

# Enhancing readiness of health profession students to address tobacco cessation with patients through online training

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## Abstract

**Objectives:** To evaluate effectiveness of an online training program in preparing health care students to address tobacco use with patients.

**Methods:** The program was evaluated on knowledge, attitude, self-efficacy, intended behavior, and user satisfaction. Participants consisted of 4,180 medical, nursing, dentistry, pharmacy, and other allied health professions students. Multiple choice questions assessed knowledge before and after the educational experience. Likert scales were used for self-reporting of attitude, self-efficacy, and intended behaviors towards tobacco cessation treatments in both a pre-module and post-module survey condition. Likert scores for satisfaction were recorded in a post-module survey. Two sample paired t-tests were used to measure statistical significance.

**Results:** The knowledge increased significantly for all modules across users. Attitude, self-efficacy, and intended

behavior scores increased. The Overview course's knowledge score increased from 59% to 89% ( $t_{(649)} = 61.9$ ;  $p < 0.0001$ ). Mean knowledge scores for all modules combined increased from 51.5% to 74.0% post-test. Satisfaction with the curriculum was high, with a mean score of 4.6 out of 5.

**Conclusions:** The success of this program is evident by overall satisfaction, and increases in knowledge, self-efficacy, attitudes, and behaviors, as well as the ease with which it was deployed to thousands of students. Results of this study demonstrate that online training in tobacco cessation is an efficient and effective method of teaching students skills in tobacco cessation counseling, and can fill a vital gap in existing curricula.

**Keywords:** Tobacco cessation, online education, medical education, tobacco, addiction

## Introduction

Approximately 46 million American adults smoke cigarettes,<sup>1</sup> 13 million smoke cigars, and 6 million use smokeless tobacco.<sup>2</sup> Twenty-five to thirty percent of the U.S. population regularly use tobacco products.<sup>3,4</sup> Over 8.6 million people live with tobacco-related illnesses, and over 400,000 deaths occur each year as a result of tobacco use. Another 38,000 deaths occur among passive smokers who die from environmental tobacco exposure (ETS).<sup>5,6</sup> Over \$150 billion annually in economic losses are associated with tobacco use.<sup>2,7</sup> Clinicians are in frequent contact with tobacco users; studies indicate that over seventy percent of tobacco users visit a physician annually,<sup>8,9</sup> and approximately half of all smokers see a dentist each year.<sup>10</sup> Other studies estimate that seventy percent of all tobacco users want to quit.<sup>1</sup>

Strong evidence exists to suggest that tobacco users are thirty to fifty percent more likely to make an attempt to quit when advised to do so by a healthcare provider.<sup>11-14</sup> Yet, despite the desire of most patients to quit, the frequent contact clinicians have with tobacco users, and the tremendous disease and financial burdens attributed to tobacco, only one-half to two-thirds of all patients may be assessed for tobacco use.<sup>13</sup> Most patients report that tobacco use was addressed in only one of every five visits to a physician or healthcare professional. Even among confirmed smokers, thirty to fifty percent report receiving no advice from a healthcare provider to quit.<sup>13-15</sup> Many clinicians recognize their own inattention to tobacco related issues, and attribute it to inadequate preparation to intervene with tobacco-using

patients.<sup>15-18</sup> Training on nicotine dependence and tobacco cessation is discernibly absent from most health professions training programs. Surveys of U.S. medical schools by the Liaison Committee on Medical Education and independent researchers have consistently documented that the majority of schools in the U.S. provide little, if any, instruction on tobacco intervention. To be specific, many schools offer one-and-a-half days or less of instruction on tobacco across all four years of medical education. The preponderance of this instruction focuses on pathology from tobacco use, rather than screening and intervention.<sup>19-22</sup>

