

# Educating Physical Therapist Students in Tobacco Cessation Counseling: Feasibility and Preliminary Outcomes

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**Background.** Smoking is the leading preventable cause of chronic disease and premature morbidity. People with physical disabilities experience elevated smoking prevalence when compared with their nondisabled peers. The physical therapy profession is dedicated to meeting needs

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of people with physical disabilities, yet most physical therapists (PT) do not typically provide tobacco cessation interventions. Similar deficits exist among other health professions, creating a demand for improved services to address smoking-related health burdens. Within other health professions, insufficient tobacco cessation counseling (TCC) education has been linked to a lack of interventions and may account for similar deficits in physical therapy practice.

**Study Purpose.** Goals were to assess feasibility, implementation, and results of a tailored TCC educational program for entry-level physical therapist (PT) students.

**Subjects.** Two cohorts of entry-level PT students ( $n = 12$  and  $n = 17$ ).

**Methods.** Educational objectives were established based on prior review of the literature, a survey of national PT education programs, and clinical guidelines for TCC established by the United States Public Health Service (USPHS). Based on these objectives, the team designed a 3-hour workshop involving didactic content and problem-based skills practice. A pre and posttest survey was used to measure 6 dimensions: knowledge, perceived barriers, perceived facilitators, self-efficacy, outcome expectations, and self-rated skill in TCC. Within each cohort, changes in score were compared using a paired  $t$  test. The ability to apply clinical guidelines for TCC was assessed using case scenarios and structured observation. These outcomes were selected based on the Theory of Reasoned Action, which states that future behavior is determined by intention to act. Intention to act is a product of knowledge, a positive balance between perceived barriers and facilitators, strong self-efficacy, favorable outcome expectations, and necessary skills. Student satis-

faction with training was assessed through anonymous written feedback. Feasibility was based on cost analysis, including material resources, as well as faculty time and effort.

**Results.** Following participation, both cohorts improved in knowledge, perceived facilitators, outcome expectations, and self-rated skill. Cohort 2 also showed an increase in self-efficacy ( $P < .01$ ). Structured observation revealed competencies in application of clinical guidelines for case-based scenarios. Mean student satisfaction ratings for the educational experience were 5/5, and cost-estimate for delivery of the 3-hour educational intervention was approximately \$32 per student.

**Conclusions.** This research study demonstrated feasibility and impact of an evidence-based curricular model designed to increase likelihood of TCC by future PTs by enhancing factors known to promote TCC behaviors. The program was well-received by students, and objectives were achieved through efficient use of faculty time and resources. Subsequent research should examine the effects of training on the provision of TCC within clinical settings, as well as the impact of TCC on smoking quit rates for patients who have received this intervention as a component of their physical therapy plan of care.

**Key Words:** Smoking cessation, Physical therapist education, Curricular design for tobacco cessation counseling education.

## INTRODUCTION

Smoking is the leading cause of preventable morbidity and mortality, both within the United States and globally.<sup>1,2</sup> It has been estimated that smoking leads to 4.83 million pre-

mature deaths worldwide, making tobacco cessation a leading health priority.<sup>2</sup> Within the United States, approximately 21.7% of the adult population currently smokes.<sup>3</sup> In people with physical disabilities, smoking prevalence can be up to 10% higher.<sup>3</sup> The magnitude and impact of smoking constitute the need for greater attention towards tobacco cessation counseling (TCC) by health care professionals within the academic and clinical environment.<sup>4</sup> Smoking-related health disparities among people with physical disabilities present an even greater incentive for health counseling by physical therapists (PTs).<sup>5-7</sup> In general, approximately 40% of people who are counseled by a medical provider will attempt to quit.<sup>8</sup> However, surveys have shown that nearly 80% of patients who smoked did not receive any TCC during their last medical visit.<sup>9,10</sup> Among PTs, rates of TCC are estimated at 17%.<sup>6</sup> This is unfortunate, given that 70% of current smokers want to quit and are amenable to receiving advice and recommendations from their health care provider.<sup>4</sup> Chances of successful cessation are doubled when patients who smoke receive advice from more than 1 type of health care provider,<sup>11</sup> further demonstrating the importance of TCC by PTs as part of an interprofessional approach.

Within physical therapy treatment environments, there are several factors that are conducive to TCC. The Joint Commission on Accreditation of Hospital Organizations (JCAHO) requires tobacco screening and counseling for all patients admitted with pneumonia, myocardial infarction, and congestive heart failure,<sup>12</sup> diagnoses commonly encountered by PTs. In addition, patients confronted by an episode of serious illness may be more motivated to quit,<sup>13</sup> and may have recently experienced a period of forced abstinence due to smoking restrictions within hospitals and medical rehabilitation facilities. For this reason, an acute episode of illness or injury may provide an additional opportunity for PTs to encourage successful long-range cessation.<sup>14</sup> Smoking leads to sub-optimal physical therapy treatment outcomes in all 4 physical therapy practice areas: musculoskeletal, neuromuscular, cardiovascular/pulmonary, and integumentary health.<sup>7</sup> Each of these factors reinforces the need for the implementation and effective application of evidence-based smoking interventions within physical therapy practice and education.

