

Assessment of an Infant Oral Health Education Program on Resident Physician Knowledge

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ABSTRACT

Purpose: The purpose of this study was to implement and evaluate the effect of an early childhood oral health education program given to physician residents at Columbia University Medical Center, New York City. It was hypothesized that a short training program in infant oral health would improve the oral health knowledge base of these future physicians and promote the age 1 dental visit.

Methods: A sample size of 92 physician residents participated in this study. A 1-hour seminar describing common dental findings, including poor oral hygiene and early childhood caries (ECC), was presented, and an identical 14 question pre- and post-test were completed. The pre- and post-tests were administered to all participants, and statistical differences between pre- and post-tests were calculated using a paired *t* test ($P < .05$) and SAS 9.1 statistical software.

Results: There was an average of 77% correct responses on the pre-test and 90% correct responses following instruction ($N=92$, $P < .001$), with a mean improvement in the scores of 2 questions on the post-test. There was a significant improvement in the knowledge base of residents on topics related to ECC and its prevention and fluorides.

Conclusion: A 1-hour seminar resulted in significantly improved post-test scores for physician residents about infant oral health. (J Dent Child 2012;79(2):49-52)

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Oral health is an integral component of the overall general health of children.¹ The increased accessibility of successful preventive measures, such as fluorides, has led many to believe that children no longer suffer from oral health problems.² Unfortunately, dental caries remains the most common chronic disease of childhood and can have detrimental effects on growth and development when the disease is severe.² Between 1999 and 2002, 41% of 2- to 11-year-olds had dental caries in their primary teeth³ and as many as 2.5 million 2- to 5-year-olds had untreated tooth decay.² As dental disease continues to be a serious problem, low-income and minority children suffer disproportionately from dental caries and have additional barriers, such as limited access to dental services.⁴

To promote early detection of dental caries and the establishment of a dental home, both the American Academy of Pediatrics (AAP) and American Academy of Pediatric Dentistry recommend the first dental visit by 1 year old.^{5,6} National data suggest, however, that few children have received this suggested preventive care. Only 26% of 3- to 4-year-olds received recommended dental visits, while 80% received recommended medical well child visits.^{7,8} Further, approximately 90% of poor children have a regular source of medical care, while only 22% of children younger than 6 years old receive dental treatment.⁹ Because most children have early exposure to medical but not dental services, primary care physicians have a unique opportunity to be instrumental in helping at-risk children gain necessary access to dental treatment.²

Unlike dentists, primary care physicians see a large percentage of children during their infant and toddler years and can play an important role in the prevention and control of early childhood caries (ECC) because

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of their access to this population.¹⁰ Despite 90% of physicians in a national survey reporting that dental counseling and examinations should be part of the well child visit, 50% reported having no previous dental health education in medical school or residency, and only 9% correctly answered questions on infant oral health.⁴ Additionally, most physicians in one study did not screen for ECC, an important precursor to future disease.¹¹

While enhancing involvement of primary care medical providers is essential to increasing access to dental care for all children and improving their oral and overall health, physician education is required. Studies report that providing education after the completion of a residency is challenging, while education provided during residency training, before practice patterns are established, is successful.⁸ Dental education during medical training programs is limited and deserves more attention than it currently receives.

The purpose of this study was to evaluate the knowledge of Columbia University Medical Center (CUMC) physician residents before and after an infant oral health seminar. It was hypothesized that even a short training program in infant oral health would improve the oral health knowledge base of these future physicians and promote the age 1 dental visit.

METHODS

This research was reviewed and approved by the Columbia University Institutional Review Board (IRB-AAAD8253). The aim was to include all pediatric and family medicine residents regardless of program year at CUMC in the study. The participation in the study was voluntary, and no compensation was provided to the participants. The study included all pediatric and family medicine residents who presented for their block rotations at the pediatric medicine clinic. A 1-hour power point presentation on infant oral health was presented to these residents.¹² A 14-question pre-test was administered to residents prior to the presentation and an identical post-test was administered after the presentation.