A survey of nursing programs found that although nearly half of undergraduate programs and two-thirds of graduate programs provide instruction on tobacco cessation, less than thirteen percent provide over three hours per year of instruction on tobacco use, nicotine dependence, or cessation techniques.<sup>23</sup> Review of the literature also indicates a need for more tobacco-specific content on cessation and patient counseling skills in the curricula of dental programs.<sup>24</sup> Mandatory training on tobacco cessation and inclusion of the Public Health Service guidelines in dental school curricula has been recommended.<sup>22</sup> The insertion of tobacco content in health education curricula is in keeping with one of the Healthy People 2020 objectives: Increase tobacco cessation counseling in health care settings. Specifically, sub-objectives TU-10.1, 10.2, 10.3, and 10.4 call for increased tobacco cessation counseling in office-based ambulatory care settings, hospital ambulatory care settings, dental care settings, and substance abuse care settings, respectively.<sup>25</sup>

A major obstacle to inserting such content is the lack of available space in the curricula of most health professions training programs. The importance of preparing health professionals to intervene effectively with tobacco users prompted the 2006 Florida legislature to fund the statewide expansion of the Florida Area Health Education Center Network (AHEC) tobacco training program for health professions students, which seeks to prepare medical, nursing, and various allied/mental health students to address tobacco use with their future patients. To do this, the Florida AHEC has implemented an online training program focused on tobacco cessation across multiple student populations. The prior tobacco training program at the medical schools of the University of Florida, University of Miami, Nova Southeastern University, Florida State University and the University of South Florida reached over 7,200 medical, nursing, dental, and pharmacy students. Between 2000 and 2006, the program consisted of approximately five hours of lecture plus additional reading assignments and homework on tobacco topics.<sup>26</sup> In response to the challenge of increasing the number of health professions students and residents trained annually from under 1,500 to over 3,000, AHEC instituted a new statewide framework. AHEC adopted a set of interactive, evidence-based tobacco education and cessation online modules developed with

National Institute of Health (NIH) grant funds by Clinical Tools, Inc., a physician-run Internet-based education company with Accreditation Council for Continuing Medical Education (ACCME) Accreditation with Commendation status. An independent team of professionals from medicine, dentistry, public health and substance abuse counseling along with an instructional designer developed the modules and instruments. These modules provide students with unlimited access to materials and ensure a high degree of consistency in the delivery of program content throughout the state. Since 2007, over 15,000 students have participated. The use of a consistent set of modules across the state and among disciplines is one of the program's strengths. Tobacco cessation experts reviewed the content of the modules initially and on a regular basis.

Module content is based on Centers for Disease Control and Prevention (CDC) best practices and the US Preventative Services Task Force (USPSTF) 2008 guidelines for tobacco. In addition, Clinical Tools offers AMA PRA Category 1 Credit (TM) and other forms of continuing education for interested professionals who use the modules. Student participants completed specific modules assigned by their program faculty and based on discipline and academic affiliation. This paper examines the effectiveness of online tobacco education modules to enhance the ability of students to intervene with tobacco-using patients at multiple academic institutions throughout Florida, with respect to overall participation, user satisfaction, and increases in knowledge, self-efficacy, attitude, and intended behavior.

## Methods

### Participants

Participants consisted of 4,180 students at participating universities within the Florida AHEC network from backgrounds in medicine, nursing, dentistry, pharmacy, and other allied health professions. The program was considered a class requirement for each participant's respective program. Data was collected for all participants who requested credit for the training program. The pre-test questions were required to begin the program, and the post-test questions were required before students could request credit for completion of the program. Each question was mandatory. These facts helped ensure that there was no missing data for participants who requested credit for the program. There were no dropouts; response rate was 100%. Participants were not asked to submit demographic information (gender, race, and ethnicity). This work was determined to be exempt from the Clinical Tools IRB.

### Instrument

A portal containing eight total tobacco cessation modules ("Overview of Tobacco Cessation," "Motivational Interviewing for Primary Care," "Pharmacotherapy of Tobacco Cessation," "Children and Tobacco: Three Cases," "Julie:

Pregnancy and Smoking,” “Older Adults and Tobacco,” “Smokeless Tobacco,” and “Five Cases: Basic Tobacco Cessation Interventions”) was customized by Clinical Tools specifically for use by AHEC-affiliated health professions students and residents. Participants completed specific modules assigned by the program faculty based on discipline and academic affiliation. Tobacco control experts and primary care physicians reviewed the modules to ensure that the material would provide information on tobacco dependency and familiarize students with basic behavioral interventions to assist patients with terminating tobacco use.

