

THREE EVIDENCE-BASED TOBACCO CONTROL MOBILE APPS BASED ON FEDERALLY FUNDED RESEARCH PROJECTS.

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Abstract

Tobacco use and exposure to secondhand smoke remain major public health problems worldwide. We report results from three research projects. All three intervention programs from these research projects have shown successful results which have been used to develop three iOS apps, “Tobacco Free Teens,” “Tobacco Free Family,” and “QuitMedKit.” These apps are currently available for downloading from the Apple App Store (iPhone domain) free of charge.

Keywords

tobacco use, secondhand smoke, community, health-care-provider, iOS-apps

Introduction

Tobacco use and exposure to second hand smoke continue to be a major public health problem worldwide. The 2014 Surgeon General’s report [1] shows that in the United States despite declines in the prevalence of current smoking, the annual burden of smoking-attributable mortality currently is estimated to be about 480,000, with millions more living with smoking-related diseases.

Smoking impacts nearly every organ of the body. Annually tobacco kills more people than alcohol, heroin, cocaine, suicides, auto accidents, fire and AIDS combined. Approximately \$300 billion in direct and indirect costs are attributable to tobacco use. It contributes to cancer, diabetes, heart disease, stroke, birth defects and other diseases. Nicotine is as addictive as heroin and cocaine and new and emerging tobacco products pose an additional and significant problem due to misconceptions about their health consequences. The evidence in the 2014 report expands the list of diseases and other adverse health effects caused by smoking and exposure of nonsmokers to tobacco smoke including liver and colorectal cancer, diabetes mellitus, inflammation, immune dysfunction and rheumatoid arthritis.

In order to contribute to tobacco control in the United States and globally our research team has conducted a number of federally funded studies utilizing state-of-the-art theoretical concepts and interactive computer technologies. One of the technologies we employ are mobile health apps. In recent years many physicians and other health care providers have incorporated the use of mobile technology into their health practice. Recent surveys have shown that 47% of physicians who own mobile phones use them to show their patients videos or images. In addition, about 33% of

physicians have recommended mobile apps to their patients [2].

Here we describe three community based research projects addressing tobacco prevention and secondhand smoke, Project ASPIRE, Project CASA, and Project TEAM and the corresponding mobile apps, “Tobacco Free Teens“, “Tobacco Free Family“, and “QuitMedKit“ that are based on these projects. These apps are currently available for downloading from the Apple App Store (iPhone domain) free of charge.

Project ASPIRE - A Smoking Prevention Interactive Experience

Background

Youth-oriented smoking prevention and cessation programs utilizing state-of-the-art theoretical concepts and computer technologies hold considerable promise. Few computer-based applications have examined effectiveness at long-term (18 months), especially for high risk students. Project ASPIRE was designed to address this objective.

Methods

ASPIRE is a theoretically based interactive, multimedia smoking prevention curriculum for culturally diverse high school students. Content for our intervention was based on the PRECEDE model [3], which identifies the predisposing determinants of smoking behavior. An adolescent’s susceptibility to smoking initiation is the result of multiple social and environmental factors. An understanding how these factors operate in combination is important to guide adolescent smoking prevention programs. Project ASPIRE was a nested-cohort, group-randomized trial designed to compare a CD-ROM-based intervention for smoking prevention against the effect of a standard-care intervention (National Cancer Institute’s *Clearing the Air* self-help booklet). Sixteen predominantly

minority, inner-city high schools were randomly assigned to receive ASPIRE or standard care booklet.

Results

Of 1160 students who completed the 18-month survey, 1098 were nonsmokers at baseline. At 18-month smoking initiation rates were significantly lower in the ASPIRE condition compared to controls (1.9% vs. 5.9%, $p < .05$). We evaluated whether the intervention had a differential effect on smoking for high-risk students. Using the exact logistic regression model post hoc comparisons revealed smoking initiation rates significantly lower in intervention compared to control among students with peer pressure, parental smoking, lower resistance skills and students with depression. An additive risk factor model was used to demonstrate the effect of multiple risk factors on smoking initiation. Approximately 42% of students had 3 or more risk factors. As the level of risk increased there was a significant increase in smoking initiation in the control group, ranging from 2.7% to 17.2%, $P < .001$ (Figure 1). In the intervention group smoking initiation rates remained stable over the risk index. The results are extensively reported elsewhere [4,5].

