

COST ANALYSIS OF THE MILES OF SMILES PROGRAM, A SCHOOL-BASED
PREVENTIVE ORAL HEALTH PROGRAM

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by
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University of Missouri-Kansas City, 2011

ABSTRACT

The purpose of this study was to provide a cost analysis of the Miles of Smiles Program, a collaboration between the University of Missouri-Kansas City (UMKC) School of Dentistry and the Olathe School District. This preventive program was implemented to address the access to oral health care issues that affect low income children within the school district. The analysis of the program utilized an inventory list and an existing de-identified database to determine the costs associated with operating the program throughout the 2008-2009 school term. Costs related to equipment, supplies, and personnel were included. The results of the analysis revealed that the cost of operating the program during 2008-2009 was \$107,515.74. The program received Medicaid reimbursement for approximately 1.5% of the total cost of operating the program and approximately 6.3% of the amount produced through billable services; however, challenges with submitting and billing Medicaid claims for the first time contributed to this low percentage of reimbursement. It was determined that for the program to be sustainable, continuous external sources of funding or a change in the program design would be necessary.

The faculty listed below, appointed by the Dean of the University of Missouri-Kansas City School of Dentistry, have examined a thesis titled “Cost Analysis of the Miles of Smiles Program, A School-based Preventive Oral Health Program,” presented by Kylie J. Siruta, candidate for the Master of Science in Dental Hygiene Education degree, and certify that in their opinion, it is worthy of acceptance.

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CONTENTS

ABSTRACT	iii
LIST OF TABLES	vii
ACKNOWLEDGEMENTS	viii
Chapter	
1. INTRODUCTION	1
Access to Care and Disparity Issues	2
Strategies to Address Access and Disparity Issues in Oral Healthcare	4
The Miles of Smiles Program	13
Theoretical Framework	14
Research Questions	15
2. MATERIALS AND METHODS	16
Data Sources	16
Data Collection	16
Inputs	18
3. RESULTS	20
Participants	20
Operating Costs	20
Capital Expenditures	20
Variable Expenditures	21
Personnel	22
Total Direct and Indirect Costs	22
Medicaid Reimbursement for Services Provided	23

Comparison to Programs Staffed by Paid Dental Professionals	24
4. DISCUSSION	29
Addressing Access to Care Issues.....	29
Sustainability.....	29
Implementation of Similar School-Based Program	32
Limitations	32
Directions for Future Research	35
5. CONCLUSION.....	37
LITERATURE CITED	38
Appendix	
A. Table 1	43
B. Table 2	44
C. Table 3	46
D. Table 4	47
E. Table 5	48
F. Table 6	49
VITAE	

TABLES

Table	Page
1. Demographic Information of 2008-2009 Miles of Smiles Program Participants	43
2. Capital Expenditures	44
3. Standard Cost Profiles for Billable Procedures	46
4. Cost of Supplies Used in Multi-Procedure Encounters	47
5. Total Cost of Operating the Program During the 2008-2009 Term.....	48
6. Comparison of Costs for Miles of Smiles to a Program Staffed by an Extended Care Permit Registered Dental Hygienist.....	49

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CHAPTER 1

INTRODUCTION

The most serious issue facing health care today, including oral health care, is providing care for an increasing population of unserved, underserved, and uninsured patients who lack access to oral health care and face rising health care costs (Haden et al. 2006). Dental care has recently been recognized as the most prevalent unmet health need for children in the United States. While not often in the spotlight, millions of American adults and children lack access to preventive, routine dental care (Lake Research Partners 2011; Mouradian et al. 2000). By not addressing the challenges that underserved and vulnerable populations encounter when trying to access oral health care, the amount of oral disease these populations experience will continue to increase (Institute of Medicine and National Research Council 2011). Likewise, the costs and impacts of health disparities place complex economic burdens on the nation (Dankwa-Mullan et al. 2010).

In response to the reported access issues in oral healthcare, the Surgeon General released the first ever report on oral health in 2000 focusing national attention on the disparity and access problems in dentistry (Oral Health in America: A Report of the Surgeon General 2000). Since then, several studies and subsequent reports have documented access disparities (Lake et al. 2011; Haden et al. 2006; Mouradian et al. 2000; Yu et al. 2002); professional and advocacy groups have proposed that action be taken to provide solutions (American Dental Education Association President's Commission 2005); legislative proposals have been introduced (National Institutes of Health, National Institutes of Dental and Craniofacial Research 2003); and pilot and demonstration programs have been

implemented (Lake et al. 2011; Simmer-Beck et al. 2011; Apple Tree Dental 2009; Bailit et al., 2008; Niederman et al. 2008; Byck et al. 2006).

Access to Care and Disparity Issues

Eliminating health disparities remains a monumental challenge. Creating and sustaining health outcomes for vulnerable populations demands community engagement, cross-disciplinary research, modern infrastructure, and visionary policies (Dankwa-Mullan et al. 2010). Providing access to oral health care continues to be most challenging for specific populations, especially low income and minority children (Gehshan and Straw 2002; U.S. Department of Health and Human Services-Healthy People 2010 2000). According to a 2011 survey conducted by Lake Research Partners for W.K. Kellogg Foundation, those most likely to not have a place to receive regular dental care include those with incomes less than \$30,000, who lack dental insurance, who have a high school diploma or less, or who are Latino or African American. The availability of dental insurance coverage is also a factor. When comparing the differences among children by type of insurance coverage, the results are startling. In 2008, 31% of children ages 2-18 with Medicaid had untreated dental decay compared to 18% with private insurance (United States Government Accountability Office 2008). Similarly, only 34% of children with Medicaid received annual dental visits compared to 58% of those with private insurance (U.S. Department of Health and Human Services 2007). It is suggested that a variety of factors contribute to the inadequate dental access for this high risk population such as the geographic maldistribution of clinicians, inadequate numbers of oral health professionals treating Medicaid eligible children, relatively few pediatric dentists, individuals' knowledge and attitudes concerning oral health, lack of dental insurance and benefits, and difficulties related to facing culturally-diverse

populations (Mouradian et al. 2000). Furthermore, an analysis conducted by Yu et al. (2002) suggests that being uninsured, having parents with low educational attainment, and having an overall poor health status can also act as risk factors for not obtaining the recommended care.

The current structure of dental practice further complicates access to care issues. Unlike medical care, most dental services are provided in private practices with one or two oral health care providers and are often located in metropolitan areas. According to the Surgeon General's 2000 report, only 6% of the dental need was met in 1,198 dental health professional shortage areas. Similarly, only 10% of dentists nationwide participate in Medicaid leaving several children who qualify for Medicaid benefits without a clinician to provide the needed dental care (Mouradian et al. 2000). Another notable difference between the medical and dental practice structures is the lack of independent mid-level dental providers and strict state dental supervision laws. While the medical model utilizes Nurse Practitioners and Physician Assistants as mid-level providers, dentistry is still working to integrate a similar independent provider that could expand access to preventive dental care (Beetstra et al. 2002). The findings from a national survey conducted by the Lake Research Partners (2011) revealed that 78% of the respondents say they would support the training of "licensed dental practitioners" to provide preventive, routine dental care to people without regular access to care. Forms of this model have recently been implemented in both Alaska and Minnesota. New unconventional dental providers called "dental therapists" were independently established under federal authority in Alaskan Native areas in 2003 and under state authority in Minnesota in 2009. These new primary care dental providers deliver services that were previously delivered in the U.S. only by dentists (Edelstein 2009).

Strategies to Address Access and Disparity Issues in Oral Healthcare

By drawing attention to the disparities in children's oral health and access to care issues and suggesting recommendations for action, various organizations, agencies, and other groups are charged with supporting oral health initiatives that utilize innovative measures to address the access issue. Upon reviewing evidence that indicates millions of Americans have unmet oral health needs due to barriers in access to care, the Institute of Medicine and National Research Council committee prepared the "Vision for Oral Health Care in the United States" outlining how public and private providers should address oral health care to these populations. The vision stated that "to be successful with underserved and vulnerable populations, an evidence based oral health care system will: eliminate barriers that contribute to oral health disparities; prioritize disease prevention and promotion; provide oral health services in a variety of settings; rely on a diverse and expanded array of providers competent, compensated, and authorized to provide evidence-based care; include collaborative and multidisciplinary teams working across the health care system; and foster continuous improvement and innovation (Institute of Medicine and National Research Council 2011).

The findings and conclusions from the Institute of Medicine and National Research Council's report on improving access to oral health care for vulnerable and underserved populations support the fact that no single setting of care will meet the needs or overcome the barriers of these populations (2011). For several years, researchers have suggested that alternative practice models could meet the oral health needs of target populations, demonstrating a role for both public and private sectors to get involved (Byck et al. 2005; Institute of Medicine of the National Academies 2009; Milgrom et al. 1998).