Evidence-based clinical guidelines for TCC, developed and endorsed by the United States Public Health Service (USPHS), and commonly known as the “5 A’s and 5 R’s,”<sup>15</sup> are widely recognized as the “gold standard” for smoking cessation treatment.<sup>16,17</sup> Studies

have shown that targeted education in TCC increases implementation of these guidelines<sup>18-21</sup> and enhances the likelihood that patients who smoke will receive effective treatment.<sup>9</sup> Therefore, the USPHS endorses TCC education for all health care professionals, including PTs.<sup>22</sup>

### Review of the Literature

Within other health-related disciplines, deficiencies in the provision of TCC have been linked to a lack of education in appropriate evidence-based counseling methods.<sup>23,24</sup> For many health care professionals, insufficient TCC education can lead to limited confidence in their ability to provide successful interventions.<sup>25</sup> Other barriers in the application of TCC clinical guidelines include a lack of available resources, uncertainties in professional roles and scope of practice, doubts regarding the efficacy of TCC, and anticipated patient resistance towards receiving cessation advice.<sup>26,27</sup> Attitudes and opinions towards people who smoke can also serve as possible impediments. Oftentimes, these opinions are a result of misconceptions regarding reasons for continued smoking, particularly among people who are already experiencing negative repercussions from tobacco use. Training programs in other health professions have emphasized the need for repeated counseling due to the extremely addictive nature of nicotine and the likelihood of relapse while working towards successful long-range cessation.<sup>23,28</sup> Effective TCC education must address each of these factors in order to facilitate implementation of TCC guidelines and improved communication with patients who smoke. Although such efforts will need to target existing practitioners, student PTs represent the future of the profession, and a continued lack of TCC education in entry-level curricula will only perpetuate the dearth of effective interventions within physical therapy treatment settings.<sup>9,19,21</sup> TCC education for entry-level PT students allows opportunity for repetition and feedback within the classroom setting and fosters the development of skills and knowledge required for the implementation of TCC guidelines during future clinical practice. In research involving pharmacy students, 94% ranked their TCC abilities as good, very good, or excellent following tailored education, and 97% believed TCC education would increase the quality of their patient interactions.<sup>19</sup> Another study using patient survey data showed that chiropractic interns were 8 times more likely to provide smoking cessation advice after completing TCC education.<sup>21</sup> Among dentists and dental hygienists, practitioners trained as students were more than twice as likely to provide counseling as colleagues lacking

entry-level TCC education.<sup>29</sup>

According to a prior study by our group, curricular content related to the USPHS clinical guidelines for TCC is absent in approximately 60% of entry-level PT programs in the United States and Puerto Rico.<sup>30</sup> Factors positively associated with curricular inclusion were faculty familiarity with evidence-based TCC guidelines, prior education in TCC, self-rated knowledge and skill in applying USPHS TCC guidelines, a belief that brief TCC can be effective, and favorable opinions towards TCC as a component of physical therapy practice. While there are many factors to consider regarding implementation and assessment of evidence-based TCC guidelines within physical therapy education and practice, it should be recognized that TCC reflects the educational mission of the American Physical Therapy Association (APTA) and is congruent with elements of health promotion and wellness advocated by the *Guide to Physical Therapist Practice*,<sup>31</sup> the *Normative Model for Physical Therapy Education*,<sup>32</sup> professional core values,<sup>33</sup> the *Clinical Performance Instrument*,<sup>34</sup> and the Commission on Accreditation in Physical Therapy Education (CAPTE) criteria.<sup>35</sup> Furthermore, TCC education for entry-level PT students is an important issue because it has the potential to increase the likelihood that people with physical disabilities will receive evidence-based interventions to reduce smoking prevalence, as well as the negative impact of smoking on morbidity, mortality, and quality of life. Barriers to TCC education include lack of knowledge among educators and the lack of a feasible and effective curricular model.<sup>23,36</sup> Therefore, the goals of this study were to assess feasibility, implementation, and results of a tailored TCC educational program for entry-level Doctor of Physical Therapy (DPT) students designed to promote knowledge, skill, and favorable opinions towards TCC as a component of clinical practice.

### METHODS

Two universities agreed to allow pilot testing within their entry-level Doctor of Physical Therapy (DPT) educational programs. Recruitment of PT students at each participating university occurred via email, flyers, and brief face-to-face meetings describing the purpose of the study, inclusion and exclusion criteria, and benefits/risks of participation. Participation was voluntary and was not linked to student grades or academic standing. A \$25 gift card and certificate of completion were presented at the end of the workshop in appreciation of participants’ time and effort. Educational outcomes were assessed using a pre and posttest, single group design without

a control group, as well as observational data. The study was approved by the Institutional Review Boards at each participating university. Surveys were administered using an anonymous, online format (Qualtrics Online Survey Platform, Provo, Utah).

