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Evaluation of a Comprehensive Tobacco Cessation Curriculum for Dental Hygiene Programs

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Abstract: Dental health care providers continue to offer inconsistent and limited tobacco use cessation (TUC) interventions even though smoking-related morbidity and mortality continue to be a substantial health concern. Our purpose was to conduct a comprehensive, three-year (2003–06) TUC curriculum evaluation that included assessment of existing TUC education offered; dental hygiene educators' readiness to incorporate TUC education into the curriculum; and development of a pre-test/post-test assessment instrument and faculty development program. This curriculum study was carried out alongside a research study to evaluate the effectiveness of a peer-reviewed tobacco curriculum (*Tobacco Free! Curriculum*). Faculty members (baseline n=97; third-year n=42) from the twelve dental hygiene associate degree programs in Illinois participated in the study, which included a pre-treatment survey, six hours of on-site TUC curriculum training, and a post-treatment survey to determine the attitudes, perceived barriers, and current practices in tobacco education. Results showed an average increase of eighty-five minutes spent on tobacco education in the dental hygiene curriculum, a large positive increase in the percentage of faculty members who formally assessed the use of 5As and 5Rs (21 percent to 88 percent), and a dramatic increase (+100) in the percentage of faculty members who taught or included most of the thirteen TUC content areas following the introduction of the curriculum and training program.

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In the United States, it is estimated that 43.4 million (19.8 percent) adults currently smoke.¹ Although smoking has continued to decline, it is unlikely that the Healthy People 2010 objective of <12 percent will be reached.² For more than forty years, the medical and dental health care communities have had access to research confirming that smoking is a risk factor or strong risk factor for numerous forms of cancer, heart disease, and stroke.^{3,4} The evidence has steadily grown linking tobacco use as a major or significant risk factor to the development of oral cancer, periodontal diseases, tooth loss, dental caries in children exposed to secondhand smoke, and implant failure,⁵⁻⁹ and it remains the number one cause of preventable death in the United States.¹⁰

In response to the urgent need to reduce tobacco use, the U.S. Public Health Service (PHS) released its tobacco use and dependence guideline in 2000,¹¹ offering health care providers an evidence-based guideline for treating patients who use tobacco. This guideline is considered the gold standard for tobacco cessation treatment by establishing recommendations on how to effectively prescribe cessation medications. The guideline also stresses the value of utilizing all of the 5As (Ask, Advise, Assess, Assist, Arrange), if

possible, to achieve the greatest effect. A strong case using an extensive meta-analysis was made stating that the greater the intervention provided, the more likely the patient will succeed in his or her quit attempt. In 2008, a new updated version of the PHS guideline was released including instructions on how to use the newly released pharmaceutical varenicline, as well as a section on motivational interviewing techniques.¹² Unfortunately, there continues to be a tendency for health care providers to Ask and Advise but rarely go into Assessing their cessation needs; Assisting by discussing medications, a quit plan, or a quitline; or Arranging any follow-up. Hu et al. found that 89 percent of the dentists they surveyed were unaware of the PHS guideline and less than 20 percent spent three or more minutes on tobacco cessation per patient.¹³ In a national study of oral and maxillofacial surgeons, 21.9 percent of respondents reported that they assisted tobacco-using patients most of the time, but only 14.5 percent were aware of the PHS guideline.¹⁴ In both studies, the lack of training was cited by clinicians as a primary barrier to providing tobacco use cessation (TUC) services.

In response to the overwhelming scientific evidence of tobacco-related oral disease and the

availability of effective cessation strategies, dental and dental hygiene educators have been actively moving towards the inclusion of tobacco cessation information in their curricula. In a recent study, dental hygiene students reported an increased confidence in providing TUC following training.¹⁵ In similar articles, the dental schools at Indiana University¹⁶ and the University of Louisville¹⁷ reported innovative tobacco cessation programs utilizing mentoring by expert faculty members and standardized patients respectively.

This article reports descriptive data generated from a three-year (2003–06, plus a one-year extension), multifaceted tobacco education curriculum initiative that was implemented in the twelve associate-level dental hygiene programs in Illinois. The instrument development and baseline data from this project were published in the *Journal of Dental Education*¹⁸ in 2005 and the *Journal of Cancer Education*¹⁹ in 2006. The purpose of this article is to report the changes in tobacco cessation curriculum pedagogical practices from the beginning of the project (baseline) to the end (final post-test).