Conclusions: ASPIRE showed considerable promise in discouraging tobacco-use with options in English and Spanish and is currently disseminated in 23 states across the U.S. The ASPIRE curriculum provides an efficacious computer-based preventive option for schools aimed at smoking prevention.

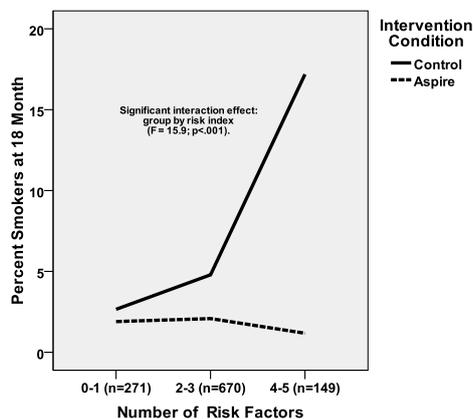


Fig 1: Smoking Initiation by Risk Score

Project CASA (Clean Air—Safe Air)

Background

Exposure to secondhand tobacco smoke has been causally linked to cancer, respiratory, and cardiovascular diseases, and to adverse effects on the health of infants and children. Second hand smoke (SHS) kills 50,000 nonsmoking Americans from heart disease and

lung cancer. A recent report by the U.S Surgeon General [5] details the mechanisms by which SHS damages every organ in the body and how cellular damage and tissue inflammation from SHS occur immediately. SHS contains at least 250 toxic chemicals, including more than 50 that can cause cancer. Texas's diverse population is 27% Mexican. Mexican Americans are a high-risk group for developing SHS-related illnesses and have limited access to healthcare [6].

Methods

The study was a randomized controlled trial nested within a cohort of Houston-area Mexican American households. Ninety-one households were randomized into: (1) Experimental Intervention (EI) where family members received comic books and *fotonovelas* (illustrated storybooks) designed to promote tobacco-free indoor air environments and (2) Standard Care (SC) where family members received an American Cancer Society booklet. Evaluations were done at baseline, 6-month, and 12-month follow-ups. The primary outcome of SHS exposure was based on objective monitoring of SHS using passive diffusion nicotine monitors. Subjectively measured SHS exposure was based on responses on indoor smoking ban provided for each household.

Results

A total of 74 households provided the baseline as well as 6- and 12-month monitor data. In the high exposure room a significantly higher decrease in the mean ambient level was seen in the EI condition compared to the SC condition (Figure 2). At baseline all recruited households allowed smoking indoors. At 12 months 70% percent of households in EI and 56% in SC that banned smoking at 12 month. The results from the study are presented in detail elsewhere [7].

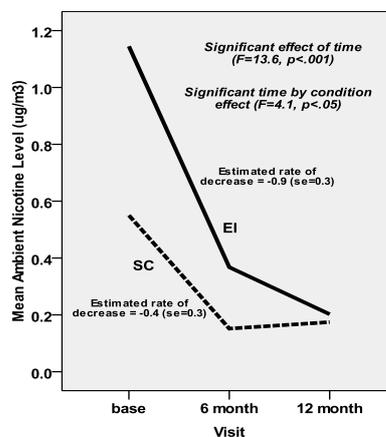


Figure 2: Mean Ambient Nicotine Level in High Exposure Room

Conclusions

Our culturally relevant intervention has potential to substantially decrease SHS-related health problems in the target households. Results will help in optimizing culturally sensitive interventions and eliminating SHS from Mexican American households.

Project Team – A community-based intervention to enhance smoking cessation counseling among physicians and pharmacists

Background

Health care providers are well positioned to identify and address tobacco use among patients. Studies have shown that even brief counseling by healthcare providers increases smoking cessation rates [8], yet fewer than 50% of patients who smoke receive cessation counseling during physician office visits [9]. Our objective was to evaluate the impact of a continuing medical education (CME)-accredited training for physicians and continuing education (CE)-accredited training for pharmacists on smoking cessation counseling practices using provider self-reports and patient exit interviews.

