Expanding Dental Hygiene to Include Dental Therapy: Improving Access to Care for Children

David A. Nash, DMD, MS, EdD

This article is dedicated to the memory of Dr. Eric Spohn, professor, University of Kentucky; and Dr. Ralph Lobene, of the Forsyth Institute, Boston; who over 30 years ago pioneered in advocating for an expanded scope of practice for dental hygienists to provide restorative care for children.

Abstract

Oral Health in America: A Report of the Surgeon General, and the subsequent National Call to Action to Promote Oral Health contributed significantly to raising the awareness of the American public and the dental profession regarding the lack of access to oral health care by many Americans, especially minorities and low income populations, with resulting disparities in oral health. The problem is particularly acute among children.

The current workforce of dentists in the United States is inadequate to meet the oral health care needs of children in terms of numbers of dentists, as well as their distribution, ethnicity, education, and practice orientation. Dental hygienists trained in an expanded scope of practice, can help address the workforce inadequacy.

Dental therapists, educated in 2-year programs of postsecondary education, comparable to America's associate degree dental hygiene programs, have been used throughout the world to provide basic, primary oral health care for children. Research has documented that utilizing dental therapists is a cost effective method of improving access to care for children. Countries that have led the way in introducing dental therapists to care for their children are now integrating their separate 2-year curriculum in dental therapy and dental hygiene into a 3-year curriculum to prepare a clinician dually trained in both dental therapy and dental hygiene. This clinician is being designated an oral health therapist.

Expanding the education of dental hygienists in the United States to include skills of the internationally acclaimed dental therapist can produce oral health therapists, individuals capable of addressing the basic preventive, restorative, and minor surgical needs of children, but also able to continue to address the preventive and periodontal needs of adults.

Key words: dental workforce, access to care for children, dental therapist, advanced dental hygiene practitioner

Introduction

Oral Health in America: A Report of the Surgeon General, and the subsequent *National Call to Action to Promote Oral Health* contributed significantly to raising the awareness of the American public and the dental profession regarding the problems associated with gaining the benefits of oral health for all Americans.[1,2] *Oral Health in America* documented the lack of access to oral health care by many Americans, especially minorities and low income populations, with the resultant existence of significant disparities in oral health. The Surgeon General's efforts have prompted major discussions regarding how to improve access to care and reduce disparities.

While *Oral Health in America* addressed the issue of oral health for all Americans, the focus of this essay will specifically be the oral health of children. The ultimate goal in oral health is the prevention of disease; thus children are core to success. However, it would be naïve to believe preventive efforts can be completely successful. Therefore, a further goal must be ensuring that children who do experience oral disease are treated effectively and efficiently. The current workforce of dentists is inadequate to achieve these goals.

This essay will briefly review the evolution of dental hygiene in America; identify 2 models for educating an expanded oral health workforce; justify focusing an expanded scope of practice for dental hygienists on children; cite workforce barriers that exist in providing access to oral health care for children; characterize dental therapy as a recognized international approach for improving access to care for children; suggest that cur-

rent approaches to care are neither outcomes-effective nor cost-effective; and suggest that expanding the role of dental hygienists in America to include dental therapy is the most effective manner to address the workforce issues in order that access to oral health care for children can be improved and disparities reduced. It will also identify advantages of a merged dental hygiene/dental therapy curriculum as has evolved internationally--the oral health therapist model[3] —over the advanced dental hygiene practitioner model (ADHP) proposed by the American Dental Hygienists' Association (ADHA).[4,5]

Expanding the Scope of Practice for Dental Hygienists to Improve Access to Care for Children

Dental hygiene has continued to develop since Alfred C. Fones opened the first school of dental hygiene in 1913. For many years dental hygiene was understood as a preventive dentistry auxiliary for the dentist, with emphasis on oral hygiene instruction, calculus removal, and polishing of tooth surfaces. Through time, dental hygienists came to be viewed as periodontal co-therapists, "providing periodontal therapy consisting of bacterial plaque control instruction, soft tissue management, sub-gingival scaling and root planing, and follow-up and supervision."[6] With this evolvement dental hygienists became further trained to employ local anesthesia and nitrous oxide analgesia to control pain. Some dental hygienists have also learned to provide expanded function restorative skills for patients, including placement of rubber dams and amalgam and composite restorations. More recently, dental hygiene has advanced a collaborative practice model based on the assumption that oral health care is a complex process that requires collaboration between the dentist and dental hygienist working as a team. State dental practice acts have changed to permit dental hygienists to take on new clinical responsibilities.