The public expects that higher education will instill its graduates with a strong sense of social responsibility (Davis et al. 2007); therefore, dental professionals should be encouraged early in their career to consider the evolving needs of society and seek opportunities to provide services outside of the traditional dental settings. A recent position paper by the American Dental Education Association (ADEA) Presidential Commission recommends seven roles and responsibilities of academic dental institutions in meeting the oral health needs of all Americans. One of these roles is “assisting in prevention, public health, and public education efforts to reduce health disparities in vulnerable populations” (American Dental Education 2006). By participating in service-learning and public health opportunities as a student, future dental professionals can develop their academic skills as well as gain exposure to the oral health needs of specific populations within their communities. It is possible that these experiences can encourage the students to make a commitment to fulfill the expectations of society by working to address these unmet needs (Aston-Brown et al. 2008; Davis et al. 2007; Gadbury-Amyot et al. 2006; Keselyak et al. 2007).

One of the capacities in which these students could serve is as care providers within safety net dental clinics. A study conducted by Aston-Brown, Branson, Gadbury-Amyot, and Bray (2008) suggests that service-learning opportunities such as these can play a role in joining academic institutions and community organizations to produce outcomes that are beneficial to both groups involved. Healthy People 2010 and Healthy People 2020, a set of health objectives released by the U.S. Department of Health and Human Services, established a goal of increasing the proportion of community health centers and local health departments that provide dental care. These safety-net dental clinics, which are often located near low-

income and underserved populations, may represent an important strategy for improving dental care for groups that face barriers.

Safety-net dental clinics are staffed by dental professionals with a specific interest in providing dental care to low-income or underserved populations. At this time, it is estimated that these clinics provide less than 5% of overall dental care in the entire nation; however, with recent calls to expand and reach more of the target population, the use of such clinics could become more prevalent. Safety-net dental clinics are often sponsored by and/or are situated in public health departments, community health centers, Indian Health Service clinics, and a variety of private not-for-profit service agencies (such as social service agencies), dental schools, dental hygiene programs, school-based clinics and mobile dental vans (Byck et al. 2005).

If these clinics are to be replicated, it is important to consider various factors that affect their operation. Byck et al. (2005) conducted a descriptive analysis of 57 Illinois safety-net dental clinics that represent the three largest identified groups of community-based clinics: health centers, health departments, and private not-for-profit agencies. The authors explored considerations such as how the clinics are organized, operated, and financed; if they provide dental care services to the targeted population groups; how they relate to dental facilities and programs in their communities; and what factors limit their productivity. The clinics treated low-income patients who were either uninsured or covered by public insurance programs and people with personal access problems. Additional resources such as language translators, transportation assistance, and social services were often provided at the facilities. Of the fifty seven clinics analyzed, 98% provided preventive dental services and 91% provided these services to children with Medicaid/State Children's Health Insurance Program

(SCHIP) coverage. The mean annual budget of all clinics (most clinics provided both restorative and preventive services) was \$182,000 with 21% of the funding provided by Medicaid, 9% from the patient's pocket, 1% from private insurance, and 5% from other sources. Therefore, only 36% of the total revenue was provided through patient fees; the remaining funding was supplied through grants (including federal grants); state, county, or school board funding; private contributions; donated dental equipment and supplies; and volunteer time from dental professionals (Byck et al. 2005).

Although the safety-net dental clinics targeted populations with the greatest need, the study estimated that they accounted for only 2% of all dental visits in the state. It suggests that the capacity and productivity of the clinics could be increased in several ways as the number of annual visits varied based upon staffing patterns, hours open, and number of operatories (Byck et al. 2005). This is supported by Albert et al. (2005) who suggest that appropriate and easily-accessible facilities, convenient hours, and full-time paid dental professionals could increase the productivity of safety-net clinics.

A proposed solution that addresses the issues related to facilities, hours, and staff includes the implementation of school-based safety-net clinics. The School-Based Safety-Net Clinic model can provide quality health care services by reducing financial, language, familial, and cultural barriers in providing care for children in the community in which they live (Guo 2010). According to the Institute of Medicine and National Research Council, school-based care systems have the potential to reduce access disparities and improve the oral health of vulnerable children by bringing oral health care to sites that are more convenient for this population (2011). Children that qualify for Medicaid or SCHIP often have difficulty accessing dental care resulting in greater prevalence of dental disease

(Mouradian et al. 2000). Given the cost-effectiveness of early oral disease prevention and the severe disparities in children's oral health status and access to care, school-based safety-net dental clinics appear to be a promising option for meeting the needs of these children. These clinics are often located in high-need schools and communities and are utilized when parents have limited financial resources or inadequate health insurance or within low-access areas such as dental health professional shortage areas (Albert et al. 2005). Oral health services in a school-based setting are often the only access to dental services a child may have since the hours of operation and location issues are no longer obstacles.

Prior to implementing a school-based dental clinic, it is important to examine the community's oral health care needs and its dental care infrastructure, including dental services available to the target population (Albert et al. 2005). Factors such as support and assistance from school and community groups, parent or community member opposition, adequate facilities and space, staff, and funding should be considered. Albert et al. (2005) reviewed several models for delivering school-based dental care. Although a variety of approaches are utilized, the model that consistently resulted in improved treatment outcomes was a "C (Collaboration) Approach," which offered additional resources by working with multiple organizations. The C model in place at Public School 8 elementary school in Washington Heights, New York includes a collaborative approach between a university (Columbia University School of Dental and Oral Surgery-CUSDOS) and a social service agency (Children's Aid Society) to respond to the population needs. The collaboration provides access to special referrals and spreads out the financial risk and burden incurred from school-based health care services (Albert 2005). Financial support was provided from a variety of sources including capital outlay from the school district, the Kellogg and Robert

Wood Johnson Foundation, the New York State Department of Health Grants, Columbia University, and the Children's Aid Society. The clinics employ full-time dentists and dental hygienists and dental students from CUSDOS who are able to obtain exposure to school-based dental services by completing rotations at the clinics.

If school based safety net clinics are to be considered an effective method for delivering preventive dental care to target populations, the issue of funding and financial support should be explored. Although grants, state, county, or school board funding, and revenue from operation are available, additional sources of income through sponsorship are often needed to support the clinics. The investigation conducted by Albert et al. (2005) looking at school-based oral healthcare programs found that in 1997 27% of the clinics were sponsored by health departments, 27% by hospitals and medical centers, 17% by community health centers, 27% by community-based organizations and private not-for-profit social service agencies, and 2% from other sources.

Existing models of sponsorship and collaboration include the Forsyth Kids program, a Massachusetts school-based caries prevention program sponsored by the Forsyth Institute. The institute developed the Forsyth Kids program to ensure that it meets national oral health goals for high risk populations (Niederman et al. 2008). The program utilizes portable equipment that is set-up in participating schools. Pediatric dentists and dental hygienists perform the services and visit the schools at least twice per year to maintain ongoing dental care (The Forsyth Institute 2011).

The Apple Tree Dental organization utilizes a mobile dentistry system that travels to patient populations with special access needs and provides a variety of dental services. Dental teams travel to one 'satellite site' each day and the staff members (usually a dentist

and two assistants) provide dental services including exams, fillings, extractions, root canals, and cleanings. The program is supported by individual donors, foundation grants, and corporate sponsors (Apple Tree Dental 2011).

Another mobile school-based dental program, the St. David's Dental Program, is a collaboration of community partners in Central Texas that provides free dental care to low-income children in schools without relying on reimbursements or government funding. A review of the program states that factors important to the program's success include sustained funding for general operating costs; well-compensated clinicians to deliver care and experienced human service workers to manage program operations; the devotion of resources to maximize consent form return rates; and the development of strong relationships with the school district and school staff (Jackson et al. 2007).

