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Exploring individual and contextual factors contributing to tobacco cessation intervention implementation

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HIGHLIGHTS

- KABO questionnaire (Q) identifies barriers and facilitators in performing smoking cessation interventions.
- KABO_Q is composed of seven domains that explained 69.7% of the variance.
- KABO_Q is a valid tool to monitor individual and organizational factors affecting smoking cessation interventions.

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ABSTRACT

Background: Previous research suggests that smoking cessation interventions are poorly implemented. This study reports the development and testing of a questionnaire including knowledge, attitude, behavioral, and organizational (KABO) factors affecting the implementation of smoking cessation practices in hospitals by health care providers and organizations.

Methods: An initial pool of 44 items was developed to assess the individual knowledge, attitudes, and beliefs of health professionals towards smoking cessation practices according to the 5 A's intervention model, as well as organizational barriers and opportunities for its implementation. Items were measured in a scale from 0 = "Not at all/Never" to 10 = "Completely/Always". Data were collected from health workers (n = 702) in Catalonia. The validity of the instrument was measured by: (a) analyzing the items, (b) assessing the internal structure, (c) estimating the internal consistency, and (d) analyzing the relationship between this tool and the 5 A's intervention model.

Results: Seven domains were extracted: individual skills, positive organizational support, attitudes and beliefs, individual commitment, organizational resources, beliefs about patient desire/readiness to quit, and organizational endorsement. These domains explained 69.7% of the variance, and allowed for the development of a refined 26-item version of the questionnaire. Both the seven domains and the total scale showed adequate internal consistency.

Conclusions: Psychometric testing indicates that the KABO questionnaire is a reliable and valid instrument for assessing the main barriers and facilitators to smoking cessation intervention implementation. Individual factors better explained the implementation of smoking cessation interventions in hospitals, and the seven identified domains can be used for further investigations into how the implementation of evidence-based practices impacts smoking cessation performance.

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1. Introduction

Smokers are frequent hospital users, and hospitalization may represent an appropriate teachable moment for quitting (Duffy, Scholten, & Karvonen-Gutierrez, 2010; McBride & Ostroff, 2003). Between 60% and 70% of patients who smoke make an attempt to quit while they are hospitalized (Zack, 2002). Hospitalization therefore provides a unique opportunity to identify and engage smokers, initiate cessation treatments, and facilitate appropriate follow-up and support after discharge (Rigotti, Clair, Munafo, & Stead, 2012).

Several international health care organizations have adopted the 5 A's smoking intervention model proposed by evidence-based guidelines (AHRQ, 2012; Fiore & Baker, 2011). This model is based on the following five steps: (1) *Ask* all patients if they smoke, (2) *Advise* all tobacco users to quit, (3) *Assess* smokers' willingness to attempt to quit, (4) *Assist* smokers' efforts with treatment and referrals, and (5) *Arrange follow-up* contacts to support cessation efforts (AHRQ, 2012; Fiore & Baker, 2011). However, previous studies have identified deficiencies in implementing smoking cessation interventions in hospital settings as part of routine practice (Freund et al., 2008; Martinez et al., 2009; Ravara, Calheiros, Aguiar, & Taborda-Barata, 2012).

Previous findings in health care services and implementation research have provided some insight into the most frequent barriers to the provision of smoking cessation interventions, including: [i] individual and psychological factors such as smoking by the health care provider, low motivation and confidence in providing the intervention, and lack of knowledge and training to provide such intervention (Applegate, Sheffer, Crews, Payne, & Smith, 2008; Leitlein, Smit, de Vries, & Hoving, 2012; Martinez, 2009; Sarna et al., 2009; Sarna, Wewers, Brown, Lillington, & Brecht, 2001; Smit, de Vries, & Hoving, 2013); [ii] cognitive factors such as preconceived ideas about the intervention or viewing smoking cessation interventions as time-consuming, ineffective, or intrusive to patient privacy (Godin, Belanger-Gravel, Eccles, & Grimshaw, 2008; Hall & Marteau, 2007; Vogt, Hall, & Marteau, 2005); [iii] organizational barriers such as an absence of protocols, records, educational materials for patients, or pharmacological aids (Eby, Laschober, & Muilenburg, 2014; Freund et al., 2009; Leitlein et al., 2012; Smith, Sellick, & Spadoni, 2012) and; [iv] organizational support such as social support from supervisors and/or coworkers (Choi & Kim, 2016; Laschober, Muilenburg, & Eby, 2015; Segaar, Bolman, Willemsen, & Vries, 2006). These factors have never been studied together to determine how they interact in the implementation of the 5 A's model or how they contribute to the performance of each component in the model (Fiore & Baker, 2011). Additionally, there is no validated questionnaire that includes the main facilitators and barriers to the implementation of smoking cessation practices in hospitals.

