

Progress in Children's Oral Health Since the Surgeon General's Report on Oral Health

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In 2008 the American Academy of Pediatrics (AAP) convened a *National Summit on Children's Oral Health* (see Acknowledgments and <http://www.aap.org/oralhealth/summit.cfm>) to assess progress made in meeting the recommendations of *Oral Health in America: A Report of the Surgeon General*¹ and the *National Call to Action to Promote Oral Health*,² relative to children's oral health. As background information for the Summit, white papers were commissioned from nationally prominent oral health educators, researchers, and policy makers. This special issue on children's oral health contains the updated papers from this effort with special commentaries by former US Surgeon General David Satcher, and Rebecca L. Slayton (guest editor of this issue) and Harold Slavkin, formerly director of the National Institute of Dental and Craniofacial Research (NIDCR). This issue also contains results of the AAP's 2008 Periodic Survey of Fellows practices in oral health.

FINDINGS OF ORAL HEALTH IN AMERICA AND THE NATIONAL CALL TO ACTION

In 2000 the Surgeon General's Report on Oral Health (SGROH) underscored the importance of oral health for overall health and quality of life, and documented profound

disparities in oral health and access to care for vulnerable populations, including children.^{1,3} Caries was identified as the most common chronic disease of childhood, and dental care as the most common unmet health care need of children,⁴ including those with special health care needs (CSHCN).⁵ Data published in 1998 revealed that fewer than 1 in 5 Medicaid-eligible children accessed dental care.⁶ The report also noted that approximately 52 million hours of school are lost per year as a result of dental problems, and that low-income children experienced nearly 12 times as many restricted activity days from dental disease as children from higher-income families.^{7,8} At the same time, children were 2.6 times more likely to lack dental insurance compared with medical insurance. The consequences of untreated caries on children were known to include spread of disease and systemic infection, a point recently dramatized by the deaths of several children due to abscesses of dental origin.⁹ The SGROH noted the existence of safe and effective preventive measures that could be implemented to prevent caries; children do not need to experience these profound oral health disparities and severe consequences, but many changes were needed to improve children's oral health and access to care.

Two conferences focusing specifically on children's oral health were convened concurrent with the release of the SGROH: *The Face of a Child: Surgeon General's Workshop and Conference on Children and Oral Health*. These conferences provided strategies for addressing the issues raised by the report.^{10,11} Recommendations were built on the premise that society has a moral obligation to provide basic health care for all children, including oral health care, because of children's vulnerability, dependency on others, higher risk for health problems as a result of poverty and race or ethnicity, and importance to our collective future, as articulated in bioethics papers commissioned for these efforts.¹²⁻¹⁴

In follow-up to the SGROH, the 2003 *National Call to Action to Promote Oral Health* was released after intensive nationwide listening conferences with oral health

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stakeholders. Five broad action steps were recommended to promote oral health and eliminate oral health disparities: 1) change perceptions of oral health; 2) overcome barriers by replicating effective programs and proven efforts; 3) build the science base and accelerate science transfer; 4) increase workforce diversity, capacity and flexibility; and 5) increase collaborations. These action steps formed the general framework for the AAP Summit. Background papers presented here summarize progress in science and surveillance, access to care (including for CSHCN), workforce capacity, and policy. Changing perceptions of oral health are evident in key advances in policy and education, while the importance of collaborations is emphasized in many articles.

OVERVIEW: EMPHASIS ON EARLY CHILDHOOD ORAL HEALTH

Because of the prevalence and consequences of caries, as well as newer evidence suggesting that caries rates may be increasing among young children, special attention was paid in these articles to early childhood caries (ECC) and opportunities for prevention. Relevant papers include a summary of the epidemiology of childhood caries and Healthy People (HP) 2010 objectives related to children's oral health (Tomar and Reeves¹⁵); advances in the science of ECC (Tinanoff and Reisine,¹⁶ Slayton and Slavkin¹⁷); use of preventive interventions (Milgrom and colleagues¹⁸); and the role of diet in caries, especially for underserved populations (Mobley and colleagues¹⁹). Children's utilization of dental services is summarized by Edelstein and Chinn.²⁰ The oral health workforce—including dentists, allied and midlevel dental professionals, physicians, and nurse practitioners—and its potential to provide care for underserved children are explored in articles by Mertz and Mouradian,²¹ Seale and colleagues,²² Nash,²³ Douglass and colleagues,²⁴ Lewis,²⁵ and Hallas and Shelley.²⁶ Lewis and colleagues²⁷ present the AAP Periodic Survey of Fellow's office practices in oral health. Because of the importance of oral health in children with chronic conditions, 2 papers cover the oral health of CSHCN (Lewis²⁷ and Casamassimo²⁸), while Strauss and Cassell²⁹ consider emerging issues in the care of children with craniofacial conditions. The oral health of children is a public health concern, and the importance of the dental public health infrastructure is highlighted by Tomar and Reeves.¹⁵ Finally, policy summaries by Edelstein³⁰ and Crall³¹ paint the larger picture of accomplishments—and work to be done—in children's oral health policy for the years and decades to come.

