

A Randomized Controlled Trial of the Effect of Standardized Patient Scenarios on Dental Hygiene Students' Confidence in Providing Tobacco Dependence Counseling

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Introduction

The Centers for Disease Control and Prevention (CDC) estimates that approximately 46 million Americans currently smoke cigarettes.¹ Each year, smoking or exposure to secondhand smoke accounts for 443,000 premature deaths and the development of 8.6 million serious illnesses.² Health issues arising from cigarette smoke account for approximately \$96 billion in medical expenses each year in the U.S.²

The harmful effects of smoking cigarettes are more clearly understood, including harm among non-smokers who are exposed to second-hand cigarette smoke either regularly or briefly.² Complications from smoking and secondhand smoke include serious diseases such as cancer, heart disease, stroke, sudden infant death syndrome, respiratory diseases and infections.¹ Since the 1970s, dental professionals have known the signs and symptoms related to tobacco use, including increased risk for periodontal health, delayed wound healing, discoloration of teeth and restorative materials, leukoplakia, hairy tongue and oral cancers.³

The best way to reduce the risk of smoking-related illness is to promote smoking abstinence and cessation. Many governmental and independent organizations offer programs to assist patients with tobacco cessation. Local and state governments are also involved in this process by incorporating smoke-free policies and offering control programs that include comprehensive

Tobacco Dependence Counseling (TDC). A major component of these TDC programs includes education on the effects of smoking and quitting.²

Abstract

Purpose: Dental hygienists report a lack of confidence in initiating Tobacco Dependence Counseling (TDC) with their patients who smoke. The purpose of this study was to determine if the confidence of dental hygiene students in providing TDC can be increased by Standardized Patient (SP) training, and if that confidence can be sustained over time.

Methods: This 2-parallel group randomized design was used to compare the confidence of students receiving SP training to students with no SP training. After a classroom lecture, all subjects (n=27) received a baseline test of knowledge and confidence. Subjects were randomly assigned to test and control groups with equivalent mean knowledge scores. The test group subjects participated in a SP TDC session. Both groups gained parallel experience to treating patients who were smokers and giving TDC in clinical scenarios during the 6 month time period. One week end-training and 6 month post-training assessments were administered to both groups. ANCOVA compared mean confidence scores.

Results: End-training scores at 1 week showed a statistically significant increase ($p=0.002$) in overall mean confidence following SP training for individuals in the test group. The 6 month follow-up test results showed a slight decline in confidence scores among subjects in the test group and an overall gain in confidence for control group participants. However, overall confidence scores were comparable for the groups.

Conclusion: SP training improved dental hygiene students' initial confidence in providing TDC and was sustained, but not to a significant degree. Clinical experience alone increased confidence. Further studies may help determine how the initial confidence gained by SP training can be sustained and what the role of clinical experience plays in overall confidence in providing TDC.

Keywords: Tobacco, Tobacco Dependence Counseling, Tobacco Dependence Education, dental hygiene education, dental hygiene students, standardized patients, Confidence

This study supports the NDHRA priority area, **Clinical Dental Hygiene Care:** Develop and test interventions to reduce the incidence of oral disease in special at-risk populations (diabetics, tobacco users, cardiac patients and genetically susceptible).

A significant role of an oral health care provider is to assess risk factors for tobacco-related illness and to examine patients for tobacco-related oral diseases, such as periodontal disease and oral cancer. The dental hygienist has an integral role in this process and is ideally positioned to provide TDC for smokers as demonstrated in previous studies of dental health professionals. Success rates of patients in the Indiana University Nicotine Dependence Program who have made attempts to quit in response to a quit message from their dental professionals has been reported as high as 58%.³ Another study that included an 8 week smoking cessation intervention by a dentist demonstrated the acceptability of the dental intervention was very high, with 94% of the subjects agreeing to the appropriateness for this type of TDC by the dental team.⁴

