

Can Midlevel Dental Providers Be a Benefit to the American Public?

Tobias E. Rodriguez, PhD
Audrey L. Galka, DDS
Ernestine S. Lacy, DDS
August D. Pellegrini, DDS
Domenica G. Sweier, DDS, PhD
Laura M. Romito, DDS, MS

Abstract: The use of midlevel dental providers (MLDPs) is being debated as a means of reducing oral health disparities and increasing access to care among underserved populations. Midlevel dental providers include the advanced dental hygiene practitioner, community dental health coordinator, dental health aide therapist, and dental therapist. While midlevel providers are new to the U.S. dental profession, medicine has utilized these positions for years. Medical literature has shown mixed results as to whether midlevel providers improve access to care and increased practice efficiency, however, it has demonstrated clearly that the quality of care outcomes of these providers have been comparable to those of physicians. Studies of MLDPs suggest potential practice and public health benefits. With appropriate training, licensure, supervision, and deployment to geographical areas of significant need, we believe MLDPs could increase access to care to underserved populations and help in the prevention of deaths attributable to untreated dental disease.

Key words: Midlevel dental provider, access to care, oral health.

The topic of midlevel dental providers is controversial. This emerging group of practitioners includes the community dental health coordinator (CDHC), advanced dental hygiene practitioner (ADHP), dental health aide therapist (DHAT), and dental therapist (DT). These providers have been described as both the solution to the disparities in oral health care as well as a threat to the survival of the dental profession. The

TOBIAS RODRIGUEZ is Vice President for Education at The Academy for Academic Leadership in Atlanta. **AUDREY GALKA** is Associate Professor and Chair of the Department of Cariology and Restorative Dentistry at Nova Southeastern University College of Dental Medicine. **ERNESTINE LACY** is Associate Professor in the Department of Restorative Sciences and Director of the Office of Student Development at Baylor College of Dentistry in Dallas. **AUGUST PELLEGRINI** is a private practice dentist and Assistant Dean, Office for Clinical Affairs at the University of Medicine and Dentistry New Jersey (UMDNJ) Dental School in Newark. **DOMENICA SWEIER** is Clinical Associate Professor in the Department of Cariology, Restorative Sciences and Endodontics at the University of Michigan School of Dentistry in Ann Arbor. **LAURA ROMITO** is the corresponding author. Her affiliation and addresses are: Laura M. Romito, DDS, MS, Associate Professor, Department of Oral Biology, Indiana University School of Dentistry, 1121 West Michigan St., Indianapolis, IN 46202; (317) 278-6210; lromitoc@iupui.edu.

authors are a diverse group of practitioners, dental educators, clinical researchers, and leaders, who share an appreciation of the dire need to improve access to oral healthcare for all segments of American society. We assert the position that midlevel dental providers (MLDPs) could be beneficial for the American public. Our contention is based on an examination of the literature concerning midlevel medical and dental providers with respect to several key issues: productivity, access to care, patient satisfaction and quality. This article significantly expands upon Shaefer and Miller's thesis, which briefly summarized the case for and against midlevel dental providers.¹

Background

The current public infrastructure for oral health care is insufficient to meet the needs of all segments of our society.^{2,3} At-risk populations include ethnic and racial minority groups, older adults, pregnant women, children with disabilities, and those whose mental or physical health, language skills, low socioeconomic status or geographical locations limit their access to or acceptance by many private practice dentists.^{4,5,6} The Institute of Medicine report *Improving Access to Oral Health care for Vulnerable and Underserved Populations* stated that in 2008, over four million U.S. children did not obtain required dental care because of financial limitations.⁷ Indeed, America's consciousness was raised on the issue by the case of a 12-year-old, African American, Maryland boy whose untreated dental infection became fatal.⁸

Private dental practices remain the primary U.S. oral health care delivery system and although many of the underserved are insured by Medicaid and the Child Health Insurance Program, less than 25% of private practice dentists are providers for these programs.⁶ Many individuals must seek care from the oral health care safety net, an informal network of facilities, providers, and programs such as federally qualified health centers (FQHC), dental schools, public school clinics, and others.⁶ However, when suffering with oral pain, disadvantaged individuals may seek care from unlicensed dentists, physicians, or hospital emergency departments (ED).⁹ One solution proposed has been to develop new categories of oral health providers, trained and deployed so as to specifically care for these at-risk populations.

