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Research Article

Acceptance of a Prescription for Smoking Cessation Utilizing an iPad Educational Application

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Abstract: Tobacco use, especially smoking, poses an enormous threat to public health. Research indicates tobacco use is linked to many illnesses and premature death. It also has unhealthy consequences in non-smokers through second-hand exposure. Primary care clinicians have the "golden opportunities" to intervene during office visit encounters. This study examined the use of an iPad educational application in tobacco cessation counseling that would increase acceptance of a prescription to aid with cessation, compared to the traditional method of counseling only. Utilizing smoking cessation guidelines, a descriptive quantitative exploratory methodology was used in two phases to assess the effectiveness of tobacco cessation education in a traditional verbal counseling versus the additional use of a mobile application along with standard tobacco cessation counseling in a primary care clinical setting. Total of 49 participants were recruited in two different groups. The standard cessation counseling had 29 subjects for Phase I and 20 participants in the enhanced tobacco cessation education group in Phase II. The enhanced tobacco cessation education with an iPad was more effective in smoking education than the traditional standard verbal counseling on smoking cessation. The addition of a mobile device with relevant educational materials shared with smokers by clinicians have shown an increase in acceptance of a prescription to aid tobacco cessation. Clinicians are strongly encouraged to find innovative ways to help smoking patients accept aids in successful cessation attempts.

Keywords: Smoking Cessation, Mobile Technology, Patient Education, Counseling Apps

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1. Introduction

Smoking is one of the leading causes of preventable deaths in the United States [1, 2]. Smoking has been one of the most discussed subjects in the healthcare literature for decades [3-5]. Research has confirmed that the ill effects of smoking pose an enormous threat to public health [4-5]. According to the CDC [4], the addictive element nicotine is an indirect carcinogen, i.e., its addictive properties increase the intake of carcinogens found in tobacco. Nicotine addiction in smokers is dependent on the amount of smoking, rate of absorption and the nicotine concentration [3]. Cigarette smoking has been linked to chronic inflammation of respiratory airways, including frequent bronchial obstruction and chronic bronchitis [7]. The National Cancer Institute [12] reported that long-term smoking has a lethal effect associated with lung cancer [17]. In addition, there has been a strong association found between smoking and cardiovascular diseases. There is a threefold increased risk of having a heart attack in smokers compared with non-smokers [13]. Cigarette smoking is a strong risk factor for abdominal aneurysms, peripheral vascular disease, stroke and heart attacks [3, 4, 7, 16, 17]. Second-hand tobacco exposure has also suffered similar consequences [6]. This has led the government, as well as professional, non-profit organizations to investigate different methods to assist smokers to stop smoking [3, 5-7].

The U.S. Department of Health and Human Services (USDHHS) has established guidelines and recommendations for treating tobacco use as a chronic disease [3-5]. The primary goals of treatment are to lower the healthcare costs associated with smoking and achieve better health outcomes through smoking cessation education [5, 8]. Healthcare providers such as nurse practitioners play an important role in implementing effective smoking cessation treatment and educating patients on options for quitting [9]. However, healthcare providers' adoption rates of utilizing these guidelines for smoking patients have been low [10]. Many barriers and challenges exist, but the top reasons for not applying the changes are the cost of implementation, time constraints, and loss of productivity [11].

In a systematic review by Asfar, Ebbert, Klesges, and Relyea [15] on smoking reduction interventions, indicated that pharmacological interventions can significantly reduce smoking rates. For that reason, pharmacological interventions should be one of the primary methods to help patients to stop smoking. Nicotine replacement therapy can double the chances of quitting smoking. Pharmacotherapy assists with decreasing withdrawal symptoms [5]. Currently, there are five nicotine replacement therapies available in various formats, including patch, gum, oral inhaler, lozenge and nasal spray [7]. Other medications, such as Bupropion and Varenicline, are available to assist with smoking cessation [5,7]. Bupropion is an atypical antidepressant that in low doses reduces nicotine cravings [7]. Varenicline is a partial nicotinic agonist, therefore it can reduce cravings and makes smoking less pleasurable [7].

Using information technology to disseminate smoking-related mortality and morbidity information has been successful in promoting tobacco cessation [19, 20]. A study with tailored smoking cessation messages in family practice settings had positive effects among moderate to light smokers [21]. In another study, a computerized tailored smoking cessation program was effective in increasing smoking cessation rates among the general smoking population [22]. Technology was useful as an adjunct to medical advice when followed with pharmacotherapy among adult smokers [20].