This paper reports the development of an instrument to measure the implementation of the brief intervention for smoking cessation based on the 5 A's model, including the above factors. This paper also explores the reliability and validity of this instrument by: (a) carrying out an item analysis of the questionnaire, (b) assessing the internal structure of the questionnaire allowing for the identification of domains related to knowledge, skills, attitudes, and barriers to the implementation of smoking cessation practices, (c) estimating the internal consistency of the instrument using the Cronbach alpha coefficient, and (d) analyzing the relationship between this tool and self-reported performance of the 5 A's. This tool may be useful to hospital administrators, researchers, and others interested in changing practices related to smoking cessation.

2. Methods

2.1. Participants

The survey was available via a hyperlink and was a compulsory step for accessing the online training course organized by the Catalan Network for Smoke-free Hospitals (www.xchsf.cat). A total of 715 health care professionals completed the online survey between January 2014 and March 2016. The most complete set of answers was used for duplicated entries. Thirteen of the respondents left > 20% of the questionnaire blank. Therefore, 702 participants (702/715 = 98.2%) completed the survey and provided the data reported here. The mean age of the whole sample was 39.0 years (SD = 9.8) and ranged from 20 to 62 years. 80.6% of participants were women. Participants reported a mean professional experience within a clinical practice setting of 14.4 years (SD = 9.2). Participants mainly worked in acute hospitals (84.5%) and public institutions (79.6%). More than half the participants were nurses (53.6%), but the sample also included doctors (7.4%) and other health care staff positions (39.0%). 24.2% of participants reported being smokers at the time of assessment.

2.2. Procedure

The data was collected online before the start of the training program. All participants were directed to an informational webpage disclosing the aims of the study and contact information for the principal investigator in case they required further information.

2.3. Measures

The “Knowledge, Attitudes, Behaviors, and Organization (KABO) Questionnaire” is a self-administered instrument specifically designed to assess several factors relevant to smoking cessation implementation practices. An initial pool of 44 items was developed to assess those factors, the specific actions taken by health care professionals, and barriers and opportunities in their daily practice.

The questionnaire includes the dimensions developed by Sheffer to measure cognitive and behavioral factors such as: 1) motivation, 2) knowledge about tobacco cessation, 3) self-efficacy, 4) belief about the importance of providing tobacco use interventions, 5) effectiveness of interventions, 6) importance of barriers, and 7) preparedness (Sheffer, Barone, & Anders, 2009). It also includes questions designed to explore the clinical environment and organizational-level characteristics identified in the literature and suggested by a panel of experts (Freund et al., 2009; Leitlein et al., 2012; Sarna et al., 2009). We asked about their level of performance in each of the 5 A's (Ask, Advise, Assess, Assist, and Arrange) to assess implementation of the brief smoking cessation intervention. Each item was measured according to its level of implementation in an 11-point scale from 0 (“Not at all/Never”) to 10 (“Completely/Always”). The questionnaire was available on Google Drive during study period, and is available from the corresponding author upon request.

The content validity of the instrument was assessed based on the advice given by five smoking cessation experts who reviewed the items and agreed on their representativeness and clarity. The KABO questionnaire also included several questions about sociodemographics and smoking behavior. Some items of the questionnaire were inversely rated, such that higher scores on these items indicated lower levels of smoking cessation implementation practices, and 15 items were consequently recoded (7, 20–24, 26–31, 33–35).

2.4. Ethical approval

All participants gave their approval for participation in the study by completeing an electronic informed consent form. The study was approved by the Bellvitge Ethics Committee (Hospital Universitari de Bellvitge, PR040/15).