SUMMARY: ASSESSING PROGRESS IN CHILDREN'S ORAL HEALTH

Epidemiology, HP 2010 Goals, and Public Health Surveillance

Oral health data have not been continuously available. Caries rates cited by the SGROH were obtained from the National Health and Nutrition Examination Survey (NHANES) conducted during 1988–1994.³ As Tomar and Reeves¹⁵ review, the next NHANES data from 1999–

2004 revealed increased caries prevalence among young children—from 24% to 28% among 2–5-year-olds, with decreased prevalence and severity of caries among older children. Large disparities by income and race and ethnicity have generally persisted.

Progress has been made in several other HP 2010 objectives important for children, including increased use of dental sealants and dental visits. Of special importance for children who may lack access to dental care and preventive interventions, almost 70% of community water systems are fluoridated (up from 65% in 2000, with the HP 2010 goal being 75%). Also of significance, in the last decade the Centers for Disease Control and Prevention implemented a National Oral Health Surveillance System, which guides collection and analysis of state-level data, much of which relates to children (eg, level of caries in third graders, sealant prevalence).³² This kind of surveillance is important for state and local planning purposes and for legislative advocacy. Unfortunately, not all states have invested in a dental public health infrastructure to carry out these essential functions.

The importance of surveillance and the dental public health infrastructure, including the dental public health workforce, cannot be overemphasized. Data are essential for establishing baselines and evaluating programs, policies, and trends. It is difficult to draw conclusions when differing methodologies are used to collect data over time and locales, or when too much time elapses between data collection and analysis and publication. Adequate resources are needed to gather methodologically sound information so that important outcomes, like children's oral health, can be assessed. It is uncertain when NHANES will next collect oral health measures adequate to fully assess trends since 1999–2004. Moreover, an adequate public health workforce—including those with specialty training in dental public health—is necessary for the implementation and monitoring of public health measures at federal, state, and local levels, as Tomar and Reeves¹⁵ assert. Despite the challenges brought by our population's increasing diversity and growth, no increased investment was made in dental public health residency programs until 2009, when some stimulus funds were designated for this purpose.³³

Advances in Science and Translation into Practice

The years since the SGROH have seen enormous advances in science, as Slayton and Slavkin¹⁷ summarize. Scientific investments have resulted in the elucidation of the human genome and greater understanding of the genetic components of many oral and craniofacial conditions. Other remarkable progress has been evident in tissue reengineering (ie, biomimicry) and salivary diagnostics. Risk factors for oral cancer are now understood to include human papilloma virus.

In the area of caries research, there is greater understanding of the multiple determinants affecting health outcomes, including critical topics such as the age and extent of a child's colonization with cariogenic bacteria (notably *Streptococcus mutans*), and the presence of

culturally determined dietary habits and availability of healthful foods, as Tinanoff and Reisine¹⁶ review. CSHCN may experience additional risks as a result of special diets and medications, the presence of enamel defects, or more significant craniofacial abnormalities, with a resulting impact on quality of life (considered by Strauss and Caspell²⁹). Studies funded by the National Institutes of Health, including those from NIDCR's Centers to Reduce Oral Health Disparities, reveal the complexity of the many factors needed to eliminate health disparities.³⁴

As a result of this increased understanding of the determinants of caries, contemporary approaches to caries management include risk assessment and modification of risk factors over time, including use of fluorides and changes in dietary and hygiene habits, in addition to traditional restorative treatment to remove decay and preserve teeth. Parental counseling has assumed greater importance, along with the capacity of the dental workforce to provide culturally sensitive and family-centered care in the context of a dental home (an ongoing source of comprehensive dental care analogous to a medical home).^{35,36} Although achieving changes in health behaviors may be difficult for families facing language or cultural barriers or other stresses, motivational interviewing has been applied successfully to support positive behavior changes in underserved families.

