications from an acute dental infection that spread to his brain. His hospitalization was estimated to cost $250,000. Earlier dental treatment of his condition would have cost approximately $80. Driver's case has brought national attention to a basic need in the U.S. health care system to identify individuals with acute dental needs and ensure that they obtain timely and necessary treatment.

An aging population, large numbers of transient, non-English-speaking populations, geographic isolation of populations in rural areas, and the difficulties facing children with disabilities in accessing oral health care are placing further pressures and demands upon our nation's oral health care system. Advocates for underserved groups are raising the demand for oral health care that goes beyond the traditional model of care.

Economic factors also impact access to care. States often have difficulty enrolling participating dentists in Medicaid—the only public program that provides a dental benefit guarantee—due to reimbursement rates that are one-half to one-third of fees in private dental practice.[4] The State Children's Health Insurance Program (SCHIP), enacted in 1997, has expanded oral health care to millions of low-income children who do not qualify for Medicaid, but the benefit is not defined and dental coverage remains optional under the program. Medicaid's Early Periodic Screening, Diagnostic, and Treat-

ment Program (EPSDT) includes comprehensive dental coverage for low-income children; however, dental coverage for adults is optional, and few states provide services beyond emergency dental coverage for adults. Dentists are also reported to be resistant to the burdensome administration of the public system, which often varies greatly from private dental insurance.[5] Consequently, millions of Americans enrolled in publicly insured programs, although entitled to dental services, experience difficulties in receiving care.

Finally, large numbers of aging dentists are projected to retire from practice during the next ten to fifteen years. Over the next decade, two dentists will retire for every new one who graduates.[6] The swell of dentists retiring is occurring simultaneously with other demographic changes that are increasing the demand for oral health services and may portend a potential shortage in the dental health workforce.[2] At the same time, significant disparities exist within the dental and allied dental workforce: minorities are disproportionately underrepresented compared to their numbers in the general population.[1]

All these factors have a combined impact on meeting the oral health needs of specific population groups. The severity of the oral health access problem has intensified the call for policymakers to address workforce capacity and identify new solutions that meet the needs of all sectors of the U.S. population.[4] Given the cultural diversity of our citizenry and the circumstances that impact oral health, no one solution is likely to address the myriad of oral health needs facing our nation.

Contemporary responses from policymakers to address access and workforce issues are occurring mostly at the state level. States typically aim to improve access to care for underserved populations in geographically isolated areas and to reduce health care disparities. States with burgeoning minority populations are increasingly concerned about diversifying their health workforce to reflect the makeup of their population.[4] State solutions have included incentives that encourage dental graduates to work in-state after they graduate and to practice in underserved communities.

Workforce contingent financial aid (WCFA) programs have become an increasingly popular means utilized by states to address workforce shortages. WCFA programs help individuals with their education expenses in exchange for a commitment to work in an occupation or area that is experiencing a workforce shortage. There are 161 different WCFA programs in forty-three states.[7] Despite the number of WCFA programs, the number of students enrolled is small compared to other financial aid programs. While teachers, nurses, and medical students are the most frequent beneficiaries of WCFA programs, some states offer WCFA programs to dental students. One program recently enacted in Wyoming will support as many as ten dental students annually over four years who agree to practice in the state after their graduation from dental school in Nebraska.[8] While WCFA programs hold promise, little is known about their effectiveness in contributing to the growth of the workforce. Moreover, many state loan and scholarship programs still struggle to retain health care providers once they have completed their service obligation.[2]

State responses have also taken the form of regulatory changes in licensure for dental and allied dental professionals. These include loosening licensing and continuing education requirements for retired volunteer dentists and expanding the scope of practice of allied dental professionals who provide care in underserved communities. In 2006, state legislatures in thirty-one states faced proposed expansions to the scope of practice of a variety of allied health professions.[4] One of the most common scope-of-practice expansions that states considered was permitting a registered dental hygienist to work independently of a dentist's supervision in public health settings. In the past five years, nine states (Arizona, California, Iowa, Kansas, Montana, New York, Oklahoma, Pennsylvania, and Rhode Island) have revised the scope of dental practice to allow a dental hygienist to initiate treatment based on his or her assessment of a patient's needs without the specific authorization of a dentist, treat the patient without the presence of a dentist, and maintain a provider-patient relationship.[9] Finally, a smaller number of states have succeeded in gaining legislators' support for payment reforms for dental care provided in public programs, such as Medicaid.[10]

To address oral health care workforce concerns, several efforts are under way that would expand the workforce by incorporating new models of care. Access to oral health care is the most critical issue driving these new workforce models. The three predominant models are 1) the advanced dental hygiene practitioner (ADHP); 2) the community dental health coordinator (CDHC); and 3) the dental health aide therapist (DHAT). Following is a description of the three models (Table 1) and an update on their status.

Table 1. Comparison of proposed and current midlevel dental providers

	Community Dental Health Coordinator*	Advanced Dental Hygiene Practitioner	Dental Therapists
Developed by	American Dental Association	American Dental Hygienists' Association	Dental therapist model developed in New Zealand, in use in 40 countries. The Indian Health Service, Alaska Tribal Health Consortium, employs dental health aide therapists.
Stage of development	Planning stage	Planning stage; curriculum being developed	Eight trained and practicing in Indian Health Service sites in Alaska
CODA standards	Being developed	Not planned	Not planned
Education/ training	18 months	Two-year master's program	Two-year program at dental school in New Zealand; education begins in Alaska in 2007
Certification/ licensure	Certification	Licensure	Certified by Indian Health Service board
Proposed settings	Community-based and public health roles; private offices	Hospitals, nursing homes, clinics, public health settings, or private offices	Indian Health Service clinics
Proposed supervision	Dual: education under general supervision; patient care under direct or indirect supervision	Unsupervised or general supervision; in collaborative practice with dentist, physician, or clinic manager	General supervision; operates under standing orders; dentists review x-rays and treatment plans electronically.
Preventive capacity	Prevention education; fluorides; sealants	Comprehensive prevention services	Fluoride treatments; sealants
Treatment capacity	Gingival scaling; coronal polishing	Manage care for referred periodontal patients; prophylaxis	X-rays; gingival scaling; prophylaxis
Restorative capacity	None	Restorations; simple extractions	Restorations; stainless steel crowns; extractions

*Community dental health coordinators have a proposed skill set that is very similar to the primary dental health aides (PDHAs) who practice in Alaska for the Indian Health Service. There are eleven federally certified PDHAs in practice, and nine more finishing their education.