Project Background

In August 2003, we were awarded a three-year American Cancer Society-Illinois Division (ACS) grant titled “Assessing Effectiveness of Standard of Care Curriculum for Tobacco Education in a Dental Hygiene Context.” The aim of this three-year study (Figure 1) was to explore the state of tobacco education in the twelve programs; it included multifaceted formative and summative evaluations of a newly developed tobacco education curriculum, *Tobacco Free! Curriculum*. The components of the ACS project included a focus group for survey development, baseline (pre-test) and two follow-up (post-test) surveys, an initial six-hour on-site curriculum faculty development training program, the complete *Tobacco Free! Curriculum* on CD and in binder format, dental hygiene student post-graduation surveys, and ongoing resource updates. The six-hour faculty development training program included active participation, a question-and-answer period, and role-play in order to increase participants’ sense of being prepared to model and evaluate a behaviorally based TUC in a clinical setting.

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- Determine the needs and readiness of dental hygiene (DH) educators for incorporating tobacco prevention and cessation education and counseling into postsecondary curricula.
 - Develop an assessment instrument, based on the theory of planned behavior,^a which predicts that intention to engage in behavior change is a function of attitudes, social norms, and perceived ability to control both the internal (i.e., self-confidence) and external barriers to change.
 - Conduct a randomized controlled experiment to evaluate the effectiveness of a professionally developed tobacco curriculum (*Tobacco Free! Curriculum*) and accompanying technical support designed for DH educators in increasing the adoption of the curriculum and time spent training DH students on tobacco education.
 - Examine the diffusion of the intervention among DH graduates who participated in either the intervention or control programs to determine their intention and actual implementation of tobacco prevention and cessation education and counseling in their new practices.

^aSee Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991;50:179–211.

Figure 1. Aims of the ACS three-year tobacco cessation curriculum study

The *Tobacco Free! Curriculum*, originally named *Leading the Way*, was developed by one of the authors (JMD) in fulfillment of a nationally competitive Tobacco-Cessation Curriculum-Development Fellowship awarded by the American Dental Hygienists' Association (ADHA) Institute for Oral Health and GlaxoSmithKline, Inc. in 2002. The curriculum was developed in accordance with the American Dental Education Association (ADEA)'s dental hygiene competencies.²⁰ The ADEA dental hygiene APIE model (Assess, Plan, Implement, and Evaluate) was combined with the U.S. Public Health Service guideline 2000's 5As (Ask, Advise, Assess, Assist, Arrange) and the 5Rs (Relevance, Risks, Rewards, Roadblocks, Repetition) for those patients who are unwilling to quit. (Note that the most recent version of this guideline is the 2008 update.¹²) The aim of the curriculum was to provide dental hygiene faculty members with evidence-based, comprehensive teaching resources in order to prepare their students with the knowledge and skill sets to confidently and effectively offer tobacco-cessation interventions in school and clinical practice.

The curriculum contains six learning modules:

1. **Historical overview** and the importance of the media, chemical hazard of both smoked and smokeless tobacco, the addiction process, and behavioral aspects of nicotine addiction.
2. **General and oral-related diseases** such as oral cancer, periodontal disease, and lung cancer.
3. **Behaviorally based tobacco prevention and cessation interventions**, which included the 5As, 5Rs, brief motivational interviewing, stages of change, and active listening.
4. **Cessation medications** including the proper use of nicotine replacement therapy, varenicline, and bupropion.
5. **How to establish a clinical TUC program** in public or private practice, which included the use of the Internet, state quitlines, and referral to a tobacco treatment specialist.
6. **Community action activities** such as prevention activities at health fairs and schools and public health initiatives.

The content from these six learning modules informed the thirteen identified content areas used for the baseline and Year 3 participant surveys.

Following the TUC faculty training, the program director and faculty members were allowed to decide when and how they were going to utilize the TUC curriculum. The modules were designed to be flexible and could be incorporated into courses such

as periodontics, oral pathology, or clinic seminar over a two- or three-year period or sequentially in a six-part series. If course time did not allow, the curriculum could be offered as an independent learning module for self-instruction. Each module contained an overview, learning objectives, content outline, learning activities, assessment tools, references, presentation slides, and talking notes. The curriculum also included an instructor's manual (Faculty Guide), educational slides, and extensive educational resources. A toolbox was included to centralize all outlines, knowledge tests, competency rubrics, handouts, and reference materials.

An essential component of this curriculum was the establishment of a behaviorally based TUC program leading to clinical competence. Tobacco cessation interventions are multifaceted and are intended to bring about complex behavioral changes. As with any complex skill, students must be given the opportunity to synthesize and apply the information they have learned in the classroom. Without the opportunity to practice TUC intervention skills, clinicians often lack the confidence to provide this important service and may not carry it into clinical practice. The complete curriculum has been made available nationally and internationally via the Internet and can be downloaded at www.sah.siuc.edu/tobacco.