Over the history of dental hygiene, licensure, and regulations have adjusted to accommodate to changing practice models. Dental hygienists were added to state dental licensing boards, several states modified practice acts to enable dental hygienists to practice in some settings with general supervision versus direct supervision. Some states have approved alternative dental hygiene practice models, and others independent practice by dental hygienists.

As a result of this evolution, dental hygienists are well-positioned with the knowledge, education, and skills to increase their role in caring for the oral health of America's children by adding the competencies of the international dental therapist--the provision of basic restorative and minor surgical care for children. The challenge is to determine the educational model by which dental hygienists can most efficiently and effectively expand their scope of practice to help meet society's need for an expanded workforce.

While multiple models exist for expanding the capacity of the nation's oral health workforce, this essay will focus on 2 related specifically to dental hygiene: dental hygiene and dental therapy integrated (oral health therapist), and the advanced dental hygiene practitioner (ADHP). The designation oral health therapist is being appropriated internationally to designate individuals whose education has been integrated to include the traditional scopes of practice of both dental therapy and dental hygiene. The advanced dental hygiene practitioner of the ADHA is a dental hygienist with an advanced scope of practice, including but not limited to the skills traditionally associated with the international dental therapist; but also providing restorative and surgical care for adults.[4,5] Arguments will be advanced that give preference to the oral health therapist model.

Focusing an Expanded Scope of Practice for Dental Hygienists on Children

Prior to discussing the details of the respective approaches to expanding the scope of practice for dental hygienists it is necessary to justify why any expanded scope of practice that advocates basic restorative and minor surgical competencies must focus primarily on children.

Loretta Kopleman and Michael Palumbo have published a thoughtful, compelling, and important article in the *American Journal of Law and Medicine* entitled: "The U.S. Health Delivery System: Inefficient and Unfair to Children.[7] The paper explores the four major ethical theories of social justice and concludes that no matter which theoretical stance you take, children should receive priority consideration in receiving health care. Norman Daniels, professor of bioethics and population health at the Harvard School of Public Health, argues that a just society should provide basic health care to all, but redistribute health care more favorably to children.[8] He justifies this conclusion based on the affect health care has on equality of opportunity for children, with equality of opportunity being a fundamental requirement of justice. As noted, poor and minority children, the most vulnerable individuals in our nation, have the highest prevalence of oral disease, the poorest access to oral health care, and the poorest overall oral health. Justice demands they be maximally benefited, in order that they ultimately have equal opportunity to succeed. The opportunity to realize one's potential in life is markedly affected by one's childhood. Presi-

dent Kennedy expressed it cogently and well: "Children may be the victims of fate....they must never be the victims of neglect." Moral considerations support an expanded scope of practice for dental hygienists focusing on children.

There is increasing concern that even dentists who are graduating from colleges of dentistry with four years of professional doctoral-level education are not adequately prepared to appropriately and safely address the oral health needs of the increasing numbers of adults who are chronically ill and are biologically and/or pharmacologically compromised. In 1995, the Institute of Medicine report on dental education, *Dental Education at the Crossroads: Challenges and Change*, called for enhanced curricula in clinical medicine to enable dentists to more effectively manage oral health care in the face of the changing health profiles of their patients.[9] Advocacy had previously been made for inserting a clinical clerkship year in general medicine in the dental curriculum to help future dentists integrate the basic biomedical sciences, including pathology and pharmacology, with clinical medicine, in order to better care for patients.[10] A number of dentists and dental educators have called for a required post-doctoral year of training to achieve this goal.[11,12] It is not reasonable to expect that any model of expanded education for a dental hygienist can address this issue adequately. It should be noted that while children also have debilitating diseases they are not as prevalent; nor are children generally as compromised biologically or pharmacologically as adults. Thus they do not present the same level of safety issues in providing care. Safety considerations support expanded scope of practice dental hygienists focusing on children.

