Preventive Dental Care

An educational program to integrate oral care into pediatric oncology

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BACKGROUND: Early childhood dental caries (dental cavities) is an infectious process. The development of oral problems during cancer care results in pain, fever, and delay in treatment.

OBJECTIVES: The objective of this project was to integrate preventive oral care into pediatric oncology care.

METHODS: This project consisted of an educational program for pediatric oncology providers who completed pre- and postprogram surveys assessing oral health knowledge, attitudes, and practice; attended an oral health education session; and performed oral assessment and fluoride varnish application on children during cancer treatment.

FINDINGS: Three major outcomes resulted from this project: (a) 15 nondental healthcare providers attended the education session and 11 became certified by the American Academy of Pediatrics, (b) 53 pediatric patients with cancer received an oral assessment and fluoride varnish during the two-month project, and (c) oral health assessment and fluoride varnish was instituted as a standard of care.

DENTAL CARIES IS AN INFECTIONOUS PROCESS that refers to tooth decay (commonly referred to as “cavities”) and may cause serious problems for children during and after cancer treatment (Haytac, Dogan, & Antmen, 2004; Kaul, Fair, Wright, & Kirchhoff, 2016; Yeazel et al., 2004). Although chemotherapy and radiation place the child at high risk for developing oral problems, preventive dental care is not considered a priority at the time of cancer treatment (da Fonseca, 2004; Kaul et al., 2016). About 30% of all childhood cancer survivors experience dental abnormalities, but younger age and increased exposure to alkylating agents or radiation to the teeth increase this risk (Kaste et al., 2009). However, survivors reported fewer dental visits than the recommended every six months (American Academy of Pediatric Dentistry [AAPD], 2016); in addition, those who did not have regular dental visits were more likely to be from a minority group, have a lower socioeconomic status, have a lower level of education, and/or lack health or dental insurance (Kaul et al., 2016; Yeazel et al., 2004). To prevent current and future dental problems, the optimal interprofessional team is the pediatric oncology provider in collaboration with the dental provider; together, these providers can deliver preventive dental care to this population during cancer treatment (da Fonseca, 2004; Perry, Iida, Patton, & Wilder, 2015).

In 2000, the Surgeon General’s Oral Health in America report emphasized the relationship between oral health and an individual’s general health, along with the need to incorporate nondental healthcare providers into oral health care (Lewis et al., 2009). All providers need to be cognizant of the oral systemic connection when treating their patients. Oral health is one of the 12 Leading Health Indicators (LHI) selected as part of Healthy People 2020. The objectives for the oral health LHI are to “increase awareness of the importance of oral health to overall health and well-being,” “increase acceptance and adoption of effective preventive interventions,” and “reduce disparities in access to effective preventive and dental treatment services” (HealthyPeople.gov, n.d., para. 7). The 2013 American Dental Association guideline recommends fluoride varnish for primary and permanent teeth in children aged younger than six years at risk of developing dental caries (Clark & Slayton, 2014; Weyant et al., 2013). On May 4, 2015, the U.S. Preventive Task Force recommended that primary care clinicians apply fluoride varnish to the teeth of all infants and children, starting at the age of primary tooth eruption.

KEYWORDS
pediatrics; childhood cancer; oral health; dental caries; cavities; fluoride varnish

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PREVENTIVE DENTAL CARE

“Early assessment can identify oral complications of cancer treatment.”

Significance of the Problem
The development of oral problems during cancer care, particularly during early childhood, results in pain, fever, delay in treatment, possible sepsis, additional hospitalization, and increased cost (Carrillo, Vizeu, Soares-Junior, Fava, & Filho, 2010; da Fonseca, 2004; Padmini & Bai, 2014). In 1989, the National Institutes of Health first recommended that all patients with cancer undergo an oral examination prior to treatment to diagnose, prevent, and stabilize or treat any oral problems that could compromise cancer care (AAPD, 2016). The mouth is the most “frequently documented source of sepsis in the immunosuppressed cancer patient” (AAPD, 2016, p. 334). As many as 90% of pediatric patients with cancer develop an oral complication (Chin, 1998). In addition, chemotherapy and radiation are responsible for oral complications, such as mucositis, xerostomia, oral fungal infection, gingival bleeding, vomiting, and lack of appetite, that contribute to poor nutrition during treatment (da Fonseca, 2004; Moursi, Fernandez, Daronch, Zee, & Jones, 2010). Families attempting to increase their child’s caloric intake frequently provide unhealthy treats and snacks and/or dietary supplements. The combination of oral problems and a diet high in carbohydrates makes the child’s mouth a perfect breeding place for dental caries (Carrillo et al., 2010; da Fonseca, 2004; Moursi et al., 2010).