Methods

The study was a nested group-randomized trial using both cross-sectional and cohort repeated measures with community as the unit of randomization. Eighty seven physicians and 83 pharmacists from 16 communities completed pre-training assessments and most completed post-training and extended (6-12 month post-training) assessments. The main outcomes included a composite index measuring providers' ability, confidence and intention to address tobacco use with their patients at pre and post training and long term follow-up and counseling practices using the 5A's of counseling from patient exit interviews at baseline and 12 month follow-up.

Results: There was a significant increase in the percentage of physicians with a high composite index in intervention from pre to post-training (27% to 73%, $p<0.05$) compared to control (27% to 34%, $p=.42$) and for pharmacists (4% to 30%, $p<0.05$) compared to control (10% to 14%, $p=.99$). Similar results were seen from pre-training to extended follow-up. For patients counseled by an intervention physician, there was a significant increase in assisting patients to quit (6% to 36% in the intervention group vs. 19% to 19% in the control group, $p<0.05$) from baseline to 12 month. Other counseling practices showed similar trends although group differences were not statistically significant. Patients counseled by pharmacists did not show significant results. The results from this study are presented in detail elsewhere [10].

Conclusions: Tobacco cessation training of physicians has led to substantial and lasting improvement in patient counseling; thus, this type of training appears to be appropriate and should be broadly disseminated. Discouraging results among pharmacists are attributed not to the existing system not being conducive to implementing the counseling knowledge and skills acquired during the training.

Tobacco Control Mobile Apps

Rationale

Once a health-related research project is complete, one of the challenges is to find a way to successfully disseminate this health information to the general public. Fortunately, the Apple App Store and other mobile app platforms provide a way to disseminate health information to a worldwide audience.

It has been estimated that over 500 million mobile phone users around the world will have used a health-related mobile app by 2015. By 2018 more than half of the more than 3.4 billion mobile phone and tablet users will have downloaded a mobile health app. These users include patients, health care providers and the general public [11].

The increasing popularity of health-related apps and the successful results of our research studies encouraged us to develop a group of evidence-based mobile apps. These apps include health information and materials that proved to be effective in the previously described projects.

Tobacco Free Teens

Background and Description

A search of the smoking cessation and prevention apps available on the Apple App Store turned up numerous results for apps directed at general users that are trying to quit smoking but few, if any, for users in specific risk categories. For example, we did not find any comprehensive smoking related apps that specifically targeted adolescents.

The results previously described for Project ASPIRE concluded that the developed curriculum for the project discourages tobacco use among adolescents. This result and the success of our web-based ASPIRE program led us to develop a mobile app that is based on the ASPIRE curriculum.

“Tobacco Free Teens“ is a smoking cessation and prevention app developed specifically for adolescents

and young adults. It contains a variety of illustrated comics and mini-games that will inform and entertain (“edutainment”) its intended audience. At the start, the user can choose one of four different tracks in order to receive the most relevant information that relates to their current health needs. The app is very comprehensive and touches on all major areas of smoking prevention and cessation.

Tobacco Free Family

Background and Description

Our searches did not find health apps that provided information about the dangers of secondhand smoke. Our Project CASA results indicate that culturally relevant materials are effective in decreasing secondhand smoke related health issues in households. These findings led us to develop a mobile app based on the intervention materials developed for the project.

“Tobacco Free Family” contains informational materials in the form of several illustrated, easy to read stories that provide lessons on the dangers of secondhand smoke to members of a household. The app also contains a mini-game that introduces the user to important facts about secondhand smoke. Links to smoking resources are included for those interested in quitting smoking. The app is localized for Spanish speakers.

QuitMedKit

Background and Description

In our research of current tobacco cessation and prevention mobile apps, we found no apps that specifically targeted physicians and other health care workers. One of the key results of our Project TEAM study indicates that patients who receive counseling from an intervention physician are more likely to quit than those who do not.

With these results in mind we developed the “QuitMedKit” app, an informational app designed to assist physicians and other health care providers to counsel their patients on smoking cessation. The user interface is straightforward and easy to navigate. The program provides up-to-date knowledge on behavioral counseling and pharmacological treatments for nicotine dependence in a compact and succinct form. All the information follows the U.S. Department of Health and Human Services Clinical Practice Guidelines [12].

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