

Disparities in Children's Oral Health and Access to Dental Care

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DENTAL CARE HAS RECENTLY been identified as the most prevalent unmet health need in US children.¹ Glaring disparities in children's oral health and access to dental services are reported by the General Accounting Office and others.^{2,3} Low-income and minority children and those with special health care needs are at greatest risk of inadequate access and poor oral health.²⁻⁶ Childhood oral disease has significant consequences for health and well-being that may not be appreciated because of the historic separation of medicine and dentistry.

Almost 3 times as many children lack dental insurance as lack medical insurance.⁷ But the presence of third-party dental coverage does not reliably predict access to care. Children from poor families who qualify for Medicaid are entitled to comprehensive oral health coverage through the program's Early Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit,⁸ yet are less likely to receive dental care than children from middle- and upper-income families, many of whom lack dental coverage.³ Lower-income children may qualify for dental coverage through State Child Health Insurance Program (SCHIP) plans,⁹ but the impact of these plans on access to dental care has not been evaluated.

This article discusses the nature and consequences of childhood oral disease, factors that contribute to disparities in children's oral health and access to care, and policies that may reduce

Dental caries can be prevented by a combination of community, professional, and individual measures including water fluoridation, professionally applied topical fluorides and dental sealants, and use of fluoride toothpastes. Yet, tooth decay is the most common chronic disease of childhood. Dental care is the most prevalent unmet health need in US children with wide disparities existing in oral health and access to care. Only 1 in 5 children covered by Medicaid received preventive oral care for which they are eligible. Children from low income and minority families have poorer oral health outcomes, fewer dental visits, and fewer protective sealants. Water fluoridation is the most effective measure in preventing caries, but only 62% of water supplies are fluoridated, and lack of fluoridation may disproportionately affect poor and minority children.

Childhood oral disease has significant medical and financial consequences that may not be appreciated because of the separation of medicine and dentistry. The infectious nature of dental caries, its early onset, and the potential of early interventions require an emphasis on preventive oral care in primary pediatric care to complement existing dental services. However, many pediatricians lack critical knowledge to promote oral health. We recommend financial incentives for prioritizing Medicaid Early and Periodic Screening, Diagnostic, and Treatment dental services; managed care accountability; integration of medical and dental professional training, clinical care, and research; and national leadership.

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these disparities. Because oral disorders affect the teeth, mouth, and supporting craniofacial structures—as emphasized in *Oral Health in America: A Report of the Surgeon General*⁷—we use the term *oral health* where possible to draw attention to the broader implications of oral, dental, and craniofacial disease. Although oral disorders include diverse conditions, such as cleft lip/palate and craniofacial injuries, this discussion focuses on dental caries.

BACKGROUND

Prevalence, Etiology, and Prevention of Childhood Caries

Tooth decay is the most common chronic disease of childhood, affecting 5 to 8 times as many children as asthma.¹⁰ By mid childhood, more than

50% of children have detectable caries,¹¹ and by late adolescence about 80% have acquired this preventable infectious disease.¹²

Dental caries is a multifactorial disease process initiated by specific pathogenic bacteria, primarily *Streptococcus mutans*, which metabolize ingested carbohydrates to form acids. These acids demineralize the tooth surface, which

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is a process fluoride helps reverse, primarily by surface action. Cariogenic bacteria are passed from the mother to the child in the first 1 to 2 years of life.^{7,13} Early childhood caries (baby-bottle tooth decay) is a rampant form of the disease often associated with inappropriate feeding practices.¹⁴ The caries process is amenable to medical management before it results in frank cavities and before many children see a dentist. Some professional associations now advise that children have a dental assessment by age 1 year. Childhood tooth decay is preventable by a combination of community, professional, and individual measures including water fluoridation, professionally applied topical fluorides and dental sealants (the latter protect chewing surfaces, where most cavities occur), use of fluoride toothpastes at home, proper infant feeding practices, and diet.¹⁵

Water fluoridation is a major, cost-effective public health achievement, and the most effective measure in preventing caries,¹⁵ yet only 62% of community water supplies are fluoridated.¹⁶ Fluoridation alone does not completely eradicate disease, as evidenced by the existence of caries in children living in fluoridated communities. However, lack of fluoridation may disproportionately affect poor and minority children, who are less likely to receive other preventive interventions, increasing morbidity and costs of care.¹⁷ Only 12% of children aged 6 to 14 years living at or below the federal poverty level (FPL) had at least 1 sealant, which is roughly one third the rate for children in higher-income families.³ The sealant prevalence for black and Hispanic 14-year-olds is 5% and 7%, respectively, compared with 24% for all 14-year-olds.¹⁸

