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The Utilization of Dental Hygiene Students in School-Based Dental Sealant Programs

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Early detection of childhood caries is important to childrens' overall health. Untreated childhood caries can lead to pain, as in abscesses from prolonged neglect; altered dietary intake; and delays in the development of the permanent teeth if the primary teeth are prematurely lost. In the summer of 2000, funds were provided to various oral health care provider organizations by the Illinois Department of Public Health, Division of Oral Health, to purchase portable equipment to deliver preventive services (i.e., exams, sealants, and oral hygiene education) to second-grade and sixth-grade children who qualified for Medicaid and/or free and reduced-cost lunch programs. The Dental Sealant Grant Program at Southern Illinois University in Carbondale was a unique program that utilized dental hygiene students as the primary human resource. Within the state, the Dental Sealant Grant Program was, at the time of this report, the only grantee sponsored by a stand-alone dental hygiene program (not affiliated with a dental school). Other positive aspects of the dental hygiene-sponsored sealant program were that the supervising dentist was the primary Medicaid provider and a member of the dental hygiene faculty; dental hygiene faculty participated actively as site coordinators and clinicians; and dental hygiene students were given the opportunity to volunteer for the program as a service-learning option.

Keywords: School-based dental sealant programs, access to care, preventive oral health care, service-learning

Introduction

Tooth decay continues to be of primary concern for children living in families that are at or below poverty level. According to the U.S. National Library of Medicine (NLM), of the National Institutes of Health, "tooth decay is one of the most common of all disorders, second only to the common cold. It usually occurs in children and young adults but can affect any person. It is the most important cause of tooth loss in younger people."¹ Dental caries is defined as "an infectious, communicable disease resulting in destruction of tooth structure by acid-forming bacteria found in dental plaque, an intraoral biofilm."²

The loss of masticatory function may be one result of early tooth extractions due to gross carious lesions. When dental caries goes undetected and untreated, it can potentially lead to systemic health problems, time lost from work by parents who must remain home with sick children, and time lost from school by children in dental distress. Moreover, abscesses from pulpal infections resulting from untreated decay can lead to bone destruction, and the infection can spread into the bloodstream.³

According to the NLM: "Although significant progress has been made in reducing and controlling dental caries, the disease still remains a problem for many children and adults in the United States. Almost 20% of children between the ages of 2 and 4 years have had dental caries, and by age 17 nearly four of five youngsters have had at least one carious lesion (cavity) or restoration (filling). More than two thirds of adults ages 35 to 44 years have lost at least one permanent tooth, and about one of every two persons 75 years or older has had root caries affecting at least one tooth."²

Understanding that the prevalence of dental caries was and is still a significant problem, in March 2001, the National Institutes of Health (NIH) hosted the Consensus Development Conference on Diagnosis and Management of Dental Caries Throughout Life, in Bethesda, Maryland. The purpose of this landmark meeting was to seek answers to six specific questions⁴:

What are the best methods for detecting early and advanced dental caries?

What are the best indicators for an increased risk of dental caries?

What are the best methods available for the primary prevention of dental caries initiation throughout life?

What are the best treatments available for reversing or arresting the progression of early dental caries?

How should clinical decisions regarding prevention and/or treatment be affected by detection methods and risk assessment?

What are promising new research directions for the prevention, diagnosis, and treatment of dental caries?

Finally, baseline data in *Healthy People 2010* stated that 52% of children aged 6 to 8 had a dental caries experience from 1988 to 1994.⁵ Data for the children older than 13 were equally as discouraging. Twenty percent of adolescents had untreated dental decay in the same time period.⁵

The Importance of Pit and Fissure Sealants in Caries Prevention

As a method for preventing dental caries, pit and fissure sealants are effective; however, they are not being used or prescribed as frequently as they should be.⁶ Not only are pits and fissures in posterior teeth "a haven for food debris and decay-causing bacteria," but posterior teeth are the first and most frequently affected by decay in both children and adolescents.³ Properly placed pit and fissure sealants can ensure caries reduction. When access to preventive services is limited, however, an increase in the decay rate is likely to occur.

