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Development of a Web-based Tobacco Cessation Educational Program for Pediatric Nurses and Respiratory Therapists

Judith Gordon

Abstract

Background—Nurses can be effective in providing advice and counseling to tobacco-using parents of hospitalized pediatric patients. However, lack of training in effective interventions is a barrier to incorporation tobacco cessation interventions into routine practice.

Purpose—This paper describes the development and evaluation of a web-based tobacco cessation educational program aimed at pediatric nurses (RNs) and respiratory therapists (RTs).

Methods—The program was developed with input from four focus groups of RNs, RTs, and educators. The interactive training program was evaluated by 50 RNs and RTs employed at a children's hospital.

Results—After completing the program, participants reported a significant change in their knowledge, attitudes, perceived barriers, and self-efficacy towards providing tobacco cessation interventions to their patients' parents.

Conclusions—The results of the evaluation of the program were extremely promising, and further investigation is warranted.

Introduction

Exposure of nonsmokers to secondhand smoke (SHS) is a serious health hazard. SHS exposure is particularly of concern in the pediatric population, as it places children at increased risk for asthma, respiratory tract infections, decreased lung growth, decreased exercise tolerance, and sudden infant death syndrome (Bek et al., 1999; Cunningham, O'Connor, Dockery, & Speizer, 1996; Gold et al., 1996; Pirkle et al., 1996; Tutka, Wielosz, & Zatonski, 2002). Exposure to SHS in children results in an increased incidence of respiratory diseases, documented by pulmonary function impairment, increased emergency visits, as well as hospitalization rates (Tutka et al., 2002). Despite the known increased risks associated with SHS exposure, an estimated 40% of children in the US live in homes with a smoker (King et al., 2009; Pirkle et al., 1996; Schuster, Franke, & Pham, 2002).

In 2005, diseases of the respiratory system, which include illnesses that are potentially associated with SHS exposure (i.e., acute bronchitis and bronchiolitis, pneumonia, and asthma) accounted for 17% of discharges from short-stay hospitals in children under 15 years of age (DeFrances, Cullen, & Kozak, 2007). According to the Healthcare Cost and Utilization Project (HCUP), there were 335,000 asthma-related pediatric hospitalizations in 2006, comprising 13.6 percent of all pediatric hospitalizations. Children under one year of age who are most likely to be at home and have an increased rate of SHS exposure, had the highest rate of hospitalization for asthma at 8 hospitalizations per every 1,000 children under age one, compared to older children, ages 15–17, who had a total of 2.2 asthma-related hospitalizations per 1000 children (Merrill, Stranges, & Steiner, 2008).

Nurses are the largest healthcare workforce, and are involved in virtually all levels of health care. They are viewed as an important and respected source of information about their

child's health. Pediatric nurses are an untapped resource for providing advice and brief counseling to smokers. Given the high correlation between SHS exposure and respiratory illnesses, nurses and respiratory therapists are in a position to motivate and assist smokers to quit, and there is a large body of evidence that support that they can be effective (Carlebach & Hamilton, 2009; Rice & Stead, 2004; Wewers, Ferketich, Harness, & Paskett, 2009). In addition, the hospital visit provides a unique opportunity to discuss the issue of tobacco and its detrimental effect on the health of the smoker's child (Rigotti, Munafo, Murphy, & Stead, 2003; Winickoff, Hibberd, Case, Sinha, & Rigotti, 2001). Pediatric hospitalizations for respiratory-related illnesses represent a "teachable moment" when parental smokers can be motivated to quit smoking by both nurses and respiratory therapists. There may be higher parental motivation in this setting since the child's hospitalization may make parents concerned about the effects of their smoking on their child's health, and there are already a number of messages discouraging smoking in the hospital environment (Mahabee-Gittens & Gordon, 2008; Mahabee-Gittens, 2002; Mahabee-Gittens, Gordon, Krugh, Henry, & Leonard, 2008; Winickoff et al., 2001; Winickoff, Hillis, Palfrey, Perrin, & Rigotti, 2003).