In general, the public and some health professionals are unaware that dental caries are a bacterial infection (U.S. Department of Health and Human Services, 2000). Although many Americans believe that children no longer suffer from tooth decay, wide disparities exist in oral health, with increased prevalence of decay in minority groups and groups with low socioeconomic status (Bader, Rozier, Lohr, & Frame, 2004). In addition, most Americans have improved their oral health, but children aged 2–5 years have experienced a significant increase in tooth decay (Dye et al., 2007). Just a few years ago, one in five children enrolled in Medicaid used his or her dental benefits (dela Cruz, Rozier, & Slade, 2004; Kagihara, Niederhauser, & Stark, 2009). However, a steady increase has occurred in children’s use of the Medicaid and Children’s Health Insurance Program (CHIP) dental benefit—from 20% in 2004, to 39% in 2007, to 46% in 2013 (Medicaid and CHIP Payment and Access Commission, 2016). The serious consequences of oncology treatment, pediatric oncology providers need to be able to perform oral assessment, provide preventive care (e.g., fluoride varnish), and refer patients to an appropriate dental provider as needed.

Needs Assessment
A quality improvement (QI) framework was used to develop and implement this evidence-based doctor of nursing practice QI capstone project. The first step of this project was to complete a needs assessment to determine providers’ baseline knowledge, which would then be used to develop a plan to teach competencies. At the time of this project, providers at the pediatric oncology center included seven medical oncologists, two pediatric nurse practitioners (as well as the pediatric nurse practitioner leading the project, who was not included in the survey), six pediatric oncology fellows, and seven RNs (N = 22). The center was also staffed with a pediatric dental resident from the NYU College of Dentistry assigned on a monthly rotation. Informal conversations with pediatric oncology fellows and RNs at the center indicated that these providers did not have formal training in conducting a complete oral assessment for dental caries, identifying a dental caries risk assessment in children, or applying fluoride varnish to children’s teeth.

Program Establishment and Objectives
Children being treated for cancer often have multiple oral complications; their condition and/or the treatments they receive place them at risk for dental caries, which may affect the care they receive. According to Haber et al. (2015), “one important component of the problem is that the majority of curricula for preparing health professionals have a dearth of oral health content and clinical experiences” (p. 437). Early assessment can identify oral complications of cancer treatment, and oral health intervention can reduce the severity of oral soft tissue disorders, mucositis, and/or fungal infections. To address this serious problem, the advanced practice nurse leading this project established an oral assessment and fluoride varnish program named Chemo Without Cavities at the Stephen D. Hassenfeld Children’s Center for Cancer and Blood Disorders, part of Hassenfeld Children’s Hospital at New York University (NYU) Langone. The objective of the Chemo Without Cavities program is to teach the following two competencies to oncology providers at the center: (a) how to conduct a complete oral assessment on pediatric patients with cancer to identify dental caries and risk of dental caries and (b) how to apply fluoride varnish to patients’ teeth.
dental caries. Multiple meetings with administrators at the center regarding this proposed project were conducted, and permission was granted to implement the project.

**Literature Review**

Following the needs assessment, an extensive review of medical, nursing, and dental health research and policy literature related to oral health, dental caries, and childhood cancer was conducted using several electronic databases. After a review of multiple studies, nine studies (six descriptive and three intervention) were found to be of relevance. They were critically read, analyzed, and synthesized to determine the best available evidence to use for the proposed program. Based on the synthesis of the strengths and limitations of six descriptive surveys (dela Cruz et al., 2004; Glenny et al., 2004; Grant, Roberts, Brown, & Quinofiez, 2007; Ismail, Nainar, & Sohn, 2003; Lewis et al., 2003; Lewis, Grossman, Domoto, & Deyo, 2000) in relation to their findings, evidence exists to support that nondental healthcare providers lack knowledge and training in oral healthcare and that, although they experience barriers to dental referral, they are willing to gain knowledge and provide oral care and fluoride varnish. In addition, the results of three oral health intervention studies (two quasiexperimental studies [Douglass, Douglass, & Silk, 2005; Schaff-Blass, Rozier, Chattopadhyay, Quiñonez, & Vann, 2006] and one randomized, controlled trial study [Slade, Rozier, Zeldin, & Margolis, 2007]) demonstrated that educational intervention for nondental healthcare providers increased oral health knowledge and practice behavior. Therefore, the following project was instituted at the center:

- An oral health educational program was developed for pediatric oncology providers.
- Pre- and postprogram surveys for nondental healthcare providers were adapted to measure a change in knowledge, current practice behavior, barriers to dental referral, and attitude toward incorporating oral care into practice.

