

UCSF

UC San Francisco Previously Published Works

Title

Pediatric Workforce Issues

Permalink

<https://escholarship.org/uc/item/0wv210mr>

Journal

Dental Clinics of North America, 61(3)

ISSN

0011-8532

Authors

Mertz, Elizabeth
Spetz, Joanne
Moore, Jean

Publication Date

2017-07-01

DOI

10.1016/j.cden.2017.02.004

Peer reviewed

Pediatric Workforce Issues



Elizabeth Mertz, PhD, MA^{a,*}, Joanne Spetz, PhD^b,
Jean Moore, DrPH, MSN^c

KEYWORDS

- Health personnel • Pediatric dentistry • Allied health personnel
- Dental care for children • Dental care delivery

KEY POINTS

- There are many new workforce models being deployed to address children's oral health.
- Evaluations of these models are variable, showing safety and effectiveness but rarely impact on health outcomes.
- Health professions regulatory barriers exist that restrict the ability to fully deploy new models.

INTRODUCTION

According to the US Surgeon General, dental disease is among the most prevalent health conditions for children, and large disparities in oral health status and access to oral health services exist among children in the United State.¹ In 2003, the *National Call to Action to Promote Oral Health* outlined the need to increase the diversity, capacity, and flexibility of the dental workforce in order to better meet children's oral health needs and reduce disparities.² Assessing progress toward the *Call to Action*, in 2009 the authors found only modest gains in workforce strategies focused on pediatric patients, and major challenges remaining.³ In 2009 the Institute of Medicine held a workshop on the sufficiency of the oral health workforce for the coming decade, which outlined the status of the dental workforce, and highlighted for the first time the multitude of new workforce models being proposed and tried.⁴ A special issue of the *Journal of Public Health Dentistry* entirely focused on the contributions of workforce innovations to delivery system redesign followed, with one of the key messages being that workforce design should be tied directly to meeting the patient care needs, with special attention to reducing disparities in oral health care, and in oral health.⁵ As

Disclosures: The authors have nothing to disclose.

^a Preventive and Restorative Dental Sciences, Healthforce Center, University of California, San Francisco, 3333 California Street, Suite 410, San Francisco, CA 94143, USA; ^b Philip R. Lee Institute for Health Policy Studies, Healthforce Center, University of California, San Francisco, 3333 California Street, Suite 265, San Francisco, CA 94143, USA; ^c Center for Health Workforce Studies, School of Public Health, University at Albany, State University of New York, 1 University Place, Suite 220, Rensselaer, NY 12144, USA

* Corresponding author.

E-mail address: Elizabeth.mertz@ucsf.edu

Dent Clin N Am 61 (2017) 577–588
<http://dx.doi.org/10.1016/j.cden.2017.02.004>

dental.theclinics.com

0011-8532/17/© 2017 Elsevier Inc. All rights reserved.

2017 begins, progress has been documented in children's use of care primarily because of improvements in coverage through Medicaid, the Children's Health Insurance Program (CHIP), and the Affordable Care Act (ACA).^{6,7} This article updates and synthesizes the evidence on clinical pediatric workforce models and discusses future directions and implications for health policy.

METHODOLOGY

This study reviews journal publications, reports, and issue briefs regarding evidence-based approaches to enhancing the workforce available to address children's oral health. The article organizes the findings into (1) new models in the dental field, including existing and new providers; and (2) workforce models outside the dental field.³ Interdisciplinary models constitute a growing area of innovation in workforce configurations (see [Edelstein BL: Pediatric Dental-Focused Inter-Professional Interventions: Rethinking Early Childhood Oral Health Management](#), in this issue). Case studies from programs of particular interest are provided to illustrate real world applications from ongoing pilots or programs.

RESULTS

The Traditional Dental Team

The core of pediatric dental care lies with the traditional team of dentists, hygienists, and dental assistants. With the opening of 12 new US dental schools and expansion of enrollment from 4300 to 5900 dentists per year, the overall supply of dentists is projected to increase.⁸ However, geographic shortages, a lack of diversity, and a lack of participation in Medicaid persist and affect the availability of dental care for children, particularly in rural, high-minority, and low-income areas.⁹ This pattern is exacerbated among pediatric dentists, who tend to concentrate in higher-income areas despite the burden of complex disease being borne by disadvantaged children.¹⁰ The need for future pediatric dentists ready and willing to treat a diverse patient pool has led to changes in the pediatric residency curriculum that incorporate a greater focus on patients who are low income, minority, and have special care needs.¹¹ In addition, residencies in general dentistry (Advanced Education in General Dentistry/General Practice Residency) are increasingly providing clinical training in pediatric dental care.¹² First-year enrollment in pediatric dental residencies has increased from 292 in 2004 to 436 in 2014, and the number of programs increased from 65 to 77 during that time frame, but the specialty remains a small portion of the dental workforce.¹³