This paper describes the development of a web-based, interactive tobacco cessation training program, based on an empirically validated tobacco cessation intervention. The program was specifically aimed at pediatric nurses and respiratory therapists specializing in the care of children with respiratory illnesses at a large, tertiary care, children's hospital.

Method

Overview

The purpose of the study was to develop and empirically evaluate a program to teach pediatric nurses and respiratory therapists how to educate, motivate and assist their patients' parents to quit smoking. We used a mixed-methods evaluation design to develop the program components and test its feasibility and consumer acceptance. The study was conducted sequentially in four phases: Phase 1 consisted of the development of a prototype (beta) version of the website; during Phase 2 we evaluated the beta site; in Phase 3, we revised the website based on feedback from Phase 3; and during Phase 4, we conducted a randomized trial of the program. This paper presents the results from Phase 1, 2 and 3 of the project. This study received human subjects protection review and approval from the IRBs at institutions at which the authors were affiliated.

Phase 1: Development of Program Content and Website

Program Content—We developed program content using an iterative focus group process, structured interviews, and direct observations. We selected the focus group model to provide an unstructured venue for obtaining qualitative information from our target audience. We used structured interviews to get open-ended responses to specific questions of interest to us. Because not all members of the project team were pediatric healthcare practitioners, we used direct observations to gather the context or environment in which tobacco cessation activities might take place.

Focus Groups: We scheduled four, sequential focus groups with a total of 12 RNs, RTs, and educators currently employed at our large, tertiary care, children's hospital. During these groups, we asked participants to describe their current tobacco cessation activities, discuss their attitudes and perceived barriers to providing tobacco cessation interventions to their patients' parents, and share their experiences using on-line continuing education courses. After completing this round of focus groups, project staff reviewed notes and identified themes or potential content areas.

Structured Interviews: To gather more specific information about the themes and potential content areas identified by the focus group participants, we conducted structured interviews with the same focus group participants. Questions included, “How much time would you spend with patients’ parents discussing tobacco use?” and “What kinds of materials and resources would be most useful to you in helping your patients’ parents quit tobacco?”

Direct Observations: In addition to the focus groups, we were allowed to observe both RTs and RNs in both the emergency department and inpatient settings for several days. This enabled us to develop concrete ideas for specific vignettes to illustrate how each intervention step could be delivered within the context of different kinds of pediatric visits.

Content: As a result of these groups and observations, we identified four major tobacco cessation continuing education needs for RNs and RTs: 1) They were concerned how to discuss the topic of tobacco with their patients’ parents; 2) They lacked the skills necessary for assisting parents to quit smoking; 3) They wanted to know more about tobacco and the process of addiction; and 4) They wanted to be able to obtain Continuing Education Units (CEUs). To address these needs, we developed four corresponding program components: *Enhancing Communication*, *Helping People Quit Smoking*, *More about Tobacco*, and a test for obtaining CEUs.

The *Enhancing Communication* component aimed to improve basic communication skills and introduce brief Motivational Interviewing techniques designed to help overcome parent resistance. In addition to standard communication techniques with a long history of effectiveness (e.g., active listening, making eye contact, etc.), we included Motivational Interviewing techniques (Miller & Rollnick, 1991) because they have been used successfully in many healthcare settings to assist practitioners with patients resistant to changing undesirable behaviors, such as drinking alcohol and smoking tobacco (Lai, Cahill, Qin & Tang, 2010).

The *Helping People Quit Smoking* component contained the majority of program content. This section was based on the *Clinical Practice Guideline: Treating Tobacco Use and Dependence 2008 Update* (Fiore et al., 2008). The *Guideline* advocates practitioner provision of the “5 A’s”: Ask about tobacco use, Advise to quit, Assess willingness to attempt quitting, Assist in quit attempt, and Arrange follow-up to all tobacco users. We selected this approach because it has been used effectively in a wide range of healthcare settings, including primary care, dental offices, and community health centers (Fiore et al., 2008). Our own prior research has shown the effectiveness of this approach in helping people to quit smoking (Gordon, Andrews, Albert, et al., 2010; Gordon, Andrews, Crews, et al., 2010; Mahabee-Gittens et al., 2008). Based on the focus group feedback, we adapted the content specifically for use in pediatric settings by focusing on using the child’s medical condition to motivate parents to quit.