The presentation focused on the: role of the physician in the early detection of caries; consequences of ECC; signs of ECC focusing on white spot lesions and when to refer; benefits and sources of fluoride; fluorosis; use of fluoride varnish; screening methods, including knee-to-knee examination; anticipatory guidance; oral hygiene and feeding practices; maternal screening; and establishment of a dental home by 1 year old.¹²

The questionnaire consisted of 14 multiple choice questions and tested: areas of ECC and its sequelae; etiology; high-risk groups; the rationale why physicians should perform oral health risk assessments; methods and components of oral health risk assessment; sources of fluoride; fluorosis and its risk factors; feeding and oral hygiene methods; and components of anticipatory guidance.¹² The statistical difference between pre-test and

post-test was calculated using a paired *t* test and SAS 9.1 statistical software (SAS Institute Inc, Cary, NC), with *P*<.05 considered statistically significant.

RESULTS

A total of ninety-two residents completed both the pre- and post-test and were included in the study. Of the 92 study participants, 80 were pediatric residents and 12 were family medicine residents. Data collection was anonymous, and no record of name, sex, or age of the participant was made during the study. Correct responses averaged 77% for the pre-test and 90% for the post-test. The average score on the pre-test was 10.7±1.6 and 12.6±1.1 on the post-test with a mean improvement in score of two questions in the post-test (*P*<.001).

Table 1 presents each topic area and relevant questions and shows the percentage of residents who were able to correctly answer the questions before and after the seminar. Eighty-four percent of the resident cohort was scored correct with regards to the consequences of untreated dental disease. Further, a large percentage of residents were scored correct with regards to *Streptococcus mutans* (88%) and frequency of sugar consumption (85%) on the pre-test. Ninety-nine percent of residents were able to identify high-risk groups for caries appropriately and were able to provide the rationale of oral health risk assessment for pediatricians in their pre-test, while, 71% of the resident cohort correctly answered the

Table 1. Individual Questions Within Each Topic Area and the Improvement from Pre-test to Post-test (% of Residents)

	Pre-test (%)	Post-test (%)
Early childhood caries		
Sequelae of untreated dental disease	84	96
Etiology	71	95
<i>Streptococcus mutans</i> is the most common infecting agent and can be vertically transmitted	88	98
Frequency of sugar consumption increases risk	85	98
High-risk groups	99	100
Screening		
Rationale for physicians incorporating oral health risk assessment into practice	99	99
Method for performing oral health risk assessment	92	91
Components of American Academy of Pediatrics oral health risk assessment	83	90
Fluoride		
Sources of fluoride	57	99
Fluorosis causes and risk factors	18	54
Prevention		
Importance of oral hygiene following night feedings	86	87
Optimal oral hygiene methods	35	72
Anticipatory guidance		
Components of anticipatory guidance	86	89
Education of parent to reduce risk of infection	88	96

question regarding the etiology of the dental caries process.

A large majority of the participants demonstrated via correct answers preliminary knowledge in the rationale for physicians incorporating oral health risk assessment into practice (99%), methods for performing an oral health risk assessment (92%), and the components of oral health risk assessment (83%), as the average for the questions concerning these topics only changed from 91% in the pre-test to 93% in the post-test (Figure 1).

Initially, 57% of study participants correctly identified sources of fluoride and 18% accurately responded to questions relating to fluorosis, and fluorosis' risk factors. The percentage of accurate responses relating to fluorosis increased significantly to 54% on the post-test. Overall, 38% of residents were able to answer questions related to fluorides correctly on the pre-test, which improved to an average of 77% correct answers in the post-test.

Sixty percent of the residents were able to answer correctly on the pre-test about topics related to prevention, such as the importance of night feedings (86%) and optimal oral hygiene methods (35%). Answers regarding optimal oral hygiene methods improved to 72% and a mean improvement of 79% after the seminar (Figure 1).

There was a significant difference noted in the topics related to ECC, fluoride, and prevention. Overall, there was no decline in residents' knowledge after the seminar, although a few topics, like anticipatory guidance and screening, did not show a statistically significant difference.