Source: Chart adapted from one prepared by Shelly Gheshan, senior program director, National Association for State Health Policy, using information from the following sources: American Dental Association Workforce Task Force Report, May 2006; American Dental Hygienists Association Draft Curriculum, January 2006; and Alaska Department of Health and Social Services, Division of Public Health, January 2005.

Dental Hygiene's Response: Advanced Dental Hygiene Practitioner

In November 2004, the American Dental Hygienists' Association (ADHA) began working with curriculum and education experts to develop the curriculum for an advanced dental hygiene practitioner (ADHP). The ADHP is an expanded function dental hygiene model that, as currently proposed, would provide diagnostic, preventive, restorative, and therapeutic services directly to the public in rural and underserved areas.

Dental hygienists are educated in more than 289 accredited programs in all fifty states and the District of Columbia. These programs graduate about 5,000 new hygienists each year. Approximately 49 percent of hygienists have a baccalaureate degree, 44 percent have an associate degree, and 7 percent have completed a certificate program.[2] Dental hygienists held 158,000 jobs in 2004. Currently, the number of dental hygiene jobs exceeds the number of dental hygienists. For this reason, it is not unusual for a hygienist to hold more than one job. Half of all dental hygienists work part-time (less than thirty-five hours per week).[11] Until relatively recently, dental hygienists were employed exclusively in the offices of dentists.

Dental hygiene practice is determined by state law and regulation. While most dental hygienists graduate from a program accredited by the Commission on Dental Accreditation (CODA), this is not a requirement in every state. Dental hygienists in all states provide preventive oral health services, including oral prophylaxis and dental hygiene education services. In many states, they are also allowed to perform radiographic examinations, administer fluoride treatments, and apply sealants.[2] In recent years, state dental practice acts have further loosened restrictions on the practice of dental hygiene. Prior to these changes, dental hygienists practiced exclusively under the direct supervision of a dentist. The expansion of dental hygienists' scope of practice has occurred incrementally and is inconsistent across states.[2] Consequently, practice varies significantly from state to state (see Table 2).

Today, forty-five states allow dental hygienists to practice under the indirect supervision of a dentist (see Tables 2 and 3). In twenty states, hygienists can treat certain patients in public health settings without initial consultation by a dentist.[12] Today, twenty-six states include more than one dental hygienist on their state dental board, and fifteen states have established dental hygiene committees that have varying degrees of influence with the dental boards in their states.[9] However, acceptance of the dental hygiene committee recommendations by state dental boards often is not mandatory.[4] Finally, twelve states allow for direct reimbursement of dental hygienists through Medi-caid[9] although the laws do not always ensure funding is available for this purpose. Reports regarding the quality of dental hygiene practice in supervised and unsupervised practice settings show preliminary evidence that independent dental hygiene practice does not increase risk to the health and safety of the public; these practices consistently attract new patients; and these practices increase access to care, contain costs, and increase visits to the dentist.[13-15]

The ADHP is proposed to be a graduate of an accredited dental hygiene program who completes an advanced education curriculum at the master's degree level. The ADHP model is the result of a directive from the ADHA House of Delegates to its leadership in June 2004. The ADHA has established a ten-member task force to develop competencies for the ADHP. The competencies in draft form have been shared with numerous oral health organizations for their review and comment and were presented at the 2007 ADHA Annual Session. To gain additional feedback from stakeholders, the ADHA has established an advisory committee made up of representatives from thirteen different organizations, including oral health and non-oral health-related groups. This committee met twice during 2005-06.[16]

According to the ADHA, the ADHP is intended to provide primary oral health care services (preventive, therapeutic, and restorative) as a mid-level provider much like a nurse practitioner does today within the medical care model. ADHPs are expected to provide oral health care services to patients who are medically compromised, children, adolescents, and geriatric populations. The ADHPs would practice in a variety of settings such as rural clinics and other institutions where they will provide basic oral health care to underserved and unserved populations. It is intended that the ADHP will be one of the comprehensive health care team members who will identify and make appropriate referrals for those in need of more comprehensive dental services.

Scope of Practice

The responsibilities of this new practitioner will be to provide primary oral health care that includes advanced preventive therapies, diagnosis, and treatment such as restorative procedures to populations with limited access to oral health care.[17] The ADHP will evaluate oral health needs and develop, implement, and monitor dental hygiene care plans for these populations. The scope of practice includes but is not limited to the following:

- health education, counseling, and health promotion;
- diagnosis, treatment, and referral of oral diseases and conditions within a multidisciplinary care team;
- cavity preparation;
- pulpotomies;
- extractions;
- palliative therapy;
- atraumatic restorative therapy;
- pain management strategies;
- nutritional interventions;
- prescription writing for select medications;
- evaluation of health promotion and disease prevention programs for specific populations;
- case management; and
- consultation/collaboratation with other health professionals.