Consequences of Untreated Oral Disease

Short-term. Untreated dental caries has been associated with failure to thrive¹⁹ and provides a reservoir of contagion for abscesses, cellulitis, and systemic spread of disease. Premature loss of primary molars predisposes to malocclusion.²⁰ Children with dental problems lose an

estimated 52 million school hours annually²¹; poor children experience nearly 12 times as many restricted activity days from dental disease as children from higher-income families.³ Substantial numbers of children with untreated caries are seen in emergency departments, and for many it is their first dental visit.²² In addition to restorative care, advanced disease may necessitate extractions, intravenous antibiotics, and treatment under general anesthesia.²²

Long-term. Decay in the primary dentition is a predictor of decay in permanent teeth.²³ Poor oral health and dental disease often continue into adulthood, with the potential to affect speech, nutrition, economic productivity, and quality of life.^{3,24}

While oral infection has long been considered a risk factor for certain patients,²⁴ significant oral-systemic associations with broader implications are now under investigation, and have recently been reviewed.^{7,25} These include increased risk of premature labor and low birth weight in pregnant women with periodontal disease, and increased risk of cardiovascular disease and stroke in adults with periodontal disease.⁷ Proposed mechanisms include the role of gram-negative periodontal infection in triggering premature labor or rupture of membranes, in contributing to vessel wall inflammation, and/or triggering microthrombus formation and the development of atherosclerosis.⁷

Costs of Neglected Oral Disease

Neglected disease can be costly in financial as well as human terms. Based on actuarial estimates for new enrollees in SCHIP plans, routine pediatric dental care should constitute 20% of a comprehensive benefits package or \$20 per child per month,²⁶ which is a sharp contrast to the 2% to 3% of current Medicaid child health expenditures on dental care.²⁷ But when treatment of rampant caries requires hospitalization, costs increase dramatically. Expenditures for restorative dental care delivered under general anesthesia to Iowa Medicaid children were \$2009 per

case with 78% of costs being attributable to hospital and anesthesiologist charges.²⁸ Costs for Louisiana children receiving hospital operating room care were estimated at \$1508 compared with \$104 for children receiving outpatient dental care.²⁹ Since dental and medical costs are usually tracked separately, actual costs of neglected dental disease are difficult to estimate (Don Schneider, DDS, MPH, Health Care Financing Administration, oral communication, August 2000).

Disparities in Oral Health

Surprisingly, even with the existence of effective preventive modalities, progress toward reducing childhood caries has been meager in recent years. According to Healthy People 2000 reviews, baseline tooth decay prevalence in children aged 6 to 8 years remained virtually unchanged between 1986 (54%) and 1995 (52%).^{11,12} Prevalence and severity of childhood tooth decay are linked to socioeconomic status across all age groups (FIGURE 1); black and Hispanic children are disproportionately affected by caries.² Approximately 20% to 25% of US children (about 20 million) experience 80% of all decayed teeth.³⁰

Most decayed teeth in preschoolers go untreated despite potential significant health consequences. Decayed teeth in children from lower-income households are more likely to remain untreated at all ages (FIGURE 2); substantial proportions of decayed teeth in black and Hispanic children go untreated regardless of household income level. American Indian/Alaskan Native children have among the highest rates of dental caries.¹¹

Disparities in Access to Care

Children from poor and near-poor families with incomes below 199% of the FPL are 3 times as likely to have an unmet dental care need as children from families with incomes above or at 200% of the FPL.¹ Poor and minority children are also less likely to have dental visits.³¹ Only 36% of children and adolescents aged 6 to 18 years whose families are liv-

ing at or below the FPL have dental visits compared with 71% from families with incomes above 400% of the FPL.³ A 1996 Department of Health and Human Services inspector general's report noted that in 1993 fewer than 20% of children enrolled in Medicaid, who were eligible for EPSDT benefits, received any preventive dental visits.⁴