Midlevel Dental Providers

There are currently several categories of MLDPs (Box 1). In 2004, the American Dental Association (ADA) developed the Community Dental Health Coordinator (CDHC) model including an 18-month CDHC training program. The U.S. House of Representatives approved funding to pilot the this model in FQHCs, the Indian Health Service, state, county or public health clinics, and private practitioners serving in dental shortage areas.³ As part of a dentist-led team, CDHCs operate as community health workers focused on education, prevention, and connection of patients with dentists who will render care.¹⁰

In 2011, New Mexico became the first state to approve the CDHC model. Community dental health coordinators can provide services under general supervision and can work in other areas besides dental offices and clinics.^{2,10} Recently, the ADA

Box 1.**COMPARISON OF DENTAL MIDLEVEL PROVIDERS**

	Advanced Dental Hygiene Practitioner (ADHP)	Community Dental Health Coordinator (CDHC)	Dental Health Aide Therapist (DHAT)	Minnesota Dental Therapist (DT)
Origin	Developed by ADHA	Developed by ADA	Based on DT model from NZ; now in AK-Health Service and implemented by Alaska Tribal Health Consortium	Created by Minnesota Legislature
Accreditation	No CODA standards	CODA standards in development	No CODA standards	CODA voted to set accreditation standards
Education	Baccalaureate degree in dental hygiene + 2 years M.S. degree	18 month training programs	2 academic years post high school	University of Minnesota: 40-month baccalaureate track with high school diploma; or 28-month Master's track with B.S.
Licensure	Licensure	No state license required; Certification	No state license required; Certification by Indian Health Service board	Licensure

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Box 1. (continued)

	Advanced Dental Hygiene Practitioner (ADHP)	Community Dental Health Coordinator (CDHC)	Dental Health Aide Therapist (DHAT)	Minnesota Dental Therapist (DT)
Supervision	Unsupervised/collaborative practice with DDS	Patient care under direct/indirect supervision	General supervision—operates under orders	Collaborative management agreement (CMA) with Minnesota-licensed dentist; some services under general supervision/others under indirect or on-site supervision
Scope of Practice	Comprehensive oral disease prevention, restorations and simple extractions	Prevention education, fluorides, sealants, scaling, polishing, temporary restoration, caries removal with hand instruments, triage patients	Prevention education Fluorides, sealants, x-rays, prophyl, restorations, crowns, extractions	<i>General supervision:</i> Prevention education, x-rays, fluorides, sealants, placement of temporary restorations, pulp vitality testing, tooth reimplantation, mechanical polishing <i>Indirect supervision:</i> Emergency palliative treatment of dental pain, cavity preparation, restoration of primary & permanent teeth, pulpotomies of primary teeth, placement of temporary crowns, extractions of primary teeth, dispense & administer analgesics, antiinflammatories & antibiotics

and A.T. Still University's Arizona School of Dentistry and Oral Health announced an ADA-funded CDHC training program with three students in Mesa, Arizona. Other pilot sites at Temple University's Kornberg School of Dentistry, the University of Oklahoma College Of Dentistry, and the University of California at Los Angeles in conjunction with Salish Kootenai College in Montana will be training students to work in urban, rural, and Native American communities, respectively. In collaboration with Rio Salado College in Tempe, Arizona, all of these programs will provide online and clinical curricular components.¹¹

The model for Alaska's dental health aide therapist (DHAT) has the longest documented history of formalized training and implementation. Initially trained as *dental nurses*, DHATs began practicing in 1921 in New Zealand to address pediatric oral health needs.¹² Other countries and regions have adopted this model with varying degrees of success.¹³ In Alaska, as many as 85,000 residents live in remotely situated Native Communities. Coupled with a high attrition rate for dentists of the Alaskan Tribal Health Programs, many Alaskans receive dental care infrequently. As Alaskan Natives' oral health is among the poorest nationwide,¹⁴ Congress developed specific objectives for DHAT programs to reduce oral disease levels in this population. Dental health aide therapists focus on prevention and alleviating pain and infection. They work under the general supervision of a dentist located in an urban hospital serving the Native villages. Both DHATs and dentists in clinics and hospitals facilitate patient care through a telehealth network in which patient health information, radiographs, and images can be viewed simultaneously. Dental health aide therapist training was initially conducted at New Zealand's University of Otago. However, in 2006, with W.K. Kellogg Foundation funding, a partnership was formed between the Alaska Native Tribal Consortium and the University of Washington's School of Medicine MEDEX Northwest to develop AlaskaDentEX, a new DHAT educational program. Dental health aide therapists have been deployed in 25 rural Alaskan villages that include more than 35,000 residents. The W.K. Kellogg Foundation has since announced a funding initiative to develop DHAT programs in Kansas, New Mexico, Ohio, and Vermont.¹¹