Arguments in favor of clinics that offer preventive dental care to populations in greatest need are often supported by comparisons between estimated costs of the preventive procedures and the costs of restoring (through fillings) the tooth surfaces that would have otherwise been affected by decay. These are not new issues as illustrated by research conducted in the 1980's, The National Preventive Dentistry Demonstration Program. This program reviewed by Klein et al. (1985) tested the hypothesis that the cost of school-based preventive dental care is minimal, especially in comparison to the costs of restoring the surfaces that would have become decayed if preventive care had not been provided. The variables used in the cost analysis included labor, capital, and materials. For labor, all members of the team were asked to indicate how they spent each 30-minute interval of time each work day. The capital cost was calculated by allocating costs to certain procedures and then to regimens in proportion to their use of the equipment. Finally, the consumable

supplies utilized during each of the preventive procedures or regimens were calculated and then reported in proportion to the number of children that received services (Klein et al. 1985). Treatment costs were calculated for school years two and three (to eliminate biases associated with start-up or close-down activities), but the authors report that the cost-effectiveness could not be calculated because of an overall decline in caries rate – even in those students that did not participate in the school-based dental program. The authors suggest that future research should include variables such as the cost of identifying high-risk children, the relative effectiveness of preventive procedures for high-risk versus typical-risk children, and the difficulties of reaching the target children during the school day if similar studies are to be replicated in the future (Klein et al. 1985). It was further suggested that another factor worth further exploring is the personnel necessary to staff school-based safety-net dental clinics. As stated previously, most dentists are in private practice settings and often localized in metropolitan areas. Programs reviewed by Albert et al. (2005) report utilizing volunteers such as parents, teachers/principals, and school nurses that are trained to administer fluoride rinses and tablets. However, those volunteers are not able to provide all the necessary services. Therefore, for dental health professional shortage areas, Mouradian et al. (2000) suggest better use of allied dental professionals to provide preventive care. The American Dental Hygienists' Association (2011) recognizes the unmet needs of special populations such as low-income children and therefore advocates the use of dental hygienists in public health programming. As the dental hygiene scope of practice increases with changes to supervision requirements, underserved populations may benefit from services provided by dental hygienists. An example is a bill passed in Kansas in 2003 that allows dental hygienists to earn an Extended Care Permit (ECP) to provide services in community

settings under the sponsorship of a dentist. This permit allows the ECP Kansas hygienists to offer a wide range of services prescribed by law such as prophylaxis, fluoride varnish applications, oral hygiene instructions, assessment of the patient's need for further treatment by a dentist, and other duties delegated by the sponsoring dentist which are in compliance with the laws governing dental care in Kansas (Kansas Dental Practice Act 2010).

School-based safety-net dental clinics utilizing an expanded scope of practice dental hygienist such as an ECP dental hygienist and current dental and dental hygiene students appear to be a promising solution to address access to care issues related to personnel and financial issues. However, if these clinics are going to be sustainable and replicable, additional financial support from an external source may be necessary to maintain program viability. As stated previously, a minimal amount of funding is gained through the operation of the clinic since reimbursement for Medicaid and SCHIPs covers approximately 20% of services rendered and patient revenue only accounts for about 36% of the total expenses (Byck et al. 2005). Therefore, the solutions proposed by Byck et al. (2005) such as remaining open for expanded hours and over the summer; providing services to younger siblings of children enrolled; offering the clinic services to Head Start children and neighboring schools/organizations; utilizing dental and dental hygiene students completing service-learning rotations to provide services; and ensuring that adequate links exist for referrals could all play a role in the success of these school-based dental clinics. By incorporating components of various models of school-based safety-net dental clinics, dental professionals at all levels have an opportunity to help alleviate access to care issues that affect many children on a daily basis (Byck et al. 2005).

The Miles of Smiles Program

Miles of Smiles is a collaborative program between the University of Missouri-Kansas City (UMKC) School of Dentistry, the Olathe School District (located in Olathe, Kansas – a suburb of Kansas City), the REACH Healthcare Foundation, and an Extended Care Permit I dental hygienist working together to provide comprehensive preventive oral health services to disadvantaged children in four schools with a high population of low income children using the community collaborative practice oral health model and teledentistry (Simmer-Beck et al. 2011, Keselyak et al. 2011). The program was designed and implemented to offer access to oral healthcare services to disadvantaged children, one of the high-risk populations discussed in the U.S. Surgeon General’s “National Call to Action to Promote Oral Health” and Healthy People 2010. Through participation in the Miles of Smiles program, low income children in four schools in the Olathe School District receive comprehensive preventive oral health services (prophylaxis, radiographs, fluoride varnish, sealants, oral health education, and nutritional counseling) on-site at the children’s schools during regular school hours. The oral health services are provided two days per week by senior dental hygiene students enrolled at the UMKC School of Dentistry and are supervised by a UMKC SOD faculty member who currently holds a Kansas dental hygiene license and an Extended Care Permit (ECP) I. The ECP dental hygiene faculty member serves as the Project Manager on the Miles of Smiles project.

During the first year of the program, 389 students were enrolled and services were provided to 339 of them. Of the 389 students enrolled, 55% ranged in age from 9-14 years old, 42% were within the 6-8 year age range, and 1% were five years old or younger. The age of the remaining participants was unknown. There were more males (55%) enrolled

compared to females (45%). Approximately half of the students enrolled were Hispanic (50%), 30% were Caucasian, 13% were African-American, and 5% were Asian. Since several of the participants and/or parents primarily spoke Spanish, all written materials for the program were available in both Spanish and English.

The portable equipment and supplies utilized were either donated by dental supply companies or purchased using funding provided through a grant from the REACH Healthcare Foundation, the National Children's Oral Health Foundation and the American Dental Hygienists' Association (ADHA). To document patient information and the dental services rendered, the Computer Management System (CMS) utilized in the general clinic at the UMKC School of Dentistry was modified and made accessible on the laptop computers utilized at the sites. In addition, the data was transferred to a data base to further track and report service utilization by the participants.

This pilot study will entail cost analysis of this Miles of Smiles school-based preventive program that was implemented to address the access to oral health care issues that affect low income children within the school district. Although it appears to meet the availability and accessibility needs of a population who likely does not have adequate access to dental care, one must consider the cost for the long-term operation of the program. By conducting a thorough economic analysis, the researcher can determine whether the program is sustainable or if additional resources will be necessary for the program to continue long-term.

Theoretical Framework

The theoretical model that will frame and inform this research is Ronald Andersen's Behavioral Model of Health Services Utilization. The model suggests that people's use of

health services is a function of three factors: predisposing characteristics, enabling resources, and need for care (Andersen 1968). This particular study will focus on the ‘enabling resources’ component of the model. Andersen defines enabling resources in terms of both community and personal resources. This factor was chosen to assist in framing and informing this research because the pilot program being examined was developed to address problems with the resources available to a population of high risk children. According to the model, both community and personal resources must be present for use of health services to occur (Andersen 1995). Challenges within the community resources include having health personnel and facilities available where people live and/or work, whereas challenges within the personal resources include having the means and knowledge necessary to get to and utilize those health services (Andersen 1995). The Miles of Smiles school-based preventive oral health program provides an innovative method of addressing both community and personal issues by bringing the dental services to high risk children in their schools, eliminating difficulties that often present barriers to receiving dental care such as transportation, time, income, and insurance coverage.

Research Questions

This study is based on the analysis of costs associated with starting and maintaining the Miles of Smiles program. The following research questions guided the analysis: (1) What are the costs of operating the program? (2) How does the cost of operating the program compare to the amount of Medicaid reimbursement received for the services that were provided? (3) What would a similar program cost if staffed by paid dental professionals only?

CHAPTER 2

MATERIALS AND METHODS

Data Sources

Data related to the number of procedures performed and services provided in the Miles of Smiles program during the 2008-2009 school term were obtained from an existing database. The database was previously created by extracting de-identified information from the patients' treatment records.

Data Collection

To begin the analysis of the direct costs associated with starting and maintaining the Miles of Smiles program, with a list of the equipment and supplies necessary to run the program were obtained from the Miles of Smiles Program Manager. The items on the list were separated into two categories: capital expenditures and operating expenditures. The prices of all items listed as capital expenditures (including portable equipment, dental hygiene instruments, technology for teledentistry, etc.) were obtained by contacting sales representatives of local dental supply companies. It was assumed that, unless otherwise noted, all durable equipment and instruments have useful lives of five years and will be depreciated over the same period using the straight-line depreciation method. The costs associated with the operating expenditures (including purchasing disposable supplies and dental materials) were also obtained from a local dental supply company.

The researcher observed the daily operation of the program for three days and consulted with the Project Manager to determine the average quantities of disposable supplies and materials needed for each procedure. This information was utilized to prepare standard cost profiles of the operating expenses associated with each billable service

provided (Prophylaxis, Sealants, Fluoride Varnish, Bitewing Radiographs, and Periapical Radiographs). The standard cost profiles provided a total supply cost of each procedure by multiplying the quantity of each item needed by the price per unit amount. The total supply cost of each encounter was then calculated by multiplying the number of units of each type of service delivered by the corresponding cost profile. To account for costs associated with personnel for the program, the salary and benefits for the Program Manager/ECP I Dental Hygienist was determined. The Program Manager is currently contracted for 182 days per year; four days per week during the academic year and additional days throughout the summer term for data management. To convert this salary to an hourly rate, the sum of the annual salary and benefits was divided by 1,456 (182 days/year x 8 hours/day). The benefits were determined using the customary formula of 35% of the annual salary (UMKC Office of Research Services 2010). Since the design of the Miles of Smiles Program utilizes supervised senior dental hygiene students to provide the services as part of their service-learning curriculum, the cost associated with the Program Manager's salary and benefits is the only direct personnel cost for this program.

