

Empowering Head Start to Improve Access to Good Oral Health for Children from Low Income Families

Peter Milgrom · Philip Weinstein · Colleen Huebner ·
Janessa Graves · Ohnmar Tut

Published online: 2 February 2008
© Springer Science+Business Media, LLC 2008

Abstract Surveys over 20 years have documented worsening in the dental health of preschoolers. Healthy People 2010 Midcourse Review reports the country moving away from oral health goals for young children; the slip is 57%. Exacerbating this is the inability of Medicaid to provide for those in need. Most children receive examinations only; few receive comprehensive care. We urge Head Start grantees to adopt a new approach to oral health goals and in this paper offer: (1) a review of the problem and premises preventing a solution; (2) a proposal that Head Start adopt a public health perspective; and (3) specific roles staff and dental personnel can take to mount aggressive strategies to arrest tooth decay at the grantee site.

Keywords Oral health · Preschool children · Head Start · Tooth decay

Recent U.S. health surveillance has documented a decrement in the dental health of preschoolers 2–5 years old in 1999–2004 relative to the previous decade [1]. In this period, the prevalence of tooth decay increased to 28% overall, the majority untreated. According to the report, tooth decay peaks earlier in life and is more severe in children in families living below the Federal Poverty Level. The Healthy People 2010 Midcourse Review found the country moving away from targets [2]. Exacerbating this problem is the persistent inability of state Medicaid programs to provide mandated services. While it is true that more children enrolled in this public insurance program receive care than do uninsured children, peak utilization occurs after the preschool period and after dental treatment needs and symptoms reach a zenith. Relatively few children receive care early on. Less than 10% of dentists are willing to see children enrolled in Medicaid [3].

In 2005, as part of a larger study, Head Start (HS) reported the first year results of a prospective experiment to meet its goals for dental care. Families were randomly assigned to receive, or not receive enabling services for access to dental care for the children [4]. The effect of the assistance provided by HS was that 17% more 3-year olds, and 16% more 4-year olds received dental care (Fig. 1). Despite more children receiving care, parent-report data showed no overall differences in health status. This result is puzzling and may reflect a common situation in which most children receive only a dental examination and few receive multiple preventive appointments from the same provider.

In practice, HS performance standards for comprehensive dental care have been difficult to achieve [5]. HS Bulletins in 1995 and 2001 called attention to the persistent problems of grantees and delegate agencies in meeting the needs of enrollees [6, 7]. A series in the professional literature and state forums followed [8]. A current project under the HS Oral

P. Milgrom (✉) · P. Weinstein · J. Graves · O. Tut
University of Washington, Box 357475, Seattle,
WA 98195-7475, USA
e-mail: dfrc@u.washington.edu

P. Weinstein
e-mail: philw@u.washington.edu

J. Graves
e-mail: janessa@u.washington.edu

O. Tut
e-mail: ohnmar@u.washington.edu

C. Huebner
University of Washington, Box 357230, Seattle,
WA 98195-7230, USA
e-mail: colleenh@u.washington.edu

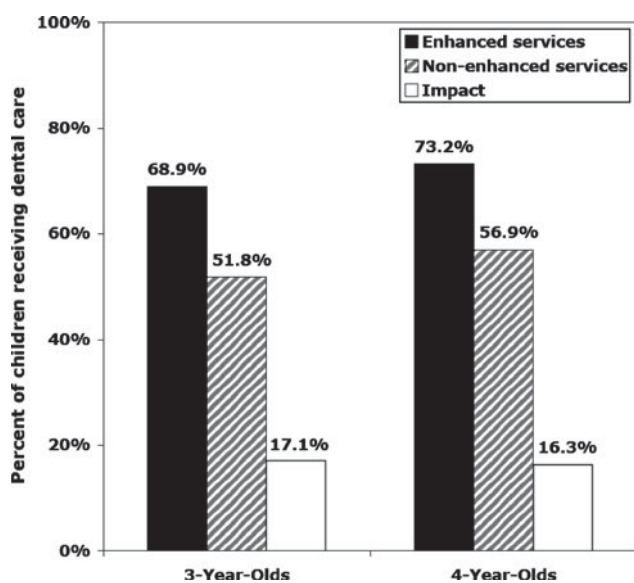


Fig. 1 The impact of Head Start services on the proportion of enrollees receiving dental care (reported by parents). From Ref. [4]

Health Initiative seeks to document these problems more fully. The study is to be completed in 2008 [9].