The international experience of over 80 years of dental therapists providing basic, primary care is essentially all with children, not adults. All of the research on the effectiveness of care by dental therapists, and it is significant, is in relationship to children.[13-20] International experience and research support the expanded scope of practice dental hygienists focusing on children.

The American Dental Association has been opposed to any one other than a dentist providing restorative and surgical care ("irreversible surgical procedures"). This is evidenced by the aggressive stance taken against dental therapists practicing in Alaska.[21] Dentistry as a profession understands that society is becoming increasingly distressed with the profession's inability to effectively address the issue of access to care for our most vulnerable population, our children. While speculation, it is possible that organized dentistry will more readily accept a model of an expanded scope of practice for dental hygienists that is focused on children. Practical political considerations support expanded scope of practice dental hygienists focusing on children.

While the focus of an expanded scope of practice should be on children, legislation should also be encouraged to permit dental hygienists to extend traditional dental hygiene care to special populations such as individuals in nursing homes, with general supervision or a consultative agreement with a dentist. In addition to traditional periodontal care, dental hygienists could perform procedures that are not invasive, that is, procedures that do not require local anesthesia, cutting of tooth structure, or removal of teeth. Examples of such procedures include atraumatic restorative treatment (ART) and adjustment of prosthetic appliances.

Workforce Barriers to Accessing Care for Children

Multiple barriers have been identified in ensuring access to care for children. Significant among these barriers is the professional dental workforce--inadequacy in the number of dentists, as well as their distribution, ethnicity, education, and practice orientations.

The dentist/population is declining from its peak of 59.5/100,000 in 1990 and will drop from the current 58/100,000 to 52.7/100,000 in the year 2020—a decline of 10%.[22] One estimate suggests the ratio could fall as low as 45 dentists/100,000 people by 2020.[23] The number of pediatric dentists is not helpful in addressing the issue of access to care for children. While there has been a significant increase in the number of pediatric dentists over the past 30 years, there are only 4,357 such trained specialists practicing in the United States today. Paul Casamassimo, then president of the American Academy of Pediatric Dentistry, stated: "...even with a Herculean increase in training positions [or pediatric dentists] improved workforce distribution, and better reimbursement and management of public programs, pediatric dentistry [the specialty] will never be able to solve this national problem [of disparities] alone. We need help."[24]

Compounding the issue of the numbers of dentists is the location of dental practices. The overwhelming majority of dentists practice in suburbia and affluent areas of cities, with few practicing in rural and inner city areas where children with the greatest need live. The number of federally designated shortage areas increased from 792 in 1993 to 1,895 in 2002.[25]

While approximately 12% of the population is African-American, only 2.2% of dentists are.[26] Individuals of Hispanic ethnicity make up another 10.7% of the population, yet only 2.8% of dentists are Hispanic.[26] Fewer than 5% of entering student dentists are African-American and less than 5% are Hispanic.[27] The demographics of oral disease indicate that these two minority groups comprise a sig-

nificant proportion of the disparity problem.[28]

A further issue is the general lack of instruction and experience graduating dentists have had in treating children. The typical college of dentistry curriculum provides an average of only 181 clock hours of didactic and clinical instruction in dentistry for children.[29] A recent study found that 33% of dental school graduates had not had any actual clinical experience in performing pulpotomies and preparing and placing stainless steel crowns; common therapies required for children.[30] Official American Dental Association policy also questions the adequacy of the dental curriculum in preparing dentists to treat children. A 2000 ADA House of Delegates resolution called for "a review of the predoctoral education standard regarding pediatric dentistry to assure adequate and sufficient clinical skills of graduates."[31] The background statement supporting the resolution suggested that inadequate educational preparation for treating children could be a barrier to access. There is no evidence that there has been an increase in emphasis in children's dentistry in predoctoral education. In fact, in a recent study entitled "U.S. Predoctoral Education in Pediatric Dentistry: Its Impact on Access to Dental Care," the authors concluded "results suggest that U.S. pediatric dentistry predoctoral programs have faculty and patient pool limitations that affect competency achievement, and adversely affect training and practice."[30]