Health care professionals generally believe that TDC should be provided to all patients; however, studies show they do not routinely offer these interventions.⁵⁻⁷ A general lack of training among health care professionals in prevention and TDC has been documented.⁸⁻¹³ However, when training is provided, its long-term effects may not be sustained. For example, in a study of medical students, Fried et al found that when health care providers felt more prepared, they were more likely to provide TDC. However, students often felt unprepared to implement TDC upon graduation.^{14,15} This may imply that although they had obtained the necessary knowledge to provide the counseling during their education, they did not either retain the knowledge or have a high level of confidence in providing the counseling. Confidence levels may play a large role in inhibiting one from providing TDC to patients. A study of Kentucky dental hygienists showed that 63% of respondents felt somewhat comfortable discussing tobacco cessation with their patients; however, 53% were either not at all comfortable assisting patients with the development a tobacco cessation plan or not too comfortable doing so (14% and 39%, respectively).¹⁶ Methods to help improve health professionals' skills in TDC include the use of the Stages of Change Model developed by James Prochaska and Carlo Di Clemente, which theorizes that, when the patient's Stage of Change is recognized, the success of the quit attempt will increase.¹⁷ Also, standardized patients (SPs) have been used to improve health care student performance and confidence in a variety of clinical encounters including TDC.^{6,18-21}

Dental schools have employed SPs in various aspects of training, including Tobacco Dependence Education (TDE) curriculum.²² However, there are

no studies that report the use of SPs in dental hygiene TDE curriculum. Therefore, it is not known to what degree dental hygiene students can benefit from SP training, what methods for incorporating SP training in dental hygiene programs are ideal or if there are special circumstances that dental hygiene education must consider when using SPs for TDC training. Also, the long-term benefits of SP training have not been measured in this population.

This pilot study was designed to assess how SP experiences affect dental hygiene student confidence in providing TDC. The purpose of this study was to determine if the confidence of dental hygiene students in providing TDC can be increased by SP training, and if that confidence can be sustained over time.

Methods and Materials

This study was approved by the University of North Carolina (UNC) Institutional Review Board. All baseline and end-training tests in this study were assessed for readability and reliability only – no validity measures were performed. Figure 1 demonstrates the study design.

Phase 1

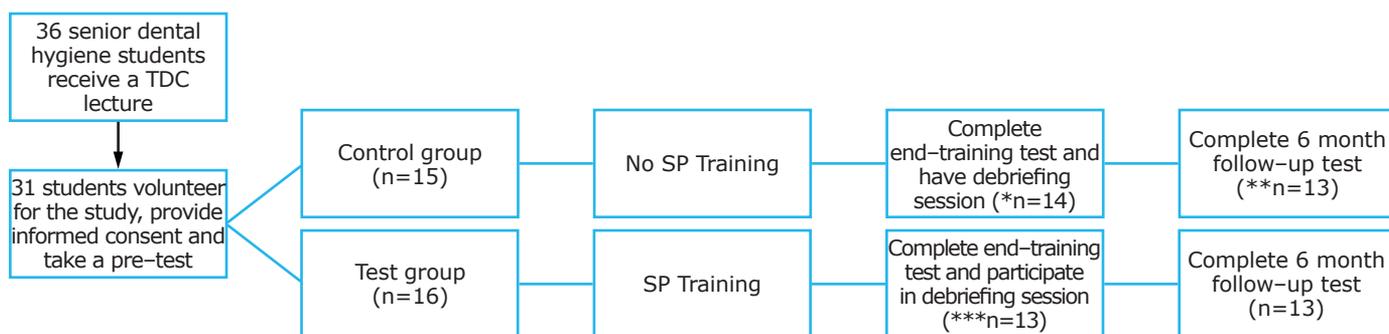
Baseline: As part of the standard curriculum, dental hygiene students receive 3 hours of tobacco cessation education. For the purposes of this study, a 3 hour TDC lecture that addressed use of both Prochaska and DiClemente's Transtheoretical Stages of Change¹⁷ and behavior modification interviewing techniques was added to the curriculum of 36 senior dental hygiene students. Following this lecture, the study was explained to all 36 students. Of the convenience sample (36 dental hygiene students), 31 (86.1%) volunteered to participate. Each provided written informed consent.