Table 2. States with practice acts that allow some advanced midlevel functions for dental hygienists

	AK	AZ	CA	CO	CT	DE	DC	FL	GA	HI	ID	IA	KS	KY	LA	ME	MD	MA	MI	MN	MO	MT	NE
Apply cavity liners and bases			S	DNR				DR	DR			DNR		DNR					DNR	DNR	DR		
Place temporary restorations		DNR	S	DNR				DNR	DR	S		DNR		DNR		DNR	DR	DNR		DNR	DR	DNR	DNR
Remove temporary restorations		DNR	S	DNR				DNR	DR	S		DNR		DNR				DR		DNR	DR	DNR	DNR
Place amalgam restorations				DNR										DR				DR	DNR	DNR	DNR		
Carve amalgam restorations				DNR										DR					DNR		S		
Finish amalgam restorations				DNR										DR						DR	S		
Polish amalgam restorations	DNR	DNR	S	DNR	S	DNR	DNR	DNR	DR	S	DR	DNR	DNR	DR	DR	DNR	DNR	DNR	DNR	DNR	DNR	DNR	DNR
Place and finish—composite resin silicate restore				DNR										DR							DNR		

	NV	NH	NJ	NM	NY	NC	ND	OH	OK	OR	SC	SD	TN	TX	UT	WA	WV	WI	WY
Apply cavity liners and bases	S	DNR				DR							DR						
Place temporary restorations		DNR	DR		DR	DR	DR		DNR	S	S		DR	DNR				DNR	DNR
Remove temporary restorations		DNR			DR	DR	DR						DR	DNR					
Place amalgam restorations		DNR											DR			DR			DR
Carve amalgam restorations																DR			DR
Finish amalgam restorations																DR			DNR
Polish amalgam restorations	S	DNR	DR	DNR		DR	DR	DR	DNR	S	DR	DNR	DR	DNR	DNR	DNR	DR		DNR
Place and finish—composite resin silicate restore																DR			DR

DR=Physical presence of a dentist is required.
DNR=Physical presence of a dentist is not required. No prior authorization by a dentist required. However, there may be a requirement for a cooperative arrangement with a dentist. Some of these states require additional experience or education of an R.D.H.
S=The supervision level is different in a private dental office from other settings such as an independent practice, long-term care facilities, hospitals, etc.

Source: American Dental Hygienists' Association. ADHA practice act overview chart of permitted functions and supervision levels by state.

Table 3. State legislative movement toward unsupervised hygienists

A compilation of laws and regulations sponsored by organized dental hygiene to achieve its ultimate goal of self-regulation. Listed are the states and the years in which they passed and implemented such laws and regulations.

Ultimate Goals: Total Unsupervised Practice/Primary Care Provider	CO-87
Limited Unsupervised Practice	CA-97; CT-97; MO-01; MN-01; NM-99; OR-97; WA
Permitting Unsupervised Practice in Institutional Settings	CT-97, 99; OR-97; WA
Facilitate Direct Payment by Third Parties/ Independent Contracting	CA; CT-94; CO-97; OR-99; WA-88
Allowing Hygienists to Own Equipment	MT-91
General Supervision in Offices	AK; AZ; CA; CT; DE; DC; FL; ID; IA; KS-98; ME; MA; MI; MN; MO; NE; NV; NH; NM; NY; ND; OH-98; OR; RI; SD; TN-98; TX; UT; VT; WA; WI; WY
General Supervision in Institutions	AK; AZ; CA; CT; DE; DC; FL; ID; IA; KS-98; KY; ME; MA; MI; MN; MO; NE; NV; NH; NM; NY; ND; OH-98; OK; OR; RI; SD; TN-98; TX; UT; VA; VT; WA; WI; WY
Administration of Local Anesthesia/ Nitrous Oxide	AK; AZ; CA; CT; DE; DC; FL; HI; ID; IL; IA; KY; KS; LA; ME; MA; MI; MN; MS; MO; MT; NE; NV; NH; NJ; NM; NY; ND; OH-98; OR; PA; RI; SC-00; SD; TX; UT; VA; VT; WI; WY
Removing Reference or Adding Alternative to ADA Commission on Dental Accreditation	CO; IA
Creating Separate Hygiene Board/Act	CT-92, 94; NM-87, 94
Increasing Representation on Dental Boards/ Enhancing Their Power	AL-97; AZ-90, 95; AR-87, 99; CA-94; CT-92; DE-97; HI-94; ID-90, 94; IA-98; KS-98; LA-90; MD-92, 05; MI-00; MO-01; MS-91; MT-97; NE-88, 94; NV-89, 95; NH-89; ND-91; OK-92; OR-01; SC-88; TN-00; TX-95; UT-96; VT-89; VA-88, 92; WI-98

Note: This listing is intended to depict the progress organized dental hygiene has made in achieving a number of steps toward their ultimate goal of unsupervised, self-regulated practice. The chart is merely intended to provide general information about the issues presented—a snapshot of what has been occurring in the legislatures and regulatory boards over the years; it does not address the specifics or uniqueness of any state law.

This chart was compiled from various sources, including the ADA's "State Legislative Movement Toward Unsupervised Hygienists"; reports issued by state dental and dental hygiene societies; analyses of state laws and regulations; and news reports. A number of these changes were adopted as a compromise between organized dentistry and organized dental hygiene; in other instances, the dental societies opposed the measures.

Education and Training

Since there are already certificate, associate, and baccalaureate degree dental hygiene practitioners, the ADHP will be created as a master's degree level program. The ADHA indicates that it purposely chose competencies to match its vision of the role of an expanded practice professional in the treatment of dental disease rather than as a "trained technician." The competency framework (Table 4) assumes delivery within a university setting but can be taught in other settings as well. The master's degree level program does not duplicate entry level courses required for a registered dental hygienist (R.D.H.) credential.

Status

Since July 2005, the ADHA has been actively advocating for the ADHP at the federal level, specifically seeking federal support for a pilot project that would field-test the ADHP. The pilot project evaluation would include an assessment of the quality of care and cost effectiveness of the ADHP. The ADHA will also seek to determine whether this model could be implemented with isolated populations, such as Native Alaskans, using distance education technology and other technological advancements, such as teledentistry.

