Dental Therapists: Improving Access to Oral Health Care for Underserved Children

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Disparities in dental health care that characterize poor populations are well known. Children suffer disproportionately and most severely from dental diseases. Many countries have school-based dental therapist programs to meet children's primary oral health care needs.

Although dental therapists in the United States face opposition from national and state dental associations, many state governments are considering funding the training and deployment of dental therapists to care for underserved populations. Dental therapists care for American Indians/Alaska Natives in Alaska, and Minnesota became the first state to legislate dental therapist training.

Children should receive priority preference; therefore, the most effective and economical utilization of dental therapists will be as salaried employees in school-based programs, beginning in underserved rural areas and inner cities. (*Am J Public Health.* 2014;104:1005–1009. doi:10.2105/AJPH.2014.301895)

THE 2000 REPORT OF THE surgeon general *Oral Health in America* noted,

> What amounts to "a silent epidemic" of oral diseases is affecting our most vulnerable citizens—poor children, the elderly and many members of racial and ethnic minority groups.[1(p1)]

This persistent epidemic has not been alleviated by continuation of the present dental care delivery system. A significant factor contributing to the inability of children to obtain adequate dental care is the shortage of accessible dentists.[2] Expansion of the dental workforce to include dental therapists offers the potential for improvement.

More than 14 000 dental therapists practice in more than 54 countries throughout the world, including New Zealand, which originated the concept; Australia; Canada; the United Kingdom; and, most recently, the United States, in Alaska and Minnesota.[3–5] High school graduates are trained in a 2-year program to provide preventive and restorative dental care, usually for children. In some countries training is being extended to 3 years to incorporate both dental therapy and dental hygiene, and to provide treatment of adults as well as children.[6,7]

Dental therapist programs have been studied extensively in a number of countries, and the quality of care, which includes preventive and restorative treatment for more than 90% of school-aged children through high school, has been consistently documented to equal care provided by dentists.[8–10] School-based dental therapists are salaried public health workers, and the overall cost of providing care to children in schools is thus significantly lower than the cost of private dental care.[11]

OPPOSITION FROM ORGANIZED DENTISTRY

The American Dental Association and its component state associations have opposed the adoption of dental therapist training and practice in the United States, mainly by asserting that it represents a second-tier or inferior level of care.[12,13] This claim has been refuted by numerous studies.[8–10] The dental therapist's scope of practice is restricted to basic care, including cavity filling, preformed stainless steel crown fitting, primary tooth pulp therapy, and simple extractions.[7] In school-based programs, significant time is devoted to preventive treatment, such as individual and classroom dental health education and sealant and topical fluoride application. Dental therapists are endorsed by the American Public Health Association, the American Association of Public Health Dentistry, and the American Dental Hygienists' Association as a successful model for increasing access to care for underserved populations.[13]

Some private practitioners oppose dental therapists in the belief the problem is not a shortage of dentists but rather their distribution. Others are more concerned with how dental therapists might adversely affect their practices and diminish their income. However, dental therapists are not intended to compete with dentists. As part of a public health infrastructure, they are intended to treat a portion of the population, particularly poor children in rural areas and inner cities, that for various reasons cannot obtain care in the private practice delivery system. In the United States, for example, only about 20% of practicing dentists provide care to Medicaid recipients.[14] Among Medicaid-enrolled children, the prevalence of dental visits for any type of care ranges from 12% to 49%.[15] More than 43 million children are covered by Medicaid and the Children's Health Insurance programs, and most of them have limited access to dental care.

The American Dental Association contends that a major barrier to treating poor children is low Medicaid reimbursements, which do not cover the actual cost of treatment, much less yield a profit. In 1 state, increasing Medicaid dental fees increased dentist participation by 42% but utilization by only 18%.[16] Overall, raising Medicaid payments has had minimal effect on utilization.[17,18] For example, an increase in the Medicaid

TABLE 1—Estimate of Oral Health Care Provider Training and Education Costs Including Opportunity Costs, 2013

