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Impact of an Online Training Program in Smoking Cessation Interventions in Hospitals

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Key words

Barriers, brief intervention, health organizations, healthcare workers, nurses, online training, smoking cessation, tobacco cessation

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Abstract

Purpose: To assess changes in the self-reported performance of smoking cessation interventions according to the 5A's model (Ask; Advise; Assess; Assist; and Arrange follow-up) among clinicians; and to identify the main barriers and facilitators in smoking cessation implementation before and after an online smoking cessation training program.

Design: Pre-post evaluation.

Methods: We assessed self-reported smoking cessation interventions in the implementation of the 5A's model among clinicians working in Catalan hospitals (Spain). In addition, we assessed individual-, behavioral-, and organizational-level factors that act as barriers and facilitators in the implementation of the 5A's model. We used a questionnaire of 63 items reflecting each of the 5A's performance (scored from 0 = *none* to

10 = *most possible*). The questionnaire was completed both immediately before and 6 months after the training. We analyzed the data of those participants who had a clinical role and answered pre- and post-questionnaires. We used the nonparametric test for paired data (Wilcoxon) to examine changes in scores.

Findings: A total of 127 clinicians completed the pre-post questionnaire; 63.0% were registered nurses, 17.3% were nursing assistants, 7.9% were physicians, and 11.8% were other professionals ($p < .001$). Overall, there were significant increases in the implementation of the assist component (from a score of 4.5 to 5.2; $p < .003$) and arrange a follow-up component (from 3.6 to 4.5; $p < .001$) of the intervention. Scores in the perception of the level of overall preparation, preparedness in using smoking cessation drugs, level of competence, and organizational recognition improved ($p < .001$) at the follow-up; however, the score in the perception that implementing smoking cessation is part of their job decreased (from 6.3 to 4.4; $p < .001$).

Conclusions: The online training had a positive impact on the implementation of assist and arrange follow-up components. Although self-preparedness in the management of smokers increased, the motivation and involvement of key professionals decreased. Organizational factors related to the incorporation of resources (such as protocols, records, etc.) should be improved for the correct progression of smoking cessation interventions within the institutions.

Clinical Relevance: Smoking cessation training programs should incorporate some motivational content to increase the engagement of health professionals in smoking cessation interventions in their clinical practice.

Smokers are frequent users of healthcare services, and their interactions with the health system might be an ideal teachable moment to encourage quitting (Duffy, Scholten, & Karvonen-Gutierrez, 2010). Thus, hospitalization provides a unique opportunity to identify and engage smokers, initiate cessation treatments, and facilitate appropriate follow-up and support (Rigotti, Clair, Munafo, & Stead, 2012). Regardless of the reason for admission, smoking cessation interventions initiated during hospitalization, which include nicotine replacement therapy and at least one follow-up visit within a month of discharge, are effective in increasing smoking cessation (Rigotti et al., 2012).

It is widely agreed that international guidelines recommend the 5A's brief intervention as the basic model for smoking cessation implementation in clinical settings (Agency for Healthcare Research and Quality [AHRQ], 2012; Fiore & Baker, 2011). This model is based on five steps: (a) ask patients about smoking at every visit, (b) advise all smokers to quit, (c) assess smokers' willingness to try to quit, (d) assist smokers' efforts with treatment and referrals, and (e) arrange follow-up contacts to support cessation efforts (AHRQ, 2012; Fiore & Baker, 2011).