Instruments for each of the eight modules were developed as online quizzes. Assessment instruments were developed in conjunction with the educational materials by the educators, including the topic experts and the instructional designer. Instruments were reviewed for face and construct validity by tobacco cessation experts who were not part of the author team.

Sixteen instruments total were developed. Two quizzes were created for each of the eight modules; one pre-quiz, and one post-quiz. Each instrument contained one question each on the topics of attitude, self-efficacy, and intended behavior. Each instrument contained 2-7 knowledge questions, depending on the length and breadth of the module. Additionally, post-quizzes contained seven questions on satisfaction.

Knowledge questions were created in multiple choice format. Each item was linked to an educational objective in a one-to-one relationship. Multiple choice items were scored as correct or incorrect; there was no additional penalty for incorrect answers. The questions on attitude, self-efficacy, intended behavior, and satisfaction were Likert style items, which used a 5 point scale.

Students “passed” the post-test when a score of 70% was achieved (chosen to correlate with the typical passing test score in the college environment). A passing score allowed the student to complete the requirements of the module. Since this is an arbitrary rate, analysis of the effectiveness of the modules used changes in the raw scores, not the pass/fail rate.

### Procedures

The AHEC tobacco training program provides students with an orientation before they begin their coursework; participants were directed to the training portal with instructions to access specific modules, depending on discipline and institutional requirements. Participants were required to complete a pre- and post-quiz for each module. A score of 70% or better on the post-test was required to “pass” the module and receive credit. Participants could re-take the knowledge assessment to obtain a passing score. In the event of an incorrect response, a link to the related content area was provided. This approach allowed participants to review material not initially absorbed or under-

stood, and reinforced important learning concepts. Although participants could re-take the post-test for passing scores, the data analysis relied solely on the results of the initial completion. Two sample paired *t*-tests were used to measure statistical significance.

### Analysis

The program was evaluated on a number of measures, including knowledge, attitude, self-efficacy, intended behavior and user satisfaction with the module. Multiple choice questions assessed knowledge before and after the educational experience. Likert scales were used for self-reporting of attitude, self-efficacy, and intended behaviors towards tobacco cessation treatments in both a pre-module and post-module survey condition for each learner. Likert scores for satisfaction were recorded in a post-module survey. Two sample paired *t*-tests were used to measure statistical significance.

### Results

From July 2009 to June 2010, 4,180 students registered in the program and completed 13,784 modules (Table 1). Nursing students completed the most modules (37.7% or 5,193 modules), followed by various allied/mental health students (33.5% or 4,622 modules), and undergraduate medical students (17.5% or 2,419 students). Results found that knowledge, attitude, self-efficacy, and intended behavior scores increased significantly ( $p < 0.00$ ) for all individual modules across users.

Mean knowledge scores for all modules combined increased from 51.5% to 74% post-test (out of a possible 100). Satisfaction with the curriculum was high, with a mean score of 4.6 out of 5 (where 1 = Strongly Disagree, 5 = Strongly Agree). Future areas of research include studies focused on statistical data related to tobacco cessation interventions and quit rates to assess patient outcomes. Learner knowledge, intended behaviors, perceived self-efficacy, and attitudes towards treatments in both a pre-module and post-module survey condition were measured for each learner. Mean knowledge scores increased significantly ( $p < 0.00$ ) from pre-test to post-test survey conditions (Table 2). Each module and cohort indicated improvements in knowledge; mean pre-test scores ranged from 37-59% for each module, while post-test scores ranged from 58-89%. Significant ( $p < 0.00$ ) increases in Likert-based assessments of intended behavior, attitude and perceived self-efficacy were observed (Table 3). Learner satisfaction, measured through a seven question Likert-based assessment, was universally high (4.6 of a possible 5 points).