One week after the TDC lecture, volunteers were administered a baseline evaluation which consisted of 2 parts. A Visual Analog Scale (VAS) that ranged from 0 to 10 was used to score confidence in performing a series of 16 TDC-related tasks. Confidence was assessed in 3 domains:

1. Initiating a dialogue with patients on their smoking habits
2. Identifying the patient's current stage of change
3. Follow-up on the patient's progress

Each VAS was scored by 2 calibrated examiners using a 100 mm ruler. To measure the knowledge levels

Figure 1: Study design assessing the influence of SP training



*1 subject in the Control Group dropped out of the study

**1 subject in the Control Group did not complete the 6 month follow-up test

***3 subjects in the Test Group dropped out of the study and did not participate in the SP training

for TDC, subjects were given a series of 4 scenarios involving smokers in various stages of change. They were asked a series of 15 multiple choice questions to assess their knowledge in 3 domains:

1. Identification of stages of change characteristics
2. TDC referral and follow-up procedures
3. Tobacco dependence resources available to the patient

ANCOVA was used to compare the average scores of the 2 groups after adjusting for effect of the baseline scores. SAS 9.1 statistical package was used to analyze all data.

Randomization: Knowledge scores were calculated as percent correct of 15 multiple choice questions. The knowledge baseline was used as a method to help assure that baseline knowledge would be equivalent in both test and control groups. To remove knowledge as a possible confounder for variation in confidence scores, the test and control groups were randomized using equal numbers of subjects scoring above and below the median score on knowledge. The resulting test group had 16 subjects and the control group had 15 subjects with similar knowledge backgrounds on TDC. The test group was assigned to participate in a single SP TDC session.

Standardized Patient Sessions: This study utilized the UNC School of Medicine's Clinical Skills and Patient Simulation Center for SP training. This is a facility used for teaching and assessing clinical skills to students in the UNC medical, nursing and pharmacy schools. It is an 18,000 square foot center that includes 15 patient examination rooms, a room for viewing student encounters, a 30 person classroom, a 10 person auxiliary classroom and a patient simulation lab with a wide array of simulators. Each SP session is recorded by 2 cameras – all

video and written session information is recorded by the B-Line Medical Clinical Skills System for assessments. The UNC Clinical Skills and Patient Simulation Center is a member school of the Association of Standardized Patient Educators (ASPE).

SPs are professional actors that are trained to portray patients in scenarios specific to the academic goals of the students receiving the training.²² The 4 SPs in this study portrayed patients returning to their dental hygienist for a second visit following an initial exam as a new patient. Each patient had identical documentation that included medical history, radiographs showing moderate periodontitis and an intra-oral photograph of a suspicious lesion on the lateral border of the tongue. The patient reported a history of smoking 1.5 packs of cigarettes per day for 11 years and reported shortness of breath. The actors were given a prepared text and participated in a training session with SP center staff and study investigators. All aspects of smoking history, health and dental issues were discussed. This calibration was designed to reduce variation among actors and to increase the chance that all subjects would have a similar experience with their SP.

Subjects in the test group reported to the SP training center and were sequestered in a classroom. They received a 15 minute orientation to the SP session process. Subjects were randomly assigned to 1 of 4 SPs by the SP training center staff. Each subject entered the examination room upon verbal cue from the facility staff. The session simulated that of a dental patient and dental hygienist in a general office setting. There were no absolutes in method or dialogue. The subjects were to approach the SPs as returning patients to their practice and to address the patient's situation as presented to them.

The 15 minute SP session was observed remotely through cameras in each examination room. With

subject consent, the session was videotaped to allow for viewing by the subject and/or instructor for education enhancement. To reduce contamination bias, the subjects were asked to exit the building immediately following completion of their session and to have no contact with their sequestered classmates. All subjects were instructed not to discuss their experience until the debriefing session the following week.

End-training Test (1 week post-training): Six days following the SP training session, the first end-training test was administered to both test and control subjects. End-training test content was identical to the baseline test with slight variation in item sequence and case study details. The purpose of this evaluation was to determine changes in self-reported confidence in TDC skills.