Methods

The original study design was a pre-test/post-test control group design with a second post-test conducted at the completion of the study. The study population consisted of faculty members (baseline n=97; third-year n=42) at the twelve community college-based dental hygiene programs in Illinois. Although we attempted to randomly assign programs to an experimental group, which would be trained on the curriculum in Year 2 of the study, and a wait-list control group, which would continue their existing curriculum in Year 2 and be trained on the curriculum in Year 3, we encountered several obstacles in maintaining this design. First, a small number of programs told us whether they could serve in the experimental or control group based on institutional constraints they were facing at the time, such as preparing for accreditation. Second, one program dropped out of the study after the baseline survey was completed because of loss of program faculty. Third, to accom-

moderate scheduling issues, we were training some of the experimental group programs in the third year, while training the control group in the same time frame. As a result, treatment differences were diffused across experimental conditions. Therefore, we are reporting only the overall changes in tobacco cessation pedagogy for both groups combined from Year 1 (baseline) to Year 3 (final post-test) after all programs were trained on the curriculum.

Participants and Measures

For the Year 1 baseline survey, ninety-seven faculty members from the twelve programs completed the survey. Of these, 55 percent were part-time (42 percent full-time; 3 percent did not answer), 88.7 percent were women, and 14.4 percent were program directors. The majority of participants taught both clinic and lecture courses (52.6 percent), whereas 44.3 percent taught only clinic courses and 2.1 percent taught only lecture courses. A B.A. or B.S. was the modal degree for 42.3 percent, followed by an M.A./M.S. degree (24.7 percent).

For the Year 3 follow-up survey, forty-two faculty members from eleven programs completed the survey (58 percent from the experimental programs and 42 percent from the control programs). Of these, 54 percent were part-time, 86 percent were women, and 17.1 percent were program directors. The modal degree was an M.A./M.S. for 34.1 percent, followed closely by a B.A./B.S. degree (31.7 percent). The majority of participants taught both clinic and lecture courses (52.5 percent), whereas 37.2 percent taught only clinic courses and 7 percent taught only lecture courses.

Among other questions, both the baseline survey and the Year 3 follow-up survey assessed the extent to which respondents covered various topics related to tobacco education in their curricula. Separate items addressed didactic and clinic classes. For the didactic questions, respondents indicated whether they covered each of thirteen tobacco education topics in their courses and, if so, how much time (in minutes) they spent on each topic. For the clinic questions, respondents indicated whether each of seven tobacco-related intervention skills was assessed formally, with a form, and how frequently the competency was assessed. Responses to the latter question were measured on a five-point scale ranging from 1 (never) to 5 (always). A variety of demographic questions were asked as well.

Research Procedure

As reported in an earlier publication,¹⁸ faculty members completed the baseline survey during meetings at their institutions, and these were collected by a member of the research team. Surveys and postage-paid return envelopes were given to faculty members who did not attend the meetings.

The follow-up surveys were distributed by mail to the program directors. For programs with sluggish returns, a member of the research team visited the program and obtained completed surveys. All participants received a \$25.00 gift certificate for completing the follow-up survey.

Results

Questions pertaining to coverage of tobacco topics in didactic courses and those pertaining to assessment of tobacco cessation competencies in clinic courses were analyzed separately. The results for the former are based on faculty members who taught lecture (didactic) courses (baseline study, $n=53$; Year 3 follow-up study, $n=24$), whereas results for the latter are based on responses from faculty members who taught clinic courses (baseline study, $n=94$; Year 3 follow-up study, $n=37$). (The results for the baseline data presented here do not match those reported by the authors in a previous publication,¹⁸ because the current analyses were based on a more precise subset of participants so that comparisons with the follow-up survey results would be more meaningful.)

Tobacco Topics Covered in Didactic Courses

The tobacco-related material in all of the thirteen identified content areas was covered by at least one faculty member (in one program) at both the baseline and the three-year follow-up: historical/social, tobacco-related general diseases, tobacco-related oral diseases, nicotine dependence, tobacco cessation strategies, 5As and 5Rs, stages of change, brief motivational interviewing (BMI), FDA-approved smoking cessation pharmacotherapies, comprehensive tobacco intervention, community-based tobacco control, and personal tobacco use by students. Moreover, dramatic increases in the percentage of faculty members who taught each of these topics were observed from the baseline to the three-year follow-up. The percentage

of didactic faculty members who taught each of these topics can be found in Table 1.

Almost all content areas saw more than a 100 percent increase following the intervention. Only those topics that were traditionally presented in the dental hygiene curriculum (general pathology and tobacco-related pathology) had less than a 100 percent increase. These figures show a strong increase in content areas included in the curriculum as compared to pretraining in the *Tobacco Free! Curriculum* two years before.