We obtained further assessment of a module's ability to achieve its learning objectives by asking participants to rate the module with respect to specified objectives on a scale from 1 to 5 (with end points “Completely Failed to Meet Objective” and “Completely Met Objective” defined). These questions were specifically designed to meet standards

associated with accreditation by the Accreditation Council for Continuing Medical Education (ACCME) and the Accreditation Council for Pharmacy Education (ACPE). Participants reported an average score of 4.6, indicating strong agreement that modules had achieved intended goals. Satisfaction scores for all modules were high; at least 90% of users agreed or strongly agreed with statements regarding satisfaction post-module.

Table 1. Health profession disciplines by module. Web-based modules completed by participant discipline (n =13,784)

Health Profession	Overview of tobacco	Pharmacotherapy	Tobacco case studies	Older adults and tobacco	Smokeless tobacco	Children and tobacco	Pregnancy and smoking	Motivational interviewing	Total by discipline
Nursing	1135	775	194	282	329	1011	452	1015	5193
Medical	574	446	166	168	34	507	183	341	2419
Dental	159	138	17	16	142	37	16	33	558
Dental Hygiene	108	56	26	35	45	100	30	85	485
Pharmacy	64	61	80	12	10	27	13	54	321
Residents	41	26	13	12	10	35	14	35	186
Other	998	657	450	357	392	621	392	755	4622
<b>Total by Module</b>	<b>3079</b>	<b>2159</b>	<b>946</b>	<b>882</b>	<b>962</b>	<b>2338</b>	<b>1100</b>	<b>2318</b>	<b>13784</b>

## Discussion

Over 90% of tobacco users become addicted to tobacco, and over half die from tobacco related illnesses. No other legal over-the-counter substance, when used as intended, is associated with such dire statistics.<sup>27</sup> Costs associated with lost productivity and treatment of tobacco-related diseases are estimated at more than \$150 billion a year. Proper training teaches health professions students how to address tobacco use with patients. Ideally, this curricula will take the form of standardized tobacco-based competencies and objectives for specific health profession disciplines. Knowledge of tobacco cessation and options for nicotine replacement and pharmacotherapy, mastery of patient-centered interventions such as motivational interviewing, and familiarity with the U.S. Public Health Service guidelines for addressing tobacco dependency should be included as part of medical, nursing and other health professions training. Once adopted by curricular committees, students must demonstrate proficiency in order to graduate; this ensures that future healthcare professionals are adequately prepared to address the subject of nicotine addiction with their patients using an evidence-based approach.

Current students have not yet had a chance to put this training into practice with patients; limitations of the data analysis and discussion include the lack of sufficient time to document impact on patient outcomes. Participants may

have been influenced to do well on the knowledge assessment portion due to the fact that they were often required to participate as part of their professional training. Finally, long term follow-up is required to determine knowledge retention and assess if intended behavior materialized.

A statewide, web-based program has several benefits: content may be standardized, and modules regularly updated, saving valuable time for medical schools and curriculum committees. For the academic year of 2009-2010, the content of each of the eight modules was updated to comply with the U.S. Public Health Service Treating Tobacco Use and Dependence: 2008 Update Clinical Practice Guidelines. Information on patient screening systems (such as computer prompts or other reminder systems for assessing patient tobacco use) and assessment of clinician intervention was incorporated into the content of the current modules. The modules now advise healthcare professionals to provide combination pharmacotherapy unless contraindicated, rather than using individual medications alone, and to provide cessation services for tobacco dependent patients within the practice setting to the extent possible. In addition, healthcare practitioners in pediatric settings are advised to ask all parents and caregivers of children about their tobacco use, educate patients on harmful effects of ETS on children, and provide them with encouragement to quit and cessation services. Based on the significant sample size, the use of consistent Internet based educational materials has proven an efficient, effective and consistent response to the need to provide the thousands of health professional students in Florida with standardized, reliable training on tobacco cessation and dependence treatment.

