

Feasibility of colocating dental hygienists into medical practices

Patricia A. Braun, MD, MPH¹; Shelby Kahl, RDH²; Misoo C. Ellison, PhD³; Sarah Ling, MPH⁴; Katina Widmer-Racich, MA¹; Matthew F. Daley, MD⁵

1 Children's Outcomes Research Program, University of Colorado Anschutz Medical Campus, Aurora, CO, USA

2 Independent Registered Dental Hygienist, Fort Collins, CO, USA

3 Colorado School of Public Health, University of Colorado Anschutz Medical Campus, Aurora, CO, USA

4 College of Osteopathic Medicine, Des Moines University, Des Moines, IA, USA

5 Institute for Health Research, Kaiser Permanente Colorado, Aurora, CO, USA

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Correspondence

Dr. Patricia A. Braun, Children's Outcomes Research Program, University of Colorado Anschutz Medical Campus, 13199 E. Montview Blvd., Suite 300 F443, Aurora, CO 80045. Tel.: 303-436-4694; Fax: 303-436-4665; e-mail: patricia.braun@ucdenver.edu. Patricia A. Braun and Katina Widmer-Racich are with the Children's Outcomes Research Program, University of Colorado Anschutz Medical Campus. Shelby Kahl is an independent registered dental hygienist. Misoo C. Ellison is with the Colorado School of Public Health, University of Colorado Anschutz Medical Campus. Sarah Ling is with the College of Osteopathic Medicine, Des Moines University. Matthew F. Daley is with the Institute for Health Research, Kaiser Permanente Colorado.

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Introduction

Dental caries is the most common chronic condition in childhood and disproportionately affects disadvantaged children and families. Poor children have more than twice the rate of dental caries of nonpoor children and are more likely to have untreated decay (1,2). The existing disparities in oral health have been judged to be so substantial that Healthy People 2020 has targeted increasing the proportion of low-income children and adolescents receiving preventive dental care as

Abstract

Objectives: To test the feasibility of colocating registered dental hygienists (RDHs) into medical practices and to evaluate parent/caregiver oral health characteristics.

Methods: From December 2008 to April 2009, we colocated five RDHs into five medical practices identified for their service to low-income children. Dual-function exam rooms were built in each office. Caregiver-child dyads were recruited from the practices for program evaluation. We used both qualitative (key informant interviews) and quantitative (survey) methods to evaluate the project. Feasibility was measured by assessment of RDH and practice factors that facilitated and/or created barriers to colocation, sustainability of services 5 years after colocation, and caregiver satisfaction with services. Caregiver oral health knowledge, attitudes, beliefs, and behaviors were also measured.

Results: Over 27 months, five part-time RDHs provided care to 2,071 children. Children of caregiver-child dyads ($n = 583$) recruited for evaluation were young (mean age = 1.8 years), white (46 percent), non-Hispanic (56 percent), and publicly insured (68 percent Medicaid/11 percent State Children's Health Insurance Plan). Key informant interviews revealed various factors that facilitated and created barriers to program adoption, implementation, and sustainability. Most barriers were overcome. Five RDHs remained in the practices 2 years after program initiation and four remained after 5 years. At 1 year, 27 percent of caregiver-child dyads returned for evaluation and were highly satisfied with services. Caregivers reported favorable oral health characteristics and few barriers to receiving preventive dental care at baseline and 1-year follow-up.

Conclusions: Colocating RDHs into medical practices is feasible and an innovative model to provide preventive oral health services to disadvantaged children.

one of the nation's 10 most important overall health goals (3).

Dental services are covered benefits in public insurance programs. Consequently, disparities in utilization and dental outcomes among publicly insured children are more likely attributable to poor access to dental care rather than to lack of insurance coverage. Public insurance programs suffer from a shortage of participating dentists, especially those who serve young children; and therefore, children with public insurance are less likely to have access to dental care than commercially

insured children and consequently experience more “avoidable” oral disease (4).