Training all healthcare workers to record smoking use and offer brief smoking cessation interventions is

a basic and effective method to improve the successful implementation of smoking cessation guidelines (Carson et al., 2012). But besides the lack of training (Stead et al., 2009; Tong, Strouse, Hall, Kovac, & Schroeder, 2010), other barriers, which have been identified to prevent its broad implementation, include health professionals' own smoking consumption; lack of time (Tong et al., 2010); low motivation, knowledge, and confidence (Applegate, Sheffer, Crews, Payne, & Smith, 2008; Leitlein, Smit, de Vries, & Hoving, 2012; Martínez, 2009; Sarna et al., 2009; Smit, de Vries, & Hoving, 2013); the deficiency of protocols, records, educational materials, and pharmacological aids (Eby, Laschober, & Muilenburg, 2014; Freund et al., 2009; Leitlein et al., 2012; Smith, Sellick, & Spadoni, 2012); and insufficient organizational support from supervisors and co-workers (Choi & Kim, 2016; Laschober, Muilenburg, & Eby, 2015; Segaar, Bolman, Willemsen, & Vries, 2006). Therefore, training, as well as eliminating individual and organizational barriers to tobacco dependence treatment in a healthcare setting, is essential (Williams et al., 2015).

In Spain, currently 29% of adults (>15 years old) are smokers (European Commission, 2015). In Catalonia (nation in the northeastern part of Spain), several

actions have been undertaken to implement tobacco control interventions in hospitals beyond the legislative framework (Martínez, 2009; Mendez, Garcia, Margalef, Fernandez, & Peris, 2004). Since 2000, the Catalan Network for Smoke-free Hospitals (Xarxa Catalana de Hospitales sin Humo [XCHsF], www.xchsf.cat) has promoted a tobacco control policy based on organizational and cultural change. This model provides expert advice and training to health workers, and has developed specific smoking cessation programs for hospital patients and staff (Ballbè et al., 2013, 2015; Martínez et al., 2012, 2014). In 2014, the in-person “Brief Intervention for Smoking Cessation Training Program” was adapted to an online platform (<http://www.e-oncologia.org/en/>) to reduce the cost and increase the training coverage among the hospital network. The content was developed using numerous meta-analysis and clinical practice guidelines (Carson et al., 2012; Fiore & Baker, 2011; Trinite, Loveland-Cherry, & Marion, 2009), and the feedback of an expert advisory group, before being tested on 10 voluntary participants (XCHsF, 2016).

In September 2014, the online training was launched and offered to health professionals working in the hospitals affiliated with the XCHsF in Catalonia (Spain). In this context, the aim of this study was to assess changes in the self-reported performance of the smoking cessation intervention according to the 5A’s brief smoking cessation intervention model (Ask; Advise; Assess; Assist; and Arrange follow-up), and to identify the main barriers and facilitators in its implementation before and after an online smoking cessation training program.

Methods

Design and Target Sample

A pre-post evaluative design was used. The sample was composed of healthcare workers from hospitals belonging to the XCHsF, who voluntarily registered for the online course “Brief Intervention for Smoking Cessation Training Program” from September 2014 to March 2016, and who completed the pre- and post-questionnaire.

Recruitment and Procedure

Several strategies were used for the recruitment of participants. An e-mail with an invitation to undertake the course was sent to the coordinators of the smoke-free project of the affiliated hospitals. In addition, the education department of each hospital distributed the electronic invitation to their health workers. The

information was also available on the XCHsF website. The inclusion criteria specified health workers of hospitals enrolled in the XCHsF who had access to the Internet and an e-mail address to receive additional communications. After registering for the course, the participants had access to the baseline survey, a requisite before accessing the course. Participants who successfully finished the training received an invitation to complete the follow-up survey 6 months later, and a maximum of five reminders were sent. Four hundred and eighteen participants completed the baseline survey, and 168 of them completed both the pre- and post-survey (40.2%). From this total ($n = 168$), 41 participants had mainly managerial or research duties and were therefore considered nonclinicians and excluded from the current study. These nonclinical workers were mainly from other professions (60.5% vs. 39.5% of those who had clinical duties; $p < .001$). Therefore, the final sample was composed of 127 clinicians who completed both surveys.