An additional workforce problem is the practice orientation of many dentists. The overwhelming majority of dentists do not treat children whose care is publicly insured by Medicaid or S-CHIP. A 1996 study indicated only 10% of America's dentists participated in the Medicaid program.[32] A more recent study indicates approximately 25% of dentists received some payment from Medicaid during a given year; however, only 9.5% received $10,000 or more.[33]

Dental Therapy as Practiced Internationally Improves Access to Care for Children

In 1921, New Zealand developed a 2 academic year program to train high school graduates to become school dental nurses.[34] These school dental nurses were then deployed to school-based dental clinics, which subsequently came to exist in all of the elementary schools of New Zealand. Today there are 610 dental therapists (the name was changed in 1988 from school dental nurses) in New Zealand caring for the countries 850,000 school children.[3] Almost 98% of New Zealand's children are enrolled in the School Dental Service where care is funded by the government. A recent report of the oral health of New Zealand's children documented that at the end of a given school year essentially none of the children in the School Dental Service had untreated tooth decay.[35]

The model developed in New Zealand has since spread to 52 other countries of the world.[3] Currently there are over 1,500 dental therapists practicing in Australia providing the overwhelming majority of dental care for children.[3] Malaysia employs dental therapists to provide government supported dental care for its 3 million children in 17,000 elementary schools and 2,000 secondary schools through a network of 2,000 public dental clinics for children.[3] All dental care for children in Malaysia is by dental therapists. There are 700 dental therapists practicing in the Great Britain in a variety of oral health care settings.[3] Dental therapists have practiced with Health Canada, Canada's Ministry of Health, since 1972.[36,37] There are currently 300 dental therapists practicing in Canada, with approximately 100 employed by Health Canada to treat Canada's First Nation people.[3] The remainder practice in Saskatchewan, where dental therapists are recognized as full members of the dental team, with many practicing in dental offices, complementing the work of dentists in much the same manner dental hygienists practice in the United States.

The typical curriculum to train dental therapists to provide basic restorative and minor surgical care for children has been of 2 academic years, each of approximately 32 weeks duration with 1,200 hours of instruction, for a total of 2,400.[38] During the first year topics of study include the basic biomedical sciences: general anatomy, histology, biochemistry, immunology, and oral biology; as well as clinical dental sciences: cariology, periodontal disease, preventive dentistry, patient management, radiography, local anesthesia, restorative dentistry, dental materials, and dental assisting. In the second year course-content includes: pulpal pathology, trauma, extraction of primary teeth, clinical oral pathology, developmental anomalies, health promotion/disease prevention, the oral health care delivery system, and record keeping, as well as administrative and legal issues associated with clinical care. In New Zealand approximately 760 hours of the 2,400 hour curriculum are spent in the clinic treating children, with most of this occurring in the second year.[38] Restorative and surgical techniques included in training are: intra-coronal preparation and restoration of primary and young permanent teeth; preformed stainless steel crowns; pulpal therapy including pulpotomies on primary teeth, and the extraction of primary teeth.

Educational Changes Occurring Internationally

New Zealand, Australia, and Great Britain have led the way in

Table 1.

Knowledge and Skill Competencies of a Dental Hygienist Inclusive of those of a Dental Therapist Providing Basic, Primary Care for Children	Knowledge and Skill Competencies of a Dental Therapist Providing Basic, Primary Care for Children Not Included in Current Competencies of a Dental Hygienist
Basic Biomedical Sciences Biomaterials Interviewing and Medical and Dental History Taking Communication Skills Behavior Management Dental Morphology Clinical Technique and Assessment: Clinical (Extra-oral and Intra-oral), Radiographic and Occlusal Examinations Risk Assessment Record Keeping Diagnostic Casts Infection Control Preventive Dentistry Theory Preventive Dentistry Skills: child and parent education; health promotion/disease prevention; prophylaxis (scaling and polishing); fluoride application, sealant application; dietary analysis Oral Pathology Instrumentation Suturing Special Needs Patients Local Anesthesia/Nitrous Oxide Analgesia Rubber Dam Application Placing and Polishing Restorations Public Health Dentistry	Intra-coronal Cavity Preparations for Primary and Young Permanent Teeth Preparation, Adaptation, and Cementation of Stainless Steel Crowns Preparation, Adaptation, and Cementation of Esthetic Anterior Crowns for Primary Incisors Pulpal Disease, Assessment, and Treatment for Primary and Young Permanent Teeth Urgent Management of Dental Trauma Extraction of Primary Teeth