2.5. Data analysis

A descriptive analysis of all items was carried out to assess their

appropriateness, consisting of an analysis of corrected item-total correlations. A cutoff point of 0.30 was considered adequate as determined by Nunnally and Bernstein (1994) (Nunnally & Bernstein, 1994). Missing data percentages were considered adequate when < 5%, according to (Guarino, Lamping, Elbourne, Carpenter, & Peduzzi, 2006). Skewness and kurtosis were analysed for all items, and a principal components analysis (PCA) was performed following varimax rotation. Factors were retained according to the Scree test and the Kaiser-Guttman rule (Kaiser, 1960), and factor loading was considered acceptable when it was ≥0.30 (Floyd & Widaman, 1995). Spearman correlation analyses were performed to assess the relationship between the factors obtained from the KABO questionnaire and the 5 A's domains. All analyses were performed using the IBM SPSS Statistics software version 23.0.

3. Results

3.1. Item analysis

A descriptive analysis of the 44 items contained in the KABO questionnaire was perfomed, and no item showed a high missing percentage.

A total of 10 items showed a corrected item-total correlation lower than 0.30 and were therefore removed from the questionnaire, since they did not discriminate between participants with higher and lower scores.

Construct validity A PCA analysis was performed to assess the internal structure of the obtained 34-item questionnaire. Eight items showing a factor loading lower than 0.60 were removed.

PCA with varimax rotation was conducted based on the 26-item refined version of the questionnaire in order to obtain a short and valid version. Kaiser-Meyer-Olkin and Bartlett's tests indicated the adequacy of the data (KMO = 0.852, $\chi^2(325) = 6983.2$, $p < 0.001$), and the PCA revealed a seven-factor solution. Communalities ranged from 0.556 to 0.861, as shown in Table 1. The seven-factor model explained 69.7% of the variance and factor loadings were acceptable in all cases.

The content analysis of the 7 retained factors revealed that items belonging to the same subscale were indeed measuring similar content and were consequently labeled according to that content, leading to the following domains: individual skills (IS), positive organizational support (POS), individual attitudes and beliefs (IAB), individual commitment (IC), organizational resources (OR), beliefs about patient readiness to quit (BPR), and organizational endorsement (OE).

3.2. Reliability

Cronbach's alphas were calculated for each domain according to the internal structure found in the PCA analysis. As shown in Table 2, internal consistency was adequate in all domains except for the IC subscale, for which Cronbach's alpha was 0.665. Corrected item-total correlations were adequate for all subscales, suggesting that all items contributed to the internal consistency of the scale.

3.3. Relationships between the KABO domains and the 5 A's model

The correlation between the scores obtained from the KABO questionnaire domains and the score given for each 5 A's component was analysed. Individual skills (IS) and attitudes and beliefs (AB) showed a significant positive correlation with all items in the 5 A's model, particularly Assist (0.640 and 0.520, respectively) and Arrange (0.642, and 0.480), as shown in Table 3. Those subscales are related to organizational features. Resources and endorsement showed the lowest correlation with the 5 A's.

Positive organizational support (POS) was a particularly appropriate factor for considering the implementation of 5 A's activities, while organizational resources (OR) and showed a low correlation. Notably, organizational endorsement (OE) was not significantly correlated to the 5 A's (Table 3).

4. Discussion

We identified seven domains related to the implementation of smoking cessation practices with good psychometric properties using the KABO instrument. These domains belong to both the individual and the organizational level, and include four domains at the individual level: individual skills, attitudes and beliefs, beliefs about patient readiness to quit, and individual commitment, as well as three at the organizational level: organizational resources, positive organizational support, and organizational endorsement. Three of these seven domains were identified in the literature as facilitators, while four were identified as barriers (Choi & Kim, 2016; Godin et al., 2008; Laschober et al., 2015; Sarna et al., 2009; Sheffer et al., 2009; Smit et al., 2013; Smith et al., 2012). These domains are useful for assessing individual and organizational factors to improve the implementation of smoking cessation interventions.

We found that the following three domains seem to have a high importance for the implementation of the 5 A's: IS (individual skills), AB (attitudes and beliefs), and POS (positive organizational support). When analyzing the relationship of these three domains to each of the items included in the 5 A's model ordered from Ask to Arrange, we noted that the higher the A in the model, the larger the correlation coefficient. However, the remaining four domains also appear to have a modest relevance. We also observed that individual beliefs about patients' readiness to quit impacts smoking cessation implementation, especially when asking and advising patients to quit. We found that health professionals are more likely to start the intervention by asking and advising when they believe that patients are ready to quit, however, the magnitude of this effect decreases along with the sequence of the five A's in the model. Beliefs could act as a facilitator for asking but are unlikely to impact further steps in the 5 A's model such as “Assess, Assist, and Arrange a follow-up.” These steps require more knowledge and skills on the part of the health professionals, rather than preconceived ideas of patient readiness.