The *More about Tobacco* section contained information identified by focus group participants as important to make them more comfortable talking with parents about their smoking. Information included the health effects of smoking and secondhand smoke, the prevalence of tobacco use, the contents of cigarettes, cigarette smoke and other smoked tobacco, and addiction to nicotine. This information was obtained from the National Institutes of Health, the Centers for Disease Control, the American Academy of Pediatrics, and the American Association for Respiratory Care.

Based on feedback from the educators who participated in the focus groups, we determined that the CE test needed to assess the degree to which the learning objectives for each section

were met, provide corrective information for incorrect answers, and the ability to print the certificate of completion.

Website Development—In conjunction with content development, we explored design and navigation options for the prototype website. Every member of the project staff appraised several continuing education websites, looking for easy navigational systems, appealing design features, and engaging program elements that reinforced learning. In addition, we reviewed information obtained from the focus group participants about their experiences with online continuing education programs. Based on this process, we designed the “look and feel” of the website in collaboration with our website development company. The members of this company who worked on this project included a project director, a graphic designer, and a programmer. The project team worked together over many months to refine and program the color scheme, layout, visual style, and navigational system for the website. Once the site was programmed, we tested its usability with our target audience via user groups.

Design: The prototype *WeBREATHe* website consisted of a homepage, three sections comprising the training program and related materials, and the CE test. As displayed in Figure 1, the homepage displayed the main menu. Users could randomly access any program content from anywhere within the *WeBREATHe* website. Each menu item was divided into subsections, each of which contained text, graphics, videos, and review quizzes to help users’ assess their progress. We created the CE test to provide immediate feedback on the user’s answers, including corrective information, and the ability to print the certificate of completion. After programming, project staff tested the prototype website.

User Groups: After debugging the prototype website, we conducted four user groups with a total of 16 participants from our target audience. The purpose of the user groups was to identify problems with and/or improvements for the user interface, navigation, and content of the website. User group participants were asked to thoroughly review the site (i.e., look at every page) while one or two project staff members observed. Participants were instructed to make notes if something was unclear or they had a suggestion for improvement. Project staff observed how the participants navigated through the site, and noted any difficulties, including programming “bugs” or errors. If participants had difficulty and needed assistance, project staff responded to their request.

Program Refinement—The feedback from the user groups indicated that the site was easy to use, contained a lot of good information, and would be a useful resource for the clinicians. Suggestions for improvements included addition of: an “advanced organizer” to help users determine the most efficient way to learn the material contained in the site; more graphics; more video vignettes; and a section on outpatient tobacco cessation. We also received many suggestions for improvements within individual sections (e.g., self-help cessation guides for low literacy populations). We incorporated a few of these suggestions into the website prior to the evaluation, including the advanced organizer and more visual elements. The additional suggestions were tabled until Phase 3 of the project.

Phase 2: Program Evaluation and Feasibility Testing

Participants—We recruited 50 pediatric registered nurses (RNs) or respiratory therapists (RTs) currently employed at CCHMC to participate in the evaluation. Sixty-six percent (n=33) of the participants were RNs and 34% (17) were RTs. The majority of participants were: female (96%); Caucasian (96%); never smokers (56%). The average age of the participants was 37 years (s.d.=10.6).

Methods—The evaluation was conducted in five three-hour sessions. The sessions were scheduled during lunch breaks, early in the morning and in the evening to accommodate shift schedules for the RTs and RNs. Participants were seen in groups of 3 - 17 in the medical center's computer lab where they spent approximately two hours using the website, ½ hour debriefing the program, and ½ hour completing assessments.

Measures—Before entering the website, the participants completed a paper-and-pencil pre-test consisting of 30 items. Five items collected demographic characteristics and tobacco use status; 25 items measured knowledge about tobacco cessation intervention in general, health effects of tobacco use and SHS exposure, and specific information relating to our intervention. These questions included items about the “5 A’s”, stages of change, motivational interviewing, etc. The participants were asked to thoroughly review the website. After completing the review, they were required to complete a post-test that included the same 25 items from the pre-test, plus 12 items measuring consumer satisfaction with the website.