Type of Provider/School	Education and Training, Years	Tuition and Fees, $	Room and Board, $	Total Out-of-Pocket Costs, $	Opportunity Costs, $	Total Cost, $
Dentist						
College	4	80 000	40 000			
Dental school	4	242 000	40 000			
Total	8	322 000	80 000	402 000	272 000	674 000
2-y RDH (AA)[a]	2	36 000	20 000	56 000	68 000	124 000
3-y RDH (AA)[a]						
College prerequisite	1	18 000	10 000	28 000	102 000	186 000
RDH program	2	36 000	20 000	56 000		
Total	3	54 000	30 000	84 000	102 000	186 000
RDH/ADT						
College prerequisite	1	18 000	10 000	28 000		
RDH program	2	36 000	10 000	46 000		
DT program	2	36 000	10 000	46 000		
Total	5	90 000	30 000	120 000	136 000	276 000
RDH + DT program[b]	1	18 000	10 000	28 000	55 000	83 000
DT/DHAT program[c]	2	36 000	20 000	56 000	68 000	124 000

Note. AA = associate of arts degree; ADT = advanced dental therapist; DHAT = Dental Health Aide Therapists; DT = dental therapist; RDH = registered dental hygienist.
Source. Health Resources and Service Administration,[25] US Dept of Labor,[26] *Dental Hygiene Education*,[27] Collegedata,[28] *2010 Survey of Dental Practice*,[29] *Survey of Dental Hygienists in the United States*.[30]
[a]In the 2-year RDH program, the student enters RDH training after high school. The 3-year program has a prerequisite of 1 year of college before entering the 2-year RDH program.
[b]Student is an RDH who completes an additional year to become a DT.
[c]The DHAT program is specific to the Alaska Native Tribal program, whereas the DT program is more generic. Essentially both are a "DT program", but there are variations in deployment and supervision.

prophylaxis payment by 50% (from $20 to $30) resulted in only a 3.92% increase in the chance of a child or adolescent seeing a dentist.[19] The effect is further limited if too few dentists practice in underserved areas. This maldistribution of the health care workforce in relation to need could be addressed with the development of a targeted, school-based system of care.

ALASKA AND MINNESOTA

Many areas of the country have a shortage of dentists, which is increasing as the population continues to expand, despite the opening of 9 dental schools between 1997 and 2011, with more in development.[20,21] In fact, the number of new dentists is barely keeping up with the rate of retirement, which is why many states are considering legislation for the training of dental therapists to serve their underserved populations.[2]

This movement began in Alaska in 2005 when 6 dental health aide therapists (DHATs), trained in New Zealand, were deployed to remote Alaska villages to serve the Alaska Native population, which previously had little or no access to care. Now trained in Anchorage, DHATs gain experience after graduation in a 6-month preceptorship under the guidance of clinical dentists who certify their competency and scope of practice.[22] As of 2011, 11 of Alaska's 27 tribal health corporations employed 25 DHATs, each of whom rotates between 3 and 6 small Alaska Native villages (Mary E. Williard, personal communication, July 9, 2013). The total population covered is about 40 000, for a ratio of 1 DHAT to 1600 people. By comparison, for the US population, 9642 additional dentists would be needed for the 4639 recognized Dental Health Professional Shortage Areas to reach a dentist-to-population ratio of 1 to 3000, which is the minimal number that can be expected to alleviate the shortage situation.[20,23]

Although DHATs practice independently, they are part of an integrated health care network. They are supervised indirectly by dentists who are on call to provide consultation by telephone and video (teledentistry). The supervising dentists periodically visit the remote sites to review the quality of care provided by DHATs, as well as to care for patients requiring more extensive treatment beyond the DHATs' scope of practice. In the interim, adults as well as children requiring immediate treatment that can only be provided by a dentist, such as root canal therapy, cast crown fitting, and complex extractions, must travel by airplane or boat to a hub clinic to visit a dentist.[22]

In 2009, Minnesota passed legislation authorizing 2 types of dental therapists: a traditional dental therapist with 28 months of training and an advanced dental therapist with 2 additional years of training plus a year of direct, on-site supervised practice.[24] The dental therapist is restricted to practicing under the direct on-site supervision of a dentist, in specific areas designated as underserved; the advanced dental therapist may provide care in other facilities, such as nursing homes, with

indirect supervision by a collaborating dentist, who must approve the intended treatment. As of March 2013, 25 licensed dental therapists were assigned to federally qualified health centers, elementary schools, and private practices for underserved populations. Medicaid provides dental coverage to about 390 000 low-income or disabled children in Minnesota, yet only about 42% of them receive any dental care each year. With little prospect of finding enough dentists willing to provide care for this population in community health centers, much less private practices, dental therapists are a viable alternative.