Professional societies such as the American Academy of Pediatric Dentistry (AAPD) (5) and the American Academy of Pediatrics (AAP) (6) endorse an “age one dental visit,” especially for children at high risk for developing caries; however, few children have received this visit (1,2,7). The provision of basic preventive dental services to young children, specifically fluoride varnish application, is variably provided by medical providers in the medical home (8-10), but this does not equate to an age one dental visit. Consequently, there has been interest in exploring whether innovative dental hygiene practice models could expand access to preventive services and improve outcomes for high-risk populations. Because most infants, toddlers, and preschoolers are more exposed to medical care than dental care, leveraging the medical home provides an opportunity to expand access to preventive oral health services for children (11). Colorado is one of 35 states that permit registered dental hygienists (RDHs) to practice independently, and one of 12 that allow them to bill Medicaid directly for reimbursement (12). Investigation into the independent practice of RDHs, specifically when colocated into medical practice is virtually nonexistent. Consequently, little is known about the process, potential pitfalls, and anticipated benefits of such practice.

Our objectives were to a) test the feasibility of colocating independent RDHs into pediatric medical practices as measured by the assessment of factors that facilitated and/or created barriers to colocation, sustainability of services 5 years after colocation and caregiver satisfaction with colocated services; and b) evaluate caregiver oral health knowledge, attitudes, beliefs, and behaviors.

Methods

Program description

Study setting

Five Colorado medical practices serving disadvantaged children were identified for colocation. In each practice, a dual-function room was built to accommodate either the RDH or the medical provider, depending on need and schedules. The room was equipped with a dental chair functional for either medical or dental exams, equipment to process and sterilize dental hygiene instruments and supplies for patient dental and medical services.

Study staff

Five RDHs were colocated into the medical practices and worked in the medical practices from 1 1/2 to 5 days per week. The first RDH was colocated in December 2008 and the last in April 2009.

Study procedures

In the program’s first year, the evaluation team had ongoing meetings with the medical practices and the RDHs to discuss issues regarding the building and use of the dual-function rooms and how to manage patient accounts with dental practice management software. After colocation of the RDH into the practice, the evaluation team periodically met with the RDH and medical practices to provide practice coaching to overcome barriers to program implementation and to help RDHs overcome barriers to receiving reimbursement from Medicaid and State Children’s Health Insurance Plan (SCHIP).

Program evaluation

We used mixed methods to evaluate the program including qualitative key informant interviews (KIIs) of practice staff and RDHs to assess the factors that facilitated or created barriers to the project’s adoption, implementation, and long-term sustainability and a quantitative survey to measure caregiver satisfaction with colocated services and their oral health characteristics. The duration of the evaluation period was 27 months and began when the first colocated hygienist saw his/her first patient. All RDHs were present in the medical practices for at least 23 months of the 27-month period.

Qualitative interviews

Study population

Within each of the participating practices, we used the Tremblay criteria (knowledge and role in project) to sample a variety of personnel including the RDHs, medical and dental directors, and practice administrative staff (13).

Key informant interviews (KIIs)

We conducted 13 KIIs 2 years after RDH colocation within the practices. These in-depth, semi-structured interviews (30- to 45-minute telephone calls) used a combination of broad, open-ended questions to elicit personal thoughts and experiences with the project and probing questions to further elicit factors that may have either facilitated or created barriers to the project’s adoption, implementation, and sustainability. All interviews were recorded, professionally transcribed and thematically coded using ATLAS Ti, version 6.0 (Scientific Software Development, GmbH, Berlin, Germany).

Data analysis

We used a template style for organizing and analyzing data. An evolving set of codes was created and linked to units of text

fragments, sentences, and paragraphs. Common themes were identified and categorized within three evaluation domains: adoption, implementation, and sustainability.

Caregiver survey

Study population

Children of all ages receiving care in the medical practices were eligible to receive dental care from the colocated RDHs. A cohort of caregivers of children less than 3 years of age were recruited to complete a survey at baseline and at 1 year to measure their oral health characteristics.

Survey design

The 59-item survey was developed using the Health Belief Model and measured caregiver satisfaction with colocated care as well as oral health knowledge, attitudes, beliefs, and behaviors. Previously validated survey items were utilized whenever possible (14-17). It was first piloted in a convenience sample of caregivers, refined and then administered in English and Spanish. Items measuring caregiver oral health characteristics utilized a four-point Likert scale ranging from “very important” to “not at all important” (attitudes), “strongly agree” to “strongly disagree” (beliefs), “all of the time” to “none of the time” (behaviors), and “a big problem” to “not a problem” (barriers to taking their child to a dental provider).