Although an ECP I Dental Hygienist must carry his/her own professional liability insurance in the state of Kansas (Kansas Dental Practice Act 2010), the Program Manager is classified as a full-time clinical instructor at the University of Missouri-Kansas City School of Dentistry and is therefore covered under the institution's liability insurance policy. As a result, the annual fee for a liability insurance policy was not considered an expense for this program's operation. The standard Facilities and Administration rate of 50% was added to fully account for indirect operating costs. The indirect operating cost rates are based on the policies of the UMKC Office of Research Services (UMKC Office of Research Services

2010). Such indirect operating costs include expenses such as utilities associated with operating the program, storage for the equipment and supplies, transportation of equipment to the various school-based sites, and data management for statistical purposes and Medicaid reimbursement. Personnel within the Patient Accounts office at the University of Missouri-Kansas City School of Dentistry assisted with the program by submitting and processing all Medicaid claims associated with patients that were treated as part of the program.

Inputs

The fixed costs associated with the program were determined by adding together the individual costs for each item listed as capital expenditures – including portable equipment, dental hygiene instruments, technology expenses for teledentistry, and other miscellaneous supplies. Since it is assumed that all equipment has a useful life of at least five years, the purchase price of each item was divided by five to obtain the cost for the 2008-2009 school term. The dental hygiene instruments (including mirrors, explorers, scalers, curets, and ultrasonic tips) were the exception as their useful life is only one year. In this case, the full purchase price for each instrument was included in the calculations.

The sum of all variable costs and fixed costs discussed above represented the total annual direct costs associated with operating the program. This total was then multiplied by 50% (the Facilities and Administration rate) to obtain a figure that accounted for all indirect costs. Indirect costs of the program include time and labor associated with submitting Medicaid claims, moving the portable equipment between sites and setting up the operatories and technology at each school, working with the school nurses to obtain eligibility verification, enrollment forms, and medical history information, and follow-up for children that needed referrals.

The totals were utilized in data analysis to answer the proposed research questions: (1) What are the costs of operating the program? (2) How does this cost compare to the amount of Medicaid reimbursement received for the services provided? (3) What would a similar program cost if staffed by paid dental professionals only? The amount of Medicaid reimbursement received for each patient encounter was also documented in the de-identified database by the Program Manager and was utilized to make the comparisons discussed in the second research question. In addition, the average hourly salary of dental hygienists in the state of Kansas was obtained from the Bureau of Labor Statistics to compare the cost of this program to a similar program staffed by dental professionals only. The results of these calculations and comparisons will be discussed by the researcher in the Results and Discussion sections below.

CHAPTER 3

RESULTS

Participants

During the 2008-2009 school term, the Miles of Smiles program provided dental hygiene services to 339 of the 389 children who were enrolled. The services were provided by senior dental hygiene students who were supervised by an ECP-I dental hygienist that also served as a clinical instructor for the students. The Miles of Smiles clinic was in operation two days per week during the school year. The demographic information for the participants was documented (Table 1). A majority of the children ranged in age from 0-14 years, with 55% in the 9-14 year age range. Approximately 55% were male, while 45% were female and nearly 50% of the children were Hispanic.

Operating Costs

Research Question 1 – What are the costs of operating the Miles of Smiles program in 2008-2009?

Capital Expenditures

The Capital Expenditures for the 2008-2009 school year were determined by utilizing the inventory list provided by the Miles of Smiles Program Manager. The retail price listed for each of these items was provided by local sales representatives of dental supply companies. The sum of all Capital Expenditures for the program totaled \$86,356.75. To account for the life expectancy of the equipment and instruments, the individual prices were divided by the number of years it was expected to last. All equipment has a life expectancy of at least five years, so all totals were divided by five. Based on the amount of use, the dental hygiene instruments were expected to last approximately one year; therefore, the

entire purchase price of all instruments was included in the calculation. The sum of these prices totaled \$19,990.61. This figure represents the total Capital Expenditures for the Miles of Smiles Program for the 2008-2009 term (Table 2).

Although a majority of the equipment was purchased, the portable operatories, portable chairs, and most of the instruments were donated by local dental supply companies. The source of all equipment and instruments is included in the inventory list provided in Table 2. Of the \$19,990.61 in Capital Expenditures, \$5,609.05 was donated to the program. Therefore, a total of \$14,381.56 was spent to obtain all necessary equipment and instruments to operate the program in 2008-2009.

Variable Expenditures

The operating expenditures were determined using expenses related to supplies utilized during each billable service, personnel to operate the program, and a Facilities and Administration fee to account for the indirect operating costs. Standard cost profiles for each billable procedure were prepared by indicating the quantity of all disposable supplies utilized and multiplying that by the price per item fee provided by local dental supply companies. These individual amounts were added together to prepare a total cost profile (Table 3). Since most patient encounters were considered multi-procedure encounters (a prophylaxis was performed in addition to other services), the expenses associated with the sterilization bags and infection control barrier wraps were assigned to the Child Prophylaxis procedure. There were three patient encounters in 2008-2009 that did not include a Prophylaxis, in which the child received Oral Hygiene Instruction only. For these three encounters, a fee of \$2.59 was assigned to the procedure to cover the expense of the toothbrush, toothpaste sample, floss, toothbrushing timer, and take-home bag that were distributed.

As stated previously, a majority of the patient encounters were multi-procedure encounters. Therefore, the individual standard cost profiles were later combined to represent the expense of supplies for the entire encounter. The quantity of each of these categories of multi-procedure encounters was determined using the results recorded in the database. The quantity of each multi-procedure encounter performed was then multiplied by the Cost Per Encounter to equal a total cost associated with disposable supplies (Table 4).

Personnel

Since the dental hygiene services were provided primarily by senior dental hygiene students; the only operating expenditures incurred for personnel included the salary and benefits for the Program Manager (a Registered Dental Hygienist with a Kansas Extended Care Permit I). As stated previously, the Patient Accounts office personnel at the University of Missouri-Kansas City School of Dentistry completed the Medicaid billing and processing. The business office personnel reported spending approximately eight hours per month on filing and processing the Miles of Smiles claims; therefore, this minimal cost was accounted for within the Facilities and Administration rate of indirect costs.

The annual salary of the Miles of Smiles Program Manager was \$38,240 and the benefits package was valued at \$9150.00 totaling \$47,390. Since the Program Manager is contracted for 182 days per year and eight hours per day (1,456 hours), her hourly rate was calculated at \$32.55.

Total Direct and Indirect Costs

To determine the total direct costs associated with operating the Miles of Smiles Program during the 2008-2009 school term, the sum of the individual totals of the Capital Expenditures, Variable Expenditures, and Personnel Expenditures was calculated. The

Capital Expenditures totaled \$19,990.61, the Variable Expenditures (expenses associated with the disposable supplies and materials that were utilized during each patient encounter) totaled \$4,296.55, and the Personnel Expenditures (expenses associated with the salary and benefits of the Program Manager/ECP I Dental Hygienist) totaled \$47,390.00. The sum of these three figures totaled \$71,677.16 (Table 5).

Upon determining the Total Direct Costs, the total was then multiplied by 50% to account for the standard facilities and administration rate and therefore calculate the total Indirect Costs associated with operating the program. The Total Indirect Costs for the 2008-2009 term was \$35,838.58 (Table 5).

The Total Cost associated with operating the Miles of Smiles Program during the 2008-2009 school term was \$107,515.74. This was determined by adding together the Total Direct Costs and the Total Indirect Costs (Table 5). This figure represents the answer to research question (1) What are the costs associated with operating the program?

Medicaid Reimbursement for Services Provided

Research Question 2 – How does the cost of the program compare to the amount of Medicaid reimbursement received for the services provided?

The Miles of Smiles Program provides services to children that qualify for Free and Reduces Lunches and/or qualify for Medicaid coverage. The children are not charged for the procedures that are performed; therefore, the only form of reimbursement for services is by filing Medicaid claims for those children that have coverage. Per the Kansas Medical Assistance Program website, the maximum amount of reimbursement for billable dental hygiene services is as follows: D1120 Child Prophylaxis - \$30.00; D1203 Topical Fluoride Treatment - \$17.00; D0272 Two Bitewings - \$20.00; D1351 – Sealant (per tooth) - \$24.92

(Kansas Medical Assistance Program 2011). No reimbursement is provided for Oral Hygiene Instruction/Patient Education. Of the 339 children that participated in the program, 144 (42.5%) qualified for Medicaid reimbursement. The total amount that was reimbursed during the Fall 2008 semester was \$130.00 and the amount reimbursed during the Spring 2009 semester was \$1,488.00 totaling \$1,618.00 for the entire academic year. Of the \$107,515.74 that represents the total cost of operating the program during the 2008-2009 year, the \$1,618.00 from Medicaid payments reimburses only 1.5% of those total costs. This figure represents the answer to research question (2) How does this cost compare to the amount of Medicaid reimbursement received for the services provided?

Comparison to Programs Staffed by Paid Dental Professionals

Research Question 3 – What would a similar program cost if staffed by paid dental professionals rather than supervised dental hygiene students?

If a similar program were developed that would be staffed by paid dental professionals rather than supervised dental hygiene students, the two primary differences in the costs associated with the programs relate to variations in salaries/wages and in the time it takes to perform the procedures. It is likely that expenses related to equipment and supplies will not vary significantly.