Finkelstein and Cha [23] researched fifty-five smokers in a hospital setting and a mobile application was used for educational purposes to enhance tobacco cessation knowledge. Knowledge gain was measured, and the main components included initial knowledge level, employment status, and high application acceptance. The results indicated an increase in patients who wanted to quit. Currently, smartphones are 35% of the mobile phones used in the US [24]. In addition, seven in ten smokers want to quit smoking and over half of the smokers attempt to quit every year [9]. Patients having the ability to review educational information on a smartphone or iPad are beneficial in aiding smokers to stop smoking [19].

2. Methods

2.1. Smoking Cessation Guidelines

The effects of smoking are detrimental to individuals and public health, therefore helping people to stop smoking is one of the top healthcare initiatives [8]. Decreasing the risks of tobacco-related illnesses is a top priority of the US Surgeon General. However, variations in clinical practice and inconsistent tobacco cessation education content can create barriers to success. The latest guidelines set forth by the Surgeon General, 8 the Agency for Healthcare Research and Quality [25], and the CDC [4] recommend a smoking cessation strategy called the five A's for healthcare providers [18]. The five A's stand for Ask, Assess, Advise, Assist and Arrange. With modern technological advances, mobile technology is a useful tool for providing consistent educational aid in the primary care setting, incorporating the available tool that is proven valid with evidence-based data.

2.2. Phase I Research

This research study was conducted at a CA, privately-owned family practice clinic. The clinic sees an average of 60 to 100 patients a day. Upon the patient's arrival at the office, the medical assistants gathered the patient's health history including whether the patient was a tobacco user. This step is the "Ask" step of the five A's [25]. As part of the standard practice, the nurse practitioner assessed the tobacco user's readiness to quit as well as advising the user to quit. Based upon the patient's responses, the steps for "Assist" and "Arrange" were provided. Choices of pharmacotherapy were discussed, and prescriptions were provided to interested patients. Follow-up appointments were arranged by the clinic staff.

The medical assistants entered the patient smoking history into the clinic's health records. The nurse practitioner reviewed patient health records. A data extraction form was used to record the number of patients who were smokers visiting the clinic in a 10-day period, their demographic information and who did or did not participate in the current standard of care smoking cessation education session. The educational session was three to five minutes and patients who did or did not accept a pharmacotherapy prescription were recorded. These data comprised the baseline benchmark for the research.

2.3. Phase II Research

In phase II of the study, an innovative, new standard of care was implemented. The new standard of care utilized the same five A's [25] but with the addition of a mobile application in the education of smoking cessation. The numerous apps available with educational materials were reviewed and the app selected had the easiest reading level and was consistent with the smoking cessation guidelines on the five A's including current medications available for clinicians to prescribe for eligible patients. An iPad application, *No Nonsense [28]*, a tobacco cessation education app was selected to enhance the education session. *No Nonsense [28]* is an educational tool to use with patients to watch while teaching patients about smoking cessation (3-10 min). Clinicians can provide the education verbally and/or through written materials. Smoking cessation guidelines [25] encourages clinicians to ask all patients if they smoke and if they do, if they would be willing to participate in a brief tobacco cessation education session. The goal of the education session was to provide pharmacotherapeutic assistance to all patients for whom it is not contraindicated.

Currently, smoking cessation education and counseling are billable treatments. Healthcare providers can be reimbursed for providing this intervention along with the office visit fee [5]. Billing is according to the time spent with the smoking patients. The CPT (Current Procedural Terminology) code 99406 is for smoking and tobacco use cessation counseling visits lasting at least three to 10 minutes. CPT code 99407 is for greater than 10 minutes of smoking and tobacco use cessation counseling [26]. Thus, enhancing the standard of care by adding tobacco cessation education is not only good for patients, but it is good for the clinic patient care practice. Patients were told that the app is available to download through Google Play Store for the android phone or the App Store for the I-phone.

Medical assistants collected the initial data as in Phase I. Data from the data extraction forms were entered into an analytical database, verified, and cross-checked by the researcher. Data were subdivided into those patients seen during the baseline period and patients who were seen during the enhanced educational period. Data were analyzed using Predictive Analytics Software version 20.0 (SPSS/IBM, Inc. Chicago, IL). These data were compared to the baseline benchmark.