Since the 1983 NIH Consensus Development Conference on Dental Sealants, it has been widely accepted that pit and fissure sealants are highly effective in preventing dental caries, regardless of whether they are applied by appropriately trained dentists, dental hygienists, or dental assistants. Moreover, teams of dental hygienists and dental assistants have been highly effective in public health settings.^{4,7} Given these results, partnerships between community entities and state or local health departments may generate the funds necessary to provide the aforementioned services to uninsured or underinsured individuals.

The Importance of School and Community-Based Dental Sealant Programs

An oral health survey conducted by the Ohio Department of Health among schoolchildren found that "targeted, school-based dental programs can substantially increase the prevalence of dental sealants. Providing sealant programs in all eligible, high-risk schools could reduce or eliminate racial and economic disparities in the prevalence of dental sealants."⁸ The study compared the results from a random sample of 1,857 schools (N = 335) representing 87 of 88 counties.

Significant results indicated that a greater percentage of third-grade children received sealants in schools with sealant programs as opposed to those who attended schools without sealant programs. A race comparison revealed that a significantly greater percentage of white children (61.6%) received sealants than black children (50.8%) in schools that had active sealant programs.⁸ An additional editorial note in the Ohio study stated that, in spite of limitations that could have had an effect on the data analysis, "among students who participated, the use of appropriately targeted school-based programs

increases the prevalence of dental sealants among children from low-income families and reduces the racial and income disparity in sealant prevalence among elementary school students."⁸

An independent Task Force on Community Preventive Services conducted a review that found strong evidence that school-associated sealant delivery programs are effective. Compared to those who did not receive sealants, those who did experienced a median decrease of 60% in dental caries.⁹ Based on evidence from their review, the task force recommended school-based or school-linked pit and fissure sealant delivery programs.

The Role of Dental Hygiene Students in School and Community-Based Preventive Programs

The many reports that document the effectiveness of collaborations of community entities and local dental or dental hygiene programs support strategies outlined in *Oral Health in America: A Report of the Surgeon General*.³ In the description of "the nature of community health programs," the primary focus is on a group in need. In the case of school-based programs, the focus is to decrease disparities in health care, particularly among low-income and minority families, and those with limited access to oral health care facilities. Typically, organizations such as government agencies, charities, schools, or religious groups "spearhead such programs, tapping into the expertise, enthusiasm, and knowledge of community values of staff and volunteers. Some programs are sponsored by national, state, and local dental societies and their members."³ This comparison of such programs begins with those using dental hygiene students as volunteers.

One such entity recognized the potential of the dental hygiene program at the University of Arkansas for Medical Sciences (UAMS) to provide much-needed preventive services to elementary schoolchildren living below the poverty level, as nearly 90% of Arkansas school children qualified for the free lunch program.¹⁰ According to DeAngelis and Warren, Children International established the Little Rock Share America Program in 1994. The program provided a variety of services to those who would be considered "at-risk" children who scored below 50% on nationwide standardized tests. Dental care was included among medical and psychological care, as were backpacks, shoes, clothes, toys, and items for personal hygiene.¹⁰

The Little Rock Share America Program sought the services of the dental hygiene program at UAMS. Because there are no dental schools in Arkansas, the dental hygiene clinic served as a site to serve underprivileged children, and the dental hygiene students provided the bulk of preventive services.¹⁰

At Lewis and Clark Community College in southwest Illinois, the dental hygiene students conducted the sealant program for the local health department. Children eligible for Medicaid or free or reduced-cost lunch programs were targeted. Six dental hygiene students, working in pairs, and a clinical dentist rotated among participating schools. The children's parents were given a list of dentists participating in Medicaid, or they were referred to the nearby dental school for any indicated treatment. The students completed a rotation evaluation form at the end of the experience (Michelle Singley, RDH, MS, personal communication, November 2003).