The purpose of this paper is to urge HS policy makers, grantees, and parents to become more effective partners and leaders to address the oral health needs of children. Frankly the current system is broken. Conventional approaches to provide traditional treatment for children who need care are not working. Projected dental workforce shortages, and unwillingness of most dentists to see children enrolled in the Medicaid program, depict a system beyond functionality or repair.

This paper has three parts. The first describes the problem, current circumstances that prevent a solution, and suggests ways to utilize the latest science to solve the problem. The second part proposes that Early HS and HS take a public health perspective toward dental care that includes triage, priority making, and careful use of scarce resources. The final part of the paper suggests strategies HS and dental personnel can take at the grantee site to meet mutual goals to arrest tooth decay.

The Problem

Cavities, broken, and abscessed teeth are the end stage of a pathological process caused by a chronic bacterial *infection* [10]. These bacteria are not present at birth; rather infants acquire the bacteria from salivary contact, usually from the mother or other children through common practices such as sharing a spoon or licking a pacifier. With a high sugar or carbohydrate diet, the bacteria that cause decay out-compete normal oral bacteria and overrun the ability of bodily

defenses—antibodies and naturally occurring antibacterials in the saliva, the acid buffering and dilution and repair processes of saliva—to protect against the infection. The damage to the teeth is caused by acid produced as a by-product of bacterial metabolism. The initial demineralization, appearing as white or opaque changes in the tooth, represents damage by the acid to the softer layer under the white enamel. This initial, easily seen damage is reversible. If the damage to the understructure is allowed to advance, the white surface crashes in like a glass window breaking, leading to a cavity. Some cavities progress to infect surrounding gum tissue and bone. This is usually painful and impacts appetite, sleep patterns, growth, and ability to concentrate in the classroom. Infections in the baby teeth generally lead to infections in the permanent teeth. Premature loss of the baby teeth can cause crowding and misalignment of the permanent teeth. Until fairly recently, even many dentists did not fully appreciate the importance of the baby teeth.

Waiting Until the Head Start Years Makes the Problem Worse

Tooth decay is common but striking disparities exist. For example, decay among Head Start enrollees is several times more common than among wealthier children. Differences in oral health emerge long before the dentist typically sees children. Because the damage to teeth is progressive and cumulative, early problems grow larger. Among low-income children, it is not unusual for 25% to have at least one decayed tooth by 24 months of age, and well over 50% to have multiple decayed teeth by 36 or 48 months. Thus waiting to address the problem at the typical age of Head Start enrollment (36 months of age or older) allows needless suffering and creates a problem largely unsolvable by our system of care.

Dental Treatment Alone does not Solve the Problem

Mounting evidence suggests repairing or extracting decayed teeth does not impact the underlying infection and therefore fails repeatedly. Follow-up studies show that even the most intensive and aggressive restorative treatment—hospitalizing a child for curative treatment under general anesthesia—does not eliminate the infection causing tooth decay. The rates of recurrence are high [11]. Nevertheless, the HS performance standards incorporate restorative care as an end goal and parents are led to believe that this solves the problem. Instead, attempts to remediate the dental decay problem in this manner drain resources away from activities that could be more effective.

The New Science

Over the last 40 or more years, dental scientists have assembled strong evidence that a combination of home and professional activities can arrest tooth decay.