Descriptive statistics were analyzed on the demographic characteristics of each group including frequencies, percentages, means, and standard deviations. Inferential statistics were used to compare the two groups on the primary outcome, acceptance of a prescription for pharmacotherapy, and (b) the secondary outcome the number of the five

A's completed. Inferential statistics were used to conduct unplanned sub-group analyses to determine whether Phase II patients who accepted a prescription were different from those who refused. Comparisons were made of gender, ethnicity, age, the number of years smoked, and the number of cigarettes/cigars smoked per day.

3. Results

Subjects ranged in age from 21-65, 86%, of women accepted a prescription, but only 15% of men did, 2 (1) = 9.38, p =.002, ES = 70%, 95% CI [25%, 86%]. Eighty percent of non-Hispanic patients accepted a prescription, however only 27% of Hispanics accepted a prescription, 2 (1) = 4.44, p = .04, ES = 42%, 95% CI [2%, 71%]. All the patients (100%) who had previously attempted to quit smoking accepted a prescription, but only 29% of those who had never attempted to quit smoking, accepted a prescription, 2 = 5.29, p = .02, ES = 71%, 95% CI [10%, 87%]. Only, three of 29 patients (10%) who received the standard tobacco cessation counseling accepted a prescription to assist with quitting smoking, while eight of the 20 (40%) who received counseling using the *No Nonsense [28]* application, accepted a prescription, 2 (1) = 5.98, p =.01. The enhanced counseling was most effective among non-Hispanic patients (p = .04), women (p < .01), moderate smokers (p < .01), and patients who had attempted to quit smoking previously (p = .02). Table 1 summarizes the results of Phase I and II.

Table 1. Summary of Phase I and Phase II

Phases	I	II
Male	29	13
Female	9	7
Hispanic	23	15
Non-Hispanic	6	5
Never attempted	27	17
Attempted to quit once	1	3
Attempted to quit twice	2	0
Accepted RX	3	8

4. Discussion

The results have numerous implications for clinicians. A mobile application such as *No Nonsense [28]* can be used to increase the effectiveness of tobacco cessation counseling in primary care. Therefore, primary care providers not only need to use standard smoking cessation education but incorporate a mobile application like *No Nonsense [28]* to assist their patients in stopping smoking. These results indicate that an iPad or other mobile device using the *No Nonsense* [28] app can be used to increase the effectiveness of tobacco cessation counseling in the primary care settings. Additional research needs to be conducted on which application enhances stopping smoking in patients the best.

This intervention has the potential to change healthcare practice nationally. It provides a strategy that (1) can easily be implemented in the primary care setting with startup costs of only $200 to $400 per practitioner, (2) has no maintenance costs, and (3) will increase revenue to the practice by adding a billable service from 5% to 20% for office visits (depending on the smoking rate of the population served), and (4) most importantly, is effective in reducing primary and secondary exposure to tobacco/smoking, a robust risk factor for respiratory, cardiac, and cancer conditions in patients of all ages.

Many smoking cessation programs are effective in reducing the effects of smoking. There is a positive dose-response relationship between the intensity of counseling and quit rates [5, 9, 27]. With today's mobile technology, healthcare providers can easily tailor smoking cessation counseling during patient encounters. Therefore, a simple technological enhancement to a standardized smoking cessation intervention such as *No Nonsense [28]* can increase the amount of time spent and information delivered to patients and is likely to increase quit smoking rates. The specific techniques implemented in this research increased the effectiveness of smoking cessation education and represent an opportunity to increase the quit rates among the 70% of smokers who visit a primary care provider each year.

The research employed a low-cost tablet and a free app to focus the patient's attention on participatory smoking cessation education. Results showed that smokers viewed the app's cessation information on the tablet were more likely to accept pharmacotherapy to aid with quitting smoking. In addition, patients completed the five A's steps as specified in the recommended guidelines [25].

Clinical smoking interventions can improve the quality, access and outcomes of smoking cessation. The degree of improvement depends on the sophistication of the intervention as well as the smokers' choices [5, 9, 10]. If all clinicians used a mobile technology to provide smoking education, conceivably the rate of accepting pharmacotherapy could be quadrupled. Healthcare providers can incorporate mobile technology in their daily medical practice to address smoking cessation along with the five A's of smoking cessation intervention. This can be achieved with every appropriate patient encounter to capture the opportunity to educate patients on stopping smoking. From the identification of tobacco users to providing them with a short, three-minute motivational face-to-face education, clinicians can educate their patients to quit smoking, for health improvement reasons and for their family members' health.