Online Training

The 6-hr online training is composed of four modules. It focuses on enhancing clinicians’ knowledge, skills, and confidence in implementing cessation treatment, and uses evidence-based information in a series of cases and problem-solving exercises (Carson et al., 2012; Fiore & Baker, 2011; Trinite et al., 2009). Module 1 provides the epidemiologic data on the tobacco epidemic in Spain and Catalonia; Module 2 explains how to ask, advise, and assess smoking dependence; Module 3 describes levels of assisting in smoking cessation; and Module 4 explains how to use approved medications for treating tobacco dependence and how to arrange a follow-up (Martínez et al., 2017). The online training provides ongoing education credits and is free of cost.

Survey Measure

The survey was a 63-item online questionnaire created by a group of Spanish researchers based on the dimensions developed by Sheffer, Barone, and Anders (2009) to measure cognitive and behavioral factors such as (a) motivation to help patients to quit smoking, (b) knowledge about tobacco cessation, (c) self-efficacy, (d) importance of smoking cessation in their job, (e) effectiveness of interventions, (f) importance of barriers, and (g) self-reported preparedness. Moreover, several questions were included to explore in more detail cognitive and behavioral factors, such as preparedness in using smoking cessation drugs, security to motivate smokers, use of

additional resources to intervene, frequency in seeing tobacco-related diseases, and having previous positive and successful experiences in providing support for smoking cessation, among others. We also explored some organizational and support factors identified in the literature, such as having records in which tobacco consumption and cessation could be detailed, having systematic protocols, having access to tobacco cessation pharmacological aids, being required by their supervisors, having organizational support, and receiving recognition, among others (Freund et al., 2009; Leitlein et al., 2012; Sarna et al., 2009). Finally, the survey also assessed the self-reported level of implementation of the 5A's and included questions about responders' individual characteristics, including sex, professional group (physicians, registered nurses [RNs], nurse assistants, and others, who were composed mainly of psychologists), tobacco use history, previous tobacco cessation training, and characteristics of their organization (public or private, hospital or other). All 63 items were assessed on a discrete scale of 0 to 10, with 0 = *none or not at all* and 10 = *the most possible*. The content validity of the instrument was carried out based on the advice given by five experts on smoking cessation, who reviewed the items and agreed on their representativeness and clarity. The instrument was created in Spanish, and its overall internal reliability was tested (Cronbach's $\alpha = .77$; Andres et al., 2018; Martínez et al., 2018).

Ethical Considerations

All participants were informed about the main objectives of the study and provided informed consent for their voluntary participation. The study protocol had the approval of the Research Ethics Committee at the Hospital Universitari de Bellvitge (PR040/15).

Statistical Analysis

Descriptive analyses were conducted on the demographic data. Mean and standard deviation of scores in each of the items were calculated. To explore barriers and facilitators for the performance of each of the 5A's, they were classified into three groups: high performance (≥ 7), low performance (< 5), and those that were in between (> 5 and < 7), which were considered neither barriers nor facilitators. This criterion was based on the results of previous studies conducted by Sheffer et al. (2009). Only the item "Lack of knowledge and skills" had a reverse interpretation. The nonparametric Wilcoxon signed-rank test for paired samples was used to compare pre- and post-test results

before and after the course completion. To assess the changes in the performance of each of the 5A's components, we compared the differences in the correlation between each component before and after the training by using Spearman's rank correlation coefficients. The significance level for all the tests was set at .05.

Results

Participants' Characteristics

The majority of the participants were women (85.7%), RNs (63%), and nursing assistants (17.3%) who worked in hospitals (81.9%) and who had never smoked (45.7%). However, among the four professional groups identified there were some demographic differences. Physicians had a higher proportion of men than the other groups ($p < .001$). Among nursing assistants there was a higher proportion of workers ≥ 40 years old ($p = .019$) and a higher proportion of smokers ($p = .001$), and a higher proportion of them had never received smoking cessation training ($p = .002$) compared to the rest of the groups. Overall, 73.2% had never been trained in smoking cessation (Table S1).