Home Care

Toothpaste

We know that twice per day brushing with fluoridated toothpaste is effective. It works by disrupting the bacteria growing on the teeth and by providing a reservoir of fluoride to repair the damage caused by the acid of the bacteria. Toothpaste is an effective home-based intervention and was likely responsible for the dramatic drop in tooth decay in permanent teeth from the 1950s until now [12–14]. Brushing with toothpaste was advertised widely in the 1950s, as it is today. Popular advertising made it a well-accepted habit in the routine of adults. However, the use of fluoridated toothpaste with very young children is controversial because very young children don't spit and can swallow a lot of toothpaste, especially if unsupervised. This is a potential problem because too much fluoride can result in fluorosis in the permanent incisors. Typically the fluorosis is a minor cosmetic concern visible primarily to dentists and nothing compared to the destruction of the teeth by decay.

In considering this problem, the American Academy of Pediatric Dentistry (AAPD) recommends that toothpaste be used in very young children on the basis of risk [15]. Unfortunately, confusion exists because toothpaste labels carry the more general warning and because many Head Start programs are advised by dentists who are either unaware of the AAPD policy or have chosen not to follow it. When the Office of Head Start issued a Program Instruction in December of 2006 specifying that children under age 2 should have their teeth brushed by a Head Start staff member daily with fluoride toothpaste (ACF-PI-HS-06-03), there was push back reflecting the confusion. In contrast, other industrialized countries have experimented with education and free distribution of toothpaste to low-income families with preschoolers, to good effect [16–19]. HS locally and nationally should use this information and build on it to advocate for including toothpaste on the formulary of Medicaid programs and encourage state Medicaid administrators and Title V MCH programs to test programs to distribute toothpaste to parents of children at high risk for tooth decay.

There is a dearth of research on best practices to introduce tooth brushing to parents of young children [20]. Working with parents to devise and test ways to do this is

just beginning and may not be the same for all cultures. It is critical that the approach be developmentally correct and consistent with parents' beliefs about the children's mastery of milestones in their maturation. Brushing more than once a day is needed because the goal is to deliver the fluoride and arrest the caries in a high-risk population, not just teach the habit of brushing. Twice daily supervised brushing with toothpaste should begin in infancy and continue through preschool and elementary school. Head Start is in a unique and influential position to make this happen at home and at school. Similar to the important contributions made by Head Start over its 40-year history to policies regarding early childhood curricula, classroom safety, adult-child ratios, and parent engagement, HS could make a substantial contribution to protecting children's oral health. Through its focus on home-school connections and family health, HS could provide oral health promotion and hands-on instruction to parents and staff to encourage early and frequent tooth brushing.

Diet

Consumption of table sugar and high fructose-corn syrup is growing in the U.S. and both are implicated in tooth decay. There is quite convincing evidence that the worse culprit is soft drinks. In the U.S., per capita consumption of soft drinks has increased by nearly 500% in the past 50 years [21]. Drinks advertised and promoted for children, such as juicy drinks that contain 10% or less juice, KoolAid™, Tang™, even sports drinks contain much sugar. In addition, some parents also add sugar to baby bottles. HS can take the lead in working with parents to find alternatives and beware of these drinks and other processed foods that promote tooth decay. As with tooth brushing, emphasis should be placed on helping the HS children and their younger siblings at home to reduce sugar consumption.

Professional Care

Fluoride Varnish

Fluoride varnishes were introduced in the U.S. in the last decade after being available in Europe for almost 40 years. They are more effective than the fluoride foams and gels that are still ubiquitous in dental offices [22, 23]. Varnishes are helpful because they are low tech, inexpensive, and child-friendly. The varnish is applied to teeth that have been dried with gauze and children return to normal activities immediately. Repeated application of the varnish is needed because the effect of fluoride to reverse and arrest decay is greater when it is applied more often. The

twice-yearly regimen prescribed by many dentists and incorporated into Medicaid programs reduces new tooth decay by only about 30% [24]; therefore the frequency of application should be increased. HS could advocate for changes in Medicaid coverage for this essential service to be provided more often. Perhaps surprisingly, professionally cleaning the teeth is not needed for the fluoride to work [25]; cleaning gives no additional benefit because cleaning has only transient impact on the bacterial populations [26]. This information is important because it means that fluoride varnish can be applied outside the dental office in classrooms without having to transport children to clinics or expect parents to take time from work. No special equipment is needed. This approach has been shown to be effective whether or not there is fluoride in the drinking water.