General dentists continue to provide most of the care for children. Predoctoral training programs are challenged in adequately preparing general dentists to treat children, in part because of the school dental clinic population mix being composed primarily of adults. Therefore, general dentists are often reluctant to treat children less than 3 years of age despite increasing practitioner recognition that children should have their first dental visit by age one.^{14,15} General dentists are more willing to see young children who are low caries risk or for prevention than children who are high risk or need restorative treatment.¹⁶⁻¹⁹ Recommendations have been made to change the Commission on Dental Accreditation (CODA) accreditation standards for dental schools to strengthen training in oral health care for young children, but this has not been enacted.²⁰ In recognition of this need for improved pediatric skills for general dentists, many states have initiated trainings for providers specifically on reaching young children, but overall data on trends are not available.²¹⁻²⁵

Dental hygienists are important members of the oral health team and their roles in pediatric care have been expanding. Hygienists are often the first point of contact,

providing evaluation and assessment of patients' oral health status, oral health education and preventive care, and referral to dental providers for necessary treatment services. Hygienists increasingly are providing community outreach to underserved populations, serving as case finders and care managers who refer for dental treatment services and encourage establishment of dental homes^{26,27} (see the case studies presented later). Dental hygiene scope of practice has evolved over time, with hygienists in many states practicing more autonomously than they had previously, particularly in public health settings such as schools, nursing homes, and correctional facilities. However, scope of practice parameters in some states limit the ability of hygienists to effectively provide services in the community. Allowing hygienists to work to the full extent of their professional competence facilitates access to services, especially for underserved populations.²⁸ An assessment of dental hygiene scope of practice across states found a positive correlation between broader dental hygiene scope of practice and better oral health outcomes.^{28,29}

Dental assistants are key members of the oral health workforce team, performing both clinical and administrative duties under the supervision of a dentist. In addition to directly assisting dentists with oral examinations and dental procedures, dental assistants perform several independent tasks, including preparing patients for treatment, arranging and sterilizing instruments, and educating patients about general and postoperative oral health care. Dental assistants also act in administrative capacities, including scheduling appointments, maintaining patient records, and billing for treatment services. However, there is variability across states in the required education and training to enter the workforce as a dental assistant, in the titles used to describe the workforce, and in the legally allowed functions. Many states now recognize expanded function dental assistants. Expanded functions permitted to appropriately trained individuals include coronal polishing, sealant and/or fluoride applications, and topical anesthetic application, as well as expanded restorative and orthodontic functions. It is unclear how much this changes clinical pediatric practice, and one study found that expanded function assistants do not use this function most of the time.³⁰ Recent research suggests that dental assistants, especially expanded function dental assistants, contribute to improved clinical efficiency and increased access to oral health services.³¹

Expanding the Dental Team

In response to the limitations of the current dental team's capacity to address pediatric dental care needs there has been an expansion into new roles, to fill gaps in providers available for treatment as well as to improve access and prevention.

Dental therapists have been used across the world by many countries as part of the health care team, with a primary focus on children.³² In 2003, the Alaska Native Tribal Health Consortium (ANTHC) was the first to implement the use of dental therapists.³³ Since then, advocates of this role have successfully changed policy to allow dental therapists to practice in Minnesota, Maine, and Vermont, whereas Washington and Oregon have tribal access authorized and statewide use under consideration and 9 more states are actively investigating their use.^{34,35} Dental therapists have the ability to do restorative and other dental procedures normally restricted to dentists. Each state has defined the role slightly differently, and states that recognize dental therapists seem to be leaning toward a combined hygiene-therapy model. In 2016 the CODA adopted standards for dental therapy education programs and put a process in place for accrediting them. The research on impacts of dental therapists on oral health access and outcomes is emerging and has generally found them to be safe and effective practitioners.³⁶ For example, dental therapists in Alaska were able to treat children

with the same clinical effectiveness as dentists.³⁷ In addition, dental therapists have been shown to be profitable in the clinical enterprise, allowing dentists to focus on more complex cases, and may be used in school-based care for children.^{38,39} The primary dental health aide role in Alaska, which is part of the 4-step dental health aide cadre in ANTHC, is discussed later.