Survey administration

The RDHs administered the survey to caregivers at enrollment and 1 year.

Data analysis

Descriptive statistics were calculated to describe baseline sociodemographics of the study population, and baseline and follow-up variables. Data are presented as means and ranges for continuous data and percent of whole for categorical data. All the data analyses were completed using SAS® version 9.2 (SAS Institute Inc., Cary, NC, USA).

This study was approved by the Colorado Multiple Institutional Review Board at the University of Colorado Anschutz Medical Campus.

Results

Feasibility

During the 27-month evaluation period, the RDHs provided a full spectrum of direct patient preventive oral health

services to 2,071 children of all ages receiving medical care in the practices. These services included caries risk assessment, prophylaxis, fluoride varnish application, oral health instruction, scaling and root planing for older children, assessment for caries, and referral to a dentist and care coordination when restorative needs were identified. All RDHs successfully billed Medicaid and SCHIP for rendered services with the exception of one who was hired by the practice; in this case, the practice billed for services. Five years after program initiation and 1 year after the conclusion of the program evaluation, four of the five RDHs remained colocated in the practices. One RDH left after the conclusion of the program evaluation due to concerns about the financial sustainability of colocating in the practice. As program evaluation concluded, each of the practices adapted the model to best meet their practice needs. These adaptations ranged from incorporating the RDH into their patient scheduling system to expanding the model to other practices within their health-care system.

Program evaluation

Key informant interviews

Five project RDHs, four medical directors (MD), one dental director, and three office managers (OM) were interviewed.

Adoption

The recognition of the oral health needs of patients, lack of available resources to meet those needs and desire to promote comprehensive medical care emerged as early themes in both the RDHs' and medical practices' desire to participate in the project. One OM said, “. . . it is hard to find a dental office that will take children who have Medicaid, and some of them don't have any insurance. . . .” An MD added, “. . . the one-stop shop being the medical home is something we've wanted to do. . . .”

The provision of equipment and supplies for the dual exam room and program stipend also facilitated program adoption but became less important to ongoing implementation and sustainability. An MD noted, “. . . the program came with dollars attached . . . it helped sell the program.”

Lack of staff buy-in and space were most commonly mentioned as barriers to program adoption, particularly for the participating practices. One MD said, “The biggest thing was selling it to the staff,” and another added, “one of the biggest concerns was space . . . the worry that [the RDH] was going to take it from others.” For the RDHs, the major barrier to adoption was concern about finances and receiving reimbursement for care. As one RDH stated, “I worried about not having enough time in the practice, but I couldn't afford to quit any of my other jobs.”

Implementation

As the program matured, the flexibility and support of the investigators promoted program implementation. One MD talked about “the program’s incredible flexibility and creativity,” emphasizing the fact that, “. . . we could still use the hygienist’s room for older kids or even for babies [for medical visits].” Patient satisfaction with services also facilitated program implementation. An MD said, “[parents] were very excited that their kid could see a dental provider.”

Incorporating a new provider into the practice proved to be a barrier to program implementation. An OM described the beginning of the project this way: “It was slow and confusing . . . the providers weren’t aware of when the hygienist would be here.” An MD added, “[The RDH] is totally foreign to our group and is even different in the sense they are a different type of health care provider . . . you really have to meet them more than half-way.” Lack of communication between staff members and difficulty scheduling patients were also mentioned as barriers to program implementation. One RDH said, “At the beginning, it was kind of rough . . . we had conferences with the pediatricians and their assistants to schedule patients and make them aware that we are there.”

Sustainability

Factors that promoted ongoing program sustainability included satisfaction with meeting the oral health-care needs of the practice population, the acceptability of the program by practice staff and patients, and improved patient scheduling strategies. The interviewees placed a high value on meeting the needs of their patient population. An OM said, “[The families] really enjoy it . . . it is easy for them . . . they can do one or two appointments in one day.” Meeting patient needs motivated the practices to sustain the program, but more practical system changes also facilitated program sustainability. One OM told us, “We are able to print out the reports of patients who are within the age span [the RDH] needs and then [the RDH] is able to contact and schedule them.”

High patient no-show rates arose as a barrier during program implementation and persisted as a barrier to program sustainability. One RDH summed it up saying, “[When] patients don’t show up . . . that’s huge for production and sustainability.”