New services to arrest tooth decay, such as diamine silver fluoride are being developed and HS can help make these new techniques available in the future. Now available only outside the U.S. and missing from textbooks, this agent has been evaluated in controlled clinical trials and shown to be efficacious and safe. A single application to cavities is highly effective in arresting the decay and twice as effective as fluoride varnish in preventing decay in the other teeth [27].

Antimicrobials

Leading experts believe that, in addition to fluorides, an antimicrobial treatment is needed to reduce decay-causing bacteria [28–31]. PVP-iodine (also called povidone iodine), approved by the F.D.A for topical use in the mouth, is the most appropriate antimicrobial. The iodine comes in a single application swab (1% active iodine, Allegiance Health Corporation, McGaw Park, IL). The treatment takes only a few minutes and costs little. Clinically, the teeth are dried with gauze and then painted. The antimicrobial effect is immediate and persists for up to 24 weeks [32]. After application, the teeth can then be dried again and coated with fluoride varnish at the same visit. PVP-iodine should be applied repeatedly, along with fluoride varnish. The reason for multiple treatments is that the antimicrobial effect wanes after 4–6 months and needs to be repeated. Although antimicrobial treatment is not common in private dental practice, the evidence base for this approach is growing and goes back more than four decades [33, 34].

Helping Parents take Better Advantage of the Options

Programmatically, the effort to arrest tooth decay among young children should take a four-prong approach:

- Twice daily supervised tooth brushing with fluoridated toothpaste
- Reduced consumption of soda and sugary drinks
- PVP-iodine topical application to the teeth three times per year
- Fluoride varnish topical treatments in conjunction with the iodine.

Recent research has shown that most parents identify tooth decay as a problem and want their children to have better oral health and fewer problems. Counseling and motivational techniques are an effective way to help parents take the steps necessary to reduce tooth decay [35]. HS is well placed to lead new preventive intervention efforts because it is widely recognized as a source of trustworthy information and advice to parents about how to best care for infants, toddlers, and preschool children. Additionally and importantly, HS has a major community-based presence throughout the U.S. It is a place where professional services as well as education about home care can be available.

A Continuum of Services

Dental providers are not sensitive to the scarcity of resources (money or availability of dentists) needed to meet the oral health needs of all children, including low-income children. Thus, there is the need for triage and priority-making where HS coordinators and parents are empowered to make decisions, with the help of health care providers. Triage means deciding what problems are most urgent or really need treatment and focusing scarce resources where they will do the most good. Children come to HS with cavities and in the absence of sustained, intensive efforts to arrest the decay process, the children continue to experience more damage. A small percentage, certainly fewer than 1-in-20, have abscesses in the jawbone and need immediate attention to have the diseased baby teeth extracted. A trained person—teacher, nurse, dental assistant or hygienist or dentist—can quickly screen enrollees and identify these problems. It should not be difficult to contract for these tooth extractions with a local dentist. In areas where dental offices are far away, this treatment might be done on site with portable equipment. The remaining teeth with cavities are not painful, even if they look ugly, and do not interfere with school. These teeth, as well as the yet unaffected neighboring teeth, need intensive treatment to stop the decay process but this treatment does not need to be carried out in high cost settings like a dental office or even Community Health Center clinic. It could be provided at the HS site. Arrested decay will be dark in color. These teeth should never be extracted if asymptomatic as the teeth hold valuable space

for the permanent successors and work for chewing. They should be allowed to shed normally.

Using this approach will eliminate barriers parents face to obtaining needed dental treatment such as taking children to the dentist at hours that interfere with work or reluctance to seek care for their child due to their own fears [36]. The approach also will be more acceptable to parents as new technology eliminates the need for dental chairs, injections, drilling and resultant upset and pain and therefore does not provoke the fear and avoidance that most low-income parents associate with dental care.