The community dental health coordinator (CDHC) was designed to function much like a community health worker with an oral health focus. The CDHC concept is being piloted in 8 states and, as of 2014, the project has 34 graduates who are serving in 26 communities in Arizona, California, Montana, Minnesota, Oklahoma, Pennsylvania, Texas, and Wisconsin.⁴⁰ CDHCs are trained to provide community education about oral health, case finding, patient navigation, and patient engagement services using motivational interviewing techniques. In a series of case studies on oral health integration with primary care, one clinic used a CDHC who was also a licensed dental hygienist and was additionally qualified as a public health dental hygiene practitioner (PHDHP) in Pennsylvania. The CDHC/PHDHP was active in the community providing oral health education at community events, schools, Head Start programs, and other settings. In addition, she was working in primary care practices affiliated with the clinic providing dental hygiene assessment and prophylactic services and navigating new patients to the main dental clinic for treatment services.³¹ Other research has found that CDHCs have reduced no-show visits and increased clinic productivity.⁴¹

Expanding the Oral Health Team

In 2003 the American Academy of Pediatrics affirmed its critical role by establishing a policy that pediatricians should know how to do risk assessments and refer high-risk children to a dental home.⁴² The Into the Mouths of Babes project in North Carolina's Medicaid program showed the effectiveness of fluoride varnish applications by physicians in reducing caries treatment needs and this is now a widely covered benefit.^{43,44} Studies have shown that application of fluoride varnish by primary care providers is just as effective in reducing caries as prevention by dental providers, and reimbursing primary care providers for this has increased the uptake of this treatment.⁴⁵⁻⁴⁷ Most pediatricians now agree that they should examine their patients' mouths and discuss oral hygiene with families, but only about half report doing it. Further, although they know the benefit of fluoride varnish, few physicians regularly apply it for their patients, citing barriers including lack of training and reimbursement.^{48,49} By 2011, 42 states had adopted a policy to support preventive dentistry initiatives for physicians.⁵⁰ Two examples of these types of initiatives are discussed later.

In the primary care setting, nurse practitioners and physician assistants (PAs) are also playing an increasing role in oral care for children. For example, in one study a nurse-dietitian team was used to provide preventive care and referrals, increasing access and acceptance of fluoride varnish.⁵¹ This example is a model for allied health professionals to integrate an oral health screen, fluoride varnish, anticipatory guidance, and dental referrals.⁵² Further, obstetricians and gynecologists are becoming more educated on the importance of improving the oral health literacy of pregnant women, which substantially influences the knowledge and behaviors of pregnant women regarding the importance of oral health.⁵³

A 2013 survey of directors of PA education programs found that more than 70% of respondent programs had integrated oral health topics into the core content of their PA curricula.⁵⁴ However, whether training in oral health in PA education programs translates into screening and assessment of patients' oral health statuses in clinical practice remains unclear. A 2013 survey of PAs conducted by the American Association of Physician Assistants identified several key barriers to the effective integration of oral health

competency into practice.⁵⁵ For example, completion of oral examinations or fluoride varnish by PAs is not as widely reimbursable as when completed by nurses or physicians.⁵⁶ However, a low survey response rate limits the ability to generalize from these results. The Oral Health Workforce Research Center (OHWRC) conducted a sample survey of PAs to learn more about the integration of oral health assessment and screening into their clinical practices. The study found that PAs trained in oral health as part of their basic PA education program were nearly 3 times as likely to conduct oral health screenings, compared to those who did not receive training.⁵⁷

In addition, programs that use community health workers who incorporate oral health into their work have been shown to increase knowledge of oral health among their clients and increase efficiencies in dental clinics.^{58–60} The coordination of care outside what is provided in the dental office remains challenging across the dental-medical divide.^{61,62}

A 2014 HRSA-sponsored report, *Integration of Oral Health and Primary Care Practice*, described core oral health clinical competencies for frontline primary care clinicians and outlined strategies for implementing oral health training in primary care practice and safety net settings.⁶³ Although this is a step in the right direction, logistical challenges remain given that dental and medical systems are so siloed. Telehealth may hold some answers; for example, as many efforts focus on bringing care to where children are. For example, the New York Telehealth Assistants have been successful in bringing oral health screenings, prevention, and referral to inner city schools.^{64,65} Receiving preventive services in the primary care setting does not directly translate to obtaining dental care in the future, and physicians are generally dissatisfied with their inability to refer because of a lack of dental providers who will accept their pediatric patients.^{46,66,67}