Table 2. Average participant change in knowledge by module (n =13,784)

Module	Mean (Pre)	Mean (Post)	SD (Pre)	SD (Post)	P
Overview of tobacco cessation	59	89	20	14	<0.0001
Motivational interviewing for primary care	55	75	22	21	<0.0001
Pharmacotherapy of tobacco cessation	46	70	21	23	<0.0001
Children and tobacco: three cases	53	68	23	24	<0.0001
Julie: pregnancy and smoking	51	78	20	21	<0.0001
Older adults and tobacco	37	58	25	26	<0.0001
Smokeless tobacco	53	76	24	22	<0.0001
Five cases: basic tobacco cessation interventions	59	77	27	25	<0.0001

Ongoing research on the impact of increased student training on patient outcomes becomes necessary as students in training become professionals dealing with patients. Statistical data related to tobacco cessation interventions and quit rates is one area for future research.

Table 3. Participant attitude, self-efficacy, and intended behavior assessment (n =13,784)

Attitude average participant change by module	Mean (Pre)	Mean (Post)	SD (Pre)	SD (Post)	p
Overview of tobacco cessation	4.3	4.7	0.97	0.64	<0.001
Motivational interviewing for primary care	4.0	4.6	1.00	0.61	<0.001
Pharmacotherapy of tobacco cessation	4.1	4.6	1.06	0.77	<0.001
Children and tobacco: three cases	4.2	4.7	0.92	0.97	<0.001
Julie: pregnancy and smoking	4.3	4.6	0.98	0.71	<0.001
Older adults and tobacco	4.3	4.6	0.93	0.67	<0.001
Smokeless tobacco	4.2	4.6	1.03	0.73	<0.001
Five cases: basic tobacco cessation interventions	4.1	4.6	1.03	0.78	<0.001
Self-efficacy average participant change by module	Mean (Pre)	Mean (Post)	SD (Pre)	SD (Post)	p
Overview	3.8	4.6	1.21	0.69	<0.001
Motivational interviewing	4.1	4.7	1.23	0.68	<0.001
Pharmacotherapy	3.8	4.5	1.23	0.79	<0.001
Children and tobacco	4.0	4.6	0.95	0.66	<0.001
Julie	3.9	4.5	1.17	0.78	<0.001
Older adults	4.0	4.6	1.10	0.69	<0.001
Smokeless tobacco	3.9	4.6	1.18	0.73	<0.001
Five cases	4.0	4.5	1.09	0.78	<0.001
Behavior average participant change by module	Mean (Pre)	Mean (Post)	SD (Pre)	SD (Post)	p
Overview	3.7	4.6	1.32	0.68	<0.001
Motivational interviewing	3.8	4.6	1.10	0.66	<0.001
Pharmacotherapy	4.0	4.5	1.07	0.78	<0.001
Children and tobacco	4.1	4.6	0.90	0.67	<0.001
Julie	4.2	4.6	1.02	0.75	<0.001
Older adults	4.0	4.6	0.97	0.69	<0.001
Smokeless tobacco	4.1	4.5	1.09	0.78	<0.001
Five cases	4.1	4.6	1.02	0.92	<0.001

## Conclusions

Students and residents experienced success with this innovative program, which was spearheaded through the statewide Florida AHEC Network. Participant knowledge outcome scores significantly increased through online training modules. Participants also reported high satisfaction with the web-based learning experience, finding the modules useful and relevant to their needs. Participants demonstrated improvements across the board in terms of self-efficacy, attitudes, and behaviors toward incorporating tobacco intervention principles in the practice setting and intention to learn more about issues related to tobacco use.

The success of this program, as evident by increases in knowledge and overall satisfaction, and changes in self-efficacy, attitudes, and behaviors, as well as the ease with which it was deployed to thousands of students,

demonstrate that online training in tobacco cessation counseling can fill a vital gap in existing curricula.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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