The usefulness of fluoride varnish in the prevention of ECC is another advance with the potential to reduce ECC. The appeal of this intervention is the simplicity of application and safety for use in very young children. Fluoride varnish application is most likely to be effective when combined with assessment of risk factors, including presence of incipient or frank decay, discussion of risk factors with parents, and referral for dental care. In fact, fluoride varnish can become part of the practice of primary care clinicians, especially those working with high-risk populations. The integration of this procedure into pediatric practices is supported by the availability of in office or online training (<http://www.aap.org/oralhealth>), and reimbursements for medical practitioners providing these services by 34 state Medicaid programs (and occasionally private dental insurers, such as the Washington Dental Service). (For details of state programs, see <http://www.nashp.org/files/EngagingPrimaryCareMedicalProvidersCOH.pdf>).

Yet Lewis and colleagues²⁷ note that although 91% of pediatricians surveyed believe they should assess children for dental caries in their practices, only 54% do so with more than half of their patients 0–3 years old, and only 41% are confident in their ability to do so. Similarly although 19% thought pediatricians should provide fluoride varnishes, only 4% routinely do so with young children. Respondents listed lack of oral health training, time during well-child visits, and reimbursement issues as important barriers to providing oral health–related care. These findings are surprising given AAP's 2003 oral health policy supporting pediatrician's involvement in oral health activities.³⁷ (There is now a second AAP policy identifying fluoride varnish as a preventive intervention for pediatricians.³⁸) Clearly we need to do more to integrate oral health assessment and fluoride varnish into primary pediatric care.

Currently no validated caries risk assessment tool exists, although guidelines exist and research on these tools continues. In this issue, Tinanoff and Reisine¹⁶ propose a practical approach to assessing caries risk that medical providers can utilize in their offices to initiate discussions with parents. Also in this issue, Mobley and colleagues¹⁹ review what is known about dietary contributions to caries and sociocultural influences on dietary choices, which also need to be taken into account when counseling caregivers. Importantly, they reiterate the lack of association between breastfeeding and caries—although frequent intake of sugary fluids is a risk factor, especially at night, a point that should always be made clear to families. However, Tinanoff and Reisine¹⁶ note the paucity of studies that address the potential of dietary counseling to reduce dental caries in preschool children.

Importantly, there has been a lag between our understanding of etiological factors in caries and our ability to ensure the translation of this evidence into clinical practice, as Milgrom and colleagues,¹⁸ Slayton and Slavkin,¹⁷ and Szilagyi³⁹ point out. More clinical transitional research is needed to assess promising interventions (such as xylitol to inhibit maternal transmission of cariogenic bacteria, or effectiveness of dietary counseling). Educational and policy advances are needed to ensure that general dentists can apply the latest science and behavioral interventions in managing ECC and that medical professionals can screen for caries and actively promote children's oral health. Strategies to overcome this chasm between science and practice will require resources and intense collaborations across many fields, not only in medicine and dentistry, but also in psychology, social work, nutrition, speech/language and occupational therapy. With these improvements, access to oral health care will have even greater benefits for children.

Access to Dental Care: National Surveys, Medicaid/SCHIP, and Safety Nets

Access to oral health care is considered necessary but not sufficient to ensure optimal oral health because of the many determinants of health outcomes discussed above. Utilization data most frequently cited are from the Medical Expenditure Panel Survey (MEPS) (which includes a cross section of families over time noting their insurance coverage) and the Centers for Medicaid and Medicare (CMS) 416 Reports (based on states' reports of certain Medicaid-covered dental services). Neither addresses adequacy of care or the persistence of unmet needs. The National Survey of Children's Health (NSCH) and National Health Interview Survey (NHIS), based on parental report, do ask families whether health care needs have been met.

Utilization of dental care has improved since the SGROH. As Edelstein and Chinn²⁰ report, MEPS (1996–2004) and CMS 416 Reports (1999–2006) indicate modest increases in utilization of dental care and decreases in uninsured children. The average state-reported dental utilization by Medicaid-eligible children improved from 27% in 2000 to 33% in 2006. No doubt a major factor behind the

increase in utilization of dental care was the advent of the State Children's Health Insurance Program (SCHIP) in 1997: the percentage of low-income children with dental coverage increased from 18% to 41% over this time. Yet disparities persist by age, income level, race and ethnicity, and parental education level. Dental visits by children under 6 years of age only increased from 21% to 25%. NSCH reports somewhat higher levels of utilization, but with disparities roughly paralleling the data from MEPS. The Child Health Insurance Program Reauthorization Act (CHIPRA) of 2009 requires states to include dental benefits in their CHIP programs (although covering certain children who have other health insurance is optional), and also includes more rigorous requirements for data collection to monitor these outcomes, as Edelstein and Chinn²⁰ and Crall³¹ discuss.