In December 2005, the ADHA succeeded in securing report language in Congress that encourages the Health Resources and Services Administration (HRSA) to explore the development of the ADHP. The language reads:

> The Committee is aware that dental disease disproportionately affects our Nation's most vulnerable populations, including many in rural America. New ways of bringing oral

Table 4. Advanced dental hygiene practitioner (ADHP) competency framework

Domains	General Competencies
Provision of Primary Oral Health Care	Health promotion and disease prevention, provision of primary care, case management, and multidisciplinary collaboration
Health Policy and Advocacy	Health care policy and advocacy
Management and Oral Care Delivery	Practice management, quality assurance, leadership, and financial management
Translational Research	Evidence-based practice; problem-solving, critical thinking, and decision making; clinical scholarship and analytical methods for evidence-based practice
Professionalism and Ethics	Professional behaviors, lifelong learning

Source: American Dental Hygienists' Association. Advanced dental hygiene practitioner (ADHP) draft curriculum, June 2006. At: www.adha.org/downloads/ADHP_Draft_Curriculum.pdf. Accessed: July 2007.

> health care to rural and underserved populations are needed. The Committee encourages HRSA to explore alternative methods of delivering preventive and restorative oral health services in rural America. Specifically, the Committee encourages HRSA to explore development of an advanced dental hygiene practitioner who would be a graduate of an accredited dental hygiene program and complete an advanced education curriculum, which prepares the dental hygienist to provide diagnostic, preventive, restorative, and therapeutic services directly to the public in rural and underserved areas.[18]

HRSA has not yet acted on the language, and Congress did not appropriate funding for this purpose. The ADHA has enlisted its members to contact legislators to urge HRSA forward, and efforts for gaining federal support for the ADHP concept by ADHA members are ongoing. The following groups have written to HRSA "urging exploration" of the ADHP: American Public Health Association, Special Care Dentistry Association, National Rural Education Association, and National Rural Health Association.

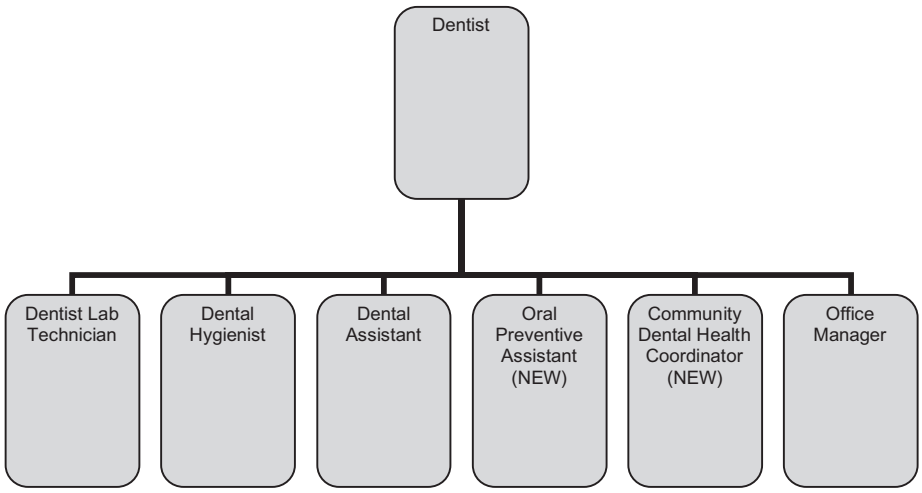
The ADHA is conducting a credentialing feasibility study to assess the level of interest of various stakeholders for advanced credentials in dental hygiene. While the ADHA supports formal education and voluntary accreditation, specific steps have not yet been initiated with the Commission on Dental Accreditation (or any other specialized accrediting agency); however, the ADHA expects that ADHP programs will become accredited.

Dentists Propose New Community Dental Health Coordinator to Address Barriers to Access

There were 175,705 professionally active dentists in the United States in 2004.[19] Approximately 4,500 dentists graduate each year from fifty-six accredited dental schools in the United States.[20] All academic dental institutions must meet quality standards established by the Commission on Dental Accreditation (CODA).

By 2020, the ratio of active dentists per 100,000 population is projected to fall to levels of the 1950s.[21] A large majority of dentists (92 percent in 2004) are in private practice.[22] The average net income for a general dentist in 2004 was $185,940 and for a dental specialist $315,160.[22] As with other health professions, dental licensing is under the jurisdiction of states. State legislation sets the parameters for dental practice that are implemented by state dental boards. State boards are affiliated with the American Association of Dental Examiners.

In 2004, the American Dental Association (ADA) House of Delegates directed three work groups to study dental workforce issues in an effort to improve access to oral health and to address gaps in the oral health care workforce. Resolution 85H-2005 created a nineteen-member workforce task force with membership from each trustee district, two trustees, and representatives of the ADA Councils on Dental Practice and Access, Prevention, and Interprofessional Relations. The task force's charge was to



Source: American Dental Association.

Figure 1. ADA-proposed dental team

analyze data regarding the adequacy of the current workforce to meet the needs of the underserved and make recommendations.

In 2006, the ADA House of Delegates approved the report of the workforce task force and enacted Resolutions 3H-2006 and 25H-2006, which created two new dental team members (Figure 1) and offered a guide that states can use to expand duties for allied dental professionals.[23,24] The ADA workforce model is meant to provide states with maximum flexibility to meet their own needs. The two new members of the dental workforce that the ADA is proposing are outlined in Table 5.

The oral preventive assistant (OPA) model is designed to create a dental assistant with a background in providing patients with oral health education and information and with the basic elements of preventive care. The OPAs may be utilized to provide preventive services for uncomplicated patients, permitting dental hygienists to focus on more complicated patients.