The average number of minutes spent on each topic area by respondents who identified themselves as lecture faculty is also presented in Table 1. Pre-training baseline averages show the highest number of minutes spent on the historical and social significance of tobacco (forty-one minutes), comprehensive tobacco intervention strategies (thirty-eight minutes), and tobacco-related oral diseases (thirty-four minutes) content areas. In the final survey (year 3), time spent on the historical and social significance of tobacco and on comprehensive tobacco interventions decreased, but gains were observed on all of the other topics, most notably the 5As and 5Rs (forty-four minutes), tobacco cessation strategies (forty-seven minutes), and stages of change (thirty-six minutes). On average, participants reported spending over

eighty-five more minutes on tobacco control topics at the three-year follow-up than was reported at baseline.

Tobacco Cessation Competencies Assessed in Clinical Courses

Faculty members who taught clinic courses reported that all seven tobacco cessation competencies were assessed formally by some faculty members (see Table 2). The highest percentage of clinic faculty members assessed whether the patient uses tobacco and associating head and neck exam assessment to tobacco use at baseline (52 percent and 48 percent, respectively), but gains were seen in the percentage of faculty members who assessed these competencies at the three-year follow-up (78 percent and 68 percent, respectively). There was a large, positive change in the percentage of clinic faculty members who assessed providing cessation resources and follow-up (408 percent change); using brief motivational counseling (345 percent change); following the 5As and 5Rs (256 percent change); and discussing tobacco cessation/prevention strategies with clients (230 percent change). There was very little change in the rated frequency with which each of the competencies was formally assessed.

Table 1. Changes in coverage of tobacco control topics in dental hygiene didactic courses from baseline to Year 3 follow-up

	Percentage of Lecture Faculty Who Teach Topic			Average Time Spent on Topic (minutes)			
	Baseline (n=53)	Year 3 (n=24)	% Change	Baseline	Year 3	Difference	
Historical/social significance of tobacco	16.98	79.17	402.46	40.83	27.27	-13.56	
Tobacco-related general diseases	45.28	87.50	85.12	28.54	39.58	11.04	
Tobacco-related oral diseases	49.06	87.50	74.54	34.26	37.73	3.47	
Nicotine dependence	20.75	79.17	245.44	21.25	33.75	12.50	
Tobacco cessation strategies	20.75	83.33	287.88	31.36	46.79	15.42	
Tobacco prevention strategies	13.21	83.33	384.85	30.56	32.73	2.17	
5As and 5Rs	20.75	87.50	289.55	24.33	43.64	19.30	
Stages of change	11.32	79.17	452.70	21.25	35.91	14.66	
Brief motivational interviewing	11.32	83.33	405.95	17.14	25.45	8.31	
Cessation pharmacotherapies	3.77	87.50	549.24	20.50	32.73	12.23	
Comprehensive tobacco intervention	3.77	83.33	1291.36	37.50	27.14	-10.36	
Community-based tobacco control	11.32	75.00	615.52	29.29	31.43	2.14	
Personal tobacco use	34.91	83.33	136.83	17.14	25.42	8.27	
				Sum	353.95	439.57	85.59

Note: Ns for the faculty members at baseline reporting the amount of time they spent on the topic ranged from six to twenty-seven, whereas for the follow-up survey, Ns ranged from seven to fourteen.

Table 2. Changes in assessment of tobacco cessation competencies in clinic from baseline to Year 3 follow-up

	Percentage of Clinic Faculty Who Assess Competency Formally			Frequency of Assessment		
	Baseline (n=94)	Year 3 (n=37)	% change	Baseline	Year 3	Difference
Assessing whether the patient uses tobacco	52.13	78.38	50.36	4.05	4.48	0.43
Associating head and neck exam findings to tobacco use, if relevant	47.87	67.57	41.14	4.59	4.39	-0.21
Assessing stages of change among tobacco-using clients	20.21	32.43	60.46	4.25	4.03	-0.22
Discussing tobacco cessation/prevention strategies with clients	10.64	35.14	230.27	3.77	3.93	0.16
Following the 5As and 5Rs for conducting tobacco cessation counseling	5.32	18.92	255.68	3.67	3.50	-0.17
Using brief motivational counseling	4.26	18.92	344.59	3.88	3.38	-0.50
Providing cessation resources and follow-up	5.32	27.03	408.11	3.58	3.63	0.05

Note: Ns for the faculty members reporting the amount of time spent on the topic at baseline ranged from eighteen to fifty-nine, whereas for the follow-up survey, Ns ranged from twenty-four to thirty-one.