The Role of Head Start

In many states the topical treatments described above to arrest decay can be applied by a nurse, dental hygienist, or dental assistant if permitted by State law. Nursing supervision requirements are generally less stringent than the dental laws and may be an option for many programs. Nurses can learn the skills needed in a short course. Where required by law, HS grantees can hire a dentist or physician on an hourly basis to provide supervision. Most communities have dentists who do locum tenens work or who are in partial retirement and willing to help out. In areas close to a dental or dental hygiene school, faculty members, graduate students or recent graduates can be hired. Licensed providers can bill Medicaid for these services if the state program is fee-for-service or could add these children to their own patient rolls if the program is under managed care, irrespective of where the services are delivered. If the intensity or nature of the service exceeds Medicaid coverage or is not covered, the programs can expend grantee funds under Part 1304.20(a)5 of the Federal Law governing Early HS and HS. The cost to HS need not be large if program changes are implemented as described here. The critical elements are that strategies to arrest tooth decay are clearly delineated, dental care is provided on site when possible, and prevention and treatment are based on science and not a function of the preferences of an individual provider. We have used this approach in a HS Innovation Project in the U.S. affiliated states and territories in the western Pacific and are seeing promising results.

Creating Innovative Parent Education and Counseling Programs

HS is an essential nationwide program designed to meet the health and education needs of children and their families. HS staff has regular contact with parents through meetings at school and home visits. The family-focus of HS confers an impact well beyond the HS child; through parent

education, benefits reach younger and older siblings. HS need not shoulder the responsibility for children's oral health alone. The Access to Baby and Child Dentistry (ABCD) program we introduced successfully in Washington State can also be a boon to families needing preventive care for toddlers before the decay process has become a problem [37]. Yet, HS can be an agent for change in communities where ABCD and similar programs do not yet exist. Partnership with Women Infant and Children (WIC) Centers is another way to get these messages out to the parents. As the rising incidence of tooth decay among young children shows, changing course has been more difficult and urgent than anticipated.

A focus on the whole family will reap additional benefits beyond the care for the HS child. If the younger sibs gain access to toothpaste and preventive services, the level of their need will decrease. When the disease is under better control, many more non-specialist dentists will have the capability to serve these children earlier and provide a dental home. Otherwise the burden on parents to try to establish a dental home for their child is much greater. Evidence from at least one state-Medicaid plan also suggests the earlier in life dental treatment is initiated, the lower the overall program costs [38].

Conclusions

It is mainly children from poor families who are especially susceptible to tooth decay, yet care is available to a limited number. In one generation in the U.S., we have gone from nearly every child having tooth decay to a situation of inequity. The improvement in oral health for the majority has come about because of the widespread use of toothpaste, fluoridated water in urban areas, and parental diligence regarding diet. Facing up to shortages of dentists and the relative ineffectiveness of standard care means new leadership is needed. HS policy makers, parents, and grantees have the influence to institute new performance standards nationally and more intensive activity at the program level. The likelihood that every child will have a regular source of care from a consistent provider is unrealistic. HS does not need to wait for this to happen; it can act now in new ways to improve the oral health status of children. Every HS program should embrace the four-part strategy presented here: twice-a-day tooth brushing with fluoridated toothpaste, control of soda and juicy drinks, three times a year topical application of PVP-iodine and fluoride varnish.

Acknowledgements Supported, in part, by Head Start Innovation and Improvement Project Grant No. 90YD0188 from the Office of Head Start, Agency for Children and Families, and Grant No. DE14254 from NIDCR, NIH.