In 2004, the the American Dental Hygienists' Association proposed the Advanced Dental Hygiene Practitioner (ADHP) model. The ADHP, a Master's degree-level hygienist, is intended to provide primary oral health care services to the underserved. The ADHP would evaluate patients' oral health needs and develop, implement, and monitor dental hygiene care plans. Working in a variety of settings, they would also provide advanced preventive therapies, diagnosis, restorative treatment, and make appropriate referrals for patients requiring additional or comprehensive care.¹⁵

The latest model of MLDPs is the Dental Therapist (DT), which was established in 2009 as an effort to address oral health disparities and expand access to dental care in Minnesota.¹⁶ Subsequently, the DT program at University of Minnesota School of Dentistry and the Advanced Dental Therapist Provider (ADT) program at Metropolitan State University (St. Paul, Minnesota) and Normandale Community College (Bloomington, Minnesota) were created.¹⁷ A collaborative management agreement with a licensed Minnesota dentist outlines DT functions within the legal scope of practice. The dentist is responsible for patient examinations, diagnosis, treatment planning, and

assisting the DT if treatment complications arise.¹⁸ Compared with the DT, the ADT has a broader scope of practice and can practice off-site without a dentist present, but is required to get approval from the supervising dentist before performing restorative and surgical procedures.¹⁶ The ADT can evaluate and compose treatment plans, perform non-surgical extractions of advanced periodontally involved permanent teeth, and provide all services of a DT.¹⁹

For decades, medicine has utilized midlevel providers: nurse practitioners (NPs) and physician assistants (PAs). While differences exist, there are ample parallels between the medical and the proposed dental midlevel providers from which information can be drawn to understand the probable impact of MLDPs in oral health care delivery.

The Experience in Medicine: Physician Assistants and Nurse Practitioners

Physician assistants and NPs emerged as midlevel practitioner categories in the 1960s in an effort to improve access and reduce health care costs.^{20,21} Physician assistant training has evolved from a non-degree program into a competency-based, Master's-level accredited program with a medical school-like curriculum.²² The PA's role is determined by the supervising physician; it must be within the physician's scope of practice; the PA's training and experience; and state law. The American Medical Association has developed guidelines for the PA's role within a physician-led health care team. All PAs are required to work under the delegated authority of a physician supervisor. However, most states allow general supervision as long as some form of communication is maintained. This facilitates the PAs' work in underserved areas—that is, locations where a deficiency of health care resources and medical personnel, particularly physicians, exists.²³

The NP model was developed to train nurses to assume tasks typically performed by physicians, and today most NP graduates earn a Master's degree.²⁴ Nurse practitioners' scope of practice is determined by state law.²³ In many states, NPs are required to work in collaboration with a physician; however, in others they may practice and prescribe independently, particularly when deployed in underserved areas.²⁵

For NPs and PAs, license to practice requires graduation from an accredited program, and passing a certification examination. State medical and nursing boards typically regulate the clinical activities and scope of practice for PAs and NPs, respectively.²³ Fifty percent of PAs and 85% of NPs practice primary care; they are more likely than physicians to practice in rural areas and to work with the underserved.²⁰ Typically, they play a *supplementary* role in which physicians delegate tasks to improve the efficiency of care provided, a *complementary* role performing functions their supervising/collaborating physicians do not perform, or a *substitute* role by taking the place of physicians by delivering the majority of services commonly provided by physicians.

Productivity. An analysis of the early economic research on the impact of PAs on rural and solo practices found that PAs increased the number of patients treated, and improved the practice workload and income.²⁶ In a study evaluating the economics of employing a PA *versus* adding another physician to a general practice, the PA was found to have seen the same types of patients and performed the same tasks as the physician

86% of the time; the low PA compensation to production ratio indicated an economic benefit to the practice.²⁷ When a national database on group medical practices was assessed, the compensation-to-production ratio was determined to be lowest for PAs, higher for NPs, and highest for family physicians.²⁸