THE ECONOMICS OF DENTAL THERAPISTS

It takes close to 8 years after high school to graduate a dentist. Dental hygienists and dental therapists can be trained in 2-year post–high school programs. Reported total expenditures for the 4 years of dental school average $312 000 for public and $233 000 for private schools.[25] These figures do not include the cost of 3 to 4 years of predental education or the opportunity cost—what the student could be earning if not attending professional school, which is an indirect but real cost to the student.[26] If these additional costs are included, the total direct and indirect cost involved in the education of a dentist is an estimated $674 000 (Table 1). The average tuition and fees for a minimal 2-year dental hygiene program is about $36 000.[27] Adding living expenses raises the out-of-pocket cost to approximately $56 000[28]; including the 2-year opportunity cost brings the total cost of dental hygienist training to about $124 000 (Table 1). Because the cost to train a dental therapist is about the same as for a dental hygienist in a 2-year program, at least 5 dental therapists could be trained in two fifths the time at the same equivalent cost as 1 dentist.

The cost of setting up and maintaining the physical plant—dental equipment, supplies, utilities, rent—is the same, whether for a dentist or a dental therapist. The difference in cost—the savings to the service—is in their salaries. The average net income of dentists in private practice in 2009 was nearly $213 000. Employed general dentists averaged $123 000.[29] Pediatric dentists averaged $312 000. The mean annual income for dental hygienists working full time reported in a 2007 survey was $56 810.[30] However, hygienists working in corporate and industrial settings averaged $65 333.

A dental therapist will likely earn at the higher rate, which is 47% less than an employed general dentist is paid, a net saving of more than $57 000 a year. But this figure is conservative. If the dental therapist's salary is compared with the average net income of a general dentist in private practice who provides the same services, the potential net savings is $148 000, or 69%.

Studies have documented the cost effectiveness of dental therapists, relative to dentists, particularly in programs for children. In New Zealand, the 2010 to 2011 per capita cost of providing care in its school-based system to 96% of children aged 5 to 12 years and 49% of preschoolers was $99; the private practice fee for examination, radiographs, and cleaning alone was $102, with the additional cost of $99 for a simple filling.[31] In 1 state in Australia, the average cost per child for treatment by a private dentist was $265, but only $52 by dental therapists in the school dental service.[3] In Saskatchewan, Canada, before the program was closed, the cost of providing care to 85% of children and adolescents aged 5 to 14 years between 1974 and 1986 decreased 273%, from $342 to $92 per child.[3]

Financial support for dental therapists will vary depending on their employment. In a school-based program, their salaries could be paid out of the school district's budget in the same manner as for school nurses. The budget could be subsidized by Medicaid, preferably on a capitated basis. For therapists employed in a federally qualified health center, Medicaid reimbursement could be a lump sum per encounter or fee for service. A private dental practice that employs a dental therapist will bill whatever source is available—commercial insurance, Medicaid, or the patient—usually as fees for service.

SCHOOL-BASED PROGRAMS

It is customary for school dental services to obtain parental consent before enrolling children in the program. Most school programs maintain an enrollment of more than 95% of the students, which is an obvious endorsement of the service and evidence of the satisfaction with care provided by therapists, as reported for New Zealand, the United Kingdom, Australia, Canada, the Netherlands, Alaska, and Minnesota.[3] In a study of 8 private dental offices in the United Kingdom, patients treated by therapists expressed more satisfaction than those attended by dentists.[32]

School-based health care has a long history in the United States that dates to the early 20th century. Today, more than 73 000 full- or part-time registered nurses provide health care for children in schools.[33] In some schools, dental hygienists provide dental screenings and preventive dental services, with referral to dentists for children who need definitive care for fillings and other pathology. Unfortunately, there is little evidence that school screening and referral programs are effective for ensuring that poor children are ultimately seen by a dentist for treatment.[34] A few schools have visiting dentists in mobile trailers who provide commendable care, but they are too few and too expensive to meet the needs of tens of millions of poor, neglected children.

Even the modest goal set by *Healthy People 2010* of increasing annual oral health care utilization among children from 20% to 57% cannot be achieved without a major change in the delivery system.[35] Children, as well as those adults confined in institutions such as nursing homes, are essentially nonambulatory. They require a caretaker with the time, the means, and the money to take them to the dental office. Many

economically disadvantaged children lack that caregiver. What would be more logical than to bring the necessary care to them in public schools?[36] Providing necessary dental care to children in their schools is an international practice of documented effectiveness.