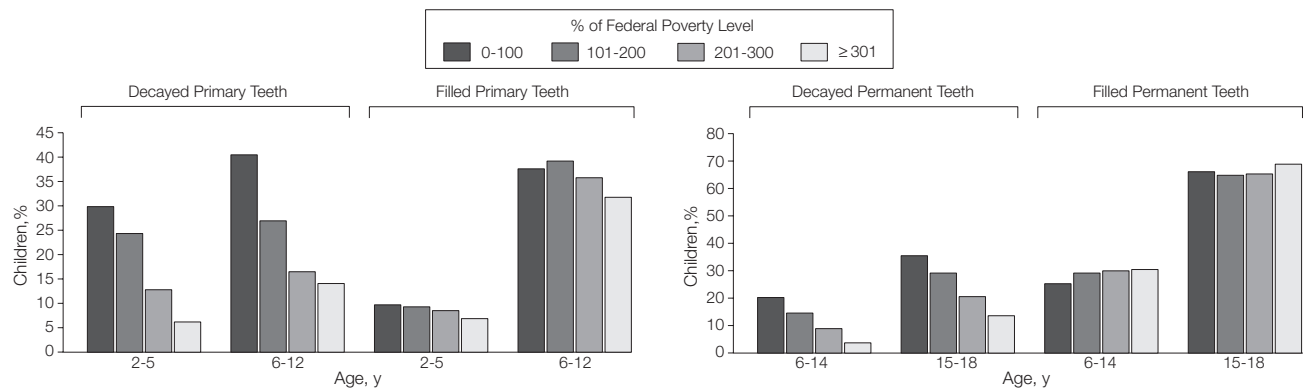
Factors contributing to inadequate dental access include geographic maldistribution of clinicians (only 6% of the dental need was met in 1198 health professional shortage areas⁷); inadequate numbers of dentists treating Medicaid-

eligible children (only 10% of dentists participate nationwide⁴); relatively few pediatric dentists (only 3500), who may be more likely to treat Medicaid children³²; individuals' knowledge and attitudes concerning oral health⁷ and other difficulties reaching culturally diverse populations; and problems intrinsic to Medicaid. Access to oral health care for near-poor families, who do not qualify for Medicaid or SCHIP, may be limited by the lack of employer-based dental insurance³³ and the exclusion of dental-related conditions from definitions of medical necessity.

Children With Special Health Care Needs

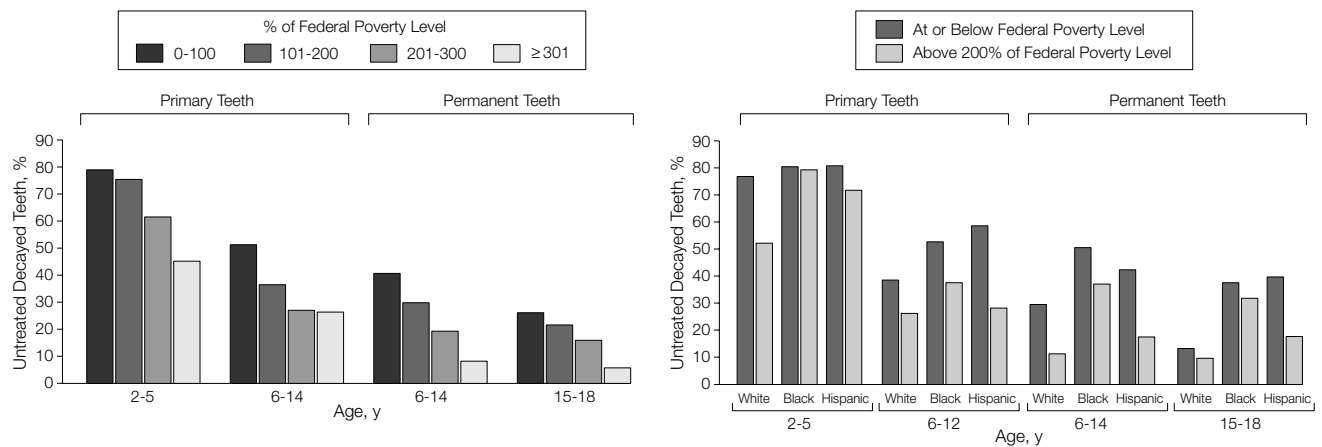
Oral health is also the most prevalent unmet health care need of children with special health care needs.⁵ No national database exists on the oral health status of these children, but clinical accounts and emerging data point to increased risks of oral health problems.^{6,34} Access to oral health care for children with special health care needs may be affected by the shortage of pediatric dentists and other dentists with training in the care of such children.³⁵ Recently, a survey of academic pediatric dental de-

Figure 1. Percentage of Children With Decayed and Filled Teeth by Household Income Level



Household income level is presented as a percentage of the federal poverty level. Reprinted from *Proceedings of Children Our Future: Ethics, Health Policy and Medical/Dental Care for Children*; April 3-4, 1998; Seattle, Wash. Reprinted with permission of the Washington State Department of Health.