A study of inpatients in an academic medical center showed that PAs can provide a safe alternative to physicians, with comparable efficiency.²⁹ Other studies focused on the production efficiency of PAs/NPs, compared with physicians, as measured by the number of office visits provided per unit time or per unit of labor cost. Physician assistants provided 76–100% as many office visits as physicians per unit time,^{30–32} and the use of PAs lowered labor costs³³ and increased efficiency.²⁸ Wodinsky³⁴ detailed how a group practice utilizing midlevel providers reduced hospital ED use, attracted new patients, and increased revenue. Staffing the office with two dedicated NPs/PAs overseen by one physician gave more flexibility to meet patient needs, and reduced operating costs. Compared with primary care physicians in similar roles, compensation, malpractice coverage, and overhead were all lower for the NPs/PAs. Morgan³⁵ found that PAs did not affect overall office resource use, tended to serve as physician substitutes, had lower labor costs, and contributed to increased efficiency in health care delivery. However, after conducting an extensive systematic review on the economic outcomes of several types of nonphysician clinicians, including PAs and NPs, Laurant *et al.*³⁶ concluded that the impact on health care costs was mixed, providing weak and contradictory evidence of the cost benefit of nonphysician clinicians.

Access to care. A key to enabling midlevel providers to improve access to care is ensuring they can be reimbursed through insurance programs and companies. The 1977 Rural Health Clinics Act made available the first direct Medicare and Medicaid reimbursement for medical midlevel providers working in freestanding, physician-directed rural clinics in underserved areas. Typically, PAs receive Medicaid and Medicare reimbursement at 85–100% of physicians' rates.³⁷ The 1997 Balanced Budget Act allowed for direct Medicare reimbursement for NPs/PAs at nonhospital sites, eliminating the necessity for physician involvement unless required by state law.²⁵ Today, "any willing provider" laws make it mandatory for all health insurers to accept any provider whose license, training and scope of practice are for services that their plan covers and who agree to plan terms and conditions.²⁵

The Rural Health Clinics Act, facilitated NPs/PAs' deployment in rural areas.²⁵ Federal Title VII funding helped provide a pipeline of PAs to underserved communities; however, while PA programs have grown, the funding from Congressional appropriations has decreased. This has reduced the ability of PA training programs to lure graduates away from specialties and into health care shortage areas.^{38,39} While the PA training is based on a general practice model, their training and practice experiences allow them to integrate into various specialty practice settings. If one so desires, a PA can obtain additional formal specialty education through post-graduate PA training programs or residencies. Doing so may increase opportunities for higher salary and career advancement. Similarly, NPs can earn postgraduate certifications in certain focus areas, such as women's health, but their training in specialty areas is typically achieved on the job by working with physician specialists.^{38,39}

Patient satisfaction and quality of care outcomes. Quality of care monitoring is

regularly conducted through hospital systems and documentation is required for renewal of PA privileges. Patient satisfaction and quality of care outcomes evaluations of PA/NP care have been positive.^{37,40} For example, in the Kentucky Health Survey of nearly 200 PA-treated patients, over 90% expressed satisfaction with their care.²² However, NP/PA roles have expanded to acute care clinics and hospital EDs. As these changes take place, midlevel medical providers are treating more complex cases; in some instances, better outcomes were not achieved when they treated such cases independently rather than under close physician supervision.^{41,42}

Most studies comparing NP/PA care to that of physicians have been conducted in primary care settings. In a randomized trial evaluating primary care outcomes in over 1,300 patients treated by either NPs or physicians, patient outcomes were comparable.⁴³ Lenz's⁴⁴ study of 1,316 patients randomly assigned to either a NP- run or an MD-run primary care practice revealed no clinically significant differences in specific measures of patient outcomes. Two detailed and extensive systematic reviews have produced evidence that the primary care delivered by medical midlevel providers can maintain and often improve the quality of care and patient outcomes^{44,36}

Dental Midlevel Providers

Fulton provided an early report on New Zealand's efforts to identify and treat dental disease among children using dental nurses in a school-based program.⁴⁵ Based on a clinical assessment of decayed, missing, and filled teeth (DMFT) in 4,000 children, he described the program as effective in dental caries control due to the low tooth mortality and a high level of treated caries. Roberts⁴⁶ reported that the School Dental Service program had widespread support and demonstrated evidence that from 1925–1974, the program was effective based on reduced tooth mortality amongst children 2.5–13 years of age. However, despite the widespread use of dental therapists through this program, disparities still exist today in the oral health of New Zealand children, particularly in socially disadvantaged and minority groups. These persistent disparities are thought to involve both material and behavioral factors.⁴⁷