The Miles of Smiles Program currently utilizes supervised dental hygiene students that are not compensated for providing the dental hygiene procedures. The only personnel expense is the annual salary of the Miles of Smiles Program Manager. The Program Manager is an Extended Care Permit Hygienists that also serves as a faculty member for the students. As an employee of the University of Missouri-Kansas City, she is paid an annual salary of \$38,240.00 and is provided with a benefits package valued at \$9,150.00. She and

the students are covered under the University's Liability Insurance policy and therefore no additional fees associated with insurance are included.

To determine the costs associated with employing a paid Extended Care Permit I Registered Dental Hygienist, the hourly salary provided by the Bureau of Labor Statistics website was utilized. For the state of Kansas, the mean hourly salary for a Registered Dental Hygienist is \$30.92 (Bureau of Labor Statistics 2011). Assuming that the Registered Dental Hygienist works the standard 2,000 hours per year, his/her annual salary would be \$61,840.00 and the total benefits package would equal \$21,644.00 using the customary 35% rate (University of Missouri-Kansas City Office of Research Studies 2010). This suggests that an additional \$10.82 should be added to the hourly wages to account for benefits as well (\$41.74).

Since the program does not operate 2,000 hours per year, the Program Manager's 1,456 hour (182 contracted days multiplied by eight hours per day) contract plus additional time for administrative duties was used for this calculation. It was estimated that approximately eight hours per week would be spent performing tasks such as billing and processing Medicaid claims, moving and setting up equipment at various sites, performing maintenance and upkeep on the equipment and supplies, ordering additional supplies, working collaboratively with the school nurse to obtain and review enrollment forms and medical history information, and providing follow-up for children that need referrals for restorative treatment. These were considered indirect costs of the Miles of Smiles Program as additional UMKC School of Dentistry personnel were available to assist with some of these duties. Since the program provided services approximately 30 weeks during the 2008-2009 school year, an additional 240 hours (30 hours multiplied by eight hours per week) was

added to account for administrative duties. Therefore, a paid hygienist would likely spend approximately 1,696 hours per year either providing services or performing administrative tasks for the program. This suggests that \$70,791.04 (\$41.74 multiplied by 1,696 hours) should be allocated for salary and benefits if a paid Dental Hygienist provided services for a program in operation the same amount of hours as the Miles of Smiles Program. This figure is \$23,401.04 higher than the \$47,390.00 that is allocated for salary/benefits for the Miles of Smiles Program Manager and unpaid dental hygiene students (Table 6).

In addition, all Extended Care Permit I Dental Hygienists are required to carry a Professional Liability Insurance policy. Since the Miles of Smiles Program Manager was also a University of Missouri-Kansas City faculty member, she was covered under the University's policy. If the program were staffed by a paid dental hygienist, he/she would need an individual policy. Although a variety of liability insurance policies exist, the cost of the policy sponsored by the American Dental Hygienists' Association was used for the calculation. The annual policy is \$77 (American Dental Hygienists' Association 2011); therefore, an additional \$77 was added to the personnel costs for a program staffed by a paid dental hygienist (Table 6).

When services were provided by students in the Miles of Smiles Program, the time required to complete the services was documented in 15-minute increments. A review of the data demonstrates that during the 2008-2009 school term, 995 units were recorded. This suggests that 14,925 minutes (248.75 hours) were spent on direct patient care during the program's first year of operation. The average time spent per encounter was 3.18 units or approximately 48 minutes. Although the amount of production within each encounter varied

based upon the procedures that were performed, the total amount of production for the year was \$25,643 and the average fee per encounter was \$81.93.

Although the literature does not provide a definite average time per encounter for Registered Dental Hygienists, it can be assumed that a licensed professional with experience will likely perform procedures faster than a dental hygiene student that must have his/her instructor verify the accuracy of the treatment provided at many stages throughout the encounter. The American Dental Association's Survey of Dental Practice (2010) states that the number of patient visits per hour by Pediatric Dentists that employ part-time or full-time dental hygienists increases by one to two patients when including hygienist visits. This suggests that the time per encounter by a dental hygienist likely ranges from 30-60 minutes. Since a dentist is not present to perform an exam (minimizing the amount of appointment time needed), an estimate of the amount of time it would take for a Registered Dental Hygienist to perform preventive services within a school-based program is 30 minutes.

If a program was in operation exactly 14,925 minutes per school year like the Miles of Smiles Program was in 2008-2009, a dental hygienist could potentially have 497 patient encounters (14,925 minutes divided by 30 minutes per encounter) as compared to the 313 patient encounters of the Miles of Smiles Program. The price per encounter varies depending upon the procedures performed and supplies needed, but the average cost per encounter was in 2008-2009 was \$11.82. If a dental hygienist has 184 more encounters (497-313) and the average cost per encounter was \$11.82, the cost of supplies will increase by approximately \$2,174.88 (Table 6).

On the other hand, increased numbers of patient encounters result in increased production. The average production per encounter for the Miles of Smiles Program in 2008-

2009 was \$81.93. An additional 184 encounters could result in an approximate \$15,075.12 increase in production. However, the program's only form of reimbursement for services provided is through the Kansas Medicaid Program. The additional production does not necessarily suggest additional reimbursement, unless the children have Medicaid coverage. Of the \$25,643.00 that was produced by the Miles of Smiles Program, only \$1,618.00 was reimbursed by the Kansas Medicaid Program. This equals approximately 6.3% of the total amount produced. If a Registered Dental Hygienist could increase the production by \$15,075.12 and the same ratio of production to Medicaid reimbursement was utilized (6.3%), an additional \$949.73 could be expected from Medicaid reimbursement (Table 6).

Assuming all other expenditures are the same and factoring in the amount of reimbursement through the Kansas Medicaid Program, the cost of running a similar program staffed by a licensed dental professional rather than supervised dental hygiene students is \$143,427.39. When compared to the \$105,897.74 total cost of the Miles of Smiles Program less the Medicaid reimbursement, the cost is \$37,529.65 more. This figure represents that answer to Research Question (3) What would a similar program cost if staffed by paid dental professionals only?

CHAPTER 4

DISCUSSION

Addressing Access to Care Issues

During its first year of operation, the Miles of Smiles Program was able to provide preventive dental hygiene services to 339 low income children. This demonstrates that a school-based program can serve as a valuable component to breaking down barriers associated with delivering oral health care to all Americans. A recent statement by The American Dental Association (2011) states that school-based programs are a proven, effective component of the nation's health care safety net system. Schools are an obvious place to provide low-cost preventive services to those children at greatest risk for dental disease (American Dental Association 2011). Utilizing the school to provide preventive services to low income children supports the Enabling Resources component of Andersen's Behavioral Model. It demonstrates that eliminating community barriers related to location, convenience, transportation, and fees and addressing personal barriers by educating patients of the importance of adequate homecare and frequent professional care can have a positive effect on vulnerable populations. However, although this cost-analysis of the Miles of Smiles program supports the contribution that the program has made in eliminating access to care issues for vulnerable populations, it also highlights the financial challenges that the program will face as it attempts to operate long-term.

Sustainability

When reviewing the cost of operating the Miles of Smiles School-Based Dental Hygiene program during the 2008-2009 term, it is evident that the costs associated with operating the program far exceed the minimal amount of reimbursement that the program

receives for the services provided. The program is designed to meet the needs of low-income children and therefore the qualification for participation in the program is that the student must qualify for the Free and Reduced Lunch Program. Only some of these children that qualify have Medicaid coverage that can reimburse the program for the services provided. The cost analysis and the comparison to the minimal Medicaid reimbursement suggest that this program is not self-sustainable. Although grant funding was available initially to purchase a majority of the equipment and instruments and to help with personnel expenses, the program does not generate enough revenue to sustain itself without this grant funding. For the program to continue to operate in this capacity, securing additional and consistent sources of external funding will be necessary.

Byck et al. (2005) suggests that reimbursement from Medicaid and/or SCHIPS typically covers 20% of the services provided. During the 2008-2009 school term, Medicaid reimbursement covered approximately 6.3% of the services provided. This figure is significantly lower than the averages discussed in Byck's analysis and can likely be attributed to the program's design, as it provides treatment to all low-income children (an identified vulnerable population), not just those that have Medicaid coverage or other forms of reimbursement for services provided. It could also be contributed to challenges associated with the data transfer and billing processes as discussed in the Limitations section below.

Such a significant gap between the amount of production (\$25,643), the amount of reimbursement (\$1,618), and the amount it costs to run the program for one school year (\$107,515.74) supports the fact that external funding sources are likely a necessity for the program to continue long-term. Other school-based programs discussed in the literature that have been in operation for several years such as Apple Tree Dental, the Forsyth Kids, and the

St. David's Dental Program all rely on external funding through corporate partners, individual donors, or grant funding (Apple Tree Dental 2011, The Forsyth Institute 2011, Jackson et al. 2007).