Differences in Self-Reported Performance of the 5A's Model Before and After the Training

Table S2 displays the self-reported frequency of providing the 5A's smoking cessation intervention to patients before and after the training, overall and by health professional groups.

Prior to the training, the most frequent component of the 5A's intervention performed by overall participants was advise (score of 7.5 out of 10) and the least frequent was arrange (score of 3.6 out of 10). Physicians and RNs reported a higher frequency of performance of the first two components of the 5A's intervention model (ask and advise) than did the two other professional groups (nursing assistants and others; see Table S2).

Comparing the scores before and after the training, participants reported significantly higher performance scores in the assist component (from 4.5 to 5.2; $p = .003$) and arrange component (from 3.6 to 4.5; $p < .001$), but no improvements in the ask, advise, and assess components were found. The improvement in the performance of the assist and arrange components was higher and statistically significant among RNs, women, those with ≥ 14 years of working experience, never smokers, those without previous training, non-hospital workers, and those belonging to public organizations (see Table S2). The results of the post-training

scores revealed that physicians and RNs reported performing more ask and advise components than did the rest of the health professionals, with scores over 7. The group of other professionals (composed mainly of psychologists) accomplished more of the assist and arrange components.

Furthermore, we observed that health professionals who had received previous training differed from those who had not received previous training, with a performance score of the smoking cessation interventions (based on the 5A's) higher both before and after the training (although it was not statistically significant).

Barriers and Facilitators in Performing the Smoking Cessation Intervention According to the 5A's Model Before and After the Training

At baseline, factors that scored <5 were identified as barriers, including self-reported preparedness; preparedness in using smoking cessation drugs; being familiar with resources; not being required by supervisors; and lack of recognition. Conversely, there were a number of other factors identified as facilitators, with scores of >7, such as being motivated to help patients; having the perception that smoking cessation was important in their job; having the desire to receive more training; and frequency in facing tobacco-related diseases in their practice.

After the training, there was an increase in the scores of the factors identified as initial barriers (score of <5): participants reported having gained overall and drug preparedness in using smoking cessation drugs; competency in assisting smokers; and familiarity with other resources; and they perceived having more recognition when performing smoking cessation interventions (Table S3). Two cognitive factors (overall and drug preparedness) and one organizational factor (receiving recognition) were those that increased the most (scores from 2.8 to 4.9), and the increase was statistically significant for all professional groups (see Table S3).

After the training, the score of three out of the four factors identified as facilitators decreased. Thus, participants expressed being less motivated to help patients to quit (8.5 vs. 7.9; $p < .01$); less interested in receiving additional training (8.5 vs. 7.3; $p < .01$); and less agreeable with thinking that smoking cessation was part of their job (6.3 vs. 4.4; $p < .01$; see Table S3). Both physicians and RNs in particular reported lower scores in considering smoking cessation part of their job after the training than before (2.3 and 3 points less, respectively; see Table S3). Professionals in the other groups showed higher scores in some factors, such as having more competency; considering

that it is part of their job; and being required by their supervisors (see Table S3).

Correlates of the Components of the 5A's Model

The results of pre- and post-correlation analyses using the 5A's showed an increase in the pairwise association among each of the components, except for assess and arrange, which decreased slightly (Table S4). The most important increase was observed between the advise and arrange components, which increased by 38% after the training (from 0.42 to 0.58; $p = .027$).

Discussion

Our study shows the effectiveness of an online brief intervention for smoking cessation training program offered to health professionals in the performance of the 5A's, in which we obtained an improvement in the scores of the assist and arrange components. Our findings indicate that the training slightly increased smoking cessation practices. The most recent meta-analysis about the effectiveness of smoking cessation training indicates that health professionals who have received training are more likely to perform significant changes in each of the steps of the 5A's smoking cessation intervention than untrained controls (including asking patients to set a quit date; making follow-up appointments; counseling of smokers; provision of self-help material; and setting a quit date), and no evidence of an effect was observed for the provision of nicotine gum or replacement therapy (Carson et al., 2012). Likewise, online smoking cessation training using the 5A's model has been proved to be effective in improving knowledge and self-confidence in smoking cessation skills (Schmelz, Nixon, McDaniel, Hudmon, & Zillich, 2010; Shishani, Stevens, Dotson, & Riebe, 2013). Our online training has demonstrated a progression in the performance of all the components of the 5A's model, except for the advise component, which was the highest at baseline. In addition, we should highlight that the correlation between almost all the components increased, especially between advise and arrange, indicating the positive effect of the training in the progression of the 5A's model.