Figure 2. Percentage of Untreated Decayed Teeth in Children by Age, Race/Ethnicity, and Household Income Level



Household income level is presented as a percentage of the federal poverty level. Reprinted from *Proceedings of Children Our Future: Ethics, Health Policy and Medical/Dental Care for Children*; April 3-4, 1998; Seattle, Wash. Reprinted with permission of the Washington State Department of Health.

partments, which serve as safety nets for children with special health care needs, revealed that many are financially threatened and clinically overwhelmed, with waits of up to 7 months for operating room time for nonemergent cases (Arthur Nowak, DMD, MS, and Charlotte Lewis, MD, MPH, unpublished data, March 2000). The consequences from delays in access to oral care for children with special health care needs include postponed bone marrow and organ transplants, cardiac and other critical surgeries, failure to thrive, breathing difficulties, septicemia, brain abscesses, and other serious complications.^{24,36}

EXPANDING ACCESS TO ORAL HEALTH EPSDT and SCHIP

Private sector financing typically separates medical and dental coverage, but at least conceptually the Medicaid EPSDT benefit covers dental and medical services together as part of comprehensive health care.⁸ Most SCHIP plans also provide dental coverage for near-poor children, although the design of the dental benefit is left to the discretion of states.³⁷

The federal EPSDT benefit includes oral health screening and referrals to dentists, all follow-up care, health education and anticipatory guidance for parents and older children, and assistance for families in scheduling and getting to appointments. State Medicaid agencies are also obligated to locate dental clinicians who will see Medicaid patients. The medical necessity coverage rule of EPSDT applies to dental as well as medical care, is specific to children, and requires coverage for primary care, secondary prevention, and amelioration of illness or disability.

The model of comprehensive health care for children contained in EPSDT recognizes the characteristics of children that distinguish their health care needs from those of adults.³⁸ Children's developmental processes are vulnerable to untreated diseases, including oral disease, making early identification of high-risk children and timely interventions critical. Moreover, opportunities

to promote health and prevent disease and complications are maximal in childhood. Explicit coverage of health education and assistance for parents recognize children's dependence on their caretakers to understand and act on oral health recommendations and to access dental services.

In many ways the EPSDT benefit is a model for children's health coverage, but the effectiveness of this legislation has been limited by lack of outreach to families, interruptions in beneficiaries' eligibility,³⁹ low dental reimbursement rates, and administrative complexities that discourage clinician participation.³² Litigation may improve states' compliance with their EPSDT obligations, but success in court may not translate into timely or lasting gains.⁴⁰ For example, a federal judge recently found that Texas had not improved access to EPSDT dental care, or remedied other program problems, as required in a 1996 settlement of a case originally filed in 1993.⁴¹ Federal Medicaid incentives, such as exist for immunizations and family planning services, could make access to pediatric oral health care a higher priority for state Medicaid programs. State and local level assessments of access barriers may suggest additional strategies for improvement.^{32,42}

Service Delivery Models

The current structure of dental practice complicates efforts to expand access. Unlike medical care, most dental services are provided in practices with only 1 or 2 dentists, with relatively limited capacity to compensate for low Medicaid fees or offset costs of missed appointments.⁴³ Dental safety-net clinicians exist at such sites as federal and local public health centers and clinics serving low-income children sponsored by universities and hospitals.⁴⁴ Dental societies and some private practitioners also participate in initiatives to reach underserved children,³² but the number and distribution of such services are inadequate to meet the needs of these children.

The degree to which states' health professional practice laws permit innovative models of preventive oral health care

is not fully understood. These laws typically restrict procedures involving the teeth and supporting structures to licensed dentists and hygienists and other personnel working under direct dentist supervision. However, Connecticut and certain other states permit dental hygienists with specified training and experience to provide selected services at schools and public health clinics under the general supervision of dentists or in dental professional shortage areas.⁴⁵⁻⁴⁷ More efficient use of allied dental personnel and other professionals could supplement the service capacity of pediatric and general dentists.

Under a special provision in North Carolina's practice law, specially trained pediatricians apply fluoride varnish to the teeth of children younger than 3 years in conjunction with periodic oral examinations and parental counseling (Betty King Sutton, DMD, MPH, North Carolina Medicaid Dental Program, oral communication, April 2000). These pediatricians participate in a primary care case management Medicaid demonstration project, under which each eligible child has a "medical home" with a primary care physician who assumes responsibility for the child's primary care and referrals, including dental referrals.