developing a new paradigm for educating and training of dental hygienists and dental therapists. Previously dental therapy and dental hygiene were taught separately and independently from one another.

Since 2000 in Australia, the education for dental hygienists and dental therapists has been integrated. The academic program is now of 3 years duration with a bachelor's degree in oral health being awarded.[3] In 2006 in New Zealand, the curriculum for dental hygiene and dental therapy merged into a 3 academic year program, with resulting credentialing in both scopes of practice and awarding a bachelor's degree.[3] Great Britain developed a combined dental hygiene and dental therapy curriculum in the mid-1990s. Most training programs now offer the combined training varying in length from 27 to 36 months depending on whether a certificate is awarded or a baccalaureate degree. Currently over 200 students are accepted each year in 15 programs, most of which are affiliated or attached to dental schools/dental teaching hospitals.[3]

Recently, The Netherlands adopted oral health therapists as a major dimension of their dental delivery system, and are now matriculating 300 a year in their vocational schools.[39,40] The Netherlands is reducing by 20% the number of dentists accepted to its dental schools, but is also adding an additional year to the education of a dentist. The rationale is that in the future significant aspects of basic preventive and restorative care will be provided by oral health therapists, with dentists performing more complex procedures and treating the increasing number of medically and pharmacologically compromised patients. Their new policy reduces the absolute numbers of dentists to control the costs of dental education--a significant issue in the United States--and develops oral health therapists to both improve access to care as well as reduce the costs of care.

Creating Oral Health Therapists in the United States

In the United States there are 255 associate degree entry level dental hygiene programs, 48 bachelor's degree entry level programs, and 17 programs offering a master's degree in dental hygiene (MSDH) or a master's degree in a related discipline.[5] The total number of accredited programs is 286 since some programs offer multiple levels of education. Traditional dental therapy is not practiced in the United States other than the recently developed initiative for Alaskan Natives under the leadership and auspices of the Alas-

ka Native Health Consortium.[41,42]

Rather than establish separate 2 year training programs to develop dental therapists for children, identified previously in the literature as pediatric oral health therapists,[43,44] it would seem to be more rational and economical to build on the current educational infrastructure for dental hygienists by educating individuals in traditional dental hygiene competencies and adding new competencies in basic restorative and minor surgical care for children. Much of the curriculum of current dental hygiene programs is inclusive of clinical competencies of traditional international dental therapists' programs; few additional competencies would need to be added to the curriculum to qualify one as an oral health therapist. (Table 1)

Research in the United States has also demonstrated that dental hygienists can be trained in a relatively short period of time to provide primary care for children; certainly within one additional academic year and potentially less. In 1970, Forsyth Dental Center initiated what was subsequently designated, and described in a book by the same title, The Forsyth Experiment.[45] The study documented that hygienists could be taught to provide quality restorative care for children effectively and efficiently. Whereas the projected curriculum time to achieve the competencies was 47 thirty-hour weeks (1,400 clock hours), the project was able to achieve its desired training outcomes in 25 weeks (740 clock hours). The study's investigators concluded that advanced training in restorative care for children could be accomplished in the "traditional 2 year dental hygiene curriculum by adding two summer sessions and condensing and combining some courses."[45]

Between 1972 and 1974, at the University of Kentucky, another expanded functions project, supported by the Robert Wood Johnson Foundation, took place. This also involved the training of dental hygienists in restorative dentistry for children. Thirty-six students, who were completing a 4-year baccalaureate program in dental hygiene, participated in a compressed curriculum that provided 200 hours of didactic instruction in children's dentistry, as well as 150 hours of clinical practice. The program was specifically addressed to providing primary care for children, including administration of local anesthesia, restoration of teeth with amalgams and stainless steel crowns, and pulp therapy. On completion of the programs, the hygienists participated in a double-blind study comparing their restorative skills with fourth year dental students. No significant differences were found between the quality of their work and that of the graduating dentists.[46]