Evaluation Results

Psychometric properties of variables: Prior to conducting the outcome analyses, we assessed the reliability of our scales. The Cronbach's alpha of the scale assessing attitude toward providing cessation advice was .84; and the alpha for perception of barriers was .75. The correlation between the two self-efficacy items was .30.

Pre-post change analysis: We found that knowledge, attitudes, and self-efficacy regarding providing cessation advice significantly increased as a function of program participation. As displayed in Table 1, the mean knowledge score increased from 11.0 (out of 25) at pre-test to 15.9 at post-test ($F(1,48)=432.1$; $p<.001$); positive attitudes towards providing tobacco cessation services increased from a mean of 22.1 to 23.1 ($F(1,48)=17.56$; $p<.001$); and self-efficacy about intervening with tobacco-using parents increased from a mean of 7.3 to 8.7 ($F(1,48)=28.57$; $p<.001$). In addition, perceived barriers to providing cessation interventions significantly decreased following program participation from a mean of 8.3 to 4.6 ($F(1,48)=25.37$; $p<.001$).

Dose-response analysis: Because actual time spent using the program was positively correlated with self-reported time spent ($r^2 = .66$, $p<.01$), and is a more accurate measurement, we chose to use actual time (actual time = end time - start time - breaks; start time and end time was automatically tracked by the program; breaks were manually logged by program staff) in all of our analyses. Participants spent an average of 1.31 hours using the program (s.d. = .34). Time spent on the program was inversely related to knowledge prior to beginning the program ($r = .28$) such that those who knew less at the beginning spent more time on the program. Time spent was not related to change in knowledge following program use. Time spent using the program was not related to attitudes, perceived barriers, or self-efficacy toward providing cessation advice prior to the program, nor to changes in attitudes, perceived barriers or self-efficacy following use of the *WeBREATHe* website.

Consumer satisfaction: Overall, participants in the study highly endorsed the program. The majority of participants rated most items at 4 or 5 on a 5-point scale (with 5 being the most positive rating). Almost 84% of participants gave the program an overall rating of 4 or 5. We grouped participant responses of 4 or 5 for the following results: Approximately 85% of participants reported that the program was useful in teaching how to help parents quit, and 75% reported that they would be likely to use the intervention program with their patient's parents. Almost 88% of participants reported that the website was easy to use, and almost

90% found the website to be well organized. Approximately 88% of participants would recommend the program to their colleagues.

Phase 3: Program Refinement

The iterative development and evaluation process was very useful in creating an engaging, effective learning experience. Suggestions from the Phase 2 and 3 led us to redesign the site and add a great deal of content. These improvements included: 1) A redesign of the menu hierarchy to improve the usability of the program; 2) provision of additional instruction on the most efficient way to use the educational program; 3) expansion of the content of the program, including information designed for practitioners who deliver care in the outpatient setting, new role-modeling vignettes, and many new graphics and resources; and 4) provision of additional tests throughout the program to track participants' achievement of the learning objectives.

1. As depicted in Figure 2, the new navigation system provided an easy structure for determining the user's location within the program, and which sections had been completed. We also added a tool that enabled users to track their progress through the program to completion.
2. During the evaluation process, project staff noticed that some participants had difficulty figuring out how best to view the program content to maximize their learning. Therefore, we added a *Getting Started* section of to the program, containing information on how the website was organized, suggestions for how to access program content in the most efficient way, and what type of resources were available on an on-going basis for continued reference.
3. To respond to participants' suggestions for additional content, we added 28 new video vignettes modeling individual steps in the intervention process as well as depicting a variety of different types of smokers at varying levels of receptivity/readiness to quit (see Figure 3). We also added text and video segments addressing outpatient delivery of the tobacco cessation intervention. As shown in Figure 3, for more visual learners, we divided the content into easy-to-read sections on each page and added many new graphics. We also expanded the selection of resources for both clinicians and patients, and provided links directly to specific items from within each content area as well as in the Resources section (see Figure 3).
4. Finally, we added multiple "Quick Quiz" tests within each section of the program in order to offer more opportunities for assessment of learning and provision of corrective feedback. A sample Quick Quiz is shown in Figure 3.