Throughout all phases of program development (adoption through sustainability), the lack of adequate RDH hours in the practice represented a barrier. One MD described the problem this way: “Both sides are hamstrung by the limited number of days the hygienist is here. [The RDH] is only here a limited time, so that frees up the space . . . but for the program to succeed, [the RDH] needs to be here more.”

Quantitative survey

A total of 583 caregiver–child dyads were enrolled for program evaluation (Table 1). The mean age of the children

Table 1 Baseline Characteristics of Children and Their Caregivers Participating in the Colocation of Registered Dental Hygienist into Medical Practices Program, Colorado

Child characteristics (<i>n</i> = 583)	
Mean age (months) [mean (range)]	18.7 (2.5–40.1)
Gender	
Female (<i>n</i> %)	263 (46.2)
Ethnicity	
Hispanic (<i>n</i> %)	254 (43.5)
Race	
White	296 (50.8)
Biracial/multiracial	63 (10.8)
Black	11 (0.2)
Other	223 (38.2)
Medical insurance (<i>n</i> %)	
Medicaid	388 (68.0)
State Children’s Health Insurance Plan	65 (11.4)
Private	76 (13.3)
Self-pay	21 (3.7)
Other/unknown	21 (3.7)
Dental insurance (<i>n</i> %)*	
Yes	445 (84.4)
Prior visit with dental provider (<i>n</i> %)	48 (8.3)
Has dental provider that plans on taking child to in future (<i>n</i> %)	147 (25.5)
Parent/caregiver characteristics (<i>n</i> = 583)	
Caregiver education (<i>n</i> %)	
High school or more	421 (74.5)
Household income (<i>n</i> %) [†]	
Less than \$10,000	129 (26.9)
\$10,000 to \$19,999	77 (16.1)
\$20,000 to \$29,999	99 (20.7)
\$30,000 to \$39,999	62 (12.9)
Greater than or equal to \$40,000	112 (23.4)
Children of caregiver (<i>n</i> %)	
1	297 (51.2)
2	176 (30.3)
3	59 (10.2)
>3	48 (8.3)
Children in household (<i>n</i> %)	
1	277 (48.2)
2	181 (31.5)
3	69 (12.0)
>3	48 (8.4)
Dental insurance (<i>n</i> %) [‡]	
Yes	356 (66.9)
Previous cavity (<i>n</i> %)	
Yes	381 (66.2)
Not sure	47 (8.2)
Has had dental visit in past 2 years (<i>n</i> %)	288 (50.0)

* Excluding 52 children whose caregivers responded “don’t know.”

[†] Excluding 80 caregivers who responded “don’t know.”

[‡] Excluding 45 caregivers who responded “don’t know.”

was 1.8 years of age. Their caregivers reported their children as white (50.8 percent), non-Hispanic (56.5 percent), and publicly insured (Medicaid 68 percent /SCHIP 11 percent). Twenty-seven percent of enrolled children returned for more than one visit and had an average of 1.8 visits (range 1-5) with the RDH over the 27-month evaluation period. The full-time RDH was more likely to see children back for more than one visit than the part-time RDHs ($P < 0.05$).

Satisfaction and barriers

At baseline, caregivers reported few barriers to accessing dental care for their child. Reported barriers included the cost of taking their child to a dental provider (reported by 38.6 percent), difficulty finding a dental provider who took their child's dental insurance (36.1 percent), their child being afraid to visit the dental provider (28.4 percent), not finding a dental provider close to their house (24.6 percent), and being too busy (18.5 percent). All of the caregivers who completed a

survey 1 year after joining the program liked having an RDH in their medical office. They reported few barriers to receiving care; the most common being that the RDH did not fill cavities and that it took too much time to see both providers on the same day.

Oral health knowledge, attitudes, beliefs, and behaviors

Caregivers enrolled at baseline and those who completed a survey at 1 year reported high levels of oral health knowledge and positive attitudes, beliefs, and behaviors (Table 2). They reported (strongly/somewhat agree) that they would be more likely to take their child to a dental provider located in their child's doctor's office than one located in the community (92 percent baseline/91 percent follow-up) and that it would be convenient (99 percent /98 percent) and made sense (96 percent /96 percent) for their child to get their care from a dental provider in the doctor's office.

