Examining the Cost-effectiveness of Early Dental Visits

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Abstract

The subject of early dental visits as an integral dimension of anticipatory guidance and the related supporting scientific evidence for this concept is a critical and timely issue for the dental profession. The purpose of this paper was to review the scientific evidence and rationale for early dental visits. In theory, early dental visits can prevent disease and reduce costs. During the age 1 dental visit, there is strong emphasis on prevention and parents are given: (1) counseling on infant oral hygiene; (2) home and office-based fluoride therapies; (3) dietary counseling; and (4) information relative to oral habits and dental injury prevention. There is evidence that the early preventive visits can reduce the need for restorative and emergency care, therefore reducing dentally related costs among high-risk children. Preschool Medicaid children who had an early preventive dental visit by age 1 were more likely to use subsequent preventive services and experienced less dentally related costs. These finding have significant policy implications, and more research is needed to examine this effect in a low-risk population. (Pediatr Dent 2006;28:102-105)

KEYWORDS: AGE 1 DENTAL VISIT, ANTICIPATORY GUIDANCE, DENTAL USE, DENTAL VISITS, PREVENTION, DENTALLY RELATED COSTS

The Symposium on the Prevention of Oral Disease in Children and Adolescents sponsored by the American Academy of Pediatric Dentistry offered an opportunity for dialogue and discussions about critical issues for the dental profession. One such issue is early dental visits as an integral dimension of anticipatory guidance and the related supporting scientific evidence for this concept.

The purpose of this manuscript was to review the scientific evidence and theoretical rationale for early dental visits.

The American Academy of Pediatric Dentistry,[1] American Dental Association,[2] and American Association of Public Health Dentists[3] currently recommend that all children have their first preventive dental visit during the first year of life. The American Academy of Pediatrics[4] recommends this for children who are at high risk for dental caries. Providing early care to infants and their families offers an opportunity to educate and inform parents about their children's oral health. This concept of anticipatory guidance has been integrated in the medical practice, but has yet to be fully embraced by the dental profession.

In dental anticipatory guidance, parents are given counseling in infant oral hygiene, home and office-based fluoride therapies, dietary counseling, and information relative to oral habits and dental injury prevention.[5] Counseling of parents by providers about dental developmental changes expected to occur between their children's dental visits is an important part of preventive care. Like well-child medical visits, one of the cornerstones of the infant dental visit is to prepare parents and caregivers for future age-specific needs and dental milestones.

With early and timely intervention, it may be possible to reduce or eliminate future dental caries—which, in turn, should reduce dentally related costs. Because dental disease increases in severity and necessitates more extensive and costly treatment in younger children, timely anticipatory guidance has great potential to reduce overall costs associated with dental treatment in preschool children.

Establishing a dental home

Evidence increasingly suggests that, to be successful in preventing dental disease, dentists must begin preventive interventions within the first year of life. If appropriate measures are applied early enough, it may be possible to totally prevent oral disease. The pediatrics community has promoted the concept of a medical home to improve

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families' care utilization. Using the medical model, the dental home concept can also be used to improve families' access to dental care. A dental home is where a qualified dental health specialist delivers or supervises primary dental health care that is comprehensive, continuously accessible, family centered, coordinated, compassionate, and culturally competent care.[6]

In a recent study, family practitioners and pediatricians were presented with a case scenario of a child with high caries risk. More than 90% recommended that the child see a dentist as soon as possible. For the child with low caries risk, the proportion of medical care providers recommending an early dental visit was significantly lower: only about 19% of family physicians and 14% of pediatricians. For a child at low risk for dental caries, about 40% of family physicians and 63% of pediatricians recommended the first dental visit around the third birthday.[7] In summary, both medical and dental professionals agree it is important that high-risk children establish a dental home early.