Phase 2

Six Month Follow-up Test (6 months post-training): Six months following the end-training test and immediately prior to graduation, a second post-test was administered. This 6 month follow-up test assessed self-reported confidence using the same VAS method. In addition, they were asked about their actual TDC experience with patients in the clinical setting in the months following the conclusion of the initial phase of the study. Subjects were asked questions, including the number of patients assigned who were smokers, number of patients for whom they provided TDC, if they felt TDC was a part of the dental hygienist's job, if they felt they had enough experience to provide TDC, and if they planned on participating in continuing education courses on TDC following graduation.

Results

Thirty-one dental hygiene students originally enrolled in the study, however, 4 withdrew consent (3 from the test group and 1 from the control group) and did not complete the study. One control group subject did not complete the 6 month follow-up test, resulting in n=13 for the control group at time of the 6 month follow-up. Both Intent to Treat (ITT) and Efficacy Analyzable (EA) statistics were completed. ITT results are being provided as there were no differences in interpretation between ITT and EA.

Table II compares the changes for test and control groups in confidence scores for each domain

Table II: Self-perceived confidence assessment results between Control and Test Groups for baseline, end-training and the 6 month follow-up

Confidence Domain	Baseline			
	Test		Control	
	Mean	Standard Deviation	Mean	Standard Deviation
Initiate Dialogue	6.2	1.3	6.1	2.1
Identify Stages	5.9	1.7	5.8	2.2
Follow-up	6.3	2.1	5.7	2.4
Overall	6.1	1.4	5.9	2.1
Confidence Domain	End-Training			
	Test		Control	
	Mean	Standard Deviation	Mean	Standard Deviation
Initiate Dialogue	8.4	1.2	7.6	1.6
Identify Stages	8.2	1.3	6.6	2.6
Follow-up	8.3	1.6	7.3	2.1
Overall	8.3	1.2	6.9	2.1
Confidence Domain	Six month follow-up			
	Test		Control	
	Mean	Standard Deviation	Mean	Standard Deviation
Initiate Dialogue	8.5	1.2	8.4	0.9
Identify Stages	7.6	1.5	7.7	1.5
Follow-up	8.2	1.5	8.4	1.2
Overall	8.0	1.3	8.1	1.2

ANCOVA was used separately for each confidence domain with group, initial domain score and interaction between group and initial domain as explanatory variables. Each item was measured on a visual analog scale from 0 to 10, with 0 representing no confidence and 10 representing very confident.

between the baseline, end-training and the 6 month follow-up tests. Table III depicts the estimated p-values for these changes. Initial end-training test scores showed the test group exhibited statistically significant higher confidence scores in the ability to identify the stage of change (p=0.04) and in overall confidence (p=0.002) compared with the control group. Both the test and control groups showed an initial increase for confidence in all 3 domains and overall confidence following initial training. However, those in the test group showed an overall higher amount of confidence change.

Confidence levels at the 6 month follow-up varied. The test group exhibited a loss of confidence from end-training in 2 domains and the control

Table III: P-Values for explanatory variables comparing baseline, end-training and 6 month follow-up tests

Confidence Domain	*End-Training			**Six Month Follow-Up		
	Pre-score	Group	Interaction	Pre-score	Group	Interaction
Initiate Dialogue	0.001	0.31	0.54	0.04	0.33	0.29
Identify Stages	0.0001	0.006	0.04	0.06	0.29	0.29
Follow-up	0.0001	0.06	0.15	0.33	0.32	0.39
Overall	0.0001	0.002	0.37	0.008	0.09	0.09

Students in the Test group showed a significant difference in Overall Confidence levels ($p=0.02$) and in the confidence to identify the Stage of Change a patient is in ($p=0.04$) between Baseline and End-Training.