References

- Dye, B. A., Tan, S., Smith, V., Lewis, B. G., Barker, L. K., Thornton-Evans, G., et al. (2007). Trends in oral health status: United States, 1988–1994 and 1999–2004. *Vital Health Statistics, 11*(248), 29, National Center for Health Statistics.
- US DHHS. HP 2010 Midcourse Review. Accessed September 3 2007, <http://www.healthypeople.gov/Data/midcourse/html/tables/pq/PQ-21.htm>.
- The Kaiser Commission on Medicaid and the Uninsured. (August 2007). Dental coverage and care for low-income children: The role of Medicaid and SCHIP. Accessed September 3 2007, <http://www.kff.org/medicaid/upload/7681.pdf>.
- US DHHS ACF. (May 2005). *Head Start Impact Study: First year findings*. Washington, D.C., Accessed September 3 2007, http://www.acf.hhs.gov/programs/opre/hs/impact_study/reports/first_yr_finds/first_yr_finds.pdf.
- US DHHS ACF. (October 1 2006). Part 1304–Program Performance for the Operation of Head Start Programs by Grantees and Delegate Agencies. Accessed September 3 2007, http://a257.g.akamaitech.net/7/257/2422/13nov20061500/edocket.access.gpo.gov/cfr_2006/octqtr/45cfr1304.20.htm.
- US DHHS ACF, Jones, C. M. (May–June 1995). Head Start and dental health. *National Head Start Bulletin*, No. 54, Accessed September 18 2007. <http://www.bmcc.edu/Headstart/Bulletins/Issue54/index.html>.
- US DHHS ACF. (May 2001). In R. Brocato (Ed.), *Head Start and partners forum on oral health*. *Head Start Bulletin*, No. 71, Accessed September 3 2007, http://www.headstartinfo.org/publications/hsbulletin71/cont_71.htm.
- Edelstein, B. L. (2000). Access to dental care for head start enrollees. *Journal of Public Health Dentistry*, 60(3), 221–229 discussion 230–232.
- US DHHS ACF. (no date). Overview. Accessed September 3 2007, http://www.acf.hhs.gov/programs/opre/hs/eval_oral_health/eval_oral_health_overview.html.
- Milgrom, P., & Weinstein, P. (1999). *Early childhood caries: A team approach to prevention and treatment*. Seattle: University of Washington, Accessed through <http://www.dentalbehavioralresources.com>.
- Graves, C. E., Berkowitz, R. J., Proskin, H. M., Chase, I., Weinstein, P., & Billings, R. (2004). Clinical outcomes for early childhood caries: Influence of aggressive dental surgery. *Journal of Dentistry for Children (Chicago)*, 71(2), 114–117.
- Bratthall, D., Hänsel-Petersson, G., & Sundberg, H. (1996). Reasons for the caries decline: What do the experts believe? *European Journal of Oral Sciences*, 104, 416–422.
- Marinho, V. C. C., Higgins, J. P. T., Logan, S., & Sheiham, A. (2003). Fluoride toothpastes for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews*, 1 p. CD002278. Accessed September 3 2007, <http://www.cochrane.org/reviews/en/ab002278.html>.
- Marthaler, T. M. (2004). Changes in dental caries 1953–2003. *Caries Research*, 38, 173–181.
- American Academy of Pediatric Dentistry, Council on Clinical Affairs. (2007). Clinical guideline on fluoride therapy (revised 2007). *Pediatric Dentistry*, 27(7):90–91. Accessed September 3 2007, http://www.aapd.org/media/policies_guidelines/g_fluoride_therapy.pdf.
- Kowash, M. B., Pinfield, A., Smith, J., & Curzon, M. E. (2000). Effectiveness on oral health of a long-term health education programme for mothers with young children. *British Dental Journal*, 188(4), 201–205.
- Harrison, R. L., & Wong, T. (2003). An oral health promotion program for an urban minority population of preschool children. *Community Dentistry and Oral Epidemiology*, 31(5), 392–399.
- Rong, W. S., Bian, J. Y., Wang, W. J., & Wang, J. D. (2003). Effectiveness of an oral health education and caries prevention program in kindergartens in China. *Community Dentistry and Oral Epidemiology*, 31(6), 412–416.
- Wennhall, I., Martensson, E. M., Sjunnesson, I., Matsson, L., Schroder, U., & Twetman, S. (2005). Caries-preventive effect of an oral health program for preschool children in a low socio-economic, multicultural area in Sweden: results after one year. *Acta Odontologica Scandinavica*, 63(3), 163–167.
- Blinkhorn, A. S., Wainwright-Stringer, Y. M., & Holloway, P. J. (2001). Dental health knowledge and attitudes of regularly attending mothers of high-risk, pre-school children. *International Dental Journal*, 51(6), 435–438.
- Putnam, J. J., & Allshouse, J. E. (1999). Food consumption, prices, and expenditures, 1970–1997. Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture, Statistical Bulletin No. 965, Accessed September 3 2007, <http://www.ers.usda.gov/Publications/SB965/>.
- Khattak, M. F., Conry, J. P., & Ko, C. C. (2005). Comparison of three topical fluorides using computer imaging. *Journal of Clinical Pediatric Dentistry*, 30(2), 139–144.
- American Dental Association Council on Scientific Affairs. (2006). Professionally applied topical fluoride: Evidence-based clinical recommendations. *JADA*, 137(8):1151–1159. Accessed September 3 2007 http://www.ada.org/prof/resources/pubs/jada/reports/report_fluoride.pdf.
- Marinho, V. C. C., Higgins, J. P. T., Logan, S., & Sheiham, A. (2002). Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews*, Issue 1. Art. No.: CD002279. doi: 10.1002/14651858.CD002279. Accessed September 3 2007, <http://doi.wiley.com/10.1002/14651858.CD002279>.
- Seppa, L. (1983). Effect of dental plaque on fluoride uptake by enamel from a sodium fluoride varnish in vivo. *Caries Research*, 17, 71–75.
- Goodson, J. M., Palys, D., Carpino, E., Regan, E. O., Sweeney, M., & Socransky, S. S. (2004). Microbiological changes associated with dental prophylaxis. *Journal of American Dental Association*, 135, 1559–1564.
- Chu, C. H., Lo, E. C., & Lin, H. C. (2002). Effectiveness of silver diamine fluoride and sodium fluoride varnish in arresting dentin caries in Chinese preschool children. *Journal of Dental Research*, 81(11), 767–770.
- Lopez, L., Berkowitz, R., Zlotnik, H., Moss, M., & Weinstein, P. (1999). Topical antimicrobial therapy in the prevention of early childhood caries. *Pediatric Dentistry*, 21(1):9–11.
- Lopez, L., Berkowitz, R., Spiekerman, C., & Weinstein, P. (2002). Topical antimicrobial therapy in the prevention of early childhood caries: A follow-up report. *Pediatric Dentistry*, 24(3), 204–206.
- Berkowitz, R. J. (2003). Causes, treatment and prevention of early childhood caries: A microbiologic perspective. *Journal of Canadian Dental Association*, 69(5), 304–307.
- Zhan, L., Featherstone, J. D., Gansky, S. A., Hoover, C. I., Fujino, T., Berkowitz, R. J., & Den Besten, P. K. (2006). Antibacterial treatment needed for severe early childhood caries. *Journal of Public Health Dentistry*, 66(3), 174–179.
- Caufield, P. W., & Gibbons, R. J. (1979). Suppression of *Streptococcus mutans* in the mouths of humans by a dental prophylaxis and topically-applied iodine. *Journal of Dental Research*, 58, 1317–1326.