Table 2 Oral Health Knowledge, Attitudes, Beliefs, and Behaviors of Caregivers Participating in Colocation of Registered Dental Hygienists into Medical Practices Program, Colorado

	Baseline <i>n</i> = 583	Follow-up <i>n</i> = 160
Oral health knowledge (<i>n</i> %)		
By what age do you think your child should have their first dental visit? <i>By age 1</i>	290 (50.6)	97 (60.6)
Previously been told my medical provider when child should see a dental provider? <i>Yes</i>	226 (39.4)	95 (59.4)
Attitudes regarding colocated care (<i>n</i> %) <i>Strongly/somewhat agree</i>		
Convenient for child to receive dental care by dental provider in doctor's office <i>Yes</i>	570 (99.5)	158 (98.6)
Having my child get dental care at same time as dental care makes sense <i>Yes</i>	544 (95.8)	155 (96.9)
More likely to take child to dental provider in doctor's office than one in community <i>Yes</i>	525 (92.4)	135 (84.4)
Oral health beliefs (<i>n</i> %)		
. . . is important for preventing cavities <i>Very/somewhat important</i>		
Brushing my child's teeth . . .	572 (99.7)	158 (98.8)
Brushing my child's teeth with fluoride toothpaste . . .	449 (79.8)	148 (92.5)
Limiting my child's sugary snacks . . .	545 (97.0)	153 (95.6)
Regularly bringing my child to a dental provider . . .	564 (99.1)	151 (94.4)
Not putting my child to bed with a bottle . . .	498 (88.1)	154 (96.6)
Giving my child water that has fluoride . . .	347 (62.0)	121 (75.6)
Perceived benefits <i>Strongly/somewhat agree</i>		
Healthy teeth will help child feel good and have confidence	518 (88.9)	144 (90.0)
Taking care of my child's teeth is important to overall health	582 (99.3)	145 (90.6)
Perceived severity/fatalism <i>Strongly/somewhat agree</i>		
Cavities in baby teeth don't matter since they fall out anyway	68 (12.0)	17 (10.6)
Not much I can do to stop my child from developing cavities	47 (8.3)	12 (7.5)
Most children eventually get cavities	255 (45.6)	57 (35.6)
Perceived susceptibility <i>Strongly/somewhat agree</i>		
Children don't need to brush their teeth until they get their permanent teeth	33 (5.9)	7 (4.4)
Taking care of my child's teeth is as important as taking care of my child's medical health	553 (97.0)	148 (92.3)
Oral health behaviors		
Brushes child's teeth ≥ 1 per day	472 (82.5)	144 (90.0)
Uses toothpaste with fluoride to brush child's teeth <i>Yes</i>	125 (22.5)	91 (56.9)
Main source of water that your child drinks at home is fluoridated tap water or bottled water with fluoride <i>Yes</i>	390 (70.1)	114 (71.3)
Child put to sleep with a bottle of formula, milk, or juice at bedtime or naptime <i>Yes</i>	233 (40.8)	36 (22.5)

Discussion

This study demonstrates the feasibility of colocating independent dental hygienists into medical practices and expands access to preventive dental services to young children at high risk of developing early childhood caries. Medical practices and RDHs favored colocation. Although there were various challenges to program adoption and implementation, these barriers were minimized, and in all but one of the participating practices, colocation was successfully sustained 5 years after program initiation. The oral health knowledge of caregivers was high, and they reported favorable attitudes, beliefs, and behaviors toward promoting optimal oral health. Caregivers also favored receiving oral health care for their children in medical settings and reported to be more likely to access these colocated services than dental services outside of their medical home.

There is a paucity of published literature describing colocated RDHs in medical practices. In federally qualified health centers (FQHCs), colocating medical and dental services within one system is common. In the FQHC model of colocation, services are typically located within the same health-care system – which may or may not be located in the same building. Other models of colocated services have been described. A randomized trial testing the colocation of primary medical care into a mental health clinic was successful at increasing access to primary care services and improving health indicators among patients with mental illness (18). This trial is not completely comparable to our model because an entire medical clinic staffing both health-care providers and administrative personnel was colocated into an existing Veterans Affairs mental health clinic. In our model of colocation, the RDHs worked independently in the participating practices and received off-site support from the study staff. The RDHs were responsible for establishing relationships with existing staff in the medical practices, such as with front office personnel who could assist them in scheduling patients for future visits. Our description of the colocation of dental providers directly into the medical home where dental services were delivered in a dual-function exam room and without the necessity of two independent visits presents new findings to the dental and medical communities.