The early dental visit

Little research has addressed factors that affect early dental visits by young children. In one of the few studies that included this age group, Edelstein and colleagues analyzed data from the 1996 Federal Medical Expenditures Panel Survey to examine the percentage of children who had an annual dental visit and the number of visits accumulated by age, sex, ethnic/racial background, family income, and parental education. They reported that 43% of all children ages 0 to 18 years recorded at least 1 dental visit in 1996, with 2.7 being the mean number of visits.[8] Low income, low education, and minority status were associated with lower numbers of visits. Not surprisingly, children under age 6 recorded less than half the dental visits of those older than 6.[8] Recently, Slayton and colleagues reported that, by age 1, only 2% of children had recorded a dental visit. This increased to 11% by age 2 and 26% by age 3.[9] In a study using complex decision analysis, Jones and Tomar[10] found that the dental utilization would be estimated to increase from 27% to 65% using the AAPD and ADA recommendation of an age 1 dental visit. The authors, however, cautioned about the possible crowding out of high-risk children if dental capacity is limited.

Rationale for the cost-effectiveness of early intervention in medicine

In medicine, there are numerous examples of the cost-effectiveness of early prevention. Folic acid supplementation beginning before conception and continued for the first 10 to 12 weeks can result in dramatically fewer neural tube defects among infants, and the cost benefits are immense.[11]

Prenatal care also is accepted as an effective tool to reduce health care costs and improve both maternal and infant health. Mothers who do not receive prenatal care are almost 3 times as likely to have a low-birthweight infant.[12] A few studies have shown that, for every dollar spent on prenatal care, the health care system saves between $2.57 and $3.38 on the medical cost of care to low-birthweight babies.[13,14] Participation in the Missouri Women, Infants, and Children (WIC) program was shown to reduce Medicaid newborn costs by about $100 per participant. Another study showed hospital savings for mothers who received prenatal care to be over $1,000.[12,15] Lastly, studies have shown that injury prevention counseling by pediatricians between the ages of 0 to 4 years can save an estimated $880 per child.[16]

Rationale for the cost-effectiveness of early dental intervention

In theory, early dental visits should be expected to reduce the child's future dental risk—leading to improved oral health and reduced oral health costs. Because untreated dental disease increases in severity and necessitates more extensive and costly treatment secondary to postponing care, timely intervention has great potential to reduce overall costs associated with dental treatment in preschool children.

As one example, Iowa Medicaid children under age 6 treated for Early Childhood Caries (ECC) in the hospital or ambulatory care setting represented less than 5% of those receiving dental care, but consumed 25% to 45% of the dental resources.[17] The total cost to the Iowa Medicaid program for hospital-based general anesthesia was over $2,000 per child in this investigation.[17] A similar study from Washington State concluded that 19% of their pediatric dental emergencies were related to ECC and, of those, over half were children 3½ years or younger.[18] These studies emphasize that early prevention has the potential to translate into significant cost savings for dental care, especially for those families at or below the poverty level where caries rates are dramatically higher in children 3 years and younger.

Cost-effectiveness of early dental visit

To date, only one study has examined the cost implications of early visits to the dentist. This seminal study was conducted by Savage and colleagues,[19] who examined the effects of early preventive dental visits on subsequent utilization and costs of dental services among preschool-aged children. The investigation studied a longitudinal cohort study of children born in North Carolina (NC) that relied on 4 large administrative datasets. These included NC composite birth records from 1992, Medicaid enrollment and claims files from 1992-97, and the Area Resource File. Their outcome measures included claims filed through Medicaid for oral health services. The authors categorized outcome variables as follows:

1. type of subsequent visits (preventive, restorative, and emergency); and
2. dentally related costs.

CDT codes from the Medicaid dental claims dataset allowed the authors to determine the type of visit and cost of services. For example, claims for a periodic oral evaluation and dental cleaning were included in the preventive

visit, while claims for stainless steel crowns were included in the restorative visit. Their major explanatory variable was the age of the first preventive dental visit. This variable was measured at the age of the first preventive procedure claim filed for each child. They examined the children by age groups as follows: (1) less than age 1; (2) age 1, but less than age 2; (3) age 2, but less than age 3; (4) age 3, but less than age 4; and (5) age 4, but less than age 5.