Online training programs are cost efficient and provide modes to teach and reinforce counseling skills, which can often be difficult to convey in the traditional classroom setting (Aggarwal et al., 2011). Previous online smoking cessation training programs have demonstrated an improvement in the health providers' skills in counseling patients on tobacco cessation (Carson et al., 2012; Gordon, Mahabee-Gittens, Andrews,

Christiansen, & Byron, 2013; Sarna et al., 2014, 2016; Schmelz et al., 2010). Although there are several online smoking cessation training programs, most of them have been developed and evaluated in English-speaking countries (Selby et al., 2015). To our knowledge this is the first online smoking cessation training course that has been implemented and evaluated in Spain.

In our study, all health professionals benefited from training, with higher scores on each item from baseline. However, we only observed statistically significant changes among RNs, who improved their performance in the components assist and arrange; physicians, who improved their performance in the assist component; and nursing assistants, who improved their performance in the advise component. The difference in the performance of these components of the 5A's model among professional groups could be a consequence of their qualifications and responsibilities. Tong et al. (2010) also identified differences among the seven health professional groups studied. Another study found that primary care physicians reported higher rates of implementing the 5A's model compared to nurses and dentists (Applegate et al., 2008). This is consistent with our results, where physicians obtained the highest performance in each of the 5A's components in comparison with the rest of the health professionals before and after the training, which would explain why physicians did not record a significant increase in their own performance after the training program. However, it is worth mentioning that physicians were under-represented in our study, accounting for only 7.9% of the sample.

A relevant impact of the online training was the increase between the correlation between the advise and arrange components. This finding suggests how training has improved the continuation of the smoking cessation support after patient discharge as recommended in the literature as a relevant component to maintain abstinence (Rigotti et al., 2012).

In addition, we observed that health professionals who had received previous education in smoking cessation also benefited from undertaking the online training, obtaining a summative increase in performance. The low performance of the 5A's could be a consequence of factors beyond the elements achievable only with training; thus, normally training can only modify knowledge, attitudes, and aptitudes (Applegate et al., 2008; Choi & Kim, 2016). Thus, there are also some organizational barriers, such as a lack of protocols, records, educational materials, and pharmacological aids (Eby et al., 2014; Freund et al., 2009; Leitlein et al., 2012; Smith et al., 2012), that hamper the correct performance of smoking cessation and that cannot be changed only through training, but by means of

structural and organizational changes. In our study, we found that trainees reported that neither their supervisors nor their organizations required them to perform smoking cessation interventions or gave them recognition for doing it. However, we believe that monitoring these barriers and facilitators when a training program is launched at the organizational level could help to detect other elements that should be improved for the correct progression of smoking cessation intervention within the institutions, especially if other elements are introduced, such as policies, records, and materials, among others.