*P-Values comparing Baseline and End-training Scores

**P-values comparing End-training and Six Month Follow-up Scores

Table IV: 6 month follow-up survey response comparison

Question/Statement	Question Selection Options	Control Group Responses (n=13)	Test Group Responses (n=13)
Number of patients assigned to you were current smokers	None	0	0
	1 to 3 patients	15% (n=2)	31% (n=4)
	4 to 6 patients	38% (n=5)	23% (n=3)
	>6 patients	46% (n=6)	46% (n=6)
Number of patients that you provided TDC to	None	7% (n=1)	7% (n=1)
	1 to 3 patients	38% (n=5)	46% (n=6)
	4 to 6 patients	38% (n=5)	23% (n=3)
	>6	15% (n=2)	23% (n=3)
Do you think TDC is part of the job of a dental hygienists?	Yes	100% (n=13)	100% (n=13)
	No	0	0
Do you think you have enough experience to provide TDC to your patients who smoke?	Yes	69% (n=9)	85% (n=11)
	No	7% (n=1)	0
	Maybe, still not sure	23% (n=3)	15% (n=2)
Do you plan to take CE courses on TDC after graduation?	Yes	85% (n=11)	69% (n=9)
	No	15% (n=2)	31% (n=4)

group gained in all domains. The 6 month overall confidence levels were 8.0, 1 and 3 SD for the test group and 8.1, 1 and 2 SD for the control group. The test group had higher scores in confidence in the ability to initiate dialogue, but lower scores in confidence from the end-training evaluation (8.3, 1 and 2 SD and 8 and 1.3 SD, respectively).

The 6 month follow-up survey included additional questions regarding clinical experience and opinions regarding TDC in the 6 months following the initial training. Table IV compares the control and test groups responses to these questions. In addition, those in the test group reported additional information regarding their SP training experience. Of the test group, 69% (n=9) reported that the SP training improved their skills in providing TDC, and 85% (n=11) stated that the SP training improved their confidence in TDC.

Discussion

Dental hygienists report multiple barriers inhibiting routine TDC for patients, including lack of time, lack of reimbursement and concerns about the effectiveness of intervention.¹⁶ Additionally, dental hygienists may be more likely to provide TDC when they feel prepared and are confident in their TDC skills.¹⁴ The use of SPs may be helpful in increasing student confidence during training in TDC, therefore increasing the likelihood of training a confident practitioner to provide TDC to their patients clinically. In this study, subjects who participated in a TDC lecture followed by a SP training session with a smoking patient in the Contemplation Stage of Change initially experienced a statistically significant increase in overall self-reported confidence in their ability to deliver TDC when compared to their peers who partook in the lecture alone. These findings are consistent with earlier studies that reported an increase in self-reported confidence following a TDE in

lecture and SP training format of a combined group of medical residents, dental students, nursing students and dental hygienists. However, data specific to the dental hygiene students were not reported.²²

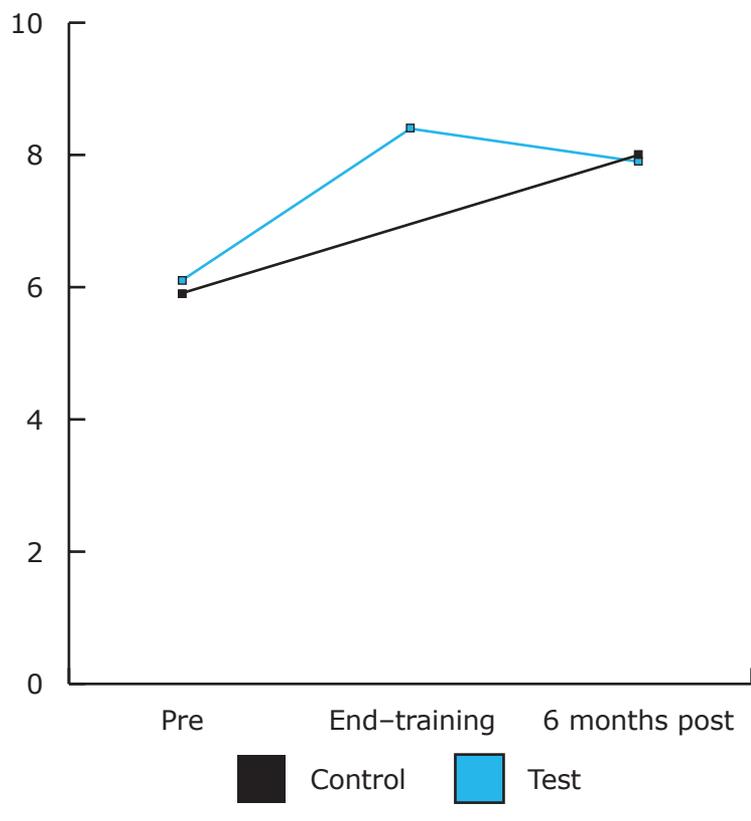
The purpose of the SP Program is to give students the ability to practice and develop competency in professional behaviors and clinical skills prior to treating actual patients that smoke. This type of learning is supported by the work of Kolb in whose 4-stage learning cycle theorizes that experience leads to reflection from which concepts are conceived.²³ These concepts guide the learner through active experimentation and the choice of new experiences. In concrete experiences, such as SP training, the learner actively experiences the learning opportunity and moves on to reflect back on the experience (reflective observation).