FUTURE RESEARCH

Workforce models to address children's oral health are the focus of current and ongoing research. Although findings are not yet available, these efforts are notable for the scope and level of commitment to understanding impacts on oral health status. In the third round of funding focused on reducing oral health disparities in children, projects funded by the National Institute of Dental and Craniofacial Research (NIDCR) specifically examined workforce policy and new models and their contributions to improving pediatric oral health.⁶⁸ A study funded by the Robert Wood Johnson Foundation (RWJF) and being conducted by researchers at the University of California, San Francisco (UCSF) and the University of California, Los Angeles is evaluating 7 workforce innovation models that have the potential to promote prevention and/or achieve improved access to oral health prevention services. Each model will be evaluated for its effectiveness in promoting prevention and its role in contributing to improved oral health outcomes. Projects will also be assessed for fidelity to the original model, their ability to generalize and replicability, and for potential sustainability. RWJF is also funding an evaluation of the Population-centered Risk and Evidence-based Dental Interprofessional Care Team (PREDICT) project, currently underway in Oregon. This quality improvement project is designed to compare traditional practice with a team-based approach of implementing evidence-based guidelines for caries management at the population level. The team includes expanded permit hygienists, community liaisons, dentists and dental specialists, and health IT specialists. Results are expected in late 2017.⁶⁹ In addition, the OHWRC, formed as a partnership between the New York Center for Health Workforce Studies and the UCSF, is funded through a 3-year cooperative agreement with the National Center for Health Workforce Analysis of the US Health Resources and Services Administration. A key goal of the OHWRC is to provide timely and accurate data and conduct policy-relevant research

to better inform strategies designed to expand access to needed oral health services, particularly for underserved populations. The oral health workforce topic will remain at the top of providers' and policy makers' agendas given how quickly models are changing and developing, the increasing interest in strategies to integrate oral health with primary care, and the critical need for improvement in children's oral health.

DISCUSSION

How does this evidence on the evolving workforce lend itself to delivering better clinical care to children and families? Although undeniably progress has been made in expanding the workforce available to address children's oral health care needs, there is little scholarship on how these changes are affecting clinical care processes, much less individual or population health outcomes. The structural divisions between public health, medical care, and dental care create a challenge not only for care coordination for providers and patients but also for research on the impacts of different models of care.⁶²

The policy environment supports some of the innovation now underway, but several significant challenges remain. Expanding pediatric dental coverage through federal and state programs and the ACA has significantly improved oral health access for children in the last decade.⁷ Although post-ACA numbers are not yet available, it is likely that use of care by children will continue to increase, and with it the demand for pediatric dental care providers.^{70,71} Although this is laudable, a large percentage of the expansion in pediatric coverage is for low-income children and Medicaid programs struggle to attract enough providers, making access for these populations an ongoing problem regardless of workforce sufficiency. States are moving to Medicaid managed care, but the dental field is slow to adopt capitation and lacks the quality and outcome measures, as well as the accountability infrastructure, required to implement value-based payments. A notable exception is Oregon's Coordinated Care Organization program for Medicaid enrollees, in which organizations operate with global budgets and are responsible for all types of health care, including dental care.

For now, the primary strategy being used to achieve cost savings is the use of less expensive labor to provide care wherever safe and effective and to do outreach for education and prevention in community settings. The primary impediment for new models is state-based health professions regulation that requires intense political action for even minor reform and creates artificial barriers to working across professional boundaries.⁷²

The dental delivery system is showing signs of rapid transformation toward larger group models and dental service organizations that are actively working to implement evidence-based care practices under evolving financial structures. The pediatric dental care workforce will need to be seamlessly embedded in these models to meet patient needs at a reasonable cost and good value, in organizational settings that are rewarding for providers. The more flexibility these organizations have to design a future workforce and system around patient needs, the more innovative provider teams can be in solving pressing issues for their patients.

SUMMARY

Research examining productivity, quality, and outcomes of traditional pediatric dental care are generally lacking. The literature shows that education, qualifications, and roles are changing with case examples of success, but what these changes portend for patient care remains an open question. New dental team configurations show promise to improve oral health literacy and access to pediatric dental care. However, some workforce innovations are currently geographically restricted to a few areas of the country and often to certain settings or populations. Although shown to be safe

and effective within their scope of practice, it is still unclear what impact new dental care providers will have on the care system or population health. In addition, there has been movement in the last decade to engage medical providers in screening, referral, and prevention activities for the oral health care of children, particularly in primary care settings. It is widely acknowledged that improving children's oral health will require a team-based approach. The biggest challenge for the future of pediatric dental care will be how to train, deploy, coordinate, and fund these teams in a patient-centered model of care.