33. Volpe, A. R., Kupczak, L. J., Brant, J. H., King, W. J., Kestenbaum, R. C., & Schlissel, H. J. (1969). Antimicrobial control of bacterial plaque and calculus and the effects of these agents on oral flora. *Journal of Dental Research*, *48*(5), 832–841.
34. McDonald, J. L., & Stookey, G. K. (1978). Antimicrobial agents and dental caries in the rat. *Journal of Dental Research*, *57*(2), 349–354.
35. Weinstein, P., Harrison, R., & Benton, T. (2006). Motivating mothers to prevent caries: Confirming the beneficial effect of counseling. *Journal of the American Dental Association*, *137*(6), 789–793.
36. Bitar, L. L. (2007). Barriers to obtaining needed dental treatment for Head Start children in Washington State. Unpublished master's thesis, University of Washington, Seattle, Washington.
37. Grembowski, D., & Milgrom, P. (2000). Increasing access to dental care among medicaid preschool children: The access to baby and child dentistry (ABCD) program. *Public Health Reports*, *115*(5), 448–459.
38. Savage, M. F., Lee, J. Y., Kotch, J. B., & Vann, WF Jr. (2004). Early preventive dental visits: Effects on subsequent utilization and costs. *Pediatrics*, *114*(4):e418–e423.