DISCUSSION

Current oral health education for physicians is limited.⁸ This study demonstrated evidence of inadequate physician oral health knowledge. It was also apparent that an educational intervention had a positive impact on the understanding of most early childhood oral health topics. While improvements were evident, it was clear that

additional and continuous education is necessary.

Although pediatricians overwhelmingly believe they play an important role in the promotion of oral health,⁴ this study indicates that very few providers are familiar with proper oral hygiene practices and sources of dental disease. Baseline knowledge regarding optimal oral hygiene methods was deficient, and, despite statistical improvement, only 72% of participants could identify correct oral hygiene practices after the seminar. Oral hygiene following night feedings was an additional area of concern. Appropriate oral hygiene after night feedings should be a topic that is not only well understood by primary care physicians, but should also be routinely incorporated into their anticipatory guidance, as inappropriate feeding practices are strongly associated with ECC.¹³

After the presentation, all residents were able to properly identify causes of the disease, demonstrating that even limited training can be beneficial to improving oral health knowledge. Lack of familiarity of oral health issues and causes of dental disease will make it challenging for primary care physicians to promote oral health and suggests the need for additional training to improve preventive oral health counseling.

According to the AAP, pediatricians and pediatric health care professionals are more likely to encounter new mothers and infants than are dentists; therefore, it is essential that they are aware of associated risk factors of early childhood dental disease to enable a timely intervention.¹⁴ This study's results show that almost all participants understood the rationale for incorporation of oral health risk assessment into their practice.

The accuracy of fluoride prescribed by physicians has been an area of particular concern, because inappropriate prescribing was shown to be a leading cause of the development of dental fluorosis.⁹ Baseline understanding of fluorosis risk factors and etiology were especially weak, with the least number of participants answering this question correctly. The percentage of accurate responses relating to fluorosis increased from 18% on the pre-test to 54% on the post-test.

Although knowledge again showed statistical improvement, slightly less than half the participants remained unclear about fluorosis following the seminar, further demonstrating the need for further instruction. While only half of the residents could correctly identify appropriate sources of fluoride on the pre-test, post-test results illustrate that almost all participants had an increased awareness of appropriate sources of systemic fluoride. Although physicians typically initiate fluoride supplementation, this study's results indicate a markedly poor baseline comprehension of fluorosis and sources of fluoride.

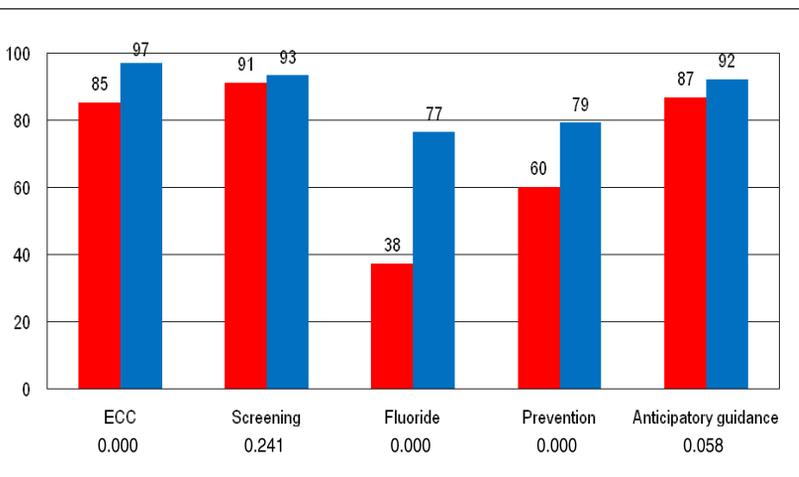


Figure 1. Mean improvement in score (%) from pre-test to post-test in each topic area.

There were some limitations to this study. First, physician residents may have been in different stages of their specialty training. There were a total of 80 pediatric residents and 12 family medicine residents. Some participants may have been exposed to this information in the past, which may add some bias. It also maybe interesting to explore further instruction, testing, and follow-up testing based on program year.