In our evaluation, we identified factors that both facilitated and created barriers to program adoption, implementation, and sustainability. Colorado is well positioned to colocate RDHs into the medical home because of its expanded dental practice act. Despite Colorado's dental practice act, one of the barriers reported by the RDHs was learning how to work with billing agencies, and instruction in billing for services was a major facilitator of program implementation. RDHs' confidence in working independently may improve as more of their peers experience success with the practice and with more education on small business development and manage-

ment. Another barrier mentioned throughout all program evaluation phases was the absence of a full-time RDH in the practice. Finding RDHs interested in working full-time in this model was challenging due to their uncertainty in the income that they could make as independent RDHs. They may have been more likely to work full-time in the practices if they were hired by the practice or job-shared with another RDH.

Medical providers can receive Medicaid reimbursement for the provision of basic preventive dental services, specifically fluoride varnish application, in 46 states (19). Each state has determined when medical providers can provide care and ranges from at any visit for children up to age 18 (Washington) to only at health maintenance visits for children up to age 5 (Colorado) (19). This model of care delivery has been successful but also has limitations including lack of medical provider buy-in and restrictions on when and to whom services can be provided (8). The colocation of RDHs into medical practices can supplement the provision of preventive services by medical providers as RDHs can provide a broader spectrum of services and are not restricted to providing oral health care only at specific appointments.

This program focused on and was successful at initiating early preventive dental services for young, disadvantaged children. The average age of the children participating in the evaluation of the program was 18 months of age. The adage “two is too late” emphasizes that ECC prevention must begin very early in life, especially for those at highest risk for developing caries. Although both the AAPD and the AAP recommend an “age one dental visit” for high-risk children (5,6), few children have received any dental care by age three (1,2,7). The children participating in our program evaluation were on average slightly older than one; the youngest child was 2.5 months and the oldest was slightly older than 3 years of age. Although their visits were not an “age one dental visit” in all cases, these children were beginning to access dental care earlier than is typically seen in disadvantaged children (1,7). In our study, few of the caregivers enrolled in the program reported barriers to accessing dental care. The rate of reappointment in our evaluation population was disappointing but demonstrates that barriers to accessing preventive oral health services are more complex than limited access to services alone. We were unable to assess why families did not return to see the RDH. Two of the practices served a large population of migrant farm workers who may have left the community. In another community, local dentists became available to see publicly insured patients and advertised their services during the study time frame. Additionally, although having an RDH in the medical home was convenient for families, lack of caregiver time, child fear, and lack of availability of RDH appointments may all have influenced return visits. Educating families and the medical community on the importance of oral health and of the existing disparities around ECC is necessary. Practice coaching in such projects is

also important to overcome system barriers that make it difficult for patients to return, such as streamlining patient scheduling and billing.

There are a few limitations to the feasibility of this program that deserve mention. Finding medical practices interested in the project and with enough space for a colocated RDH was a challenge, as was identifying RDHs willing to work independently yet full-time. The RDHs' limited time in the medical practices impacted the reach of services the RDHs could provide to patients. The project also has limitations to its evaluation. We reported the oral health characteristics of caregivers being referred to the RDH either by the medical practices' staff or through waiting room recruitment. These caregivers may be more adept at seeking out care and may have high oral health awareness, and their characteristics may not be generalizable to the practices' general populations. The limited clinical follow-up at 1 year impacted our ability to understand the full spectrum of caregiver characteristics, such as reported barriers to receiving preventive dental care.

Summary

Colocating dental hygienists into medical practices is feasible and an innovative way to provide primary preventive dental services to children at high risk for early childhood caries. The model of colocating dental hygienists into medical practices coordinates the delivery of preventive oral health care with medical care for young children while providing a familiar environment for the child and a convenient location for the caregiver and compliments having the medical provider or other designee apply fluoride varnish at medical visit. This model offers a practical representation of a patient- and family-centered medical home and has the potential to improve the oral health of children at high risk of developing early childhood caries, especially for those who have limited access to preventive dental services.

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