At the College of Dentistry at the University of Iowa a 5-year project, conducted between 1971-1976, and supported by the W.K. Kellogg Foundation, trained dental hygienists to perform expanded functions in restorative dentistry and periodontal therapy, for both children and adults. The results were the same as the studies at Forsyth and Kentucky. Hygienists could be effectively trained, in a relatively brief time period, to perform, at a comparable quality level, restorative procedures traditionally reserved for dentists.[47]

Integrating traditional dental therapy into the dental hygiene curriculum will not only help address the access to care problem for children, but it will also help address an issue that has been in the forefront of dental hygiene for some time. Dental hygienists, functioning as oral health therapists, utilizing new skills, expanding their scope of practice, and participating in new practice settings, will be able to experience enriched professional lives and work.

While expanding 2 year dental hygiene programs to 3 years can prepare oral therapists of the future, provision must be made for hygienists currently in practice who want to expand their skills to provide basic restorative and minor surgical care for children. This can be accomplished by establishing continuing professional development programs in dental therapy. While some significant period of time would have to be spent on-site at a clinical facility to gain required preclinical and clinical skills, the actual time required in such a setting could be reduced through distributive education strategies for much of the didactic course work basic to dental therapy.

The Advanced Dental Hygiene Practitioner

Since the initiation of training of Alaska Natives in dental therapy in New Zealand in 2003 and their subsequent deployment in tribal Alaska, the American Dental Hygienists' Association has realized the imperative of expanding the scope of dental hygiene practice to include basic restorative and minor surgical care. The resultant of this work has been the development of the proposed advanced dental hygiene practitioner (ADHP).[4,5] The ADHP is an individual who will have had a baccalaureate degree in dental hygiene with the advanced credentials in restorative dentistry and surgery for children and adults being earned in a master's degree program. The entry level credential for the ADHP is a master's degree, typically requiring 6 years of post-secondary education. The competencies of an ADHP as adopted by the ADHA Board of Trustees exist in 5 domains: provision of primary oral healthcare; health care policy and advocacy; management of oral care delivery, translational research, and professionalism. Clinically the ADHP would be able to: prepare

cavities and restore primary and permanent teeth using direct placement of appropriate dental materials; place temporary restorations; place preformed crowns; temporary re-cement restorations; pulp cap primary and permanent teeth; perform pulpotomies on primary teeth, and extract primary and permanent teeth. While competencies in leadership, administration, and research are included in the ADHP model, the additional clinical skills are consistent with those traditionally associated with the international dental therapist. As noted previously, the curriculum internationally for individuals with this scope of clinical duties is educated in 3 academic years.

Advantages of the Oral Health Therapist in Comparison to the Advanced Dental Hygiene Practitioner

The knowledge and skills necessary to expand the dental hygienist's scope of practice to include basic restorative and minor surgical care for children does not require nor justify what would ostensibly be a 6 academic year program versus the internationally developing standard of 3 academic years. In fact, the ADHP model offers several problems that would mitigate its effectiveness.

The ADHA has explicitly stated that the ADHP is being developed as a response to the Surgeon General's Report of 2000 in order to improve access to care and help reduce disparities of oral health among Americans.[4] However, structuring the ADHP with a postgraduate, master's degree entry level severely restricts the number of expanded scope of practice dental hygienists who could be trained to address the issue of access to care. This extended time period is not required to achieve the basic level of clinical skills necessary to provide the scope of care traditionally expected of a dental hygienist as well as those of a dental therapist.