Primary care case management and other models of comprehensive medical managed care offer administrative structures that can support interventions with enrolled populations. The performance of Medicaid medical managed care arrangements is mixed, but reports of improved immunization and lead screening rates suggest that primary care practitioners could also be accountable for basic oral health screening and timely dental referrals.⁴⁸ Although Medicaid managed care organizations are typically obligated to provide EPSDT oral screening and dental referrals, the contracts under which they operate do not usually specify particular oral health preventive interventions (eg, fluoride applications, parental counseling).⁴⁹ A full range of children's oral health services could be specified in contracts, obligating managed care organizations to ensure delivery.⁵⁰

Need for Integration of Medicine and Dentistry

While the root causes of disparities in children's oral health and access to care are many and complex, a common link can be seen in the long-standing separation of medical and dental systems. This separation occurs at the level of professional training, clinical care and continuing education, and in scholarly journals, research agendas, and financing and delivery mechanisms.

Failure to integrate oral health into pediatric training can lead directly to poorer health outcomes. For example, a recent national survey demonstrated that many pediatricians lack the current scientific knowledge needed to promote children's oral health. Only 39.5% knew about transmissibility of dental caries; 37.3% understood that dental sealants are not usually applied to primary teeth; 60.8% knew the correct fluoride dosage for 4-month-old infants; and 22% were aware of fluoride varnishes. Only 9% answered 4 knowledge questions correctly.⁵¹ Conversely, an emphasis on technical aspects of dental training over medical and social correlates of health may contribute to the observed underreporting by dentists of important pediatric problems such as child abuse and neglect.⁵²

In its 1995 report "Dental Education at the Crossroads," the Institute of Medicine both predicted and recommended closer integration of dentistry with medicine and the health care system as a whole at the levels of research, education, and patient care. Specifically, the Institute of Medicine foresaw that scientific and technological advances in molecular biology, immunology, and genetics, and an aging population with more complex health needs would continue a process of linking dentistry and medicine. Financial pressures on academic medical centers also would encourage consolidation and coordination of programs in related areas such as medicine and dentistry.⁵³

The goal of reducing children's oral health disparities also supports increased integration of dentistry with medicine and other health disciplines.

Specifically, solving the oral health and access problems of poor and minority children requires understanding the complex interplay of medical, economic, and social determinants of health. For children with special health care needs, the potential for significant oral-systemic interactions necessitates integrated approaches to care and research.

A model of complete integration consistent with the Institute of Medicine's recommendations is the "oral physician," with combined MD/DMD degrees.⁵⁴ Applications of this model have thus far been limited to oral and maxillofacial surgery training programs (about half of which offer joint degrees). Short of major changes in the structure of dental and medical education, there are compelling reasons to enhance the oral health skills of all primary care practitioners, who see children before they are referred to a dentist, and to reassess current dental curricula with respect to important areas of child health. Such enhancement could take place within existing and emerging training models.

For example, general dentists are important to the care of children because they comprise 80% of the dental work force. They need the skills to examine and treat infants and young children and counsel families, including those from high-risk populations. Opportunities for pediatric experience may be limited in a dense undergraduate curriculum, but a mandatory postgraduate dental (residency) training year is increasingly recommended.⁵⁵ General dentistry residencies could allow more time for additional clinical experiences, and potentially create new service sites.⁴⁴

Medical and dental trainees and faculty would benefit if dental residents were present regularly in pediatric clinics and wards. Cross-disciplinary trainees on the same team would develop increased appreciation of each other's area and its importance to the care of children. Low-income children and children with special health care needs, who are frequently followed up in academic centers, could also benefit from such training innovations. While hospital-

ized children typically receive complete pediatric examinations, it is rare that their oral health is fully evaluated and its impact on systemic health considered. An exception occurs in the craniofacial clinic, where medical and dental care are integrated into comprehensive, coordinated team care for children with craniofacial conditions. Other examples of service integration include dental screening in specialty clinics and co-located services, but these are not widely used.⁵⁶

Another emerging model of integration is the Leadership Education for Children With Neurodevelopmental and Related Disabilities (LEND) program, offered through the Maternal and Child Health Bureau (Health Resources and Services Administration). Applicants seeking competitive funding for LEND training grants must now include pediatric dentistry as a core discipline along with pediatrics, nutrition, occupational/physical therapy, social work, and other fields.⁵⁷ These programs will extend oral health training and research opportunities to other health disciplines.