At the University of Missouri Kansas City (UMKC), dental hygiene students participated in the seasonal program as part of a community dental health course incorporating field experiences. Because the students participated in the sealant program as part of a course, supplies were purchased as part of that course's expenses. One faculty member accompanied students to the school sites. The students also served as the clinicians and were given course credit. One dentist screened the children, and the dental hygiene students returned to the school sites to complete the sealants. The faculty received help from a custodian in moving equipment back and forth with a van provided by the university. Students completed a self-reflection form and the faculty conducted a group discussion at the end of the semester to talk about the process (Bonnie Branson, RDH, PhD, personal communication, November 2003).

Finally, the Indiana University (IU) School of Dentistry sealant program, SEAL INDIANA, operated out of a mobile unit that was funded by the Indiana State Department of Health. The long-term goal of the program was to provide a service-learning opportunity for the dental students, while also improving access to oral health care in areas of the state most in need.¹¹ Karen Yoder, RDH, PhD, director of community dentistry at IU and co-director of SEAL INDIANA, said

that "dental hygiene students from the IU South Bend campus volunteered for services when the mobile clinic visited Goshen [Indiana] ... The students gave the Seal Mobile rave reviews [and] they found it to be a good experience."¹¹

Description of the Program

Brief History of the Illinois Dental Sealant Grant Program

The Illinois Dental Sealant Grant Program (DSGP) began in 1987. According to the Illinois Department of Public Health (IDPH), the state dental director at that time wanted to create a statewide, school-based sealant program to decrease the rate of dental caries occurring in children of low socioeconomic status by increasing the use of dental sealants by this population. To date, the DSGP has served more than 181,000 children. In 2001 alone, more than 50,000 dental sealants were placed on the teeth of more than 21,000 children.¹²

The IDPH secured funds from the Maternal and Child Health Preventive Block Grant that allowed county health departments and communities to compete for available money to purchase portable equipment and provide dental examinations and sealants for children eligible for Medicaid and free or reduced-cost school lunch programs.¹³ The DSGP specifically targeted children in the second and sixth grades, which the program suggests is the most efficient way to seal as many first and second molars as possible after eruption. At the time of this report, there were 61 grantees providing services in their respective communities throughout the state.¹² The grantees were reimbursed for services at the current Medicaid rates.

Significance of the Dental Sealant Grant Program at Southern Illinois University in Carbondale, Illinois

The Southern Illinois University in Carbondale (SIUC) Dental Hygiene Program endeavored to do its part in assisting IDPH in meeting objectives stated in the oral health section of *Healthy People 2010*,⁵ in addition to the policies and recommendations in *The Illinois Oral Health Plan and the Community Oral Health Infrastructure Development Project* (IOHP),¹⁴ and *Oral Health in America: A Report of the Surgeon General*.³

In FY 2000-2001, grant funds were provided by the IDPH Division of Oral Health (DOH) to initially purchase portable equipment to deliver preventive services (i.e., exams, sealants, and oral hygiene education) to second-grade and sixth-grade children who qualified for Medicaid and/or free and reduced-cost school lunch programs. These children were targeted according to the typical eruption sequence of the six-year and 12-year permanent molars and because they represented the population who would be the most at-risk or susceptible to dental caries with respect to socioeconomic status. The DSGP at SIUC was unique in that, within the state, it was the only grantee that was sponsored by a dental hygiene program. Therefore, dental hygiene students were the primary clinicians placing the sealants.

One of the policy goals of the IOHP was to "increase the number and types of community-based experiences that benefit both communities and students of dentistry and dental hygiene."¹⁴ Grant funds were initially provided to purchase portable equipment, and remaining and subsequent funding was used for preventive dental hygiene services, including dental examinations, pit and fissure sealants, and oral hygiene instruction.

Although the DSGP specifically targeted second-grade and sixth-grade students eligible for Medicaid and/or enrolled in the free and reduced-cost school lunch program, students in other grades, as well as children who had a third-party payment provider, were eligible to participate. In other words, no child returning a permission slip was turned away. In addition to the first and second molars being treated, premolars were also sealed wherever indicated. Traditionally, children were treated in the school setting during the academic year. More recently, however, children were examined and treated through a church-sponsored summer lunch program and during Vacation Bible School activities.