CASE STUDIES

Case study 1: extended care permit registered dental hygienists in Kansas

In 2003, Kansas legislature established the Extended Care Permits for Registered Dental Hygienists (ECP-RDH). There are now 3 levels of ECP-RDHs. An ECP-RDH I can practice in specific settings when a dentist is not present, but with a relationship with a supporting dentist, their own liability insurance, and specific training and practice experience. Services are limited to children receiving specific social services (eg, therapeutic services in nonresidential centers, in foster care, and in public and private schools) who also meet requirements of Medicaid, qualify for free or reduced lunch programs, or other requirements designed to identify children at higher risk for poor access to dental services. ECP-RDH II (added in 2007) can also provide services to persons with developmental disabilities, those 65 years of age and older living in residential care, and those receiving home-based and community-based services. In 2012, a third category was added, ECP-RDH III, which permits the identification of decay and placing an interim dental restoration, adjusting dentures, smoothing a sharp tooth with a low-speed dental handpiece, using local anesthetic (with some limitations), and extracting deciduous teeth (with some limitations). ECP-RDHs must complete a specific course of study and have specified experience as a dental hygienist. The expected clinical care improvement for pediatric oral health is that ECP-RDHs will provide preventive services and some restorative services to high-risk children in underserved settings.

Case study 2: primary dental health aides in Alaska

The Alaska Dental Health Aide (DHA) Program was created in 2005 as a specialty area under the Community Health Aide Program, which has long provided medical services in Alaska's remote communities. There are 4 categories of DHA: primary dental health aides (PDHAs), expanded function dental health aides, dental health aide hygienists, and dental health aide therapists. DHAs focus on prevention, pain relief, infection relief, and basic restorative services. PDHAs practice at 2 levels. The PDHA I level provides dental education and preventive dentistry services, including the application of topical fluorides, after only a few weeks of training in oral hygiene, nutritional counseling, fluoride application, iodine application, and chlorhexidine varnish application. These aides can advance to PDHA II after additional training in at least 1 skill set for this higher level, which can include sealant application, dental prophylaxis, radiographs, and dental assisting. PDHAs practice in both clinics and in remote villages. Within larger communities in which a dental team is present, their work typically focuses on applying fluoride and providing education in both clinic and community settings, such as Head Start programs, nursing homes, and schools. In remote villages, the scope of work is broader, and they are often the sole oral health providers. In the villages, their work often includes examinations of individuals at high risk for caries, including saliva production tests, bacterial load tests, and visual inspection of teeth; application of fluoride varnish in clinic and community settings; instruction in oral hygiene; scheduling of follow-up appointments; and scheduling of appointments when dental teams visit remote communities. The expected clinical care improvement for pediatric oral health is that PDHAs will provide children and families with essential education about oral health, ensure that children receive fluoride treatments, and ensure that those with high caries risk are monitored regularly.

Case study 3: oral health screening and fluoride application in pediatrics offices

Programs to reimburse pediatricians for providing fluoride application to patients often include offering additional training to pediatricians in oral health screening and the development of improved referral processes to pediatric dentists. UnitedHealthcare (UHC) has operated such a program in New Jersey and other states, as part of their medical-dental integrated Medicaid insurance plan. UHC's Chief Dental Officer established close relationships with large pediatrics practices across the state, offering a variety of educational materials about the reimbursement offered, where to order supplies, and local pediatric dentists accepting Medicaid referrals. He also directed pediatricians to training resources, so that they and/or their medical assistants could learn to apply fluoride. UHC's expectation is that this program will both improve the overall health of their pediatric enrollees and reduce long-term costs through effective prevention of dental disease.

Group Health of Puget Sound, an integrated health maintenance organization (now part of Kaiser Permanente), has had a similar program since 2005, for both Medicaid and commercial enrollees. In collaboration with the Washington Dental Services Foundation, they offered in-person training to pediatricians on oral health screening and the application of fluoride varnish. Group Health offered reimbursement to pediatricians for these services, with initial funding from the Foundation. After a successful pilot project, Group Health decided to continue financial support of this program directly and extend it to all clinic sites. The expected clinical care improvement for pediatric oral health is that at-risk children will receive fluoride varnish, more thorough oral health screenings, and more effective referrals to pediatric dentists.

ACKNOWLEDGMENTS

The authors would like to thank Jean Calvo for her research assistance on this article.