If the program were to become self-sustainable, significant modifications to the design of the program would be necessary. In 2008-2009, the program recorded a total of 248.75 hours providing services. According to the Kansas Department of Education (2011), all elementary schools within the school district must be "open for business" for 1,116 hours per year. This does not include the lunch hour or before and after school activities. Therefore, services were provided only 22% of the time that school was in session. It is possible that if the program were operating at a higher capacity, more reimbursement could be generated to help off-set the expenditures. This is supported by Byck et al.'s analysis (2005) that suggests that expanding the capacity of a school-based program by either increasing the number of participants (provide services to eligible non-school age siblings or to Head Start program participants associated with the school districts) or increasing the amount of days and hours the program is in operation may help to close the gap between the cost of the program and the reimbursement received. This provides an opportunity for future research as analyzing the cost of the program operating at various capacities could determine the value of expanding this program to operate at a higher capacity.

In addition, the possibility of adding a restorative component to the program (restorative services provided by a licensed dentist or supervised dental students) in addition to the preventive services could be explored. Adding this component would not only allow the program to operate at a higher capacity (the equipment would be utilized additional days of the week by the dentist or dental students), but could also result in higher amounts of

Medicaid reimbursement as restorative procedures are likely reimbursed at a higher rate. On the other hand, additional research should be performed to determine if the increased costs associated with the equipment, supplies, and materials needed to perform the restorative services would outweigh the benefits of operating at an increased capacity and providing more services.

Implementation of Similar School-Based Programs

The analysis also suggests that a similar school-based program staffed by a paid Registered Dental Hygienist rather than supervised dental hygiene students would likely experience the same challenges with self-sustainability. Although a licensed professional might be able to provide services to more children within the same time frame because of his/her greater efficiency, the predicted additional production still does not appear to generate enough reimbursement to sustain the program based on reimbursement alone. In addition, the paid dental hygienist would be required to perform administrative tasks that are currently shared by the Program Manager and other UMKC School of Dentistry employees. An identical cost-analysis of a school-based program staffed by a paid dental hygienist could be performed in the future to provide more specific comparisons. It would also provide exact figures related to the appropriate time per procedure for a licensed professional, rather than supervised students.

Limitations

The limitations of this study include the potential bias associated with performing the cost analysis on the program's first year of operation. Most new programs experience challenges in defining the procedures and policies associated with daily operation. As the program has continued to operate over the last few years, it is likely that these processes have

been refined and therefore contributed to the program running more efficiently. The Program Manager reports making changes to the enrollment processes since that first year of operation. To increase the number of students enrolling in the program, program representatives go to the July enrollment of the first school in which services will be provided to communicate with the parents directly and have them fill-out all the forms at that time, rather than sending consent and medical history forms home with the children and waiting for them to be returned. For subsequent schools in which services will be provided, the Program Manager works closely with the school nurses to promote participation in the program and to obtain enrollment forms and accurate medical history information. This has increased the number of students enrolled in the program since the first year of operation. Another factor contributing to increased numbers of students enrolling in the program is the parents' confidence in the program now that it has been in existence for several years and they have been able to see first-hand the value of the services provided. A higher volume of students suggests that the program has also become more efficient in performing patient encounters to verify that all the children signed up for the program receive treatment.

An additional change to the program to increase efficiency is the recent implementation of a Clinic Manager to assist with the daily operation of the program. According to the Program Manager, approximately 50% of the time, a third dental hygiene student (in addition to the two assigned to provide services) is scheduled as the Clinic Manager. The student is therefore required to be present to help with duties such as preparing and cleaning operatories, assisting with sterilization procedures, processing phosphor plate radiographs, assisting peers with sealant placement, etc.

Likewise, the Program Manager reports that the process of transferring billing information from the program sites to the Patient Accounts office at the UMKC School of Dentistry (and therefore the Medicaid billing process) has improved over the course of the program's operation. She reports that this was a challenge for them during the first year of operation as the program was using a "store and forward" method of data collection and tracking as opposed to "real time" data collection, suggesting that the reimbursement rates in 2008-2009 could have been affected by challenges associated with transferring the data in a timely manner and verifying that it was billed correctly. According to the database, a total of \$17,104 could have been billed for services provided to Medicaid-eligible children in 2008-2009; however, only \$1,618 was collected. If the entire amount of \$17,104 was collected, that figure would represent approximately 67% of the total production and approximately 16% of the overall costs of operating the program during the 2008-2009 school year. Although it varies slightly from Byck's research of safety-net clinic funding (2005), this would be more in alignment with the suggested averages of 21% of safety-net clinic revenue coming from Medicaid reimbursement and 36% of total revenue coming from some type of reimbursement for billable procedures (Medicaid, insurance, patient payment, etc.) Recognizing this difference, the process has since been addressed and the program currently has a very effective and efficient method of transferring this data between the two sites.

Several assumptions were made in making the comparisons between the Miles of Smiles Program and a similar program staffed by a paid dental professional as there is no published literature related to the average amount of time dental hygienists spend providing preventive dental hygiene services for children. Not having exact data for this particular comparison resulted in limitations for the analysis. It was assumed that a program staffed by

paid dental hygienists would use identical amounts of equipment, supplies, etc. It was also assumed that all patient encounters would take an average of 30 minutes. Understanding that both of these factors can vary depending on the clinician, further research that compares a similar program already in operation with exact data of equipment supply/usage and could provide a more detailed and accurate comparison. In addition, an estimated eight hours per week were added for personnel expenses to account for administrative tasks that a paid hygienist would have to perform. These tasks are currently performed by the Miles of Smiles Program Manager with the assistance of other UMKC School of Dentistry employees. Depending on the program, these additional duties may vary and therefore the estimated eight hours per week (in addition to the time that services are provided) may vary. Despite the assumptions, the results do however; provide an estimated cost prediction for groups that are interested in implementing a school-based program.

Directions for Future Research

This study lends itself to several opportunities for future research. First of all, now that the Miles of Smiles program has been in operation for several years, the processes have been refined and have likely resulted in increased productivity and a better system to file for reimbursement. An identical cost analysis of the Miles of Smiles Program would allow for valuable comparisons of productivity as the systems of reimbursement evolved. This would eliminate any bias associated with analyzing the program's first year of existence and the challenges that the program encountered when submitting Medicaid claims and obtaining reimbursement initially.

Since the Miles of Smiles Program operated only 22% of the time that school was in session during 2008-2009, it is worth exploring the change in overall costs if the program

were operating at various capacities and if this could make the program more sustainable. Operating at a higher capacity will result in an increase in variable costs and personnel expenses so it is unclear of the impact that a change in program design would have without further investigation and analysis. The feasibility of expanding the Miles of Smiles Program to operate at a higher capacity would also need to be explored as limitations exist with using dental hygiene students that have scheduling considerations associated with other class and clinical obligations. As a service-learning opportunity for the dental hygiene students, verifying that this remains a valuable learning environment that exposes students to opportunities to meet the needs of vulnerable populations (one of the original goals of implementing this type of collaborative model) should be considered before making significant changes to the program design.

Another opportunity for research is to perform an identical cost-analysis on a school-based preventive oral health program already in operation that utilizes paid dental professionals. As stated previously, several assumptions were made when answering Research Question #3, so having exact data related to the time allotted per procedure, the amount of supplies used, and the time dedicated to additional administrative duties would provide a more precise comparison to the Miles of Smiles program. In addition, some existing school-based programs provide both preventive and restorative treatment by employing a dentist and a dental hygienist. Making comparisons between the costs associated with these programs and reimbursement rates to that of a preventive program only could also determine if the program can minimize costs and increase reimbursement rates if restorative procedures are performed as well.

CHAPTER 5

CONCLUSION

Within the limitations of this analysis, the following conclusions can be drawn:

1. The cost of operating the Miles of Smiles Program in 2008-2009 was \$107,515.74.
2. The amount of Medicaid reimbursement for services provided in 2008-2009 was \$1,618.00. The total production for the procedures performed was \$25,643.00; therefore, the amount of Medicaid reimbursement totaled 6.3% of the total amount produced and 1.5% of the program's total annual cost.
3. If a similar program staffed by dental professionals was implemented, the program would cost approximately \$37,529.65 per year more. This increase is attributed to higher salaries/wages, more supplies used (variable expenditures), and the costs associated with administrative duties. Although more reimbursement is predicted, it will not off-set the additional costs.
4. There have been several "lessons learned" for the Miles of Program since its first year of operation in 2008-2009. Since the program has now had time to refine the processes and procedures, it is likely that some of this data may vary if a current analysis was performed on the program.