The curriculum designed for this study was 3 hours long: 2 hours of didactic material followed by 1 hour of case-based discussions and role-playing exercises. Design of this TCC educational workshop centered on evidence-based USPHS clinical guidelines for TCC (ie, the “5 A’s and 5 R’s”).<sup>15,37</sup> The “5 A’s: Ask, Advise, Assess, Assist and Arrange” refer to recommendations used to promote cessation in patients receptive towards changing their smoking behavior within the next 30 days. The “5 R’s: Relevance, Risks, Rewards, Roadblocks, Repeat” refer to recommendations that practitioners can employ to encourage further consideration of cessation in patients who are unable or unwilling to commit to quitting within the near future. These clinical guidelines have been effectively employed in dental education,<sup>38</sup> physician education,<sup>39,40</sup> pharmacy education,<sup>18,41</sup> chiropractic education,<sup>20</sup> and nursing education.<sup>11</sup>

In applying the “5 A’s” and “5 R’s” within a program designed for entry-level DPT students, the first step was to define the educational objectives.<sup>42</sup> These objectives were based on the rationale for TCC as a component of PT practice,<sup>7</sup> and skills required to successfully implement USPHS TCC guidelines during typical patient encounters. Pre-existing educational needs were assessed using a cross-sectional survey of accredited entry-level PT programs throughout the United States and Puerto Rico.<sup>30</sup> Additional data were obtained by consulting findings of studies regarding content, objectives, and educational outcomes for TCC education in other health professions. Based on a confirmed need for tailored TCC education for entry-level DPT students, a blueprint was developed, outlining instructional content and instructional methods.<sup>42</sup> TCC instructional content included epidemiologic data regarding tobacco use,<sup>19,43,44</sup> and high risk groups with the most difficulty in achieving successful cessation.<sup>45,46</sup> Additional topics focused on the scientific rationale for physical therapy involvement in TCC,<sup>7,46</sup> the consequences of smoking, the benefits of quitting, and the impact of tobacco use on all areas of PT practice.<sup>7,41</sup> Participants were instructed in obtaining a smoking history, screening for nicotine addiction, assisting patients in quitting, and identifying community resources for patient referral.<sup>15,37</sup>

In order to encourage active student engagement, didactic content was augmented

**Table 1. Learning Objectives, Teaching Methods, and Assessment Measures**

Upon completion of this learning module, participants will be able to meet the following objectives:		
OBJECTIVE	METHOD	ASSESSMENT MEASURE
Describe the rationale for evidence-based tobacco-cessation counseling as a component of physical therapy practice.	Lecture, visual aids, workbook, reading assignment, class discussion	Survey  Class discussion
Identify and apply techniques designed to screen physical therapy patients for tobacco use and nicotine addiction.	Lecture, visual aids (laminated treatment guide, workbook), written resources (Fagerstrom’s Questionnaire), case discussion/role play	Survey  Case-based role play (observation)
Assess a patient’s readiness for tobacco cessation using the Stages of Change.	Lecture, visual aids, written resources (Stages of Change Questionnaire), case discussion/role play	Survey  Case-based role play (observation)
Apply the USPHS clinical practice guidelines for tobacco cessation counseling, based on Stages of Change.	Lecture, visual aids (laminated treatment guide), workbook, patient education materials, case discussion/role play	Survey  Case-based role play (observation)

by case-based role-playing exercises. Each student had the opportunity to play the role of patient, therapist, and observer. Students providing counseling were given performance feedback by peers and the faculty moderator, guided by use of objective observational criteria.<sup>39</sup> Specific to TCC skills, role-playing has also been shown to increase provider performance by promoting self-reflection and improved self-efficacy.<sup>47</sup> In addition, active student engagement through role-playing provided data for formative assessment, allowing the students and instructor to focus on material that required further clarification or additional skills practice during the session.<sup>48</sup> Each case study involved patient characteristics described by the Transtheoretical Model of Behavior, which defines readiness to change through use of 5 stages.<sup>49</sup> Skills practice focused on counseling in the pre-contemplation/contemplation, preparation, and action stages, although factors related to relapse and long-term abstinence during the maintenance phase were also discussed. (See Table 1 for a list of training objectives and instructional methods.)

Based on research assessing the TCC behaviors of dental hygiene students and successful training of family medicine physicians and staff, workshop participants were provided with a handbook, treatment algorithm, patient education guidelines, and a guide to

assessing patient readiness to change.<sup>40,50</sup> Participants were also given an objective screening instrument for nicotine addiction and a laminated pocket reference outlining the USPHS TCC clinical guidelines.

Results of TCC education were assessed using a paired *t* test to compare scores before and after participation in the workshop. An anonymous online survey was administered in order to assess designated educational objectives, including whether participation produced changes in knowledge, perceived facilitators and barriers, and self-efficacy. Other survey items explored outcome expectations and self-rated skill level or confidence in providing TCC when faced with various challenges common within the clinical environment, such as beliefs regarding the efficacy of TCC, time constraints within patient care settings, and perceptions regarding scope of practice and professional obligations.<sup>20,51</sup> The survey was also used to gather demographic information, including respondent age, sex, race/ethnicity, and tobacco use, as well as current year of study in the PT education program.

The assessment instrument (survey) was specifically designed for use in this study and was based on the Theory of Planned Behavior.<sup>52</sup> According to this theory, knowledge, attitudes (ie, perceived barriers and facilitators), self-efficacy, outcome expectations,

and self-rated skill are viewed as proximal determinants of a person's subsequent course of action.<sup>35</sup> In order to ensure a coherent relationship between the survey instrument and the underlying behavioral theory, prior to its implementation, face validity and construct validity were examined using existing literature and expert consultation.<sup>53</sup> Items reflecting each of the categories were reviewed by an educational psychologist with expertise in theory-based assessment.