THE MORAL IMPERATIVE

Whether care is provided in schools, community health centers, or private practices, the concept of social justice demands that priority be given to those least able to care for themselves: children. The highest priority is assigned to those who are most disadvantaged.[37] As Nash declared,

> [O]ur nation's health care system, if it is to be just, must be . . . committed to maximally benefiting the "worst off." . . . Poor and minority children, the most vulnerable individuals in our nation, and the worst off, 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 do well.[38(p53)]

Ensuring that the entire population receives oral health care is a long-term goal. Because it can only be achieved incrementally, it is necessary to establish priorities and to develop evidence-based programs for implementation. The school-based oral health care program staffed by dental therapists is not the only option. It is simply the best. It need not exclude employment of dental therapists in federally qualified health centers and even private practices in underserved areas. But limited resources dictate that the highest priority should be given to oral health care for children in schools. Healthy children are, after all, the precursor to a healthy adult population. ■

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This article was accepted January 16, 2014.

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J. W. Friedman wrote the original draft of the article. K. R. Mathu-Muju contributed to the history of dental therapists and their current implementation. Both authors revised the article.

Acknowledgments

Special thanks to David A. Nash, DMD, EdD, whose teaching and writing on social justice and ethical practice, in addition to his support for dental therapists, are reflected in this article.

Human Participant Protection

No protocol approval was required because no human participants were involved.

References

1. National Institute of Dental and Craniofacial Research. *Oral Health in America: A Report of the Surgeon General.* Rockville, MD: US Department of Health and Human Services; 2000.

2. Pew Charitable Trusts. In search of dental care: two types of dentist shortages limit children's access to care. 2013. Available at: http://www.pewstates.org/uploadedFiles/PCS_Assets/2013/In_search_of_dental_care.pdf. Accessed November 27, 2013.

3. Nash DA, Friedman JW, Mathu-Muju KR, et al. *A Review of the Global Literature on Dental Therapists: In the Context of the Movement to Add Dental Therapists to the Oral Health Workforce in the United States.* Battle Creek, M: W. K. Kellogg Foundation; 2012. Available at: http://www.wkkf.org/knowledge-center/resources/2012/04/nash-dental-therapist-literature-review.aspx. Accessed September 2, 2013.

4. van den Heuvel J, Jongbloed-Zoet C, Eaton K. The new style dental hygienist—changing oral health care professions in the Netherlands. *J Dental Health.* 2005;44(6):3–10.

5. Pew Charitable Trusts, Pew Center on the States. The Minnesota story. Issue brief. 2010. Available at: http://www.pewtrusts.org/uploadedFiles/www pewtrustsorg/Reports/State_policy/060_10_DENT%20The%20Minnesota%20Story%20Brief_web.pdf. Accessed December 3, 2013.

6. Nash DA, Friedman JW, Mathu-Muju K, et al. A review of the global literature on dental therapists. *Community Dent Oral Epidemiol.* 2014;42(1):1–10.

7. Nash DA, Friedman JW, Kardos TB, et al. Dental therapists: a global perspective. *Int Dent J.* 2008;58(2):61–70.

8. Phillips E, Shaefer HL. Dental therapists: evidence of technical competence. *J Dent Res.* 2013;92(7 suppl):11S–15S.

9. Bader JD, Lee JY, Sugars DA, Burrus BB, Wetterhall S. Clinical technical performance of dental therapists in Alaska. *J Am Dent Assoc.* 2011;142:322–329.

10. Bolin KA. Assessment of treatment provided by dental health aide therapists in Alaska. *J Am Dent Assoc.* 2008;139(11):1530–1539.

11. Mathu-Muju KR, Friedman JW, Nash DA. Oral health care in countries utilizing dental therapists in public, school-based programs, contrasted with that of the United States utilizing dentists in a private practice model. *Am J Public Health.* 2013;103(9):e7–e13.

12. Bramson JB, Guay AH. Comments on the proposed pediatric oral health therapist. *J Public Health Dent.* 2005;65(3):123–127.

13. Mathu-Muju KR. Chronicling the dental therapist movement in the United States. *J Public Health Dent.* 2011;71(4):278–288.

14. Sanders B. Dental crisis in America: the need to expand access. Report from Chairman Bernard Sanders, Subcommittee on Primary Health and Aging, US Senate Committee on Health, Education, Labor, and Pensions. 2012. Available at: http://www.sanders.senate.gov/imo/media/doc/Dentalcrisis.report.pdf. Accessed September 2, 2013.

15. Hakim RB, Babish JD, Davis AC. State of dental care among Medicaid-enrolled children in the United States. *Pediatrics.* 2012;130(1):5–14.