The authors found that, of the 53,591 Medicaid-enrolled children born in 1992, there were 9,204 children continuously enrolled for 5 years who met the inclusion criteria. Twenty-three children had their first preventive dental visit before age 1, 249 between 1 and 2 years, 465 between 2 and 3 years, 915 between 3 and 4 years, and 823 between 4 and 5 years. Children who had their first preventive dental visit by age 1 were more likely to have subsequent preventive visits, but were not more likely to have subsequent restorative or emergency visits. Those who had their first preventive visit at age 2 or 3 were more likely to have subsequent preventive, restorative, and emergency visits.

The age at the first preventive dental visit had a significantly positive effect on dentally related expenditures, with the average dentally related costs being less for children who received earlier preventive care. The average dentally related costs per child, according to age at the first preventive visit, were as follows: (1) before age 1=$262; (2) age 1 to 2=$339; (3) age 2 to 3=$449; (4) age 3 to 4=$492; (5) age 4 to 5=$546. The authors cautioned that the results should be interpreted carefully because of the potential for selection bias. They concluded, however, that preschool-aged, Medicaid-enrolled children who had an early preventive dental visit were more likely to use subsequent preventive services and experience lower dentally related costs. In addition, children from racial minority groups had significantly more difficulty in finding access to dental care, as did those in counties with fewer dentists per population.

Conclusions

Children who had their first preventive dental visit by age 1 were more likely to have subsequent preventive visits, but not more likely to have subsequent restorative or emergency visits. Those who had their first preventive visit later (at ages 2 and 3) were more likely to have subsequent preventive, restorative, and emergency visits. It is possible that those children who were seen by age 1 were the children of parents who were the most motivated to provide the best possible oral health care for their children. This parental behavior would be expected to carry over into home care, diet, and nutrition—all factors that would lead to improved oral health.

A second rationale to explain why those children who started preventive care earlier fared better might be related to a positive outcome from the dental anticipatory guidance given to the parents who took their children to an early preventive visit. Oral health anticipatory guidance has not been the subject of systematic investigation. As in the case of pediatric medicine, however, there are good reasons to assume that early parental education and timely intervention and/or referral can lead to improved health outcomes and reduced costs. Because this study followed children for 5 years, one can only hypothesize about what the cost savings would be if this cohort were followed for 10 or 20 more years. If the trend of using more preventive services and less restorative or emergency services holds or increases, the cost impact would be dramatic—with savings in the millions of dollars.

Evidence increasingly suggests that, to be successful in preventing dental disease, dentists must begin preventive interventions in infancy. If appropriate measures are applied sufficiently early, it may be possible to raise a cavity-free child. The medical community has promoted the concept of a medical home to improve families' care utilization. Establishment of the home early in the child's life can introduce children and their families to prevention and early intervention prior to the development of dental problems.[20]

Acknowledgements

This research was supported by the Maternal and Child Health Grant no. 5 T17 MC 00015-13-01 and NIDCR grant no. 1K22DE14743-04.

References

1. American Academy of Pediatric Dentistry. Infant oral health. Pediatr Dent 2000;22:82.
2. American Dental Association. ADA Statement on Early Childhood Caries. 2004. Available at: http://www.ada.org/prof/resources/position/caries. Accessed March 3, 2006.
3. American Association of Public Health Dentistry. First Oral Health Assessment Policy. 2004. Available at: http://www.aaphd.org/statements. Accessed March 3, 2006.
4. American Academy of Pediatrics. Recommendations for preventive pediatric health care. Pediatrics 2000;105:645.
5. Mouradian WE, Wehr E, Crall JJ. Disparities in children's oral health and access to dental care. JAMA 2000;284:2625-2631.
6. Casamassimo PS. *Bright Futures in Practice: Oral Health.* Arlington, Va: National Center for Education in Maternal and Child Health; 1996:1-131.
7. Ismail AI, Nainar SM, Sohn W. Children's first dental visit: Attitudes and practices of US pediatricians and family physicians. Pediatr Dent 2003;25:425-430.
8. Edelstein BL, Manski RJ, Moeller JF. Pediatric dental visits during 1996: An analysis of the federal Medical Expenditure Panel Survey. Pediatr Dent 2000; 22:17-20.
9. Slayton R, Kanellis MJ, Levy S, Warren J, Islam M. Frequency of reported dental visits and professional fluoride applications in a cohort of children followed from birth to age 3 years. Pediatr Dent 2002; 24:64-68.