Composite scores for each behavioral determinant were interpreted using a relevant scale. For example, the total score for knowledge was represented by the number of correct responses to information-based survey items. Measurement of perceived barriers and facilitators was accomplished using a Likert-like scale (agree, neutral, disagree). Composite scoring for perceived facilitators consisted of an increase in the number of positive responses (agree) when reviewing a series of statements regarding familiarity with the USPHS TCC clinical guidelines, beliefs regarding the benefits of TCC, and the professional roles and obligations of the PT. Composite scoring for perceived barriers consisted of a decrease in the number of negative responses (disagree) when reviewing a series of statements regarding challenges to TCC within the patient care environment. Composite scores for self-efficacy were calculated by counting the number of students who rated themselves as very confident or somewhat confident in their ability to provide TCC when faced with possible impediments, such as a busy schedule or patient resistance to receiving cessation advice. Composite scoring for outcome expectations reflects the number of positive responses (agree) when presented with statements regarding the potential benefits of TCC. Self-rated skill level was based on the number of positive responses (agree) regarding the student's ability to provide TCC, take a smoking history, enhance patient motivation to quit, and provide referrals for patients who want to stop smoking. Similar methods have been employed in examining the impact of tobacco cessation training on other health professions students.<sup>20,39,54</sup>

Content validity (ie, how well test items reflect intended subject material) was examined using data regarding the relevance of TCC to physical therapy outcomes and practice.<sup>7</sup> Prior to use, the survey was independently reviewed by 3 content experts in cardiopulmonary physical therapy, a content expert in patient education and substance use, a biostatistician, and 3 physical therapy faculty members, including a program chair and director of research. Modifications included edits for wording consistent with the

*Guide to Physical Therapist Practice*,<sup>31</sup> item organization to promote complete responses, and the inclusion of open-ended follow-up questions.

The survey was also reviewed by a small sample of current PT students ( $n = 5$ ), recent graduates ( $n = 3$ ), and practicing clinicians ( $n = 2$ ). Based on feedback, minor adjustments were made to descriptors for race/ethnicity. In addition, items concerning clinical guidelines were edited to include a full listing of the "5 As" and the "5 Rs."

Program assessment also included observable behaviors: role-playing activities and checklists were used to provide structured feedback from the student's peers and the course instructor. At the end of the workshop, participants were asked to complete a course evaluation based on research which showed that learner satisfaction with training can also have an impact on intention to implement the materials contained in the course.<sup>55</sup> The student course evaluation was based on content, organization of materials, teaching methods, and quality of instruction. The educational intervention was repeated with 2 different cohorts of students to assess feasibility and replication of results.

Feasibility assessment involved factors deemed important by a previous survey of academic faculty at entry-level PT programs throughout the United States and Puerto Rico.<sup>30</sup> Goals were to deliver a self-contained training module that would limit faculty workload through delivery of a standardized curriculum. This curriculum centered on implementation of the USPHS clinical guidelines for TCC and the scientific rationale for TCC as a component of PT practice.<sup>7</sup> It was decided beforehand that training should occur within a single class session (ie, 3 hours or less), produce an increase in knowledge and self-rated skill in TCC, and meet criteria for student satisfaction with training.

Data analysis centered on the following initial research question: Does TCC education tailored for entry-level PT students promote knowledge, skill, and favorable opinions towards TCC as a component of clinical practice? In terms of survey data, outcomes were divided into 5 categories: knowledge, opinions (perceived barriers and perceived facilitators), self-efficacy, outcome expectations, and self-rated skill. Within each of the categories outlined above, the average change in the number of desired responses was calculated and compared before and after the educational intervention, using a paired  $t$  test. An assessment of actual TCC skills was performed using the observational data gathered by participants and the faculty mentor during the case-based laboratory discussion.

For each student cohort, demographics and survey scores were analyzed using frequency counts, percentages, means, medians, standard deviations (SD) and interquartile range (IQR). Due to limited individual sample sizes and multiple pairwise comparisons, statistical significance for each of these procedures was defined as  $P \leq .01$ , using the Bonferroni correction.<sup>56</sup> Analyses were completed using SPSS software, Version 16 (IBM Corporation, Armonk, NY), and SAS software, Version 9.3 (SAS Institute, Cary, NC).

## RESULTS

The first educational workshop was held at an entry-level PT program at a public university in the Middle Atlantic region. This program is on a smoke-free campus, in a nontobacco-growing state, and has a total of 180 students. The TCC first cohort involved 16 participants, while 12 completed both pre and posttest surveys. Average age of participants was 26 years (SD 1.24, range 22–27), 85% ( $n = 7$ ) were female, and 83% were student members of the American Physical Therapy Association (APTA). By self-report, 100% of participants were nonsmokers, although 17% ( $n = 2$ ) had previously smoked. Students in their first year of PT education accounted for 67% of the sample ( $n = 8$ ), and the remaining 33% ( $n = 4$ ) were in year 2. None of the participants reported any prior education in TCC techniques, nor were they previously familiar with the USPHS TCC guidelines, although 58% ( $n = 7$ ) reported prior education regarding effects of smoking on cardiovascular health, 33% ( $n = 4$ ) reported training on effects of smoking on musculoskeletal and neuromuscular health, and 42% ( $n = 5$ ) reported training on effects of smoking on integumentary health/wound healing (Table 2). Training occurred within the spring semester, meaning that first-year PT students had some prior exposure to performing a patient interview and gathering data about patient history as a component of their course in foundations of professional practice. Additionally, second-year PT students had prior experience working with patients during their initial full-time clinical internship at the end of year 1.