The result of this developmental process was *WeBREATHe: Web-Based Respiratory Education About Tobacco and Health*, an interactive Internet-based program designed to train pediatric nurses and respiratory therapists to provide brief, hospital-based tobacco cessation interventions to parents of hospitalized pediatric patients. The program provides users with a step-by-step approach, complete with detailed instructions and video vignettes that illustrate effective counseling methods, as well as a complete resource library to help both clinicians and patients learn more about the health effects of smoked and smokeless tobacco and self-help materials to assist parents who want to quit. This version of the program was evaluated in a randomized clinical trial during the final phase of the project. The results of that trial are currently in preparation.

Discussion

The results of our evaluation provide strong support for the efficacy and acceptability of the program with pediatric nurses and respiratory therapists. Knowledge, attitudes, and self-

efficacy regarding the provision of cessation advice significantly increased, and perceived barriers significantly decreased, as a function of program participation. Particularly striking are the effects of program participation on increasing the participants' knowledge of tobacco cessation intervention techniques, and decreasing participants' perceived barriers to routinely providing this type of advice and assistance to their patients' parents. In addition, the majority of participants highly rated the consumer satisfaction items. RNs and RTs found the program easy to use and reported that they learned new information that could be helpful to them in intervening with tobacco-using parents.

These results suggest that this interactive educational program is engaging, easy to use, and increases participants' knowledge of an empirically validated tobacco cessation program. The amount of time spent using the program was strongly related to change in knowledge about tobacco cessation. Although threats to internal validity may exist, these results suggest that the program was effective in teaching new skills, and that the increases in post-test scores were not merely an artifact of taking the same test twice.

Conclusions

Our study suggests that this type of web-based educational program could be easily incorporated into a hospital's nursing or respiratory staff training program. It could be used as a "stand alone" course or as an adjunct to existing tobacco cessation courses. In addition, pediatric RNs and RTs could use this program to obtain continuing education units in an empirically validated treatment for tobacco use and dependence.

Clinical Implications

Tobacco use is the leading preventable cause of death and disease in the United States (CDC, 2008). If pediatric nurses and respiratory therapists regularly engage parental smokers in brief tobacco cessation counseling while their child is hospitalized, there is the potential for reducing tobacco use in parents and SHS exposure-related morbidity in their children. Even modest cessation rates in this setting could have an enormous public health benefit. The ability to intervene with parental smokers on a routine basis is an important skill for pediatric practitioners to possess. An interactive, web-based educational program such as *WeBREATHe* could be a useful tool for enabling pediatric nurses and respiratory therapists to obtain these skills.

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Key Points

- This paper describes the development and evaluation of a web-based tobacco cessation educational program aimed at pediatric nurses and respiratory therapists.
- The program was developed with input from nurses, respiratory therapists, and educators, and evaluated by 50 nurses and respiratory therapists at a children's hospital.
- After completing the program, participants reported a significant change in their knowledge, attitudes, perceived barriers, and self-efficacy towards providing tobacco cessation interventions to their patients' parents.

WeBREATHe
Web-Based Respiratory Education About Tobacco and Health

Hello, My Name! | Sign Out | Print this Page

Home	Enhancing Communication	Helping People Quit Smoking	More About Tobacco	CE Test
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WeBREATHe

Over 430,000 people die of smoking-related diseases each year. Environmental Tobacco Smoke (ETS) is responsible for 3,000 deaths per year plus a host of other diseases. As healthcare professionals, you know the impact that ETS has on your patients' lives. You have the opportunity to make a difference in your patients' lives by helping clear their air of tobacco smoke.

If you are a first-time user of this site, we suggest that you review the information in the following order:

- 1. Enhancing Communication**
This section contains information and video role models of basic communication and Motivational Interviewing skills to help you talk to patients and their parents.
- 2. Helping People Quit Smoking**
In this section, you will learn a brief, proven method for helping smokers to quit. This step-by-step process and video role models will teach you to quickly and effectively assess readiness to quit and provide appropriate assistance. Take-home materials for patients and their parents are contained in this section.
- 3. More About Tobacco**
This section contains detailed information about the health effects of smoking and secondhand smoke, cigarettes and other smoked tobacco, and nicotine addiction.
- 4. CE Test**
If you are interested in obtaining Continuing Medical Education (CME) credits for this program, plan on spending approximately three hours reviewing the information contained in this site. Then take the CE test, which will qualify you for three hours of CME.