**Chemo Without Cavities Program**

**Implementation**

The Chemo Without Cavities program was developed with interprofessional collaboration from the chairman of the department of pediatric dentistry and pediatric residents of the NYU College of Dentistry. After review and approval by NYU Langone Health’s institutional review board, protocol review and monitoring committee, and office of clinical trials, program implementation began.

The program had the following components: (a) an announcement made during a staff meeting at the center regarding an upcoming online survey; (b) a preprogram survey emailed to all pediatric oncology providers; (c) marketing of the oral health education sessions through email and promotional flyers; (d) four separate didactic one-hour education sessions; (e) a mentored first fluoride application on a live patient by the pediatric oncology provider; (f) encouragement to complete American Academy of Pediatrics (AAP) online certification; and (g) a postprogram survey emailed to all pediatric oncology providers two months after the program was completed.

All pediatric oncology providers were emailed a link to the preprogram survey, which was modeled after one used by Lewis et al. (2000); questions that did not pertain to the oncology population were eliminated. The four survey domains were (a) knowledge of preventive oral health regarding causes of early childhood dental caries and transmission of bacteria between mother and child, as
well as any previous oral health education; (b) current participation in prevention (assessed with a four-point scale examining how likely the provider was to perform five oral health tasks); (c) experience with dental problems and perceived barriers to referral for dental care (assessed with a four-point scale rating frequency of dental caries and difficulty of referral), and (d) attitudes toward fluoride varnish application and reimbursement (see Figure 1). Providers were given one week to complete the survey. The oral health education sessions were marketed through emails and flyers placed in the staff area of the center.

Education Session
Four separate didactic education sessions based on the AAP’s (2010) Oral Health Risk Assessment Training for Pediatricians and Other Child Health Professionals, which was developed to meet the educational needs of pediatricians concerning oral health information and training, were offered. The lead pediatric nurse practitioner led the sessions. Providers could choose between attending one of the four education sessions or completing the AAP’s online program. Education session content focused on how to do an oral risk assessment, perform an oral examination, and apply fluoride varnish. Each session lasted about one hour, took place in a conference room, and consisted of a Microsoft PowerPoint presentation and handouts, followed by a postsession test and a skills session. During the skills session, application of fluoride varnish was demonstrated by the pediatric dental resident and lead pediatric nurse practitioner using tooth models, and the providers performed a return demonstration. The first application on a patient was observed by the dental resident or the lead pediatric nurse practitioner. In addition, providers were encouraged to follow this program with the AAP’s online program and become certified in oral health, and all were emailed a link to a postprogram survey two months after completion of the Chemo Without Cavities program.

Results
To determine the success of the Chemo Without Cavities program and whether the program outcomes had been met, the authors (a) reviewed the pre- and postprogram survey data to assess any changes in the four domains; (b) consulted with the pharmacy at the center to determine how many fluoride varnish application treatments had been ordered; and (c) conducted a chart audit.

Twenty-two nondental healthcare providers were sent the Chemo Without Cavities program survey, created and distributed with SurveyMonkey®, before and after the educational program. The survey was anonymous and did not request that providers indicate their profession. Table 1 shows that the majority of providers (n = 15) completed the preprogram survey; however, just 10 completed the postprogram survey. Of the 10 who completed the postprogram survey, two did not attend the education session, and three did not attend the skills session or participate in testing or certification. The authors are unable to determine whether the 10 participants who completed the postprogram survey are the same as the 15 participants who completed the preprogram survey; as such, these groups cannot be compared. However, the postprogram survey demonstrated the following positive results:

- All 10 postprogram survey participants answered all three knowledge questions correctly. In contrast, in the preprogram survey, only 10 of 14 participants who responded to the question correctly noted that cavity-causing bacteria could be transmitted between mother and child, 14 of 15 correctly responded that not only bottle-fed children could get early childhood caries, and only 8 of 15 were familiar with fluoride varnish.
- Just one preprogram survey participant of 14 reported often assessing patients’ fluoride intake, whereas two out of two participants who responded to the same question on the
postprogram survey reported that they did. In addition, 0 of 14 preprogram survey participants reported inquiring about the mother’s oral health, but 1 postprogram survey respondent of 10 noted the practice.