5. Limitation

This study research was conducted at one primary care clinic. The outpatient setting also had limited smoking patients enrolled in this study. The time frame of smoking cessation counseling was also limited to ten days, equivalent of two weeks of working weekdays by the researchers. Extension of this project would be useful to include more subjects and, in more clinics, to validate the impacts of the effectiveness in using an enhanced educational innovation.

6. Conclusion

This research confirmed that smoking cessation education enhanced with mobile technology, specifically an iPad app, can improve the rates of patients accepting pharmacotherapy for tobacco cessation in a primary care setting. Incorporating mobile technology in smoking cessation education is an effective, innovative approach to tobacco cessation. This represents an opportunity for clinicians can to increase rates of delivering tobacco cessation education and highlights the need for clinicians to go beyond providing smokers with a simple admonition to quit. Instead, all clinicians should follow the guidelines below:

- All patients should be asked for their smoking/tobacco use status.
- All smoking patients should be assessed for their readiness to quit.
- All smoking patients should be advised to quit; the utilization of an iPad in this step can boost the initial quit rate by providing tailored education and support for abstinence on a continuingly, increasing the patient's knowledge of supportive lifestyles and strategies with each visit.
- All smoking patients who express an interest in quitting should be introduced to the different types of pharmacotherapy available for stopping smoking. Using

an iPad app at this stage can give smokers information on choosing the appropriate type of pharmacotherapy that matches their needs and values. In addition, it can provide reinforcement to the patient after their visit.

In conclusion, all smoking patients, who are willing to receive a prescription, should be automatically scheduled for follow-up to monitor their use and response to pharmacotherapy, to reassess their readiness to remain smoke-free, and to advise them on additional strategies to support their continued smoking abstinence. Returning patients who continue to use tobacco, should be reassessed using the five A's to find appropriate quitting strategies and support their renewed quit attempts. Do not give up on the smokers since a seed is planted in their minds to quit as it holds a great promise for future adherence with good follow-up.

References

[1] Centers for Disease & Prevention. CDC Fact Sheet. 2017, May 15. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm.

[2] Beckham, S., Washburn, A., Ka'aha'Aina, D., & Bradley, S. Filling the void: A multi-component, culturally adapted smoking cessation program integrating western and non-western therapies. *American Journal of Health Education*, 2007, 38(4), 208-211. http://www.eric.ed.gov/PDFS/EJ795632.pdf.

[3] US Surgeon General. The consequences of smoking-50 years of progress. 2015, 08-26. https://www.surgeongeneral.gov/library/reports/50-years-of-progress/fact-sheet.html

[4] Centers for Disease Control & Prevention. Preventing tobacco use among youth and young adults – A report of the Surgeon General. [Executive Summary]. US Department of Health and Human Services (2012). http://www.cdc.gov/tobacco/data_statistics/sgr/2012/.

[5] Fiore MC, Jaén CR, Baker TB, et al. Treating tobacco use and dependence: 2008 update. *Quick Reference Guide for Clinicians*. 2009, April. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service.

[6] American Cancer Society. Secondhand smoke: What is secondhand smoke? 2013, January 17, http://www.cancer.org/cancer/cancercauses/tobaccocancer/secondhand-smoke.

[7] Dunphy, L., Winland-Brown, J., Porter, B. & Thomas, D. (2015*). Primary care: The art and science of advanced practice nursing. (4th ed.).* Philadelphia, PA: F.A. Davis Company.

[8] US Surgeon General (2015) The Consequences of Smoking- 50 years of progress. https://www.surgeongeneral.gov/library/reports/50-years-of-progress/fact-sheet.html

[9] McAfee, T. (2012). *Taking advantage of a golden opportunity to help smokers quit.* [PowerPoint slides]. http://www.cdc.gov/primarycare/materials/smokingcessation/docs/smokingcessation_resident_education_module_508.pdf.

[10] Covino, J. (2010). Tobacco dependence: How should a busy physician assistant intervene? *Journal of the American Association Physician Assistant, 23*(2), 22-25. www.highbeam.com/doc/1P3-1965005511.html.