Table 5. Integrated oral health prevention and dental care model

Category	Competencies
Oral Preventive Assistant (OPA)	Preventive services on all patient types including disease prevention, oral hygiene instruction, fluoride and sealant application, coronal polishing, and scaling for Perio Type I (gingivitis) patients.
Community Dental Health Coordinator (CDHC)	Develop and implement community-based oral health prevention and promotion programs; collect diagnostic data; perform a variety of clinical supportive treatments; demonstrate knowledge and skill required for administrative procedures; provide individual preventive treatment services based upon plans; and perform palliative temporization on dental cavities in preparation for restorative care by a dentist.

Source: American Dental Association. Community dental health coordinator: project description. Chicago: American Dental Association, June 2007.

OPAs can also fill a role in public facilities such as community health centers and schools.

The community dental health coordinator (CDHC) is a new dental team model that, like the OPA, in nearly all cases (from a scope of practice perspective) outlines many duties that can be done today by dental assistants and dental hygienists. The ADA plan calls for the CDHC to be trained under an entirely new academic program to help organize community programs, function in remote locations, and provide service to patient groups and areas that are underserved. He or she would be employed by federally qualified community health centers (FQCHC), the Indian Health Service (IHS), state or county public health clinics, or private practitioners serving dentally underserved areas. The CDHC would be supervised by a dentist. Working in facilities without the continuous presence of a dentist, the CDHC could perform palliative temporization of conditions (limited to hand instrumentation only) for later diagnosis and treatment by a dentist.

Status

The ADA's Workforce Models National Coordinating and Development Committee's (NCDC) Curriculum Subcommittee is leading the development of an eighteen-month model academic program for the CDHC. The program will include a comprehensive curriculum with objectives, outlines, teaching aids, resources, learning activities, and evaluation mechanisms. The NCDC hopes to have the curriculum finalized by the end of 2007. Standards for the academic programs that will lead to certification of the CDHC will be developed by CODA.

In April 2007, the ADA issued a call for letters of interest to identify institutions to pilot the CDHC academic model being developed by the NCDC.[25] Eight letters of interest were received from schools, institutions, and organizations interested in piloting the program. The NCDC is reviewing the submissions and plans to make visits to six sites that are potential pilots for the model. The ADA plan is to pilot the program in at least three sites; however, the number of pilot sites may change depending upon the level of private, federal, state, and/or local funding available for the program.

The goal is to test and evaluate the CDHC model in urban, rural, and American Indian community settings. Groups that could pilot the project include colleges, universities, dental schools, vocational-technical schools, technical institutes, federal service training centers, hospitals, community health centers, and federally qualified community health centers. A representative from each institution serving as a pilot site will sit on the NCDC Curriculum Subcommittee.

Each pilot site must train at least eighteen CDHCs over a three-year period and coordinate their activities with a state coordinating committee that includes representatives from the state board(s) of dentistry, dental associations, academic dental institutions, and the NCDC. A two-year evaluation will be conducted to determine the overall success of the pilot programs. The evaluation will determine how effective the programs are in educating individuals as CDHCs, the extent to which they improve access to dental care, and whether they reduce disparities of care in their communities.[26] After the evaluation is completed, the NCDC may consider refinements that would enhance the success of the CDHCs.

In 2006, the ADA Foundation granted $334,000 for development of the CDHC curriculum as the first phase of the project. The ADA is currently seeking additional funding in order to pilot the program. The cost is expected to be around $300,000 annually per site for three years, or $5.4 million for the duration of the project if all six sites are approved to pilot the model. Legislation pending in Congress, if enacted, could provide funds needed to test, evaluate, and implement the curriculum at the local sites. According to the ADA, local sites will contribute to funding by leveraging their relationships with state agencies, foundations, state dental associations, and others in their communities to bring additional resources to the program.

Legislation Sought to Implement the CDHC

The American Dental Association won introduction of the CDHC model in the U.S. House of Representatives. Representatives Albert Wynn (D-4-MD), Mike Simpson (R-2-ID), and Carolyn Kilpatrick (D-13-MI) introduced H.R. 2472, the "Essential Oral Health Care Act of 2007." The bill would amend Title V of the Social Security Act (42 U.S.C. 701 14 et. seq.), adding language for demonstration grants to develop and implement a model community health coordinator education program. H.R. 2472 provides such funds as necessary for six sites to test the CDHC model over a four-year period (2008 through 2012). Each of the six sites must recruit and train at least twelve CDHCs over a three-year period, establish a

"state-specific coordinating committee," and work with the NCDC.

The CDHC is referred to in the legislation as "a new midlevel allied dental professional who will work in underserved communities where residents have no or limited access to oral health care." H.R. 2472 requires that CDHCs be employed by a federally qualified health center, Indian Health Service facility, state or county public health clinic, private practitioner serving dentally underserved populations, or other similar entity. All CDHCs would work under the supervision of a licensed dentist to "provide community-focused oral health promotion and coordination of dental care" in collaboration with health organizations, community organizations, schools, and similar organizations.

The secretary of health and human services (HHS) is responsible for an evaluation of the program over a two-year period that would be conducted by a national evaluation team and coordinated by the American Dental Association's Workforce Models National Coordinating and Development Committee.

A Federal Response to an Oral Disease Epidemic in Alaska: The Dental Health Aide Therapist

Dental care for Alaska Natives is provided by dentists who contract with the Alaska Tribal Health Care System or the Indian Health Service, dentists in the public health service corps, or dentists who volunteer their time. Dental services are directly funded through the Indian Health Service. The Dental Health Aide Therapist Program was created to augment the dental team under the auspices of the Community Health Aide Program (CHAP) authorized by section 121 of the Indian Health Care Improvement Act (IHCIA), 25 U.S.C. § 1616*l*. Today, the program is the backbone of the health care delivery system for rural Alaska Natives, providing more than 350,000 patient visits each year. The program always included dental services; however, in 2002, additional categories of dental health aide therapists (DHATs) were added to address the oral health, geographic, and cultural needs of Alaska Natives.