The second workshop was held at an entry-level PT education program at a public university within the South Atlantic region. This program has a total 105 students and is located on a smoke-free campus in a tobacco-growing state. The second cohort involved 19 participants, with 17 completing both pre and posttest surveys. The average age was 23 years (SD 1.24, range 22–27), 88% were female ( $n = 15$ ), all were completing their first year, and 29% were student members of APTA. All of the pretest respondents were nonsmokers,

**Table 2. Descriptive Statistics**

Category		Cohort 1 (n = 12)	Cohort 2 (n = 17)
Age		25.58 years (SD 4.19, range 22–36)	22.83 years (SD 1.24, range 22–27)
Sex	Male	58% (n = 7)	12% (n = 2)
	Female	42% (n = 5)	88% (n = 15)
Race/ethnicity	White, non-Hispanic	50% (n = 6)	88% (n = 15)
	Asian	33% (n = 4)	12% (n = 2)
	Other	17% (n = 2)	0%
	Hispanic, Black or African American, Native Hawaiian or Other Pacific Islander	0%	0%
Member of APTA		83% (n = 10)	29% (n = 5)
Smoking status		100% nonsmokers	88% nonsmokers (n = 15)
			83% never smoked (n = 10) 17% former smokers (n = 2)
Year in PT school	Year 1	67% (n = 8)	100% (n = 17)
	Year 2	33% (n = 4)	0%
Prior training in TCC		0	12% (n = 2) 6% (n = 1) Training included AHRQ/USDHHS clinical guidelines
Prior training in effects of tobacco use on cardiovascular health		58% (n = 7)	29% (n = 5)
Prior training in effects of tobacco use on musculoskeletal health		33% (n = 4)	12% (n = 2)
Prior training in effects of tobacco use on neuromuscular health		33% (n = 4)	12% (n = 2)
Prior training in effects of tobacco use on integumentary health/wound healing		42% (n = 5)	12% (n = 2)

although 12% (n = 2) had previously smoked. In terms of prior training, 12% (n = 2) reported previous education in tobacco cessation, and 1 had some prior knowledge regarding USPHS clinical guidelines. For other related topics, 29% of the sample (n = 5) reported prior training on the effects of smoking on cardiovascular health, and 12% (n = 2) reported prior training on the effects of smoking on musculoskeletal, neuromuscular, and integumentary health. (See Table 2 for a summary of descriptive statistics). Training for the second cohort also occurred during spring semester. Students in the second group had nearly completed their first year of the curriculum, and while they did not have any previous full-time clinical internship experience, they had some prior instruction in

performing a patient interview and gathering data for patient history, and had observed these techniques while working part-time with their clinical mentors.

Following training, both groups showed statistically significant increases in knowledge and perceived facilitators ( $P < .01$ ). Neither group showed a statistically significant decrease in perceived barriers ( $P = .22$ , cohort 1, and  $P = .74$ , cohort 2). Both groups also showed statistically significant changes in outcome expectations and self-rated skill ( $P = .01$  or below). Cohort 2 showed a statistically significant increase in self-efficacy ( $P < .01$ ). In terms of knowledge, cohort 2 was somewhat more familiar with the principles of motivational interviewing, a counseling technique often used to promote change in

lifestyle behaviors such as smoking. Students in both cohorts had a high level of preexisting knowledge regarding the severity of nicotine addiction (comparable to addiction to cocaine and heroin), as well as the use of the Transtheoretical Model in assessing readiness to change. For both groups, the largest gains in knowledge involved an increased awareness of elevated smoking rates among people with disabilities, use of the Fagerstrom test to screen for nicotine addiction, and the effects of motivational interviewing based on an individual's initial resistance to change.

Changes in perceived facilitators were most prominent in terms of an increased awareness of the “5 A’s” and “5 R’s,” used to describe TCC steps outlined in the USPHS clinical guidelines. Prior to participation in