[11] Wallace, A. E., Sairafi, N. A., & Weeks, W. B. (2006). Tobacco cessation counseling across the ages. *Journal of American Geri-atric Society*, 54, 1425-1428. doi:10.1111/j.1532-5415.2006.00843.x

[12] National Cancer Institute (2017). Harms of cigarette smoking and health benefits of quitting. https://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco/cessation-fact-sheet

[13] Bullen, C. (2008). Impact of tobacco smoking and smoking cessation on cardiovascular risk and disease. *Expert Review Cardiovascular Therapy, 6*(6), 883-895. http://www.medscape.com/viewarticle/577468.

[14] Zwar, N. A., & Richmond, R. L. (2006). Role of the general practitioner in smoking cessation. *Drug and Alcohol Review, 25*, 21-26. doi:10.1080/09595230500459487.

[15] Asfar, T., Ebbert, J. O., Klesges, R. C., & Relyea, G. E. (2011). Do smoking reduction interventions promote cessation in smokers not ready to quit? *Addictive Behaviors*, 36, 764-768. doi:10.1016/j.addbeh.2011.02.003

[16] Sherman, C. B. (1991). Health effects of cigarette smoking. *Clinics in Chest Medicine*, 12(4), 643-658. http://www.ncbi.nlm.nih.gov/pubmed/1747984

[17] Dahms, T. E., Bolin, J. F., & Slavin, R. G. (1981). Passive smoking. Effects on bronchial asthma [Abstract]. *Chest, 80*(5), 580-584. doi:10.1378/chest.8.5.580.

[18] Van Schayck, O, Pinnock, H., Ostrem, A., Litt, J. Tomlins, R., Williams, S., Yaman, H. (2008). IPCRG consensus statement: Tackling the smoking epidemic – Practical guidance for primary care. *Primary Care Respiratory Journal, 17(*3), 185-193. doi: 10.3132/pcrj.2008.00060.

[19] Whittaker, R., McRobbie, H., Bullen, C., Rodgers, A. and Gu, Y. (2016) Mobile phone-based interventions for smoking cessation. *Cochrane Database System Review*. https://www.ncbi.nlm.nih.gov/pubmed/27060875.

[20] Etter, J. (2002). Using new information technology to treat tobacco dependence. *Respiration, 69*, 111-114. http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowPDF&ArtikelNr=56311&ProduktNr=228221&filename=56311.pdf.
[21] Strecher, V. J., Kreuter, M., Bower, D. D., Kobrin, S., Hospers, H. J., & Skinner, C. S. (1994). The effects of computer-tailored smoking cessation messages in family practice. *Journal of Family Practice*, 39(3), 262-269. http://knowledgetranslation.ca/sysrev/articles/project21/Strecher%20VJ%20J%20Fam%20Pract%201994%20Sep%2039%203%20262%2070-20090818142410.pdf
[22] Etter, J., & Perneger, T. V. (2001). Effectiveness of a computer-tailored smoking cessation program. *Archives of Internal Medicine, 161*, 2596-2601. http://www.ncbi.nlm.nih.gov/pubmed/11718591.
[23] Finkelstein, J. & Cha, E. M. (2016). Using a mobile app to promote smoking cessation in hospitalized patients. Doi: 10.2196/mhealth.5149.
[24] BinDhim, N, Hwakey, A. & Trevena, L. (2014). A systematic review of quality assessment methods for smartphone health apps. Telemedicine and eHealth 21(2). Doi: 10.1089/tmj.2014.0088.
[25] The Agency for Healthcare Research and Quality (2019). Five major steps to intervention – The "5 A's". https://www.ahrq.gov/prevention/guidelines/tobacco/5steps.html.
[26] American Association of Family Physicians (2016). Coding references on tobacco use prevention and cessation counseling. https://www.aafp.org/dam/AAFP/documents/patient_care/tobacco/codes-tobacco-cessation-counseling.pdf.
[27] Okuyemi, K. S., Nollen, N. L., & Ahluwalia, J. S. (2006). Interventions to facilitate smoking cessation. *American Academy of Family Physicians, 74*, 262-276. http://www.aafp.org/afp/2006/0715/p262.pdf.
[28] Eyesix Games (2012, January 27). The No nonsense stop smoking guide 1.0.1. Retrieved June 30, 2013, from http://eyesixgames.co.uk/2012/index.php/nonsense-stop-smoking-guide/