In the United Kingdom (UK), which has a lengthy history of dental therapist utilization, the therapist's role can vary with the composition of the dental team and many DTs consider their skills underutilized.^{48,49,50} Dental therapist recruitment and retention concerns included low pay relative to other oral health professionals and inconsistent remuneration schedules.⁵⁰ Harris and Burnside⁴⁸ evaluated the economics of DT utilization from a pilot incorporating DTs in four dental private practices and found that the duties of the DTs in each practice varied widely and in all four practices, the income generated did not cover expenses of employing the DT. However, the UK remuneration system for general dentists providing National Health Service care has created a challenge to incorporating DTs into general practice teams. Nonetheless, a case study of six UK dental practices demonstrated how disincentives to DT delegation embedded within the remuneration system could be overcome by changing reimbursement arrangements within the practice.⁵¹

Sun⁵² *et al.* compared patient satisfaction for care delivered by UK dentists and dental therapists. Although the study was limited by its lack of randomization and

dental procedure identification, the results suggested that in terms of communication, understanding, and technical skill, patients seen by therapists had a significantly higher level of satisfaction. However, a survey of 1,000 UK adults found that only 10% were aware of dental therapists as a professional group, suggesting a need for public education on the role of DTs.⁵³

Since the early 1970s, Canada employed dental therapists through two separate programs. One program provided oral health care for Canada's Indian, Inuit, and Métis populations, and the other addressed oral health care among Saskatchewan children. The dental therapists, high school graduates who completed two years of training at Canada's National School of Dental Therapy (NSDT), repeatedly demonstrated the ability to provide oral health services of equal or better quality than dentists. Additionally, the Canadian DTs were shown to be both cost-effective for the government-sponsored health care system and well-accepted by the public. However, in the decades that followed, due to federal funding cuts, both programs were closed. Today, Canadian DTs are employed in the private sector by supervising dentists, academia, and Indian health and school-based programs; however, their future is uncertain.⁵⁴

Since MLDP models are new in the U.S., available outcome studies are scarce. A pilot study assessing the treatment provided by Alaska's DHATs via a chart review of over 640 irreversible dental procedures in approximately 400 patients found that, compared with dentists, DHATs treated significantly more children. However, no other significant differences in consistency of diagnosis, treatment, or postoperative complications were noted between patients seen by DHATs versus dentists.⁵⁵ Although limited by its scope, sample size, and its subjective definition of quality, a study evaluating the clinical technical performance of DHATs in various restorations indicated that treatment outcomes were at an acceptable level and comparable to that of dentists treating similar populations.⁵⁶

Discussion

Economic fluctuations, an aging U.S. population, and provider shortages have contributed to access to care issues which have altered the dynamics of the oral health care workforce. A report forecast that even with an anticipated additional 5,600 dental graduates, by the year 2020 the ratio of dentists to U.S. population would be less than it was in 2010.² Dental midlevel providers are advocated as one possible solution to this worsening problem.

Based upon reports from the medical and dental literature, there is reason to believe that these new workforce models have the potential to effectively, safely, and efficiently contribute to the U.S. oral health care delivery system, particularly in dental safety net programs and nonprofit community based practices whose primary mission is caring for the underserved. We found little indication in the literature involving medical and dental midlevel providers that patient safety is a significant problem.^{22,43,37,40,44} Further, patient safety can be maintained with a rigorous MLDP educational program, clinical training, licensure examinations and a level of practice and supervision that is consistent with training. Currently the focus is on further development of MLDP programs,

standards, and criteria consistent with existing standards for oral health care providers, and for existing programs, to move forward with accreditation processes. For example, the Commission on Dental Accreditation (CODA) recently voted to set accreditation standards for U.S. dental therapist programs.² The Minnesota DT program includes program-specific courses, but students also take classes with dental and dental hygiene students to learn to work as an oral health care team and gain an appreciation for each team members' role.¹⁸ This could help increase acceptance of the MLDP among other oral health professionals and patients.