These results are consistent with previous studies identifying individual skills and motivation as the most important predictors of implementation (Amemori, Michie, Korhonen, Murtomaa, & Kinnunen, 2011; Delucchi, Tajima, & Guydish, 2009; Godin et al., 2008). “Knowledge-attitudes-behavior” were explored as initial domains for assessing adherence to tobacco cessation guidelines in a study conducted among nurses, however nurses also reported several organizational aspects as important barriers to implementing the guidelines, including insufficient time and resources, the presence of smoking areas, and a lack of coordination with primary care (Katz et al., 2016).

This study correlates these domains with self-reported implementation of the 5 A's smoking cessation intervention for the first time, and indicates that in addition to individual skills (IS) and attitudes and beliefs (AB), positive organizational support is the most relevant factor for each of the components of the 5 A's model.

Other instruments are available for measuring some of the identified barriers to the implementation of smoking cessation practices (Ganz et al., 2015; Lina et al., 2016; Sarna et al., 2016; Tong, Strouse, Hall, Kovac, & Schroeder, 2010), but only three have tested their psychometric propierties (Amemori et al., 2011; Delucchi et al., 2009; Newhouse, Bobay, Dykes, Stevens, & Titler, 2013) and none have been tested for their use at general acute hospitals or have included all the facilitator and barrier items explored by the KABO questionaire.

Additionally, some theoretical frameworks have explored factors influencing the behavior of health care professionals, including motivation, capability, intention, self-efficacy, skills, and environment (Ajzen, 2011; Bandura, 1986; Fishbein, 2008). We observed that individual domains have more weight than organizational domains for smoking cessation practices. However, our results suggest that high

Table 1
Factor loadings obtained in the principal components analysis on the retained 26 items of the KABO questionnaire.

	Retained items	Communalities	Factor loadings						
			1. IS	2. POS	3. AB	4. IC	5. OR	6. BPR	7. OE
1	Knowledge about performing smoking cessation	0.707	**0.775**	0.031	0.222	0.140	0.148	−0.09	−0.079
2	Self-reported preparedness	0.800	**0.767**	0.095	0.403	0.128	0.140	−0.039	−0.045
3	Preparedness in using smoking cessation drugs	0.723	**0.788**	0.220	0.183	0.137	−0.014	−0.035	−0.035
4	Familiar with practical guidelines for smoking cessation	0.753	**0.735**	0.405	0.133	−0.009	−0.079	0.138	0.074
5	Familiar with recommending some smoking cessation resources	0.704	**0.681**	0.421	0.125	−0.067	−0.138	0.106	0.113
6	Lack of knowledge and skills[a]	0.586	**0.622**	0.022	−0.037	0.100	0.240	0.295	0.208
7	Protocolled intervention in my organization	0.751	0.134	**0.744**	0.135	0.054	0.390	−0.001	−0.077
8	Intervention requested by supervisors	0.744	0.194	**0.748**	0.086	0.279	0.230	−0.093	−0.011
9	Organizational support	0.698	0.175	**0.742**	0.145	0.186	0.242	−0.008	−0.051
10	Recognition received	0.659	0.249	**0.720**	0.061	−0.013	−0.085	0.177	0.190
11	Motivated to help patients stop smoking	0.663	−0.062	0.136	**0.748**	0.203	−0.158	0.116	0.004
12	Confidence in overcoming difficulties	0.665	0.257	0.069	**0.769**	−0.013	0.039	−0.001	−0.042
13	Self-confidence in their ability to assist patients to quit	0.795	0.413	0.039	**0.781**	0.025	0.097	−0.039	−0.021
14	Self-confidence in their own capacity to motivate smokers to quit	0.665	0.208	0.122	**0.768**	0.113	−0.012	0.050	0.027
15	It is not part of their job[a]	0.780	0.080	0.047	0.123	**0.861**	0.004	0.114	0.049
16	It is not required by supervisors[a]	0.621	0.055	0.244	0.031	**0.691**	0.229	0.061	0.156
17	Their colleagues do not provide smoking cessation[a]	0.603	0.064	−0.055	0.034	**0.746**	0.141	0.120	0.061
18	It is part of their job	0.685	0.161	0.384	0.204	**0.666**	−0.163	−0.008	< 0.0001
19	Smoking cessation provision not protocolled in their organization[a]	0.626	0.140	0.360	−0.039	0.294	**0.585**	0.163	0.140
20	Lack of pharmacological aids in the organization[a]	0.635	0.009	0.081	0.001	0.098	**0.737**	0.159	0.224
21	Lack of specific records for smoking cessation intervention[a]	0.720	0.083	0.249	−0.040	−0.014	**0.742**	0.223	0.222
22	Belief that smoker patients are not motivated to quit[a]	0.652	0.018	0.033	0.036	0.04	0.223	**0.757**	0.156
23	Beliefs about irrelevance of smoking cessation for patients[a]	0.620	−0.035	0.044	0.042	0.207	0.002	**0.752**	−0.084
24	Beliefs about stress in patients quitting smoking[a]	0.556	0.134	0.005	0.032	0.021	0.169	**0.696**	0.151
25	Consider having little time to provide smoking cessation intervention[a]	0.858	0.029	0.002	0.027	0.094	0.203	0.095	**0.893**
26	Afirm that "I am overloaded at work"[a]	0.861	0.034	0.051	−0.027	0.137	0.240	0.116	**0.876**
Eigenvalues			70.010	3.377	2.077	1.939	1.376	1.322	1.027