**Table 3. Results of Training: Changes in Knowledge**

Item	Number of Correct Responses					
	Cohort 1 (n = 12)			Cohort 2 (n = 17)		
	Pretest	Posttest	Change in Score	Pretest	Posttest	Change in Score
Group with the highest smoking rates	1	9	8	2	16	14
Percentage of US smokers who would like to quit	4	8	4	7	15	8
Average weight gain for smokers who quit	8	11	3	5	17	12
Time required to implement USPHS TCC guidelines	2	12	10	8	0	-8
Peak in withdrawal symptoms following cessation	2	12	10	2	4	2
Test used to screen for nicotine addiction	2	12	10	3	17	14
Number of smokers who are eventually successful in cessation efforts	3	10	7	3	16	13
Ability to correctly identify Stage of Change and preparation	7	8	1	8	13	5
Likelihood of dying of a smoking-related illness among those who continue to use cigarettes	2	7	5	1	16	15
Ability to identify at least 2 negative consequences of tobacco use on muscular health	7	11	4	6	12	6
Ability to identify at least 2 negative consequences of tobacco use on skeletal health	9	9	0	6	11	5
Ability to identify at least 2 negative consequences of tobacco use on neurological health	2	7	5	12	12	0
Ability to identify at least 2 negative consequences of tobacco use on integumentary health	8	7	-1	12	9	-3
Effects of motivational interviewing on behavior based on resistance to change	1	8	7	2	10	8
Principles of motivational interviewing	3	8	5	9	10	1
Two public resources available for patients interested in quitting smoking	2	4	2	2	5	3
Nicotine addiction relative to cocaine or heroin addiction	11	12	1	16	17	1
Physical activity as a cessation aide	11	11	0	12	17	5
<b>Total number of correct responses</b>	<b>85</b>	<b>166</b>	<b>81</b>	<b>116</b>	<b>217</b>	<b>101</b>

the training, most students already possessed favorable opinions towards the PT's role in TCC and believed that PTs should screen for tobacco use as part of the patient's history during initial evaluation. Baseline data showed that the majority had positive outcome expectations regarding efficacy of TCC and perceived that there were few barriers towards implementation of TCC in PT practice. The largest numbers of negative opinions both before and after the workshop were in response to statements concerning smokers' level of personal responsibility, as well as frustration resulting from smokers' resistance to quitting. Neither category showed significant change following training. In fact, cohort 2 increased in their level of frustration regarding smokers who did not want to quit. Across

all categories and in both cohorts, training enhanced participant self-confidence in the ability to provide TCC when faced with challenges commonly encountered in the clinical environment. However, even at posttest, students in each cohort expressed a lower level of confidence in providing TCC when written materials were not available than in any other area.

An increase in positive outcome expectations were present in both cohorts, but were also fairly high even prior to training. By comparison, cohort 2 showed a greater change in personal outcomes than cohort 1 when students were asked whether they believed that their own TCC behaviors would increase the likelihood of their patients quitting smoking. Both cohorts showed substan-

tial increases in the level of self-rated skills associated with successful TCC, as well as other abilities needed for effective management of patients who smoke. A comparison of scores within each cohort can be found in Tables 3-7.

A review of the checklists used to provide feedback during case studies discussion and skills practice showed competency in all areas outlined in the USPHS TCC guidelines. When providing counseling within the pre-contemplation stage, observers were asked to verify whether the student initiated the session by expressing concern and obtaining patient consent to discuss smoking issues. Other areas of competency included whether the student assessed the patient's willingness to quit, screened for nicotine addiction, and

**Table 4. Changes in Attitudes and Opinions**

Category and Item	Response Frequency													
	Cohort 1 (n = 12)							Cohort 2 (n = 17)						
	Pretest			Posttest				Pretest			Posttest			
Perceived Facilitators	A	N	D	A	N	D	Ch	A	N	D	A	N	D	Ch
Familiar with 5As	0	1	11	12	0	0	12	1	0	16	17	0	0	16
Familiar with 5Rs	0	2	10	12	0	0	12	1	0	16	17	0	0	16
PTs should screen for tobacco use	10	2	0	12	0	0	2	16	1	0	16	1	0	0
TCC is an important role of the PT	9	2	1	12	0	0	3	13	3	1	17	0	0	4
Counseling by the PT can be effective in promoting cessation	12	0	0	12	0	0	0	17	0	0	17	0	0	0
TCC can be part of a normal PT session	9	2	1	12	0	0	3	13	3	1	16	0	1	3
TCC is an important factor in health care cost containment	1	3	8	12	0	0	11	16	1	0	17	0	0	1
Total number of responses (perceived facilitators)	41	12	32	84	0	0	43	77	8	34	117	1	1	40
<b>Note:</b> Change in score represents change in number of respondents that agreed with factors known to enhance rates of TCC.														
Perceived Barriers	A	N	D	A	N	D	Ch	A	N	D	A	N	D	Ch
TCC is an invasion of patient privacy	2	4	6	2	2	8	2	0	2	15	4	1	12	-3
Most smokers are not interested in quitting	1	3	8	0	0	12	4	3	3	11	1	1	15	4
Too many smokers do not take responsibility for their habit	6	4	2	6	4	2	0	7	8	2	5	3	9	7
Smokers who do not want to quit frustrate me	6	4	2	4	4	4	2	9	4	4	12	3	2	-2
TCC is beyond the PT's scope of practice	2	0	10	0	0	12	2	0	0	17	0	0	17	0
Total number of responses (perceived barriers)	17	15	28	12	10	38	10	19	17	49	22	8	55	6
<b>Note:</b> Change in score represents change in number of respondents who disagreed with factors known to decrease rates of TCC.														