Click on the menu items on the top of the screen to continue.

Did You Know?

There are 1,900 - 2,700 Sudden Infant Death Syndrome (SIDS) deaths each year in the US caused by exposure to environmental tobacco smoke.

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Figure 1.

WeBREATHe
Web-Based Respiratory Education About Tobacco and Health

Hello, JudithZ!

Home | Getting Started | **Help People Quit Smoking** | Resources | CE | Ask the Expert | Sign Out

Treat Tobacco Dependence

Overview ✓
 ▶ Tobacco & Health
 ▼ **Treat Tobacco Dependence**
 ▶ Ask
 ▶ Advise
 ▶ Assess
 ▶ Assist
 ▶ Arrange
 ▶ Put It Together
 ▶ Pharmacotherapy
 ▶ Communication Skills

14% of Program Completed

Overview

The "5 A's" are five sequential steps designed specifically for healthcare professionals like you. The 5 A's have been proven to be effective, and are recommended for use by the Public Health Service (Clinical Practice Guideline: Treating Tobacco Use and Dependence; Fiore et al., 2008). Using the 5 A's, you will be able to provide a comprehensive treatment program.

You will want to routinely provide the 5 A's to your adolescent patients who smoke, but **this section of the WeBREATHe program is focused on helping you to intervene with your patients' tobacco-using parents or caregivers.**

The 5 A's are:

- 1 Ask** Identify tobacco use at every visit
- 2 Advise** Directly urge tobacco users to quit
- 3 Assess** Determine level of readiness to quit
- 4 Assist** Help people to quit with behavioral and pharmacological approaches
- 5 Arrange** Provide follow-up contact and encouragement

It's best to go through the 5 A's steps in order. Each plays an important role in motivating and helping your patients' parents to quit. Video role models are available for each step to give you examples of how to use the intervention.

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Did You Know?
Over 80% of smokers expect and appreciate advice to quit from a healthcare provider.

Treating Tobacco Use And Dependence

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Figure 2.

WeBREATHe
Web-Based Respiratory Education About Tobacco and Health

Hello, Judith2!

Home | Getting Started | **Help People Quit Smoking** | Resources | CE | Ask the Expert | Sign Out

Treat Tobacco Dependence > Assist > Pharmacotherapy

Overview ✓

- Tobacco & Health
- Treat Tobacco Dependence
 - Ask
 - Advise
 - Assess
 - Assist
 - Set Quit Date ✓
 - Provide Resources
 - Pharmacotherapy**
 - Review Quiz
 - Progress
 - Arrange
 - Put It Together
- Pharmacotherapy
- Communication Skills

14% of Program Completed

Assist by Comparing Costs of Quitting

Case History
5-year-old Tamika has been admitted to the peds unit with pneumonia and hypoxia. Both of her parents have set a quit date and are interested in cessation medications.

Play Video

Quick Quiz
After watching this video, answer the following question:
The practitioner addressed the parents' concerns about using Nicotine Replacement Therapy (NRT) by:

Mark all that apply

- ☐ Comparing the cost of NRT to buying cigarettes
- ☐ Telling parents not to use NRT
- ☐ Discussing the proper use of NRT to avoid addiction
- ☐ Recommending the use of Chantix instead
- ☐ Describing ways to get less expensive NRT

Check Answer

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Figure 3.

Table 1

Change as a Result of Participation in the Program

	Pre	Post	F-value
Knowledge	11.00	15.92	$F(1,48) = 432.10, p < .001$
Attitude	22.10	23.10	$F(1,48) = 17.56, p < .001$
Perceived Barriers	8.32	4.56	$F(1,48) = 25.37, p < .001$
Self-Efficacy	7.27	8.69	$F(1,48) = 28.57, p < .001$