Despite efforts by the Indian health system to improve health care in Alaska Native communities, providing oral health care remains a huge challenge. Significant geographic barriers combine with severe and unpredictable weather patterns that adversely impact access to health care. As a result, approximately 85,000 native Alaskans live in 200 remote villages without road access and with no access to dental care. To travel to these remote villages, one must go by plane or snow machine or by boat in summer. The villages cannot support a full-time dentist, and getting dental services to villages is expensive. Most patients are seen annually, if at all, when a dentist is flown in to conduct a dental clinic.

The dental health of Alaska Natives is the worst of any group in the United States. Alaska Natives experience oral disease at rates that are 250 percent above the national rate.[27] One-third of Alaska Native children miss school due to dental pain. Two-thirds of Alaska Native adults present signs of periodontal disease.[28] Alaskan Tribal Health Programs experience a 25 percent vacancy rate among dentists and a 30 percent average annual turnover among dentists. According to the native Alaskan community, a dental workforce study showed that even if the Indian Health Service and tribal health system doubled the number of dentists in the state, it would take ten years to eliminate the epidemic of dental disease among Alaska Natives.

To that end, Congress set out seven specific dental objectives to be met by the DHAT program: 1) reducing dental caries in children, 2) reducing untreated dental caries in children and adolescents, 3) reducing the proportion of adults sixty-five years old and over who have lost all of their natural teeth, 4) increasing the proportion of adults who have never lost a permanent tooth due to caries or periodontal disease, 5) reducing periodontal disease in adults, 6) increasing the use of protective sealants on permanent teeth in children, and 7) reducing the prevalence of gingivitis in adults.[29]

Scope of Practice

The DHAT concept is an accepted primary care model in more than fifty countries, including Great Britain, Canada, and New Zealand. The DHAT program focuses on prevention, pain and infection relief, and basic restorative services. Each DHAT is assigned to a dentist who is responsible for writing standing orders, providing general supervision, and being the point of contact for the therapist. Supervising dentists are located in hub hospitals serving the villages. Dentists are connected to the DHAT through a telehealth network. This network, the largest of

Table 6. Categories of dental health aides in Alaska

Category	Scope of Practice
Primary Dental Health Aide I (PDHA)	Oral health education, "toothbrush" prophylaxes, topical fluoride application, oral cancer screenings. (Twenty individuals trained in Alaska.)
Primary Dental Health Aide II	Oral health education, topical fluoride application, prophylaxes and dental sealants, intraoral radiographs, manage dental emergencies, provide atraumatic restorative treatment for caries and assist dentists. (The University of Kentucky developed the curriculum for the PDHA training.)
Expanded Functions Dental Health Aide I (EFDHA)	Assigned to regional hub clinics to assist dentists and provide expanded functions: prophylaxes, placing restorative materials in prepared simple cavities, placing stainless steel crowns. (The Indian Health Service has developed the curriculum, and thirty-five individuals have been educated in Alaska.)
Expanded Functions Dental Health Aide II	Function as the EFDHA I except that filling materials may be placed in both simple and complex cavities. (The IHS has developed a curriculum for the education of this position.)
Dental Health Aide Hygienist	Traditional dental hygienists who provide services including the administration of local anesthetics, ART, and prediagnostic screenings under general supervision. (No one has applied for this designation to date.)
Dental Health Aide Therapist (DHAT)	Located in villages or hub clinics, they provide oral health education, preventive services, diagnosis and treatment of dental caries, uncomplicated tooth removal, and pulpotomies without direct supervision by a dentist. They may also supervise primary dental health aides. (Formal education has been completed for twelve students. An additional six students have been selected for DHAT education.)

Source: Sekiguchi E, Guay AH, Brown LJ. Improving the oral health of Alaska Natives. Am J Public Health 2005;95(5):769-73.

its type in the world, provides dental health aides in remote locations with the ability to relay real-time digital images to dentists in clinics, hospitals, and other hub locations, thus enabling the dentists to view the same images and radiographs being examined by the DHAT.

There are four basic dental health aide categories, two of which function at two levels. Each category accompanied by its scope of practice appears in Table 6.

Education and Training

Education for the DHATs currently serving in Alaska has been conducted at the University of Otago, New Zealand, in an internationally recognized and regionally accredited school of dentistry with eighty-five years of experience in developing and implementing this highly successful practice model. The DHATs complete a two-year program that includes 2,400 hours of didactic education and clinical training. DHATs spend approximately 760 hours treating children in local clinics. Their education includes four weeks in the field learning the responsibilities of a dental aide therapist. The University of Otago curriculum for a Diploma in Dental Therapy is outlined in Table 7.

In October 2006, the Alaska Native Tribal Health Consortium (ANTHC) in partnership with the University of Washington School of Medicine's MEDEX Northwest (which trains physician assistants) announced receipt of a $2.8 million W.K. Kellogg Foundation grant to support a new DHAT education program, Alaska DentEX. The first year of education will focus on oral disease prevention; courses will be taught by faculty from the university's School of Dentistry. However, the University of Washington will not teach irreversible procedures. Instructors hired by the tribal health organizations may teach those procedures in the program during the second year of the DHAT curriculum.