In addition to providing services to meet the *Healthy People 2010* oral health objectives, the DSGP attempted to increase access to preventive oral health services among low-income children, a goal consistent with the surgeon general's report. Not only did the grant allow the dental hygiene program to be the sponsoring agency, but it also provided a viable

service-learning opportunity for the dental hygiene students and allowed them to see firsthand some of the potential barriers to frequent oral health care visits.

Dental hygiene students volunteered to participate in the service-learning activity and to obtain credit either in a rural health or community oral health course, or as clinic requirements. Senior dental hygiene students were assigned to the DSGP as one of several rotations in a multicultural course as part of the curriculum. A short form was developed by the junior clinic supervisor to use at the sites to monitor the number and quality of dental sealants placed by dental hygiene students. Faculty, who used the same competency criteria as in the dental hygiene clinic, evaluated sealant quality at the completion of each to ensure its retention, and that the sealant was free of voids. Each patient's sealants were also evaluated for possible occlusal interferences.

In the spring of 2003, a graduate student who was also a licensed dental hygienist participated on site and helped with grant management. In the previous two years of the program, a full-time dentist on faculty had integrated the sealant program into his clinic-teaching schedule. This proved to be a positive aspect of the program, in that time spent recruiting dentists became non-problematic. Before this arrangement, the legal requirement of a dentist to be physically present during treatment had posed difficulties. Further, the dentist had good rapport with the students and faculty. The dental hygiene students were comfortable with the dentist, which helped to alleviate stress in some students with little experience with youngsters. In addition, two other dental hygiene faculty members incorporated this activity as a community service component of their three-pronged research, scholarly activities, and service requirements for tenure and promotion.

Although having one half-day set aside for this activity helped in scheduling the schools and the dental hygiene students, it was somewhat of a hindrance, mainly because of the restrictive supervision laws for dental hygiene practice that required a dentist to be present during treatment. As of August 2004, however, dental hygienists may practice under the general, rather than direct, supervision of a dentist, thus allowing the potential expansion of hours at the school sites. This supervision change has already led to an increase in the number of children examined and dental sealants placed.

Most recently, one dental hygiene student managed the program over two academic semesters via independent study with a dental hygiene faculty member. As part of the requirements for earned credit hours, the student created and maintained a procedure manual, managed dental hygiene students at the school sites, prepared the necessary paperwork for monthly state reports, gathered equipment and supplies to facilitate transport to the sites, created a program photo scrapbook, and established a patient database (Table I). In a reflective essay of her experiences, the student offered helpful suggestions for improvement, such as organizing the required paperwork for state reports in a more user-friendly manner and establishing a better system of storing equipment and supplies. The student also indicated that she felt more confident to work with public health-related programs upon her graduation in May 2004.

Table I. Sample Demographic and Clinical Database Sheet*

‡Record#	•Race	Age/YOB	Gender	Exam	Gde	ME	F/RL	#DPT	#FPT	#SPT	#ddt	#fdt	#sdt	†New Sealant
1-01	AA	1988	M	Y	6	N	Y	0	4	2	0	0	0	0
2-01	A	1989	F	Y	6	N	Y	0	0	0	1	0	0	5
3-01	C	1988	F	Y	6	N	Y	0	0	0	0	0	0	8

*Additional database includes patients' names to track multiple encounters, and names for retention checks.

‡Records were number sequentially, followed by the year the child was examined.