REFERENCES

1. US Department of Health and Human Services. *Oral health in America: a report of the Surgeon General*. Rockville (MD): US Department of Health and Human Services; 2000.
2. US Department of Health and Human Services. *National call to action to promote oral health*. Rockville (MD): US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Dental and Craniofacial Research; 2003.
3. Mertz E, Mouradian WE. Addressing children's oral health in the new millennium: trends in the dental workforce. *Acad Pediatr* 2009;9(6):433–9.
4. Institute of Medicine. *The U.S. oral health workforce in the coming decade: a workshop*. Washington, DC: The National Academies; 2009.
5. Mertz EA, Finocchio L. Improving oral healthcare delivery systems through workforce innovations: an introduction. *J Public Health Dent* 2010;70(Suppl 1):S1–5.
6. Nasseh K, Vujcic M. Dental care utilization rate continues to increase among children, holds steady among working-age adults and the elderly. Chicago, IL: American Dental Association; 2015.
7. Nasseh K, Vujcic M. Dental benefits coverage rates increased for children and young adults in 2013. Chicago, IL: American Dental Association; 2015. Available at: http://www.ada.org/~/media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_1015_3.pdf?la=en.
8. Munson B, Vujcic M. Number of practicing dentists per capita in the United States will grow steadily. Chicago, IL: American Dental Association; 2016.

9. Institute of Medicine. Improving access to oral health care for vulnerable and underserved populations. Washington, DC: National Academies Press; 2011.
10. Tsai C, Wides C, Mertz E. Dental workforce capacity and California's expanding pediatric Medicaid population. *J Calif Dent Assoc* 2014;42(11):757–64, 766.
11. Ramos-Gomez FJ, Silva DR, Law CS, et al. Creating a new generation of pediatric dentists: a paradigm shift in training. *J Dent Educ* 2014;78(12):1593–603.
12. Massey CS, Raybould TP, Skelton J, et al. Advanced general dentistry program directors' attitudes and behaviors regarding pediatric dental training for residents. *J Dent Educ* 2008;72(3):344–51.
13. American Dental Association. Surveys of advanced dental education. Chicago: Health Policy Institute; 2015.
14. Santos CL, Douglass JM. Practices and opinions of pediatric and general dentists in Connecticut regarding the age 1 dental visit and dental care for children younger than 3 years old. *Pediatr Dent* 2008;30(4):348–51.
15. Clark SJ, Duong S, Fontana M. Dental provider attitudes are a barrier to expanded oral health care for children ≤ 3 years of age. *Glob Pediatr Health* 2014;1. 2333794X14557029.
16. Long CM, Quinonez RB, Rozier RG, et al. Barriers to pediatricians' adherence to American Academy of Pediatrics oral health referral guidelines: North Carolina general dentists' opinions. *Pediatr Dent* 2014;36(4):309–15.
17. Salama F, Kebriaei A. Oral care for infants: a survey of Nebraska general dentists. *Gen Dent* 2010;58(3):182–7.
18. Rutkauskas J, Seale NS, Casamassimo P, et al. Preparedness of entering pediatric dentistry residents: advanced pediatric program directors' and first-year residents' perspectives. *J Dent Educ* 2015;79(11):1265–71.
19. Casamassimo PS, Seale NS. Adequacy of patient pools to support predoctoral students' achievement of competence in pediatric dentistry in U.S. dental schools. *J Dent Educ* 2015;79(6):644–52.
20. Seale NS, McWhorter AG, Mouradian WE. Dental education's role in improving children's oral health and access to care. *Acad Pediatr* 2009;9(6):440–5.
21. Crall JJ, Illum J, Martinez A, et al. An innovative project breaks down barriers to oral health care for vulnerable young children in Los Angeles county. *Policy Brief UCLA Cent Health Policy Res* 2016;(PB2016–5):1–8.
22. Niederman R, Gould E, Soncini J, et al. A model for extending the reach of the traditional dental practice: the ForsythKids program. *J Am Dent Assoc* 2008; 139(8):1040–50.
23. Shulman ER, Howard WG, Sharps G, et al. The impact of a continuing education oral health program on providing services for young children by dentists, dental hygienists and dental assistants. *J Dent Hyg* 2011;85(3):220–8.
24. Solomon ES, Voinea-Griffin AE. Texas first dental home: a snapshot after five years. *Tex Dent J* 2015;132(6):382–9.
25. Stewart RE, Sanger RG. Pediatric dentistry for the general practitioner: satisfying the need for additional education and training opportunities. *J Calif Dent Assoc* 2014;42(11):785–9.
26. Delinger J, Gadbury-Amyot CC, Mitchell TV, et al. A qualitative study of extended care permit dental hygienists in Kansas. *J Dent Hyg* 2014;88(3):160–72.
27. Myers JB, Gadbury-Amyot CC, VanNess C, et al. Perceptions of Kansas Extended Care Permit dental hygienists' impact on dental care. *J Dent Hyg* 2014;88(6):364–72.
28. Langelier M, Baker B, Continelli T, et al. A dental hygiene professional practice index by state, 2014. Rensselaer (NY): Oral Health Workforce Research Center;