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APPENDIX

TABLES

TABLE 1
DEMOGRAPHIC INFORMATION OF 2008-2009 MILES OF SMILES PROGRAM PARTICIPANTS

Category		Number (n)	Percentage (%)
Age	0-5 years	4	1
	6-8 years	165	42.4
	9-14 years	215	55.3
	Unknown	5	1.3
Gender	Male	213	54.8
	Female	176	45.2
Race/Ethnicity	Hispanic	193	49.6
	Caucasian	117	30.1
	Black	49	12.6
	Asian/Pacific Islander	19	4.9
	Two or More Reported	9	2.3
	Unknown	2	0.5

TABLE 2
CAPITAL EXPENDITURES

Equipment and Instruments	Quantity	Price Per Unit	Total Price	Life Span (in yrs)	2008-2009 Cost	Source
Portable operator (Pac 1 Field Unit)	2	\$4,355.00	\$8,710.00	5	\$1,742.00	Donation
Portable light	2	\$1,104.00	\$2,208.00	5	\$441.60	Grant Funding
Portable chair and carrying case	2	\$3,270.00	\$6,540.00	5	\$1,308.00	Donation
Operator Stool	4	\$574.00	\$2,296.00	5	\$459.20	Grant Funding
Operator Stool - Carrying Case	4	\$190.00	\$760.00	5	\$152.00	Grant Funding
Nomad Pro Handheld Extraoral X-ray	1	\$7,495.00	\$7,495.00	5	\$1,499.00	Grant Funding
Nomad Positioning Stand w/ Remote Activation	1	\$750.00	\$750.00	5	\$150.00	Grant Funding
Nomad Carrying Case	1	\$465.00	\$465.00	5	\$93.00	Grant Funding
Scanex Digital Scanner, Eraser, and Phosphor Plates	1	\$19,000.00	\$19,000.00	5	\$3,800.00	Grant Funding
Child-size Lead apron	2	\$77.99	\$155.98	5	\$31.20	Grant Funding
Laptop Computers w/ CMS software	4	\$2,400.00	\$9,600.00	5	\$1,920.00	Grant Funding
Printer	1	\$249.00	\$249.00	5	\$49.80	Grant Funding
Ethernet cord	1	\$8.99	\$8.99	5	\$1.80	Grant Funding
Extension cord/Surge Protector	2	\$18.00	\$36.00	5	\$7.20	Grant Funding
Rubbermaid organizers	6	\$37.00	\$222.00	5	\$44.40	Grant Funding
Rubbermaid storage totes	10	\$10.00	\$100.00	5	\$20.00	Grant Funding
SciCan Autoclave w/ cassette (Statim 2000)	1	\$4,299.99	\$4,299.99	5	\$860.00	Grant Funding
Sterilization Maintenance/Service and Strips (monthly)	12	\$16.67	\$200.04	1	\$200.04	Grant Funding
Schein Ultrasonic Cleaner w/ powder	1	\$349.99	\$349.99	5	\$70.00	Grant Funding
Child Blood pressure cuffs	2	\$109.00	\$218.00	5	\$43.60	Grant Funding
Stethoscope	2	\$5.99	\$11.98	5	\$2.40	Grant Funding
Cavitron Select SPS Ultrasonic	2	\$2,629.00	\$5,258.00	5	\$1,051.60	Grant Funding
Cavitron inserts (sets of 3 S,L,R)	4	\$409.00	\$1,636.00	1*	\$1,636.00	Grant Funding
Slow speed handpieces (AP44 Prophyl HPS)	6	\$785.00	\$4,710.00	5	\$942.00	Donation
RQ04 Roto Quicks handpieces	3	\$210.00	\$630.00	5	\$126.00	Donation
Napkin Clip/Metal chain	10	\$4.49	\$44.90	5	\$8.98	Grant Funding
Mirror (price figured by adding handle + mirror)	10	\$4.71	\$47.10	1*	\$47.10	Grant Funding
Shepherd's Hook Explorer	10	\$12.99	\$129.90	1*	\$129.90	Grant Funding
11/12 Explorer	10	\$16.99	\$169.90	1*	\$169.90	Grant Funding
Nebraska Sickle Scaler	10	\$32.99	\$329.90	1*	\$329.90	Donation
204 S Posterior Scaler	10	\$32.99	\$329.90	1*	\$329.90	Donation
Columbia 13/14 Curette	10	\$32.99	\$329.90	1*	\$329.90	Donation
Air/Water Syringe tips	10	\$6.15	\$61.50	1*	\$61.50	Grant Funding
Gracey 1/2 Curette	3	\$32.99	\$98.97	1*	\$98.97	Donation
Probe	3	\$21.99	\$65.97	1*	\$65.97	Grant Funding
Curing light Unit	4	\$494.99	\$1,979.96	5	\$395.99	Donation
Intraoral Camera Dock	1	\$2,265.00	\$2,265.00	5	\$453.00	Grant Funding
Intraoral Camera	1	\$3,815.00	\$3,815.00	5	\$763.00	Grant Funding
Canon Rebel Digital Camera w/ lenses and flashes	1	\$499.00	\$499.00	5	\$99.80	Grant Funding

*Table 2 continued on page 45

Equipment and Instruments	Quantity	Price Per Unit	Total Price	Life Span (in yrs)	2008-2009 Cost	Source
Delton Sealant applicator handle	4	\$7.99	\$31.96	5	\$6.39	Donation
Mouth props	4	\$19.50	\$78.00	5	\$15.60	Grant Funding
Patient mirrors (handheld)	2	\$8.99	\$17.98	5	\$3.60	Grant Funding
Fans	2	\$15.00	\$30.00	5	\$6.00	Grant Funding
Safety glasses	6	\$6.99	\$41.94	5	\$8.39	Grant Funding
Storage unit for supplies	1	\$80.00	\$80.00	5	\$16.00	Grant Funding
Total Capital Expenditures			\$86,356.75		\$19,990.61	

* Life span determined by contacting manufacturer and determining the average lifespan of instruments/cavitron inserts used 2-4 times per week

TABLE 3
STANDARD COST PROFILES FOR BILLABLE PROCEDURES

Procedure	Cost	Items Included in Cost Calculation
Child Prophylaxis	\$9.85	Prophy Angle, Prophy Paste, 2x2 Gauze, Floss, Saliva Ejector, Patient Napkin, Infection Control Barrier Wraps, Sterilization Bags, Clinician Mask and Gloves, Toothbrush, Toothpaste, Floss, Disclosing Solution, Medicine Cups for Disclosing Solution
Two Bitewing Radiographs	\$0.41	Phosphor Plate Film Sleeves, Disposable Bitewing Tabs
Fluoride Varnish Treatment	\$1.56	Fluoride Varnish*
Sealants (per tooth)	\$2.87	Cotton Rolls/Dri-Angles, Sealant Material (single dose), Etchant Material (single dose)

*All students received fluoride varnish at the time of Child Prophylaxis so no additional supplies were needed for the application

TABLE 4
COST OF SUPPLIES USED IN MULTI-PROCEDURE ENCOUNTERS

Multi-Procedure Encounter Category	Cost Per Encounter	Quantity	2008-2009 Total Cost
Prophy + Bitewings + Fluoride Varnish + Sealants + Oral Hygiene Instruction	\$11.82(86)+2.87(246)	86	\$1722.54
Prophy + Bitewings + Fluoride Varnish + Oral Hygiene Instruction	\$11.82	171	\$2021.22
Prophy + Fluoride Varnish + Oral Hygiene Instruction	\$11.41	28	\$319.48
Prophy + Fluoride Varnish + Sealants + Oral Hygiene Instruction	\$11.41(4)+2.87(12)	4	\$80.08
Prophy + Bitewings + Oral Hygiene Instruction	\$10.26	2	\$20.52
Prophy + Oral Hygiene Instruction	\$9.85	3	\$29.55
Prophy + Bitewings + Fluoride Varnish	\$9.58	9	\$86.22
Prophy + Fluoride Varnish	\$9.17	1	\$9.17
Oral Hygiene Instruction Only	\$2.59	3	\$7.77
Total Costs of Disposable Supplies			\$4,296.55

(n) = number of sealants placed for all Multi-Procedure Encounters in that category

TABLE 5

TOTAL COST OF OPERATING THE PROGRAM DURING THE 2008-2009 TERM

Expenditure	Associated Cost
Capital Expenditures (Table 2)	\$19,990.61
Variable Expenditures – Supplies Utilized During Patient Encounters (Table 4)	\$4,296.55
Personnel Expenditures	\$47,390.00
TOTAL DIRECT COSTS	\$71,677.16
Standard Facilities and Administration Rate <i>50% of Total Direct Costs</i>	\$35,838.58
TOTAL INDIRECT COSTS	\$35,838.58
TOTAL COST	\$107,515.74