While some of the programs currently offering a bachelor's degree could be expanded to offer a master's degree leading to advanced dental hygiene practitioner certification, only 17 programs (in 15 states) offer dental hygiene graduate education and are thus positioned in graduate education to do so.[5] An enhanced scope of practice would be limited to those individuals able to attend universities offering graduate education. Improved access to oral health care and a reduction in the disparities in oral health would be limited with the model of the advanced dental hygiene practitioner, as relatively few individuals would be able to meet the entry level requirements. Only a minority of dental hygienists hold a bachelor's degree. The model would effectively deny the majority of dental hygienists the opportunity to expand their scope of practice to include restorative/surgical skills. The need is for thousands of dental hygienists to be able to expand their scope of practice to provide primary care for children. All of the nation's 2 year dental hygiene programs could be expanded to 3 years to include dental therapy in the curriculum. All 50 states and the District of Columbia have entry level associate degree programs in dental hygiene.[5]

A critically important concern in the expansion of dental hygienist's skills to include dental therapy is the potential loss of significant numbers of individuals (or hours of care) to provide traditional dental hygiene services. Dental hygienists are in great need and demand absent the expansion of their scope of practice and role. It will be incumbent on society to dramatically expand the number of educational positions available for oral health therapists to ensure adequate numbers of clinicians are available to meet the needs of both adults requiring periodontal care and children requiring restorative care.

While providing documentation is beyond the scope of this essay, the costs to society of training oral health therapists in a 3 year program would be far less than that of educating a comparable number of advanced dental hygiene practitioners in master's degree programs. Economic considerations also strongly favor utilizing oral health therapists to provide primary care for children rather than dentists.

Practice Settings for Oral Health Therapists

The practice environment for oral health settings will be dependent on the evolving health care delivery system in the United States. Oral health therapists could practice in the private or the public sector.

Oral health therapists would be in demand in dental practices as dental hygienists traditionally trained are today. Oral health therapists could function in ways dental hygienists currently do, but also collaborate with dentists in children's primary care. It does not make economic sense for dentists to routinely perform scaling, root curettage and polishing of teeth, and other procedures able to be competently performed by dental hygienists. In like manner, it is not reasonable for dentists to perform basic restorative and minor surgical procedures for children when an oral health therapist can do so safely and effectively. There is an important role for dentists, that is, focusing on problems that cannot be managed by an oral health therapist; problems that only a dentist can address.

It is speculated that dentists who do not currently care for children in their practices might expand their

care to include children, should such care be able to be managed by another member of the practice's dental team. Adding an oral health therapist to the dental team could result in an increase in the numbers of dentists providing care for children, as well as expand the capacity for dentists already caring for children to see more children. Many dentists do not accept children in their practices whose care is publicly insured, ostensibly due to the inability to manage the costs of care given overhead considerations and the lower reimbursement schedule. Oral health therapists could help mitigate this issue as care could be provided in a more cost-effective manner for the practice. This situation is analogous to the economics of dental hygiene practice in a practice setting today. Few dentists would want to practice without the collaboration of dental hygienists due to their ability to enable the practice to provide more care.

It has also been suggested that oral health therapists could play a role in improving access to care for children by practicing in the offices of the nation's pediatricians. A dental hygienist in the state of Maine currently practices in the office of a group of pediatricians.[48] The results of a recent study of state, medical, and dental practice acts indicates that in many states physicians could provide dental care for children under their license to practice medicine.[49] Pediatricians and family physicians are now receiving training in oral health care in a number of settings around the country and are conducting oral exams and applying fluoride varnish to children's teeth, for which they are being remunerated. It is not unrealistic to envision physicians further expanding oral health care for children and utilizing oral health therapists as a method of doing so.

Oral health therapists could practice in the public sector in public health clinics, health departments, federally qualified health centers, and with not-for-profit organizations. Ideally, children should be engaged in environments in which they normally function, if the access problem is to be effectively addressed. As in New Zealand, the most logical place to capture this audience is in the school system. As James Dunning stated over 30 years ago, "any large-scale incremental care plan for children, if it is to succeed, must be brought to them in their schools."[50] It is reasonable to deploy oral health therapists in mobile facilities to provide primary care for children in a school; moving through the year from one school to another. Large schools could have their own clinical facility. School programs, initiated incrementally, with the youngest children (with the least carious experience and the greatest potential for implementation of preventive care), would be a cost-benefit effective way of managing the oral health needs of our poorest and neediest children. In New Zealand, the school dental therapist also provides care for preschool children from birth, thus enabling preventive therapies to be instituted among infants and toddlers to address early childhood caries.