A = Agree  
 N = Neutral  
 D = Disagree  
 Ch = Change

**Table 5. Changes in Self-Efficacy**

Confidence in Ability to Provide TCC	Response Frequency																
	Cohort 1 (n = 12)									Cohort 2 (n = 17)							
	Pretest				Posttest					Pretest				Posttest			
	VC	SC	UD	U	VC	SC	UD	U	Change	VC	SC	UD	U	VC	SC	UD	
When patient is resistant to advice	0	2	9	1	1	10	1	0	9	0	4	9	4	4	13	0	
When patient's diagnosis is not clearly linked to tobacco use	0	6	6	0	1	10	1	0	5	1	6	8	2	9	8	0	
When counseling is not covered by patient's medical insurance	0	5	7	0	3	9	0	0	7	0	7	10	0	12	5	0	
When faced with a busy schedule	0	4	8	0	2	8	2	0	8	2	7	8	0	11	6	0	
When preprinted educational materials are not available	0	7	5	0	3	8	1	0	4	1	8	8	0	7	8	2	
When lacking the support of the referring clinician	0	4	8	0	2	10	0	0	8	0	9	7	1	6	10	1	
Total number of responses	0	28	43	1	12	47	5	0	31	4	41	50	7	49	50	3	

**Note:** Change in score represents change in number of respondents who felt confident or somewhat confident following training.

**Legend:** Please indicate how confident you are that you would be able to provide TCC under each of the following conditions or circumstances: VC = Very Confident; SC = Somewhat Confident; UD = undecided; U = unable

provided patient education using a clear, personalized message. Observers were also asked to verify whether the message was tailored to the patient's physical therapy diagnosis and incorporated possible roadblocks and strategies to assist in successful long-term cessation. When providing counseling in the contemplation stage, students were also expected to be competent in encouraging the patient to set a quit date and formulate an action plan. For patients already engaged in action, students were deemed competent when they were able to demonstrate an ability to review and discuss situations and circumstances that might contribute to lapses and relapses in smoking behaviors, and help the patient resume successful behavior change through use of additional resources. Other strategies for the action phase were to offer to contact the patient's health provider to make arrangements for the patient to discuss pharmacotherapy as an adjunct to cessation. In each stage, the final step for competent performance was to work collaboratively with the patient to set an appropriate time for follow-up. The majority of participants indicated that counseling was most challenging

when the patient was resistant to change (pre-contemplation stage) and easiest when the patient had already decided to quit and was seeking additional resources (action stage).

Participant feedback reflected a high level of satisfaction with the TCC educational program (mean rating: 5/5, range: 4/5 to 5/5). Participants were unanimous in indicating a belief that the content included in the TCC educational session would help improve their practice, and that TCC was clearly related to other topics covered during their other entry-level PT coursework. Participant suggestions for future improvements included video demonstration of counseling techniques for patients with varied levels of readiness for change and a greater number of case discussions interspersed with didactic content.

In terms of feasibility, the same "prepackaged" TCC workshop was delivered with comparable results at 2 different entry-level PT education programs in different regions of the United States. Training in the application of USPHS clinical guidelines for TCC was accomplished within a single 3-hour class session, and resulted in significant changes in knowledge, opinions, and skill. In addition,

student satisfaction of the training was high. Cost analysis included materials and faculty effort for preparation and delivery of content and was based on an hourly breakdown of annual salary. Costs were estimated at \$32 per student and should be reduced in subsequent iterations due to decreased time for preparation.

**CONCLUSIONS**

This study demonstrated that a tailored educational intervention for DPT students improved knowledge, skill, and favorable opinions towards TCC as a component of clinical practice. By enhancing these traits and improving self-efficacy and outcome expectations, it is anticipated that education in TCC methods will increase the application of evidence-based TCC guidelines during future clinical practice. These results were achieved using a relatively small investment of time and resources, showing that TCC education for entry-level student PTs is feasible and cost-effective.

In reviewing the results of testing, cohort 2 had a higher level of preexisting knowledge regarding principles of motivational inter-



**Table 6. Changes in Outcome Expectations and Self-Rated Skill Level**

Category and Item	Response Frequency													
	Cohort 1 (n = 12)							Cohort 2 (n = 17)						
	Pretest			Posttest				Pretest			Posttest			
Outcome Expectations	A	N	D	A	N	D	Ch	A	N	D	A	N	D	Ch
My counseling will increase a patient's likelihood of quitting smoking	8	4	0	12	0	0	4	7	8	2	17	0	0	10
Brief counseling is an effective intervention for smoking cessation	7	2	2	12	0	0	5	12	2	3	17	0	0	5
Total number of responses	15	6	2	24	0	0	9	19	10	5	24	0	0	15
<b>Note:</b> Change in score represents change in the number of respondents to agree with statements consistent with positive outcome expectations regarding TCC.														
Self-Rated Skills	A	N	D	A	N	D	Ch	A	N	D	A	N	D	Ch
I have skills needed to provide TCC for patients who smoke	2	4	6	12	0	0	10	0	17	0	16	0	1	16
I can take a smoking history	2	3	7	12	0	0	10	1	3	13	16	0	1	15
I can help motivate patients who want to stop smoking	10	2	0	11	1	0	1	10	7	0	17	0	0	7
I can provide referrals for patients who want to stop smoking	9	3	0	11	1	0	2	7	10	0	17	0	0	10
Total number of responses	23	12	13	46	2	0	23	18	37	13	66	0	2	48
<b>Note:</b> Change in score represents change in number of respondents who agree with statements consistent with self-rated skills in various areas of tobacco cessation within PT practice.														