Despite enhanced coverage, dental care remains the most frequent unmet health care need of children. Data from the 2008 NHIS indicate that 7% of all children aged 2–17, or 4.6 million children, had unmet dental needs because their family could not afford dental care compared with 2.8% who had unmet medical needs because their family could not afford medical care.⁴⁰ Similarly, Lewis²⁵ reports in this issue that families of CSHCN also continue to identify dental care as the highest unmet health need, with financial issues being the most common barrier (2006 National Survey of CSHCN). Overall, children still are more than twice as likely to lack dental as medical coverage.

Provision of dental care through community health centers (CHCs) has increased since 2000, Crall³¹ notes, because a federal mandate now requires new CHCs or CHC expansions to include dental services. Although CHCs provide only about 1% to 2% of dental care nationally, their provision of care for underserved children undoubtedly contributes significantly to the dental safety net for these children. However, these programs have difficulty recruiting and retaining sufficient numbers of dentists. Efforts to redress this problem have included more loan repayment programs at state and federal levels, and dental student service learning experiences, as considered by Seale and colleagues.²²

Barriers to accessing dental care are many: underserved families may not utilize services for sociocultural or financial reasons, or because of a lack of oral health literacy—that is, appreciation of the importance of oral health and how to promote it. Health literacy as a contributing factor to disparities has received additional attention since 2000 with publication of major reports and availability of resources on this topic^{41,42} (see also <http://nmlm.gov/outreach/consumer/hlthlit.html>). Barriers at the policy level include, among others, the fact that in all but a few states, Medicaid does not cover primary dental care for adults, even though adults who are caregivers affect children's oral health through transmission of cariogenic bacteria, development of good dietary and oral hygiene habits, and provision of regular visits to the dentist. The availability of dental practitioners in underserved communities and their willingness to see young children, especially those who are publicly insured, are other factors.

The Oral Health Workforce

The SGROH and the *National Call to Action* raised concerns about the size, diversity, and capacity of the dental workforce and the education of other health professionals in oral health. The adequacy of the dental workforce is difficult to assess because of importance of factors such as geographic distribution, dental practice capacity and types of services delivered, as Mertz and Mouradian²¹ note. There has been only a modest increase in the diversity of the dental workforce despite the recognition of the importance of this factor, while the number of dental health professional shortage areas continues to rise. Innovations in dental workforce models include enhanced dental hygienists' and dental assistants' scope of practice and creation of new models such as dental therapists (discussed by Nash²³) to assist on the front lines in underserved communities. A recent Institute of Medicine workshop report highlights the development of new dental workforce models.⁴³

The capacity of the dental workforce to meet the needs of underserved children is discussed by Seale and colleagues.²² Concerns include lack of adequate pediatric educational experiences as a result of shortages of pediatric dental faculty, and inadequate attention to the behavioral, developmental, social, and cultural issues in the care for young children. These authors call for a revision of current Commission on Dental Accreditation requirements to include standards related to infant oral health care, provision of dental care to culturally diverse populations (with required service learning experiences), and professionalism and ethics related to access to care for vulnerable populations. New standards might also include attention to the care of pregnant women who are in a position to improve their own and subsequently their young child's oral health. New guidelines on perinatal dental care have been released since the SGROH.⁴⁴

Nondental child health professionals see children early and frequently and could promote oral health and identify dental disease—an important advantage, given young children's low access to dental care. Articles in this issue by Douglass and colleagues²⁴ and Hallas and Shelley²⁶ explore the progress to date, as well as the potential for greater involvement of pediatricians, family physicians, and pediatric nurse practitioners to promote children's oral health through screening, counseling, and use of preventive interventions. Many educational materials for nondentists have been developed since the SGROH, yet uptake has been slow. A report released jointly by the American Association of Medical Colleges and American Dental Education Association calls for more oral health education for medical students and more shared curricula,⁴⁵ but few efforts have been implemented within medical schools. More encouraging is the inclusion of oral health training in family medicine residency requirements and availability of training resources (<http://www.smilesforlife2.org/>). The merging of the New York University Colleges of Dentistry and Nursing has opened a way to new interprofessional models. The largest effort training

medical providers in oral health is North Carolina's model program, *Into the Mouth of Babes*, which reported 137 000 preventive dental visits in primary care offices for more than 59 000 children in 2008.