Similarly, Rogers' interpretation of Experiential Learning theorizes that learning is facilitated when the learner fully involves themselves in the process, controlling the direction and nature of the process, is able to face the task at hand through direct confrontation and where progress or success is measured best through self-evaluation.²⁴ The SP experience would give the learner the ability to actively learn by doing and practicing the skill.

When asked for perceived barriers to providing TDE, faculty and students report lack of training and confidence.¹⁴ Ramseier et al reported several barriers to TDE offered to dental hygiene students. Among these were dental hygiene educators' lack of integration between the didactic content and the clinical practice, a failure to provide supportive intervention skills and lack of faculty expertise in teaching TDE.²⁵ Researchers in the current study hypothesized that confidence in TDC could be improved by offering a method of integrating the didactic information and clinical application for the dental hygiene student. Results from the end-training test showed that both the test and control groups exhibited an initial increase for confidence in all 3 domains and overall confidence following initial training. However, those with the SP experience showed an overall higher amount of confidence change, supporting the initial hypothesis.

Although initial end-training results showed a significant gain in confidence for the test group, the 6 month follow-up evaluations revealed an overall loss of confidence for subjects in the test group and an increase in confidence for the control group. Comparison of the overall confidence levels for the test and

Figure 2: Comparison of the mean overall confidence scores from pre (baseline), end-training and 6 months post (6 month follow-up) between Control and Test Groups



control groups showed little difference with mean values at 8 and 1.3 SD and 8.1 and 1.2 SD (Table III). Figure 2 shows a comparison of the confidence scores between groups from baseline, end-training and the 6 month follow-up. This would indicate that although the initial overall confidence scores of the test group were higher than those in the control group, control group subjects continued to gain confidence in the 6 months following training, without having the initial SP training. The test group subjects did show a slight increase in confidence in the ability to initiate dialogue, which may suggest their clinical practice gave them the experience, and therefore confidence, to start a conversation regarding smoking cessation with their patients.

Confidence scores for those in the control group may have increased over the 6 month period as a result of patient experience. Subjects in both groups gained experience working with patients who were smokers in the clinical setting. And though both groups had similar experiences in the number of patients that smoked, some students may have had a better learning experience than others with particular patients. A positive patient experience may give a student additional confidence, whereas a negative patient encounter may cause the student to feel a lack

of confidence and/or desire to initiate TDC. Subjects in the test group may have felt an initial confidence boost related to their SP experience; however, individuals in the control group may have also gained clinical confidence as they worked with smoking patients in the clinical setting. This may indicate that practical experience may be more impactful long-term on a student's confidence in TDC than SP training. With this information, dental hygiene programs may see merit in increasing the exposure that students have to working patients who are smokers in the clinical setting in order to increase their confidence and ability in giving TDC.

Another factor that may have influenced test group confidence levels was that the SP experience only focused training in 1 of the Stages of Change, Contemplation Stage of Change. The test group individuals may have initially increased confidence by gaining the patient experience; however, not all patients they treat will display similar characteristics or be in the same stage of change as the SP. It is also noteworthy that test group subjects only had 1 SP experience, rather than multiple visits with patients in various stages of change.