†= Sealants placed on treatment day

YOB = Year of birth

Gde= Grade in school

ME= Medicaid Eligible

F/RL = Free/Reduced Lunch

DPT = Decayed Permanent Teeth

FPT= Filled Permanent Teeth

SPT= Sealed Permanent Teeth

ddt= decayed deciduous teeth

fdt= filled deciduous teeth

sdt=sealed deciduous teeth

•Race was coded: A=Asian; AA=African American; H=Hispanic; C=Caucasian; BNH=Black, Non-Hispanic; AI=American Indian; AN=Alaska Native; O=Other

Initially, junior and senior dental hygiene students were given the opportunity to volunteer to participate in the DSGP as their class schedules permitted, and approximately 24 students volunteered. Generally, two students per portable unit, of which there were two, worked together for efficiency, incorporating the concept of four-handed dentistry. More importantly, students had the opportunity to apply skills learned in the dental hygiene clinic directly to providing much-appreciated services to a population in need.

The students also gained practical experience working with young children. During on-campus scheduled clinic hours, the students primarily treated adults because normal clinic hours often conflicted with school schedules.

Offering the management of the DSGP as an independent study experience continued for the fall 2004 and spring 2005 semesters. The dental hygiene students were each given four hours of college credit for the independent study, and they gained real-world experience as an added benefit. The students continued maintenance of the tasks previously mentioned, ordering supplies for the program, and expanding the database to include information from dental examinations as it related to the level of care indicated (i.e., "routine," "preventive," and "urgent," or "no treatment required") based on the choices from the forms used in the program (Table II). The data were later analyzed to determine if the need (decrease in incidence of decay) was being met.

Table II. Levels of Dental Status of Patient

- Urgent: abscess formation, nerve exposure, advanced disease state including handicapped individuals
- Routine dental care needed: alloys, composites, stainless steel crowns, etc.
- Preventive dentistry only needed: prophylaxis, fluoride treatment, sealants, etc.
- No treatment required
- Other (space is allowed to indicate other options)

Note: the form also contains areas to note pathology on the hard or soft tissues, malocclusion, and whether or not the child will need orthodontic intervention.

Some of the positive aspects of the dental hygiene-sponsored dental sealant program were: 1) the dental hygiene students represented the main human resource; 2) the supervising dentist was the primary Medicaid provider and member of the dental hygiene faculty; 3) the dental hygiene faculty participated actively as site coordinators and clinicians and, 4) dental hygiene students were (initially) given the opportunity to volunteer for the program as a service-learning option. Other positive aspects were that the DSGP reported directly to Doral Dental Services, which provided reimbursements for the state and was separate from the on-campus public aid clinic that provided services for adults and children, also sponsored by the SIUC Dental Hygiene Program.¹⁵ In addition to the DSGP, the students in the dental hygiene program also staffed the Community Dental Center (CDC). The CDC (formerly the SIUC Heartland Dental Clinic) served as a place to refer children who were Medicaid-eligible and required additional dental treatment, based upon the data collected relative to the levels of dental status of children seen in the DSGP. Because the supervising dentist in the DSGP was also one of three providers with the CDC, some continuity of care was expected.

Conclusion

Today's dental hygiene students are in a great position to learn about the opportunities available to them in public health. They have the opportunity to be participants in programs that benefit the community by offering skills they learn while in school. In order to foster the desire within dental hygiene students to work with underserved populations and to be a solution to access-to-care issues, it is recommended that dental hygiene program administrators and faculty teach students to:

Maintain relationships with their state and local health departments.

Be familiar with ever-changing trends that affect national health care.

Be knowledgeable about their particular states' dental practice acts.

Stay abreast of legislation that may change the nature of dental hygiene practice.

Keep an open mind about advancing the practice of dental hygiene with expanded functions.

Remain aware of the specific health needs within their own communities.

Be prepared to be a spokesperson or advocate for the support of programs designed to decrease the disparities in overall health care, including oral health care.

Volunteer their time and services to local schools by offering to deliver oral health education programs to increase the public's oral health IQ.

Upon graduation from an accredited dental hygiene program, secure and sustain membership in professional associations or organizations as well as local groups that provide networking with other like-minded individuals.

With more states relaxing practice restrictions as they relate to the utilization of dental hygienists, this valuable oral health professional will become a greater asset as the nation prepares to face access to oral health care head-on. Therefore, it is imperative that dental hygiene students be taught to meet the challenges that await them while they are still in school.

Acknowledgements

Notes

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