In June 2007, the Rasmuson Foundation approved $170,000 for further investments in oral health care that will include support of the Alaska DHAT program. Since 2002, the foundation has made four grants to the ANTHC for oral health care services to support the DHAT program. This initiative will 1) inform policymakers, organized dentistry, and other stakeholder groups regarding rural oral health care and the DHAT program; 2)

Table 7. Dental health aide therapist (DHAT) curriculum framework, University of Otago

Domains	Modules
General Health Science	Anatomy, cell biology, biochemistry, microbiology, and immunology.
Oral Health Science	Anatomy and histology, microbiology, oral biology, and oral medicine and oral pathology.
Society and Health	New Zealand society, Maori oral health, sociology of health and illness, health promotion concepts and principles, health education, the prevention of oral disease in populations, New Zealand health system, allies in health, and quality of oral health care.
Clinical Dentistry	Communication skills, dental surgery assisting, cross-infection control, pharmacology, dental diseases and their prevention, dental caries and its clinical management, periodontal disease in children, local analgesia and pain control, radiology, radiography, basic dental materials for dental therapy practice, and introduction to patient management.
Advanced Clinical Dentistry	Dental radiography, operative management of dental caries (amalgam, GIC, composite and compomers, and stainless steel crowns), dental pain (toothache), differential diagnosis of dental pain, management of deep carious legions, pulp therapy for the primary dentition, extraction of deciduous teeth, management of traumatic injuries and school dental therapist's role, management of periodontal diseases in children, orthodontic treatment and school dental therapist's role, routine dental care of children with special needs, clinical oral pathology, anomalies of tooth formation and eruption, teenage issues (behavior management and caries), and young permanent dentition (premolars and molars).
Dental Therapy Practice	Knowledge of the dental therapy work environment, records (including computer records, work experience, and legal requirements to practice dental therapy). Includes four weeks in the District Health Board carrying out dental care under the supervision of a school dental clinic.

Source: University of Otago Department of Oral Health. Diploma in dental therapy. At: www.phs-dental.org/depac/chap/dt_dip.booklet.doc. Accessed: July 2007.

develop a comprehensive oral health delivery plan for the Bristol Bay region; and 3) create an internship program for out-of-state fourth-year dental students in rural Alaska.[30]

The following groups have endorsed the DHAT program: Alaska Native Health Board, Nation Indian Health Board, Indian Health Service, American Public Health Association, American Association of Community Dental Programs, National Rural Health Association, Alaska Rural Health Association, Alaska Primary Care Association, Hispanic Dental Association, American Dental Hygienists' Association, and American Association of Public Health Dentists. In addition, Oral Health America has issued a special commendation to the DHAT project in Alaska.

Certification/Accreditation

Currently, the community health aide (CHA) program and its dental component do not fall within the parameters of the Alaska State Medical or Dental Practice Acts. As part of the CHA program, each DHAT meets qualifications established by the Federal Community Health Aide Program Standards and Procedures.[31] This requires certification by a twelve-member federal board that includes one dentist. The board is authorized by Congress and appointed by the Indian Health Service under standards adopted by the Alaska area director of the Indian Health Service. The board has the ability to prohibit someone from practicing if necessary.

The DHATs undergo a competency-based credentialing process that evaluates services they provide in day-to-day practice. Each DHAT's scope of practice is directly related to his or her individual competencies. This credentialing process includes domains of patient access, chart review, and patient satisfaction surveys. The process for credentialing DHATs requires 400 hours in preceptorship under the direct supervision of a dentist. DHATs must demonstrate their ability to perform each procedure for their scope of practice before they may practice under a consultation/referral status with a dentist—usually the dentist who supervised them during the preceptorship. This same dentist is responsible for writing the standing orders for the DHAT and for the oversight and recertification of the DHAT. DHATs must be recertified on a biennial basis. The continuing education requirements for DHATs are identical to those of dentists in the state of Alaska.

Philanthropic support for this program has come from the Rasmuson Foundation, Paul G. Allen Charitable Trust, Ford Foundation, Alaska Mental

Health Trust, Robert Wood Johnson Foundation, and Kellogg Foundation.

Status

Although federal legislators failed to reauthorize the Indian Health Care Improvement Act in the 109th Congress, legislation introduced in 2007[32,33] includes compromise language that has been accepted by both chambers regarding the DHAT program. The language, which preserves the ability of dental therapists to continue serving rural Alaskans, limits the scope of practice of DHATs. Specifically, if enacted, the legislation will ensure that pulpal therapy (not including pulpotomies on deciduous teeth) or extraction of adult teeth can be performed by a dental health aide therapist only after consultation with a licensed dentist who determines that the procedure is a medical emergency that cannot be resolved with palliative treatment, and further that dental health aide therapists are strictly prohibited from performing all other oral or jaw surgeries, provided that uncomplicated extractions shall not be considered oral surgery under this section.

The language further prevents the DHAT program from being nationalized in any of the lower forty-eight states as part of the national Community Health Aide Program and directs the Indian Health Service to conduct an evaluation of the DHAT program and report to Congress.[32] The evaluation must specifically consider 1) the ability of DHAT services to address the dental health needs of Alaska Natives; 2) the quality of care provided through those services; and 3) whether there are safer and less costly alternatives to the DHAT program.

Two assessments in the United States have reviewed the quality of care provided by the DHATs to Alaska Natives.[34,35] The most recent was a chart review of the DHATs currently practicing in rural Alaskan communities with the purpose of determining whether the DHATs are delivering care within their scope of practice; determining whether there were any recorded adverse outcomes or complications resulting from treatment; and comparing the entries from patient charts of DHATs with patient charts of those treated by dentists during the same time period. This study reviewed charts at three of the health corporations that employ DHATs, two regional hub clinics, and three remote village clinics in Alaska. Only procedures considered "irreversible" were counted for the analysis. Three categories were reviewed: 1) DHAT under direct supervision, 2) DHAT under general supervision, and 3) dentists as a control group. While there were limitations in the study due to its small sample size and the short history of DHAT practice, the conclusion was that no significant differences in treatment were rendered by the DHATs compared with the dentists and there were no significant differences in the incidence of complications from treatment between the two groups.[35]

The ANTHC, the Institute of Social and Economic Research (ISER), and the University of Alaska-Anchorage (UAA) are collaborating on a broader evaluation of various aspects of the DHAT program. The project will evaluate the program's impact on access to quality dental care for rural Alaska Natives and determine whether care is culturally acceptable and integrated into the overall health delivery system. The project is collecting baseline data on oral health status from thirty-seven villages. It will include control villages with and without dental health aides and will use the Association of State and Territorial Dental Directors (ASTDD) model to follow the effects of the DHATs' activities. A Dental Health Aide Evaluation Advisory Committee is being assembled by several philanthropic organizations that will seek input on evaluation design from professional dental associations such as the ADA and AAPHD and other interested organizations.