In evaluating attitudes toward TDC at the 6 month follow-up, 69% (n=9) of the test group and 84% (n=11) of the control group reported that they planned on taking continuing education courses related to TDC. One hundred percent of both groups agreed that providing TDC is a part of a dental hygienists' role. This is a positive and noteworthy response, as it shows by having the presence of study in the curriculum it reinforced to the class that smoking cessation was an integral part of the dental hygiene process of care. Subjects became more aware of their relevance in TDC and the study proved to be beneficial by placing emphasis on the importance of TDC to dental hygienists.

Subject response in the knowledge assessment reflected awareness of 1-800 quit line telephone numbers (100%) and the knowledge to refer patients for further counseling (97%). TDE instruction in the schools of dental hygiene often includes ADHA's Ask, Advise, Refer counseling strategies, and generally incorporate stages of change behavior modification techniques.²⁶ On the knowledge portion of the baseline and end-training tests, the subjects were not specifically asked to define or list the 5 A's or the Ask, Advise, Refer protocol, but they were given scenarios in which knowledge of these actions steps was necessary in order to answer correctly.

Feedback on SP Training

This study is the first to report on dental hygiene

student feedback on SP training. Students in this study were given the opportunity to submit written anonymous remarks, questions and evaluations. In addition, a group debriefing was conducted during which the majority of subjects reported feeling anxious when meeting the SP but were soon comfortable and felt overall that the encounter was much more comfortable than TDC with real patients they might encounter in their clinical education environment. They also reported that they would have appreciated the opportunity for self-assessment. They agreed they would participate again and would benefit from additional sessions.

Study Limitations

Small sample size is one limitation of this study. Other biases inherent in a study of this type include attention bias that occurs because people who are part of a study are aware of their involvement and, as a result, may give more favorable responses or perform better than people who are unaware of the study's intent. Contamination bias occurs when members of the control group inadvertently receive the treatment or are exposed to the intervention, thus potentially minimizing the difference in outcomes between the 2 groups. Attempts to control this bias were to minimize the time between the baseline and end-training tests; however, the 6 month follow-up test was administered 6 months after the initial assessment. Contamination was controlled during the SP training session by requiring subjects to leave the facility without contacting subjects who had not completed the training. Withdrawal bias occurs when subjects who leave the study (drop-outs) differ significantly from those that remain. This study had 4 drop-outs following initial consent for reasons that included schedule conflict and personal health. None of the drop-outs displayed any varying characteristics from the rest of the subjects in the study. Proficiency bias occurs when the interventions or treatments are not applied equally to subjects due to skill or training differences among personnel, in this case the SP actors. Attempts to reduce this bias included conducting a mock training session to calibrate the SPs to help assure they each were equally proficient in portraying the dental patient scenario.

Because this was a pilot study, limitations were easy to identify, as well as ways to improve additional testing in this subject matter. For a follow-up study design, an ongoing data collection during the 6 months following initial training is supported, to gain objective data rather than relying on student subjective memory. Asking subjects to remember patient data from a 6 month time period may have resulted in inaccuracies in reported patient numbers related to smoking exposure and TDC rendered. It would be more appropriate

to include a study design that more closely monitored subject experience with these patients in clinic and followed-up with them on a timed schedule. Additional studies are needed to determine the appropriate number and type of SP sessions before stating that SP training is recommended routinely in dental hygiene curriculum to increase long-term confidence levels.

Cost may impact the feasibility of implementing a SP program into a curriculum. The cost for implementing this study was approximately \$2,000. Although initial costs are high due to training of the SPs, once they are trained, the costs may go down because the same actors may be utilized again, and once the curriculum is developed, those costs will not recur. Investing in 1 SP session may not be worth the cost; however, if utilizing the SPs for multiple sessions, it may prove to be cost-effective. The benefits of keeping the course in the curriculum would have to be weighed against the costs of the additional fees.

Conclusion

This pilot study aimed to see how SP experiences would affect students' confidence in giving TDC. Results indicate that SP intervention or an increase in practical experience will help improve confidence in providing TDC that may translate

into higher levels of TDC in private practice. Future studies of SP training for TDC that include more integrated clinical application and reinforcement of TDC may produce more improved results. Long-term studies of graduates are also needed to determine if the self-confidence gained while in school will translate into an increase in TDC interventions in practice.

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