- Eight of 11 preprogram survey participants reported difficulty referring patients with no dental insurance, but 6 of 10 postprogram survey participants reported this issue.
- Both pre- and postprogram survey participants largely reported an overwhelmingly positive attitude toward oral assessment and fluoride varnish.

The four overall outcomes of the Chemo Without Cavities program two months postimplementation are as follows:

- 15 nondental healthcare providers attended one session.
- 11 nondental healthcare providers became AAP certified in oral health.
- 53 pediatric patients with cancer received an oral assessment and fluoride varnish treatment during the program.
- An oral health and fluoride varnish policy became standard of care.

Discussion

This project found that the pediatric oncology providers who did respond to the preprogram survey reported a lack of knowledge and training in oral care and noted that, although they experience barriers to dental referral, they are willing to gain knowledge and provide oral care and fluoride varnish, which is consistent with research from the six descriptive studies (dela Cruz et al., 2004; Glenny et al., 2004; Grant et al., 2007; Ismail et al., 2003; Lewis et al., 2000, 2009). Those who responded to the postprogram survey reported a positive attitude toward including oral assessment and fluoride varnish in their practice, which is consistent with research on this topic (Lewis et al., 2000, 2009). The results of this program were consistent with the three prior intervention studies (Douglass et al., 2005; Schaff-Blass et al., 2006; Slade et al., 2007) and found that the participating pediatric oncology providers reported heightened knowledge and awareness of oral health assessment and an increase in practice behaviors related to oral assessment. The pediatric oncology providers reported similar responses in the pre- and postprogram surveys on the importance of including oral assessment in their practice and a positive attitude toward oral assessment and fluoride varnish, similar to results reported by Lewis et al. (2000, 2009).

Prior to implementing the Chemo Without Cavities program, none of the nondental healthcare providers at the pediatric oncology center assessed children from a dental health framework, and they were not AAP certified in oral health. Now, the pediatric oncology center has a new standard-of-care policy to ensure that all pediatric patients with cancer receive the gold standard best practice of having an oral assessment and fluoride varnish application every three months while undergoing cancer treatment. Such a policy change is significant because it addresses the sustainability of this evidence-based practice.

Limitations

Several limitations are related to implementing the survey aspect of the Chemo Without Cavities program. For a better postprogram response rate from providers, the postprogram survey should be sent to participants who attended the education session one month, instead of two months, after completion of the program. Follow-up emails may also be helpful. In addition, the pre- and postprogram surveys should have questions inquiring about participants’ professional role, and the postprogram survey should be sent only to those who attended an education session. This discrepancy between providers who completed the pre- and postprogram surveys may call into question whether the educational program made a difference. The postprogram survey should have been sent only to those 15 who completed the educational program, and the lack of demographic data about the participants makes generalizing the data to specific nondental healthcare providers difficult.

Conclusion

The fact that 53 pediatric patients with cancer received oral assessment and fluoride varnish, compared to none prior to this educational program, and that the institution implemented a policy so that all pediatric patients with cancer would have this gold standard of care supports the clinical relevance of the findings.

Based on this QI small test of change project, nondental healthcare providers of pediatric patients with cancer, when exposed to dental health evidence, can increase their knowledge of dental health care, develop evidence-based practice competencies in oral health and the application of fluoride varnish to children, have the knowledge and interest to become AAP certified, and be willing to incorporate these competencies into their practice. This project is an exemplar of how an interprofessional team led by an advanced practice nurse (pediatric nurse practitioner) was able to collaborate with medical, dental, pharmacy, and nursing professionals to create a sustainable program intended to create quality outcomes for pediatric patients with cancer. Making the Chemo Without Cavities program an essential component of pediatric oncology care involves understanding that pediatric patients with cancer are at high risk for oral health problems and that many oral health problems are preventable. In addition, nurses need to be aware of pediatric patients’ oral health needs, educate pediatric patients and their family members about the prevention of oral health problems, and work in interprofessional teams when implementing the Chemo Without Cavities program.

IMPLICATIONS FOR PRACTICE

- Understand that pediatric patients with cancer are at high risk for oral health problems, many of which are preventable.
- Be aware of the oral health needs of pediatric patients with cancer, educate these patients and their families about prevention of oral health problems, and work in interprofessional teams to implement oral health assessment and fluoride varnish programs.
- Institute targeted training for oncology providers to perform oral assessments and fluoride varnish application for effective preventive dental care in pediatric patients with cancer.
to protect the oral health of pediatric patients with cancer. The current authors recommend that this project be implemented in other pediatric oncology centers, as well as in the acute care pediatric setting, using an interprofessional QI framework.

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REFERENCES