TABLE 6

COMPARISON OF COSTS FOR MILES OF SMILES TO A PROGRAM STAFFED BY
AN EXTENDED CARE PERMIT REGISTERED DENTAL HYGIENIST

Expenditure	Cost for Miles of Smiles	Cost for a School-Based Program Staffed by ECP Dental Hygienist
Capital Expenditures	\$19,990.61	\$19,990.61
Variable Expenditures – Supplies Utilized During Patient Encounters	\$4,296.55	$\$4,296.55 + \$2174.88 = \$6,471.43$
Personnel Expenditures	\$47,390.00	$\$70,791.04 + \$77.00 = \$70,868.04$
TOTAL DIRECT COSTS	\$71,677.16	\$97,330.08
Standard Facilities and Administration Rate <i>50% of Total Direct Costs</i>	\$35,838.58	\$48,665.04
TOTAL INDIRECT COSTS	\$35,838.58	\$48,665.04
TOTAL COST	\$107,515.74	\$145,995.12
Less Medicaid Reimbursement	-\$1,618.00	$\$1,618.00 + \$949.73 = -\$2,567.73$
TOTAL COST LESS REIMBURSEMENT	\$105,897.74	\$143,427.39

VITAE

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Current Position:

2010-Present Clinic Coordinator/Classroom Instructor, Dental Hygiene
Manhattan Area Technical College

Education:

2008-Present University of Missouri-Kansas City, School of Graduate
Studies
Master of Science Degree in Dental Hygiene Education
Anticipated Date of Graduation: December, 2011
Cumulative GPA – 4.0

2006-2008 University of Missouri-Kansas City, School of Dentistry
Bachelor of Science Degree in Dental Hygiene – May 10, 2008
Summa cum Laude; Cumulative GPA – 4.0

2001-2004 Kansas State University, College of Arts and Sciences
Bachelor of Science in Nutritional Science – December 11,
2004

Academic Appointments:

2009-2010 Classroom Student Instructor, Division of Dental Hygiene
University of Missouri-Kansas City School of Dentistry

2008-2010 Part-time Clinical Instructor, Division of Dental Hygiene
University of Missouri-Kansas City School of Dentistry

June 2008-August 2008 Radiology Clinical Instructor
Department of Oral Pathology, Radiology, and Medicine
University of Missouri-Kansas City School of Dentistry

Professional Presentations:

Regional/Local

Siruta K. *Student Teaching Presentation* “Clinical and Radiographic Assessment – Your ‘Clues’ to a Periodontal Diagnosis,” Principles of Periodontics Course, University of Missouri-Kansas City School of Dentistry, Kansas City, Missouri, February 11, 2010.

Siruta K. *Student Teaching Presentation* “Nutrition and Oral Health – What is the *link?*,” Applied Nutrition Course, University of Missouri-Kansas City School of Dentistry, Kansas City, Missouri, December 2, 2009.

Siruta K. *Student Teaching Presentation* “Carbohydrates and Lipids,” Applied Nutrition Course, University of Missouri-Kansas City School of Dentistry, Kansas City, Missouri, September 30, 2009.

Siruta K. *Mini-Seminar Presentation* “Nutritional Counseling – Its Role in Managing Periodontal Disease,” Seminar in Advanced Clinical Teaching and Methodologies Course, University of Missouri-Kansas City School of Dentistry, Kansas City, Missouri, April 14, 2009.

Siruta, K. *Seminar Presentation* “Promotion and Tenure,” Special Issues in Higher Education Course, University of Missouri-Kansas City School of Dentistry, Kansas City, Missouri, March 9, 2009.

Siruta K. *Microteach Presentation* “A ‘Guided’ Tour through the World of Nutrition Guidelines,” Principles in Dental Hygiene Education Course, University of Missouri-Kansas City School of Dentistry, Kansas City, Missouri, December 5, 2008.

Siruta K, Tilley J. *Table Clinic Presentation* “Herbal Supplements ‘Take Root’ in Dental Hygiene,” 2008 Midwest Dental Conference, Kansas City, Missouri, April 4, 2008.

Courses Taught:

August 2011-Present	DHT208	Pain Management
August 2011-Present	DHT205	Dental Hygiene Clinic III
January 2011-Present	DHT108	Periodontics
January 2011-Present	DHT205	Dental Hygiene Clinic II
August 2010-Present	DHT105	Dental Hygiene Clinic I: Preclinic

January 2010-May 2010	DH3260	Principles of Periodontics, Student Instructor
January 2010-May 2010	DH4260C	Dental Hygiene Clinic IV, Clinical Instructor
August 2009-December 2009	LSBIO3240	Applied Nutrition, Student Instructor
August 2009-December 2009	DH4120C	Dental Hygiene Clinic III, Clinical Instructor
June 2009	DH4020	Local Anesthesia/Pain Control, Lab Instructor
June 2009-July 2009	DH4060C	Dental Hygiene Clinic II, Clinical Instructor
January 2009-May 2009	DH3280C	Dental Hygiene Clinic I, Clinical Instructor
August 2008-December 2008	DH3080L	Preclinical Dental Hygiene, Clinical Instructor

Professional Licensure and Certifications:

Current Kansas Dental Hygiene License (#10979) – Attained June, 2008

Current Missouri Dental Hygiene License (#2008019433) – Attained June, 2008

Local Anesthesia and Nitrous Oxide Certifications – Attained June, 2008

American Heart Association Cardiopulmonary Resuscitation and Basic Life Support – Attained April, 2008; February, 2012

Professional Affiliations:

2008 – Present	American Dental Education Association
2008 – Present	Sigma Phi Alpha Dental Hygiene Honor Society
2008 – Present	Kansas Dental Hygienists' Association
2008 – Present	University of Missouri-Kansas City Dental Hygienists' Alumni Association
2006 – Present	Student Member of the American Dental Hygienists' Association

Non-Academic Professional Experience:

2010-Present	Part-time Registered Dental Hygienist Community Health Ministry – Healthy Smiles Outreach Program Wamego, Kansas
2010-Present	Part-time Registered Dental Hygienist Total Care Dentistry – Dr. Larry McGary Junction City, Kansas
2008-2010	Part-time Registered Dental Hygienist S&G Family Dentistry – Dr. Lynne Schopper, Dr. Jarrett Grosdidier Overland Park, Kansas
2005-2006	Chairside Dental Assistant Family and Implant Dentistry – Dr. Mark Hungerford, Dr. Grant Witcher, Dr. Josh Walker, Dr. Curtis Snowden Manhattan, Kansas

Community Service:

2009-Present	Kansas Mission of Mercy, Manhattan, Kansas
2008-2010	Miles of Smiles Dental Hygiene Program, Olathe, Kansas
2008	Academic Service Learning Project with Children’s Center for the Visually Impaired, Kansas City, Missouri
2008	Academic Service Learning Project with Children’s Therapeutic Learning Center, Kansas City, Missouri
2007-2008	Give Kids a Smile, UMKC School of Dentistry
2007-2008	Dental Care with a Heart, UMKC School of Dentistry
2007-2008	University of Missouri-Kansas City Open House – Dental Hygiene Representative, UMKC School of Dentistry
2007	University of Missouri-Kansas City Career Fair – Dental Hygiene Representative, Kansas City, Missouri
2007	Oral Health Education Presentation at Summer Bible School Program, Kansas City, Missouri

2007	Central City Catholic Schools Oral Health Education and Fluoride Varnish Program, Kansas City, Missouri
2007	Area Health Education Center (AHEC) Rotation in Northwest Missouri Region, St. Joseph, Missouri
2007	Summer Explorers Oral Health Education Program, St. Joseph Missouri
2005-Present	Gamma Phi Beta International Sorority Recruitment Advisor - Kansas State University, Manhattan, Kansas
2005-Present	Gamma Phi Beta International Sorority Traveling Recruitment Consultant
2004	Mexico Missions Trip with Ichthus Student Ministries, Galeana, Mexico

Honors and Awards:

2010	ADEA/Crest Oral-B Award for Dental Hygiene Students Seeking Academic Careers, Presented at 2010 ADEA Annual Session in Washington, DC
2009	Susan Brockmann-Bell Memorial Scholarship Recipient, UMKC School of Dentistry
2009	2009 Clinical Instructor of the Year – Awarded by the Dental Hygiene Class of 2010, UMKC School of Dentistry
2008	Dean’s Academic Distinction Award for Top Rank in Graduating Dental Hygiene Class, UMKC School of Dentistry
2008	Missouri Dental Hygienists’ Association Outstanding Graduate Award
2008	Table Clinic Presentation Winner at 2008 Midwest Dental Conference, Kansas City, Missouri
2008	Susan Brockmann-Bell Memorial Scholarship Recipient, UMKC School of Dentistry
2007	Sigma Phi Alpha Annual Chapter Award, Alpha Gamma Chapter, Kansas City, Missouri

2007	Johnson County Dental Hygienists' Association Scholarship Recipient, UMKC School of Dentistry
2007	Noveta Brown Memorial Scholarship Recipient, UMKC School of Dentistry
2007	Trudy Parker Memorial Scholarship Recipient, UMKC School of Dentistry
2006-2008	Dean's List for Academic Achievement, UMKC School of Dentistry
2006-2008	University of Missouri-Kansas City Chancellors' Scholarship Recipient, UMKC School of Dentistry
2006	Otis B. Gentry Memorial Scholarship Recipient, UMKC School of Dentistry