Moreover, we observed that training could also modify individual factors (such as cognitive and behavioral factors). We found that participants increased their self-reported preparedness, competency, and perception of receiving more recognition. These findings are in consonance with the results of Applegate et al. (2008). However, our results show that after the training, participants decreased their engagement. Hence, the score of those who considered smoking cessation part of their job did decrease. This barrier can also be related to the little support given by the supervisors and organizations as reported by trainees. Nevertheless, it is worth mentioning that after the training, participants reported receiving more recognition for performing smoking cessation interventions; so, this factor should be taken into consideration in future implementation research projects to motivate and engage clinicians. In this sense, a study conducted in the Netherlands among nurses showed that both attitude and being more prone to innovation characteristics were found to be positively associated with the intention to implement the intervention (Smit et al., 2013). Smit et al. (2013) suggested that to increase smoking cessation implementation, it may be important to convince health professionals of the beneficial characteristics of the new intervention, and generate positive attitudes towards it. This process could be enhanced by involving general practitioners and other organizational and managerial members in the process. Other studies have also stated that there is a significant relationship between positive attitude and the delivery of more smoking cessation interventions (Applegate et al., 2008; Choi & Kim, 2016). However, we explored for the first time how other contextual and organizational factors change after training.

Limitations

Several limitations should be noted for this study. First, this study relied on self-reported responses. Second, our participants may not have been representative of the general characteristics of healthcare workers in Catalonia. In fact, participants had a lower prevalence

of current smoking (16.5%) than previously reported (28.1%, data from 2009 to 2012; Martínez et al., 2016). Third, due to the convenient nature of our sample, we could have introduced compliance bias, as our participants should have had more interest in smoking cessation interventions and provided more positive responses. However, this study explored, for the first time in our context, the impact of an online smoking cessation training program on changing the level of implementation of the 5A's model. In addition, we restricted the analysis to subjects with clinical responsibilities, excluding those with other tasks (such as supervisors, managers, researchers, etc.). While the observed improvement in the frequency of the health professionals' interventions is very unlikely to occur without the presence of an educational intervention such as the one assessed in this study, the lack of a comparison group prevents us from attributing our findings exclusively to the online training. Moreover, we cannot rule out that our results could be influenced by effects of regression to the mean—those health professionals who obtained higher increases in providing smoking cessation interventions were those with lower means at the baseline. Finally, although our sample size was small, we performed nonparametric paired tests, which are robust statistics regardless of the sample size.

Implications

The implications of our results are noteworthy for improving the health of the population. In Catalonia, there are around 972,995 annual hospitalizations (Generalitat de Catalunya, 2013), and approximately 30.7% of acute inpatients smoke (Sabido, Sunyer, Masuet, & Masip, 2006). This represents about 300,000 smokers hospitalized. Our data suggest that an online smoking cessation training program can increase the frequency with which patients receive smoking cessation services. Given the impact of tobacco on health, the public health benefits of smoking cessation training would be enormous (U.S. Department of Health and Human Services, 2012). But to ensure its success, organizational solutions to engage healthcare workers in smoking cessation should be implemented, including facilitating resources (such as nicotine replacement therapy, guidelines, etc.) and increasing the support and recognition for participation in these practices (Williams et al., 2015).

Conclusions

Health professionals reported higher levels of implementation of the 5A's smoking cessation model, greater

preparedness and competency in assisting smokers, more familiarity with resources, and higher recognition from their supervisors after participating in an online program. However, healthcare organizations must facilitate the incorporation of smoking cessation into best practices for patient care, and diminish some of the identified barriers attributable to the organization itself, which cannot be reduced with training alone.

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Clinical Resources

- American Nurses Association. <https://www.nursingworld.org/practice-policy/work-environment/health-safety/healthy-nurse-healthy-nation/tobacco-cessation/>
- Comité Nacional para la Prevención del Tabaquismo. <http://www.cnpt.es>
- Tobacco Free Nurses. <https://tobaccofreenurses.org/>
- Unidad de Control del Tabaco. <https://www.icopreencio.cat/uct/es/>

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web site:

Table S1. Participants' Characteristics by Professional Groups ($N=127$)

Table S2. Mean Scores* of Self-Reported Performance of the 5A's Model Components Before and After 6 Months of Finalizing a Specific Training

Table S3. Barriers and Facilitators in Performance of the Smoking Cessation Intervention According to the 5A's Model Before and After the Training

Table S4. Pairwise Spearman's Correlation Coefficients Between Each of the Components of the 5A's Model Before and After the Training