Although not altogether opposed to the use of DHATs for certain procedures, the ADA and the Alaska Dental Society (ADS) had advocated for the removal of the dental health aide therapist's ability to perform "irreversible surgical procedures." The ADA claimed that DHATs did not have sufficient education to extract teeth, prepare cavities, and perform pulpotomies. Therefore, the ADA argued that DHATs exposed patients to "a lower standard of care." (Licensed dentists typically complete eight years of higher education to graduate from dental school.) To that end, the ADA and the ADS filed a lawsuit in January 2006 against the ANTHC (the entity that administers the dental therapists program), the State of Alaska, and eight dental health aide therapists on the grounds that the DHATs were illegally performing "unlicensed" dental procedures.[36]

On June 27, 2007, the Alaska Superior Court upheld the decision of the Alaska attorney general, who had previously ruled in favor of the continuation of the DHAT program.[37,38] The court's decision was based upon the Federal Indian Health Care Improvement Act. It ruled that the federal act preempted Alaska state law with regard to the provision of

oral health care to Alaska Natives. After the court decision, ADA President Kathleen Roth, D.D.S., and Executive Director James B. Bramson, D.D.S., announced a "full and final settlement" with the ANTHC and the state of Alaska. The ADA said that a settlement was "imperative" to maintain the ability to work cooperatively with the ANTHC to improve the oral health of Alaska Natives.

Under the settlement, the ANTHC has agreed to 1) ask the Indian Health Service to add a licensed dentist nominated by the ADA to the Community Health Aide Program Certification Board's Dental Academic Review Committee; 2) support a pilot program for the ADA's community dental health coordinator model; 3) support a longitudinal review of the use of dental health aides, dental health aide therapists, public health dentists, private sector dentists, community dental health coordinators, and any other model that provides direct care to patients; and 4) work with the ADA to preserve the language in the Indian Health Care Improvement Act that limits the scope of DHAT practice and confines it to the state of Alaska.

In return, the ADA has agreed to 1) work with dental schools to build residency partnerships and support residencies and rotating internships in Alaska; 2) work to develop a pipeline program offering tuition incentives to dental school graduates to work for at least two years in remote areas of Alaska; and 3) contribute $537,500 to the ANTHC Foundation and $75,000 to the state of Alaska to promote preventive oral health in remote Alaska. According to the ADA, this contribution relieves the ADA of paying the significant attorney's fees to which the ANTHC is entitled under Alaska law. Drs. Roth and Bramson emphasized that the contribution will not fund the DHAT education program.[39]

Dental Education: A Major Force in Sustaining the Oral Health Workforce

Academic dental institutions educate a broad spectrum of diverse oral health professionals who sustain the oral health of our nation. These institutions include not only dental schools, but also schools and programs in the allied dental professions as well as those hospitals and other independent institutions that have advanced dental education programs. As new dental workforce models evolve, it is critical that our nation reinforce the bedrock upon which our oral health care workforce is built—namely, that of academic dental and allied dental education. Like other health professions education institutions today, academic dental institutions now operate at maximum capacity. There are currently more than 2.5 dental school applicants for every first-year student position that is available. While new dental schools have been approved, there is still the problem of 350 vacant faculty positions in existing dental schools. More than three-quarters of faculty vacancies are full-time positions. In 2001-02, approximately one in four dental schools had ten or more faculty vacancies. Of the faculty who leave, more than half (53 percent) enter more lucrative careers in private practice.[40]

Although it is not ADEA's role to develop new practice workforce models, ADEA policy supports extended employment of allied dental professionals as one way to improve oral health care delivery and availability.[41] While academic dental institutions can not make changes in laws and regulations, they can inform and influence legislative leaders about ways that allied dental professionals can complement, supplement, or, in some cases, substitute for dentists to alleviate severe access to care problems in their communities and states.

As states expand scopes of work and as levels of supervision are modified, education and credentialing requirements must keep pace with practice requirements. To ensure the competence of allied dental professionals, the academic dental community must continue to support accredited programs, national certification of dental assistants and laboratory technicians, and licensure of dental hygienists. The academic dental community also needs to anticipate and prepare for curriculum changes that these new workforce models will demand. These new workforce pressures place an additional burden on academic dental institutions, many of which are also facing the need to modernize aging infrastructures, adapt to rapid changes in technologies, and address the challenges of faculty shortages. Enhanced financial support for dental education from state and federal governments is needed to allow these institutions to expand their educational capacity and respond to the needs of an evolving oral health care workforce. Funds are also needed to support institutional efforts to build a pipeline of diverse professionals who enter careers in oral health through accredited academic programs. While many dental education institutions receive financial support from states and dental school residents receive support from the dental

graduate medical education (D-GME) program, these funds have diminished in recent years.

The United States spends more money per capita on health care than any other country in the world.[42] Yet there are still many underserved groups that do not have any access to oral health care. In a handful of states, the need for oral health care is so great that other medical professions are being utilized to provide services traditionally provided by oral health care professionals.[2] To address the complex circumstances facing our dental workforce, solutions will almost certainly involve a broad spectrum of interests that include oral health and public health care professionals, representatives from minority interests, insurers and other payers such as businesses, consumers, and, most importantly, federal and state legislatures. Dental educators, including those in dental schools, allied dental programs, and advanced education programs, must work together to strengthen and build partnerships within these communities to ensure their seat at the table as broader discussions about our nation's health care workforce ensue. It is only by working together with one voice that dental education will have the means to meet the challenging diversity of oral health needs facing our nation and to maintain a viable and strong academic dental education system.

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