10. Jones K, Tomar SL. Estimated impact of competing policy recommendations for age of first dental visit. Pediatrics 2005;115:906-914.
11. Van Allen MI, Fraser FC, Dallaire L, Allanson J, McLeod DR, Andermann E, et al. Recommendations on the use of folic acid supplementation to prevent the recurrence of neural tube defects. Clinical Teratology Committee, Canadian College of Medical Geneticists. CMAJ 1993;149:1239-1243.
12. Henderson JW. The cost effectiveness of prenatal care. Health Care Financ Rev 1994;15:21-32.
13. Gorsky RD, Colby JP, Jr. The cost effectiveness of prenatal care in reducing low birth weight in New Hampshire. Health Serv Res 1989;24:583-598.
14. Bonifield SL. A cost savings analysis of prenatal interventions. J Healthc Manag 1998;43:443-451.
15. Schramm WF. WIC prenatal participation and its relationship to newborn Medicaid costs in Missouri: A cost/benefit analysis. Am J Public Health 1985;75:851-857.
16. Miller TR, Galbraith M. Injury prevention counseling by pediatricians: A benefit-cost comparison. Pediatrics 1995;96:1-4.
17. Kanellis MJ, Damiano PC, Momany ET. Medicaid costs associated with the hospitalization of young children for restorative dental treatment under general anesthesia. J Public Health Dent 2000;60:28-32.
18. Sheller B, Williams BJ, Lombardi SM. Diagnosis and treatment of dental caries-related emergencies in a children's hospital. Pediatr Dent 1997;19:470-475.
19. Savage MF, Lee JY, Kotch JB, Vann WF, Jr. Early preventive dental visits: effects on subsequent utilization and costs. Pediatrics 2004;114:e418-423.
20. Nowak AJ, Casamassimo PS. Using anticipatory guidance to provide early dental intervention. J Am Dent Assoc 1995;126:1156-1163.

Abstract of the Scientific Literature

Current Wound Closure and Soft Tissue Management

Management of soft tissues in endodontic surgery has become increasingly important for an esthetically successful treatment. The objective of this article was to provide an overview and guidance for integrating current and new successful flap designs and wound closure methods. This critical review of currently used techniques, based on clinical and scientific data, reveals great potential for improvement. To achieve these goals, several measures are necessary—including accurate preoperative treatment planning in reference to the condition and quality of the tissue to be manipulated. Minimal trauma should be inflicted during incision and flap raising. Both the flap and unreflected tissue remaining on the tooth surface should be kept moist during the entire procedure, especially in situations where excellent hemostasis can be achieved. Also, sensitive handling of the soft tissues during suturing is mandatory, with wound edges being reapproximated without tension and held in place with nonabsorbable atraumatic sutures. Suture removal performed after 3 to 5 days promotes rapid healing. The flap design plays an important role as to how much recession will occur postoperatively. Papilla base flaps have allowed virtually recession free healing after endodontic surgery.

Comments: This article is an excellent overview of soft tissue management in endodontic surgery. It shows that perfect tissue adaptation of wound edges creates smaller distances for epithelial migration during the healing process and that more rapid soft tissue healing is a result of reduced tissue trauma and enhanced wound closure. Clear understanding of wound closure and tissue-healing patterns call for the use of atraumatic procedures, nonirritating suture materials, and adequate suturing techniques. **FSS**

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Velvart P, Peters CI. Soft tissue management in endodontic surgery. J Endod 2005;3:4-16.
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