A = Agree  
 N = Neutral  
 D = Disagree  
 Ch = Change

viewing. This may be a result of differences in the curricula at each individual program, where cohort 2 had been previously exposed to content regarding patient education for weight loss, healthy diet, medication adherence, and more. Additionally, this shows the relevance of TCC within a wide scope of health promotion and wellness efforts, in that the techniques used to counsel patients about smoking are similar to techniques used to counsel for other lifestyle behaviors. In terms of perceived facilitators and barriers, the prevalence of preexisting positive opinions towards TCC as a component of physical therapy practice may be a reflection of selec-

tion bias, as it should be noted that students in both cohorts freely volunteered to take part in the study. Presumably, students who volunteered did so because they perceived value in the knowledge and skills that would be gained through participation. Surprisingly, there was 1 perceived barrier that did not respond favorably to training. In fact, students in cohort 2 actually increased in their level of frustration regarding smokers who are resistant to quitting. During informal discussions following the workshop, a few students revealed that, as perceived relevance of smoking cessation relative to physical therapy diagnoses and outcomes increased, the level

of frustration towards patients who were “not willing to help themselves” increased. This area needs further exploration and should be addressed by future studies to understand whether this perception challenges delivery of effective TCC, and what can be done to foster a change in perspective.

Results of this project are similar to those seen in TCC counseling education for student dental hygienists,<sup>57</sup> medical students,<sup>40</sup> and pharmacy students.<sup>18</sup> For dentists and hygienists educated as students, follow-up studies investigating the long-term results of TCC education on subsequent clinical behaviors found a 23% increase in provision of

**Table 7. Results of Training Based on Changes in Response Categories**

Category	Training Results: Cohort 1			Training Results: Cohort 2		
	Mean Change in Score Per Individual	SD	Level of Significance (Paired t Test)	Mean Change in Score Per Individual	SD	Level of Significance (Paired t Test)
Knowledge	6.50	2.54	< 0.01	6.62	2.36	< 0.01
Perceived facilitators	4.25	1.81	< 0.01	4.76	1.99	< 0.01
Perceived barriers	-1.25	2.83	0.22	-0.18	2.13	0.74
Self-efficacy	1.33	2.10	0.05	6.24	3.17	< 0.01
Outcome expectations	1.27	1.42	0.01	1.18	1.07	< 0.01
Self-rated skills	3.00	1.95	< 0.01	3.47	1.54	< 0.01

TCC and a 12% increase in patient education regarding the consequences of tobacco use.<sup>58</sup> In a particular study, patients who received advice from dental students who had been educated in brief TCC demonstrated a 20% quit rate.<sup>59</sup> In a second study, TCC delivery by dental students yielded a 22% quit rate, with an additional 14% of patients reducing the amount of tobacco use following TCC as a component of routine dental care.<sup>60</sup> Given the results obtained in the present study, it is likely that TCC counseling by PTs who are educated as students can have a comparable impact on patient behavior.

PT students expressed satisfaction with the TCC educational experience, as well as increased intention to apply evidence-based TCC guidelines in future clinical practice. While these findings are strengthened by the application of this pilot workshop in 2 different cohorts, certain limitations should be noted. Within each cohort, there were a relatively small number of participants. However, guidelines for educational assessment of programmed instruction in higher education verify the ability to demonstrate meaningful change using samples of 7 to 14 participants when the effect size is at least 0.28.<sup>61</sup> Nonetheless, it should be noted that the small sample size restricted the analysis of data with regards to demographic variables. For example, it was not possible to stratify and explore associations between race, sex, or year of training with regards to the attitudes and opinions of the PT students. Another issue is that, due to scheduling conflicts, only first and second-year PT students were enrolled. Research has shown that opinions of dental students regarding their professional role in TCC varied by year of training.<sup>62</sup> Therefore, future assessments may wish to employ larger samples which include third-year PT students.

Although the number of students at each

institution was limited, both cohorts reflect demographics described in aggregate program data provided by CAPTE.<sup>63</sup> However, in order to enhance external validity, further testing should include private universities and programs with larger class sizes in other regions of the country. Also, since it is important to include opportunities for students to apply TCC techniques when working with patients, educators may wish to consider the use of community-based activities, such as health fairs and school-based group interventions aimed at high-risk youth as additional venues for continued student practice in conjunction with the supervision and feedback of experienced clinical mentors.<sup>16</sup> Additional feedback regarding implementation of TCC within clinical settings could also be derived from clinical instruction throughout the course of PT education.

Research is also needed to assess the design and implementation of tailored TCC continuing education programs for experienced clinicians, since it is likely that the educational needs of practicing PTs differ from the needs of entry-level PT students. Further studies should assess the professional role beliefs of practicing PTs and the use of evidence-based TCC guidelines within the current scope of practice. Additionally, studies should examine other factors that may potentially influence the integration of evidence-based TCC as a routine component of patient care.

In summary, TCC education is consistent with professional values espoused by PTs. By increasing access to effective educational formats and materials, PTs may be able to increase their professional role and provide more effective counseling and treatment outcomes for smokers with physical disabilities. This project demonstrated that training of PT students is feasible, well-received, and may

provide an ideal catalyst for this important change.

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