- Center for Health Workforce Studies; School of Public Health, SUNY Albany; 2016.
29. Langelier M, Continelli T, Moore J, et al. Expanded scopes of practice for dental hygienists associated with improved oral health outcomes for adults. *Health Aff (Millwood)* 2016;35(12):2207–15.
 30. Post JJ, Stoltenberg JL. Use of restorative procedures by allied dental health professionals in Minnesota. *J Am Dent Assoc* 2014;145(10):1044–50.
 31. Langelier MH, Moore J, Baker B, et al. Case studies of 8 federally qualified health centers: strategies to integrate oral health with primary care. Rensselaer (NY): Center for Health Workforce Studies; School of Public Health, SUNY Albany; 2015.
 32. Nash DA. Adding dental therapists to the health care team to improve access to oral health care for children. *Acad Pediatr* 2009;9(6):446–51.
 33. Mathu-Muju KR, Friedman JW, Nash DA. Oral health care for children in countries using dental therapists in public, school-based programs, contrasted with that of the United States, using dentists in a private practice model. *Am J Public Health* 2013;103(9):e7–13.
 34. Pew Charitable Trusts Dental Campaign. States expand the use of dental therapy. Research and Analysis 2016. Available at: <http://www.pewtrusts.org/en/research-and-analysis/analysis/2016/09/28/states-expand-the-use-of-dental-therapy>. Accessed September 29, 2016.
 35. Koppelman J, Vitzthum K, Simon L. Expanding where dental therapists can practice could increase Americans' access to cost-efficient care. *Health Aff (Millwood)* 2016;35(12):2200–6.
 36. Nash DA, Friedman JW, Mathu-Muju K. A review of the global literature on dental therapists. WK Kellogg Foundation; 2012.
 37. Bolin KA. Assessment of treatment provided by dental health aide therapists in Alaska: a pilot study. *J Am Dent Assoc* 2008;139(11):1530–5 [discussion: 1536–9].
 38. Urahn SK, Schuler A, Koppelman SG, et al. Expanding the dental team: studies of two private practices. Washington, DC: The Pew Charitable Trusts; 2014.
 39. Nash DA, Mathu-Muju KR, Friedman JW. Ensuring access to oral health care for children: school-based care by dental therapists - a commentary. *J Sch Health* 2015;85(10):659–62.
 40. American Dental Association. About community dental health coordinators. Action for Dental Health 2016. Available at: <http://www.ada.org/en/public-programs/action-for-dental-health/community-dental-health-coordinators>. Accessed September 15, 2016.
 41. American Dental Association. Community dental health coordinator. In: Action for Dental Health, editor. Empowering communities through education and prevention. Chicago: American Dental Association; 2016.
 42. American Academy of Pediatrics. Oral health risk assessment timing and establishment of the dental home. 2003, 2009. Policy statement. Available at: <https://www2.aap.org/oralhealth/PolicyStatements.html>. Accessed September 16, 2016.
 43. Pahel BT, Rozier RG, Stearns SC, et al. Effectiveness of preventive dental treatments by physicians for young Medicaid enrollees. *Pediatrics* 2011;127(3):e682–9.
 44. Rozier RG, Stearns SC, Pahel BT, et al. How a North Carolina program boosted preventive oral health services for low-income children. *Health Aff (Millwood)* 2010;29(12):2278–85.