16. Hughes RJ, Damiano PC, Kanellis MJ, Kuthy R, Slayton R. Dentists' participation and children's use of services in the Indiana dental Medicaid program and SCHIP: assessing the impact of increased fees and administrative changes. *J Am Dent Assoc.* 2005;136(4):517–523.

17. Kenney GM, Marton J, Klein AE, Pelletier JE, Talbert J. The effects of Medicaid and CHIP policy changes on receipt of preventive care among children. *Health Serv Res.* 2011;46(1 pt 2):298–318.

18. Borchgrevink A, Snyder A, Gehshan S. Increasing access to dental care in Medicaid: does raising provider rates work? Increasing dentists' participation in Medicaid and SCHIP. California HealthCare Foundation. 2008. Available at: http://www.chcf.org/~/media/media%20library%20files/pdf/I/pdf%20increasingaccesstodentalcareinMedicaidib.pdf. Accessed September 2, 2013.

19. Decker SL. Medicaid payment levels to dentists and access to dental care among children and adolescents. *JAMA.* 2011;306(2):187–193.

20. US Dept of Health and Human Services. Dental HPSA designation criteria. Available at: http://bhpr.hrsa.gov/shortage/hpsas/designationcriteria/dentalhpsacriteria.html. Accessed October 29, 2013.

21. Anderson EL. Expansion in dental education: dental schools. American Dental Education Association. 2011. Available at: http://www.dentalboards.org/PDFS/2011MidYearPresentations.pdf. Accessed September 1, 2013.

22. Williard ME, Fauteux N. Dentists provide effective supervision of Alaska's dental health aide therapists in a variety of settings. *J Public Health Dent.* 2011;71(suppl 2):S27–S33.

23. Institute of Medicine and National Research Council. Improving access to oral health care for vulnerable and underserved populations. Washington, DC: National Academies Press; 2011. Available at: http://www.nap.edu/catalog.php?record_id=13116. Accessed September 2, 2013.

24. Minnesota Dental Association. Dental therapy in Minnesota. Issue brief. 2013. Available at: https://www.mndental.org/_asset/by0rg0/MDA-2013-03-Dental-Therapy-Fact-Sheet-Page-One.pdf. Accessed September 2, 2013.

25. Health Resources and Service Administration. *Financing Dental Education: Public Policy Interests, Issues and Strategic Considerations*. Washington, DC: US Dept of Health and Human Services; 2005.

26. US Dept of Labor, Bureau of Labor Statistics. Earnings and unemployment rates by educational attainment. Available at: http://www.bls.gov/emp/ep_chart_001.htm. Accessed March 11, 20114.

27. *Dental Hygiene Education*. Chicago, IL: American Dental Hygienists' Association; 2013.

28. Collegedata. Available at: https://www.collegedata.com/cs/content/content_payarticle_tmpl.jhtml?articleId=10064. Accessed March 11, 2014.

29. *2010 Survey of Dental Practice: Income From the Private Practice of Dentistry*. Chicago, IL: American Dental Association; 2011.

30. *Survey of Dental Hygienists in the United States, Executive Summary*. Chicago, IL: American Dental Hygienists' Association; 2007.

31. *Internal Data*. Wellington, New Zealand: New Zealand Ministry of Health; 2012.

32. Sun N, Burnside G, Harris R. Patient satisfaction with care by dental therapists. *Br Dent J*. 2010;208(5):E9, discussion 212–213.

33. US Dept of Health and Human Services, Health Resources and Services Administration. The registered nurse population: initial findings from the 2008 National Sample Survey of Registered Nurses. 2010. Available at: http://bhpr.hrsa.gov/healthworkforce/rnsurveys/rnsurveyinitial2008.pdf. Accessed September 2, 2013.

34. Milsom K, Blinkhorn A, Worthington H, et al. The effectiveness of school dental screening: a cluster-randomized control trial. *J Dent Res*. 2006;85(10):924–928.

35. *Healthy People 2010*. Vol 2. 2nd ed. Washington, DC: US Dept of Health and Human Services; 2000.

36. Friedman JW. Bringing oral health care to school-aged children. *J Public Health Dent*. 2008;68(4):187.

37. Rawls J. *A Theory of Justice*. Cambridge, MA: Harvard University Press; 1972.

38. Nash DA. Developing and deploying a new member of the dental team: a pediatric oral health therapist. *J Public Health Dent*. 2005;65(1):48–55.