Discussion

Assessments of the state of tobacco education in U.S. dental/dental hygiene curricula have primarily consisted of students' perceptions and receptivity to tobacco cessation curricula^{15,21,22} and national surveys of tobacco education in dental/dental hygiene schools.²³⁻²⁵ Our unique prospective study followed both clinical and didactic dental hygiene faculty members over a three-year period determining the time spent, content offered, and competencies assessed before and after faculty training in a comprehensive tobacco education program, the *Tobacco Free! Curriculum*.

To the credit of the participating educators, the results of the baseline survey indicated that many of them were already presenting tobacco-related health effects and various levels of cessation interventions in their didactic and clinical courses. Of particular importance is the substantial increase of formal (i.e., with a form) assessment of specific elements in a comprehensive tobacco intervention (Table 2). While faculty members reported including TUC in the classroom, only limited assessment in the clinical setting was being conducted prior to the curriculum intervention. While dental hygiene educators have autonomy to decide what is formally assessed in the clinical setting, priority may be given to the knowledge and skills that are deemed essential to clinical practice. Since the importance and value of TUC are widely accepted in the field of dental

hygiene, it may be reasonable to advocate the inclusion of tobacco cessation as a component of required clinical evaluations to ensure that students will be competent in this essential skill. In the areas in which foundational tobacco content such as the effects of tobacco on oral tissues and periodontitis were strong in the baseline survey, they remained strong in the third year. However, new topics such as the PHS guideline 5As and 5Rs greatly increased in both the percentage of faculty members (21 percent to 88 percent) and minutes spent (twenty-four to forty-four minutes) by Year 3.

This study did not separate the potential effect of the six-hour onsite faculty training on curriculum implementation from the *Tobacco Free! Curriculum* materials if provided alone. During the training, faculty members did express a high degree of interest in a more comprehensive TUC program that included cessation medications, formal clinical competencies, and effective tobacco prevention community outreach tools. It is possible that there existed a synergistic effect of knowledge acquisition, role-playing, and opportunity to strategize implementation that may have enhanced the overall adoption of the TUC program. The training format may have allowed the entire faculty of these programs to learn, digest, practice, discuss, and plan how to implement this new information as a unit. In addition, a TUC coordinator was designated by the program director at the conclusion of the training as a contact person for future updates and to encourage follow-up.

Participants in our focus group indicated that the lack of time in an already full curriculum was the primary reason for not including comprehensive TUC. This finding was consistent with research examining other content areas such as family violence²⁶ and ergonomic education²⁷ as well as TUC studies^{24,25} in which faculty members reported a lack of training and lack of time to develop new material as primary barriers to adoption of new information. Removing the barriers of lack of time or expertise by providing faculty development and ready-made educational units may move more complicated, behaviorally based interventions such as tobacco cessation into fundamental curriculum instruction faster than that which we have experienced in the past.

These results suggest that the flexible components of the *Tobacco Free! Curriculum* combined with faculty training may have motivated both clinical and didactic faculty members to become more involved with tobacco education resulting in more minutes spent overall and more faculty members involved in formal competencies. This positive effect has also been reported in studies focusing on faculty members' tobacco education training for nurses²⁸ and nurse practitioners.²⁹

The primary strength of this study lies in the very committed dental hygiene faculty members who were willing to take the time to participate in this long-term study and make an earnest effort to integrate a comprehensive tobacco cessation curriculum into an already full program. Their level of interest and enthusiasm speaks highly of their commitment to move this extremely important topic from an "extra topic if there is time" to an essential component in their curricula.

The primary weakness of this study lies in the inability to train and then evaluate the control and experimental schools as discrete groups. Each program offered its TUC unit(s) in unique and varied time frames during its professional sequence. Therefore, the six schools in the treatment group may not have been able to integrate the material until sometime the following year, whereas the control programs may have started teaching the material the next week. In addition, participant mortality due to faculty turnover and personal issues could not be controlled for and resulted in a reduced participant number in Year 3.

Future Research Directions

Future research directions may include the reproduction of this study in dental hygiene programs nationwide to explore the level of current tobacco education and potential expansion of a comprehensive TUC curriculum based on the PHS 5As and 5Rs. Another direction may be to examine the process of how a new or extra subject such as tobacco cessation is integrated or diffused through a health care curriculum. This may provide a guideline or best-practice template for educators to follow. Identifying best practices for the diffusion of new curricular innovations may assist in not only the establishment of comprehensive tobacco cessation education but in moving forward other important health care issues such as diabetes, obesity, and family abuse interventions into the dental setting.

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