The issue of supervision always emerges in discussions of dental hygienists having an expanded scope of practice. The international tradition for dental therapists has been one of indirect or general supervision. In New Zealand, school dental therapists care for children with general oversight by district dental officers who provide consultative services as well as visit and audit dental therapists' practices on a periodic basis. There is a similar tradition in other countries utilizing dental therapists. In New Zealand, Australia, Great Britain, and Canada recent legislation permits dental therapists (oral health therapists) to practice independently (with some variations) as long as they maintain a collaborate/consultative relationship with a dentist.[3]

The practice and supervision circumstances for oral health therapists will be varied, and will be dependent on state practice acts. However, for oral health therapists, as described herein, to be effective and have an impact on access to care for children they must have the ability to practice with general supervision, or with a consultation agreement with a dentist.

Conclusion

Inadequate access to oral health care for America's children has been documented, with resultant disparities in oral health among children. Children from low income families and minorities experience more oral disease and receive less care. The current dental workforce is inadequate in numbers, composition, location, education, and orientation to address this problem. Other countries in the world have utilized dental therapists, individuals trained in 2 year programs of post-secondary education, to provide basic, preventive, restorative, and minor surgical care for children. The care provided by dental therapists has been documented to be equivalent in quality to that of dentists, and is more economical. Recently, several of these countries have integrated the education of dental therapists and dental hygienists to create an oral health therapist. Developing and deploying oral health therapists is a viable strategy to improve access to care and reduce disparities among America's children. The American Dental Hygienists' Association can play a critical leadership role in addressing the inadequacy of the oral health care workforce, specifically for children, by endorsing a nationwide strategy to develop a 3 year curriculum to integrate dental therapy with the competencies of dental hygiene, thus creating oral health therapists for America.

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David Nash holds the William R. Willard Endowed Professorship of Dental Education in the College of Dentistry at the University of Kentucky where he is a professor of pediatric dentistry. He is the coordinator for the College of Dentistry's professional ethics curriculum, and teaches each of the three courses of the curriculum. He also teaches pediatric dentistry, both didactically and clinically. From 1987-1997, Nash was dean of the College of Dentistry.

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individuals with moderate periodontal disease.

Scaling and root planing, coupled with professional plaque removal every two weeks results in similar improvement of periodontal disease in both healthy and diabetic patients and reduced levels of TF in diabetics.

Professionally delivered periodontal care did not impact blood glucose measures in the sample diabetics with poor metabolic control.

Summary

Dental hygiene clinicians are in a unique role to assist patients in managing the chronic diseases of periodontitis and type 2 diabetes. In doing so, it is important that the clinician have realistic expectations for the role periodontitis has in type 2 diabetes, as well as the expected outcomes to dental hygiene care in this group of patients. Results from the NHANES study suggests that moderate periodontal disease may predispose individuals to increased risk of type 2 diabetes, but not in isolation of other risk factors. Therefore, comprehensive patient evaluation that includes consideration of risk factors such as age, socioeconomic level, body-mass index, blood pressure and tobacco use, along with periodontal status can provide guidance in establishing appropriate periodontal maintenance intervals. Additionally, although it is critical for individuals with type 2 diabetes to have regular and thorough periodontal maintenance, expecting maintenance alone to achieve metabolic control is unrealistic. The dental hygienist is the primary professional in general and periodontal practice charged with providing non-surgical periodontal care and evaluating the results of such care. In order to provide optimal care and assist patients in achieving best outcomes requires an understanding of current and developing evidence. Evidence on the systemic / periodontal link continues to provide clinicians with excellent information that can guide practice, but it is only when clinician appropriately apply that evidence that patient care is optimized.

Dr. Williams has been active in clinical dental hygiene for over 35 years and in clinical research for 23 years. Her areas of specialization include research design and statistics, educational methods, dental product efficacy, health outcomes research, and clinical dental hygiene. She is a research consultant for numerous dental manufacturers. Dr. Williams has presented papers and continuing education programs throughout the United States and internationally.