Second, although immediate improvements were demonstrated following the presentation, this study was unable to determine if knowledge was retained. The purpose of this study was not to determine if an hour of training in early childhood oral health was sufficient, but whether physicians could benefit from oral health education in their residency programs. Participants performed well with the limited education they received, and it can be speculated that further improvements could be gained if supplementary instruction was provided. It can also be theorized that physicians who are educated on oral health and dental disease would be more likely to promote the age 1 dental visit and be more comfortable in providing anticipatory guidance.

Establishing collaborative relationships between primary care physicians and dentists is crucial to increasing access to dental care for children and improving their dental and general health.¹⁴ Some barriers, however, may prevent primary care practitioner involvement in oral health. Many physicians are unaware of the importance of oral health to overall health, and because physicians have a demanding schedule, oral health may not be a high priority, even in well-child care.⁹ An oral health screening may be viewed as just another element to accomplish in an already long list of to-dos. To overcome obstacles in the medical-dental partnership, it should be emphasized that oral health information can be integrated into areas that primary care physicians already focus on, including nutritional/feeding practices, fluoride needs, and anticipatory guidance.⁹ Dental caries is a consequential disease that affects the pediatric population with such frequency that it is essential for physicians to incorporate oral health into their daily practice, despite any barriers that may exist.

CONCLUSIONS

Based on this study's results, the following conclusions can be made:

1. There was improvement in the physician residents' knowledge immediately following the presentation.
2. There were significant improvements in post-test scores in the areas of fluorides, ECC and prevention.

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REFERENCES

1. American Academy of Pediatric Dentistry. Policy on mandatory school entrance oral health examinations. *Pediatr Dent* 2007;29:26-7.
2. Dela Cruz GG, Rozier G, Slade G. Dental screening and referral of young children by pediatric primary care providers. *Pediatrics* 2006;114:642-52.
3. Centers for Disease Control and Prevention. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis: United States 1988-1994 and 1999-2002. Available at: "<http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5403a1.htm>". Accessed July 14, 2006.
4. Lewis CW, Grossman DC, Domoto PK, Deyo RA. The role of the pediatrician in the oral health of children: A national survey. *Pediatrics* 2002;106:84-90.
5. American Academy of Pediatric Dentistry. Policy on the dental home. *Pediatr Dent* 2007;29:22-3.
6. AAPD Foundation. The dental home: It's never too early to start. Available at: "<http://www.aapd.org/foundation/pdfs/DentalHomeFinal.pdf>". Accessed July 14, 2006.
7. Yu SM, Bellamy HA, Kogan MD, Dunbar JL, Schwalberg RH, Schuster MA. Factors that influence receipt of recommended preventive pediatric health and dental care. *Pediatrics* 2002;110:e73.
8. Douglass JM, Douglass AB, Silk HJ. Infant oral health education for pediatric and family practice residents. *Pediatr Dent* 2005;27:284-91.
9. Mouradin WE, Schaad DC, Kim S, et al. Addressing disparities in children's oral health: A dental-medical partnership to train family practice residents. *J Dent Educ* 2003;67:886-95.
10. Pierce KM, Rozier GR, Vann WF. Accuracy of pediatric primary care providers' screening and referral for early childhood caries. *Pediatrics* 2002;109:82-8.
11. Ismail AI, Hashim Nainar SM, Woosung S. Children's first dental visit: Attitudes and practices of US pediatricians and family physicians. *Pediatr Dent* 2003;25:425-30.
12. American Academy of Pediatrics. Oral health risk assessment: Training for pediatricians and other child health professionals. Available at: "<http://www.aap.org/commpeds/dochs/oralhealth/cme/index.htm>". Accessed July 14, 2006.
13. AAPD. Policy on early childhood caries (ECC): Classifications, consequences, and preventive strategies. *Pediatr Dent* 2007;29:39-40.
14. AAP. Draft policy: Preventive oral health intervention for pediatric medical practitioners. Available at: "<http://www.aap.org/commpeds/dochs/oralhealth/policy.cfm>". Accessed July 14, 2006.