The dental profession does not have a national systematic monitoring system for quality assurance. Unlike hospitals, dental practices do not measure and report outcomes of care. However, specific treatment outcomes may be compared to a set of standardized criteria. Process and outcome measures such as technical adherence to published standards, alleviation of pain, and patient satisfaction can then be used to assess quality of care with some degree of validity. Overall, the literature has established that the outcomes of care delivered by NP/PAs and physicians are comparable, particularly in primary care and preventive settings.^{43,57,40,42,44} Studies on dental auxiliaries, Canadian DTs and DHATs have shown similar results.^{54,55,58,59}

The question of whether medical midlevel providers have actually improved access to care remains equivocal, in part because providers may have little impact on some of the factors that impede individuals from valuing or seeking health care. These factors notwithstanding, we believe that the effectiveness of MLDPs in improving access to care will depend upon their deployment, reimbursement, and scope of practice. As seen in medicine, without state and national policy incentives, market forces may lure them to other practice venues. Therefore, emphasis should be placed on deploying MLDPs to areas and populations in need. For example, by Minnesota law, DTs and ADTs must serve uninsured, underserved populations or work in dental health professional shortage areas.¹⁶ Serendipitously, this mandate may have also assisted DT graduates to distinguish themselves from other allied dental workers; they have been described as "professionals dedicated to serving the underserved."¹⁸^[p.631] This underscores the cultural, social and ethical elements of a MLDP career and highlights a unique role for them in the oral health care team.

As occurred with medical midlevel providers, state and federal payer programs must enable reimbursement for a broad range of services provided by these new allied oral health workers, including services performed in alternate settings, such as schools, mobile clinics, and nursing homes. Midlevel Dental Provider models primarily focus on preventive, palliative, and basic restorative treatments.^{2,6} Increasing such services in underserved populations can improve the oral health of individuals in these groups and decrease both short-term and long-term health care costs. The use of MLDPs in public, corporate, or nonprofit oral health care delivery systems may be an economically feasible means to address the needs of underserved populations through efficiencies and improved volume.

In medicine, midlevel providers often have indirect or general supervision and work in teams with collaborating or supervising physicians, and this has successfully facilitated their work in underserved areas.^{25,23} This model is also used with Alaskan

DHATs and recently, in Arizona, the legislature allowed qualified dental hygienists in public health settings to enter into an affiliated practice relationship with dentists to provide care for underserved populations without general or direct supervision. Facilitated by teledentistry, such a program can be adapted to any MLDP model so that practitioners can be connected to other members of the oral health care team.⁶⁰ Such innovation requires changes in state dental practice acts and cooperation between organized dentistry, allied providers, communities and legislators to place the priority on the oral health needs of its citizens.

Findings from the medical and dental literature on the effect of midlevel providers on practice efficiency are inconclusive.^{27-30,32-36,48-50,61} The financial implications of MLDP utilization are complex and depend on a number of factors both external and internal to the practice. It is well-established that allied dental professionals such as hygienists and expanded function dental assistants can have a positive impact on practice efficiency.^{51,57,58} There is reason to believe, that with the aforementioned state and federal policy changes and a shift in the remuneration model favoring prevention and disease management, that employing MLDPs could be economically viable, particularly in public settings such as community dental clinics and FQHCs.⁶⁰ Compensation to production ratios can be calculated, and if allied personnel can access more underserved patients, allowing dentists to reach more patients, then productivity gains may be realized. Additionally, computer simulations can serve as effective manpower decision support systems by providing productivity data on the addition of MLDPs to various patient mix and staffing scenarios.⁶¹

The impact of MLDPs on various dental practice models also depends upon the social and cultural characteristics of the practice model, as well as its core mission. With the inclusion of MLDPs on the dental team, the responsibilities of individual team members will shift. The dentist will have to demonstrate excellent leadership, as well as organizational and communication skills. Allied dental personnel would conduct the assessment and triage of patients. The MLDP would function in a supplementary or complementary role to the dentist, allowing the dentist to provide more complex care. To enhance productivity and effectiveness, dentists focused on caring for underserved populations and willing to make a commitment to this practice model should maximize the skill mix of all members of their oral health care team.

Conclusion. For the dental profession, access to care for the underserved has been a lingering problem. We posit that MLDPs can be of benefit to the American public and the dental profession by reducing oral health care disparities and improving citizens' oral health status. As oral health care providers with appropriate training, credentialing, licensure, supervision, and deployment to areas of significant need, MLDPs could increase access to care to disadvantaged populations. Working in a complimentary or supplementary role, the MLDP would enable the dentist to treat more patients and diagnose more complex cases, as well as manage and render more complex services. Midlevel dental providers can be a first contact for oral health care needs, referring services, enhancing continuity of care, and facilitating dental homes for those most in need of oral health care. These measures would help improve access to care for the underserved and help prevent deaths from untreated dental disease.

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