45. Herndon JB, Tomar SL, Catalanotto FA, et al. The effect of Medicaid primary care provider reimbursement on access to early childhood caries preventive services. *Health Serv Res* 2015;50(1):136–60.
46. Kranz AM, Preisser JS, Rozier RG. Effects of physician-based preventive oral health services on dental caries. *Pediatrics* 2015;136(1):107–14.
47. Kranz AM, Rozier RG, Preisser JS, et al. Comparing medical and dental providers of oral health services on early dental caries experience. *Am J Public Health* 2014;104(7):e92–9.
48. Lewis CW, Boulter S, Keels MA, et al. Oral health and pediatricians: results of a national survey. *Acad Pediatr* 2009;9(6):457–61.
49. Quinonez RB, Kranz AM, Lewis CW, et al. Oral health opinions and practices of pediatricians: updated results from a national survey. *Acad Pediatr* 2014;14(6):616–23.
50. Sams LD, Rozier RG, Wilder RS, et al. Adoption and implementation of policies to support preventive dentistry initiatives for physicians: a national survey of Medicaid programs. *Am J Public Health* 2013;103(8):e83–90.
51. Biordi DL, Heitzer M, Mundy E, et al. Improving access and provision of preventive oral health care for very young, poor, and low-income children through a new interdisciplinary partnership. *Am J Public Health* 2015;105(Suppl 2):e23–9.
52. Taylor E, Marino D, Thacker S, et al. Expanding oral health preventative services for young children: a successful interprofessional model. *J Allied Health* 2014;43(1):e5–9.
53. Kerpen SJ, Burakoff R. Improving access to oral health care for pregnant women. A private practice model. *N Y State Dent J* 2009;75(6):34–6.
54. Langelier MH, Glick AD, Surdu S. Adoption of oral health curriculum by physician assistant education programs in 2014. *J Physician Assist Educ* 2015;26(2):60–9.
55. Healthcare Performance Consulting. Oral health needs assessment. American Academy of Physician Assistants; March 2013.
56. American Academy of Pediatrics. State Medicaid payment for caries prevention services by non-dental professionals. <http://webcache.googleusercontent.com/search?q=cache:9wmh5GcAwEMJ:www2.aap.org/oralhealth/docs/ohreimbursementchart.pdf+&cd=1&hl=en&ct=clnk&gl=us>. Accessed March 19, 2017.
57. Langelier M, Surdu S, Gao J, et al. Determinants of Oral Health Screening and Assessment in Physician Assistant Clinical Practice. Rensselaer, NY: Oral Health Workforce Research Center, Center for Health Workforce Studies, School of Public Health, SUNY Albany; December 2016. http://www.oralhealthworkforce.org/wp-content/uploads/2017/03/OHWRC_Oral_Health_Assessment_in_PA_Practice_2016.pdf.
58. Dental providers. 2013. Available at: <http://mnchwalliance.org/chws-you/dental-providers/>. Accessed September 15, 2016.
59. Healthy Smiles for a Lifetime/Sonrisas Saludables Para Toda La Vida. National Center for Farmworker Health; 2007.
60. [press release]Community health workers are helping Minnesotans access better care. Northwest Technical College; 2016.
61. Quinonez RB, Kranz AM, Long M, et al. Care coordination among pediatricians and dentists: a cross-sectional study of opinions of North Carolina dentists. *BMC Oral Health* 2014;14:33.
62. Mertz EA. The dental-medical divide. *Health Aff (Millwood)* 2016;35(12):2168–75.

63. US Department of Health and Human Services. Integration of oral health and primary care practice. Washington, DC: Health Resources and Services Administration; 2014.
64. Kopycka-Kedzierawski DT, Billings RJ. Teledentistry in inner-city child-care centres. *J Telemed Telecare* 2006;12(4):176–81.
65. Glassman P, Helgeson M, Kattlove J. Using telehealth technologies to improve oral health for vulnerable and underserved populations. *J Calif Dent Assoc* 2012;40(7):579–85.
66. Miloro B, Vujicic M. Physicians dissatisfied with current referral process to dentists. American Dental Association Health Policy Institute; 2016.
67. Kranz AM, Rozier RG, Preisser JS, et al. Examining continuity of care for Medicaid-enrolled children receiving oral health services in medical offices. *Matern Child Health J* 2015;19(1):196–203.
68. National Institute of Dental and Craniofacial Research. NIDCR Oral Health Disparities and Inequities Research Consortium. 2015. Available at: http://www.nidcr.nih.gov/research/NIDCR_Centers_and_Research_Networks/Consortium-to-Reduce-Oral-Health-Disparities.htm. Accessed September 7, 2016.
69. Cunha-Cruz J. What is the problem of access to oral care services and improvement in oral health? Cincinnati (OH): National Oral Health Conference; 2015.
70. Yarbrough C, Vujicic M, Nasseh K. More dental benefits options in 2015 health insurance marketplaces. Chicago: American Dental Association; 2015. Available at: http://www.ada.org/~/media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_0215_1.ashx.
71. Meyerhoefer CD, Panovska I, Manski RJ. Projections of dental care use through 2026: preventive care to increase while treatment will decline. *Health Aff (Millwood)* 2016;35(12):2183–9.
72. Manski RJ, Hoffmann D, Rowthorn V. Increasing access to dental and medical care by allowing greater flexibility in scope of practice. *Am J Public Health* 2015;105(9):1755–62.