The training of dental and medical professionals to provide care for children depends on adequate faculty. The critical dental faculty shortages noted by the SGROH have worsened in the past 10 years. Although the numbers of pediatric dentists trained has increased, it is unclear whether this will translate into better access for underserved children. Innovations in the selection and training of dental students and residents will be needed to increase capacity to care for young children and to build the academic pipeline, as discussed by Seale and colleagues.²² Training of medical professionals in oral health also requires investment of resources and expertise in oral health. Greater collaboration between dental and medical educational institutions and community practitioners can further both these goals.

Increasing Access Through Innovative Collaborations

Many collaborative efforts since the SGROH have been developed to overcome barriers to improving children's oral health and access to dental care. For example, national, state, and local dental associations and others have worked to increase dentists' participation in Medicaid utilizing such strategies as adequate reimbursement, case management, simplification of administrative requirements, and targeted pediatric dental training for general dentists (eg, the Access to Baby and Child Dentistry program in Washington State). Others have worked directly with schools, Head Start, and other programs to provide dental care for children at these locales (eg, the American Academy of Pediatric Dentistry's Head Start Dental Home Initiative). The American Dental Association's Give Kids a Smile Day has brought dental care to many underserved children across the country and has raised the visibility of the problem (see <http://www.aap.org/oralhealth/summit.cfm> for other representative community initiatives aimed at increasing children's access to dental care). Beyond these examples, it is clear that collaborations to improve oral health—as called for by the SGROH and *National Call to Action*—have dramatically increased since 2000. It is not possible to highlight the many worthy programs, but it is clear that collaboration will be essential to improve children's oral health.

CONCLUSION: CHANGING TIMES, POLICIES, AND OPPORTUNITIES

Comparisons have been made with data and insights available at the time of the SGROH. Yet as Crall³¹ notes, the country has experienced many changes since 2000, including the September 11, 2001, terrorist attack, global health worries, and the recent economic downturn. Despite these challenges, legislation enacted during this time to ensure inclusion of mental health benefits in health plans, CHIPRA, and the current interest in health care reform are cause for optimism. Additionally, Edelstein³⁰ describes

the deepening interest in oral health achieved by persistent behind-the-scenes policy work in Washington, DC, accelerated, no doubt, by media coverage of the death of Deamonte Driver. These policy analyses identify the substantial progress—and work remaining—to ensure all children have access to dental care. Crall³¹ calls for a renewed commitment to oral health as a part of overall health by ensuring essential dental care is considered medically necessary and on a parity with medical care. He also calls for careful oversight of state CHIP plans' dental programs. The most intense policy work now falls to states to implement these and other programs in the face of budgetary constraints.

Yet much more must be done beyond ensuring access to dental care. Unchecked caries rates in young children, increases in childhood populations at risk for caries, and evidence of morbidity and even mortality from spread of caries create a clear mandate for prevention. Efforts must now focus on the search for additional prevention strategies, translation of what we already know into widespread practice, and solutions to the multiple determinants of health outcomes, including the best ways to reach underserved children.

Dentists, physicians, and other health professionals who work with children must embrace a shared responsibility for children's oral health, and work to overcome the historic separation between dentistry and medicine—between the mouth and the rest of the body. If knowledge gaps and other barriers were addressed, pediatric medical providers could deliver preventive oral health services as a matter of routine practice, similar to childhood immunizations. If the barriers that dentists experience were tackled and they received better education in pediatric oral health care, children's access to dental care could improve. If oral health were part of all health professional training, we would have nurses and nurse practitioners, pharmacists, social workers, and others attending to children's oral health as well. There is a critical need for leadership and collaboration—among professional organizations in medicine, dentistry, and nursing and other health professions, parent advocates, and the many public and private stakeholders—to implement the changes called for in these papers. The collaborative work of the AAP, Academic Pediatric Association, the editors of *Academic Pediatrics*, the authors of the articles in this special issue, and the many public and private sponsors contributing to this project, indicate that the will and resources to optimize children's oral health in America do exist.

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