For pediatric and dental practitioners in community practice, targeted continuing education programs could be beneficial. The recent creation of a provisional Section on Pediatric Dentistry within the American Academy of Pediatrics has brought attention to the need for pediatricians and pediatric dentists to collaborate on practice issues and policy development and has increased interdisciplinary continuing education opportunities.

Increased professional integration at many levels can promote research agendas elucidating the disparities in children's oral health. For example, there is a need to refine dental indicators and report them with other important child health indicators, and to address other critical gaps in oral health services research and epidemiology.⁵⁸ There is a lack of knowledge of oral health status and access to care for children with special health care needs,^{7,34} and a need for more research to illuminate important oral-systemic health interactions affecting children.

Immunizations: Lessons for Children's Oral Health

A decade ago, epidemics of measles and pertussis occurring disproportionately in low-income preschool children warned the nation that the public health triumph of immunization was not yet complete.⁵⁹ Substantial numbers of Medicaid children had not received immunizations, even though (as with oral health care) they were entitled to these services.⁶⁰ Under White House leadership and oversight of a national advisory committee, government agencies, professional associations, private foundations, researchers, and community coalitions mounted multifaceted childhood immunization initiatives. National monitoring of childhood immunization was refined, medical associations agreed on a single schedule for childhood immunizations, and research alerted practitioners to missed opportunities to immunize children. Targeted education campaigns advised families and clinicians of recommended immunization schedules. Congress ordered federal purchase and distribution of pediatric vaccines for free use in children covered by Medicaid and children without health insurance. Today, early childhood immunization rates are markedly improved,²⁰ and timely immunization is a marker of access to and quality of pediatric health care.

Parallels between immunization and oral health care are inexact, given differences in practice structures of dentists and physicians and the nature of the target conditions and interventions themselves. Still, the nation's childhood immunization experience holds lessons for children's oral health. First, like the early successes of immunizations, the successes of fluorides and timely dental treatment may cause health professionals and the public to assume that pediatric oral disease has been eliminated. Second, the immunization experience demonstrated that a multifaceted campaign addressing causes of underuse of critical health care services can make a substantial difference. Finally, many constituencies had begun to respond to the epidemics

when the White House made immunizations a national priority, but leadership at the highest level lent urgency and focus to the activities.

The recent surgeon general's report on oral health,⁷ the surgeon general's conference on children and oral health: *The Face of A Child* that followed,⁵⁶ the US General Accounting Office report,³ and others^{2,4,61} have called attention to the disparities in children's oral health and access to care and prepared recommendations for action. The National Institutes of Health⁶² and Health Care Financing Administration⁶³ have solicited proposals to establish research centers to reduce children's oral health disparities. Other agencies are supporting oral health initiatives and research including, among others, the Centers for Disease Control and Prevention⁶⁴ (which also has a major emphasis on fluoridation), the Indian Health Service,⁶⁵ and the Agency for Healthcare Research and Quality.⁶⁶ Private foundations are also funding oral health initiatives. State legislatures in 1999 enacted or considered legislation to increase Medicaid reimbursements or provide tax credits for participating dentists, mandate health plan coverage of anesthesia for dental care, and charge task forces with preparing recommendations.⁶⁷ The National Committee for Quality Assurance is developing pediatric oral health measures.⁶⁸ Many state and community level collaborations have reported efforts to address disparities in children's oral health and access to care.⁵⁶

CONCLUSIONS AND RECOMMENDATIONS

Now is the time to focus attention on this important child health problem and take advantage of the latest efforts in this area. Strong national leadership, with a mechanism for oversight, could pull together all those responsible for children's health, including dental and medical practitioners, professional associations, educators, researchers, parents, policymakers, and others, to address disparities in children's oral health and access to care.

Demonstration projects are needed that explore, among others: models for increasing medical-dental integration in professional training, continuing education, clinical care, and research; more emphasis on preventive oral health in primary care; better use of allied dental professionals and primary care practitioners to provide preventive care; and increasing dental trainees' experience with children from high-risk populations including low-income and minority children and children with special health care needs. Other potential points for change exist in primary care case management, managed care contract language, review of existing practice laws, federal incentives, state and community efforts to address disparities, and graduating additional pediatric dentists.

The surgeon general has called for a national oral health plan to eliminate disparities in oral health of all Americans.⁷ Given the cost-effectiveness of early oral disease prevention, and the severe disparities in children's oral health status and access to care, the first part of that plan should focus on children.

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