IS, individual skills; POS, positive organizational suport; AB, attitudes and beliefs; IC, individual commitment; OR, organizational resources; BPR, beliefs about patient desire/readiness to quit; OE, organizational endorsement.
Selected factor loadings obtained in the principal components analysis.
[a] Inverted scores.

scores for organizational resources (such as the availability of educational materials and treatments) are correlated with components of the 5 A's model, scaling from Ask to Arrange. This indicates that this domain should be also taken into account when designing interventions to enhance implementation. However, a substantial body of knowledge emphasizes the importance of organizational leadership and support for adopting and implementing an innovation (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Rogers, 2003). Individuals are less likely to implement an innovation if they perceive that the organizational context includes barriers to use (Klein, Conn, & Sorra, 2001). This is one possible explanation for understanding why training does not always increase intervention frequency (Applegate et al., 2008). Additionally, manager support and resource availability are key for the implementation of procedures, protocols, and guidelines in health care services. Changes in organizational policies, tobacco control regulation, and training efforts could modify delivery, and the KABO questionnaire appears to be a sensitive tool for detecting individual and contextual factors impacting the implementation of the 5 A's smoking cessation model.

Health care organizations should set an example for controlling tobacco consumption and implementing smoking cessation interventions (Hausmann, Jeong, Bost, & Ibrahim, 2008). For this reason, there is an increasing need to provide valid and reliable instruments to measure the implementation of smoking cessation practices and detect areas of improvement. This study addresses this lack of knowledge, and provides a validated questionnaire including both individual and organizational domains.

5. Limitations

There are some limitations associated with the current study. First, we used a convenience sample of hospital health care workers who enrolled in an online smoking cessation course, and these participants were likely more interested in smoking cessation practices than other health care professionals in hospitals. Additionally, we relied on self-reported performance for smoking cessation implementation based on

Table 2
Internal consistency of the KABO questionnaire.

Subscale/Domains	Cronbach's Alpha	Number of items	Corrected item-total correlation	
			Mean	Range
1. Individual skills (IS)	0.866	6	0.669	0.441–0.744
2. Positive organizational support (POS)	0.820	4	0.644	0.733–0.816
3. Attitudes and beliefs (AB)	0.844	4	0.681	0.538–0.739
4. Individual commitment (IC)	0.665	3	0.479	0.448–0.529
5. Organizational resources (OR)	0.754	3	0.584	0.513–0.661
6. Beliefs about patient desire/readiness to quit (BPR)	0.790	4	0.602	0.525–0.750
7. Organizational endorsement (OE)	0.874	2	0.776	–
Total	0.881	26	0.444	0.241–0.586

Table 3
Correlation between the KABO questionnaire subscales and each of the components of the 5A's smoking cessation model.

Subscales/Domains	Ask	Advice	Assess	Assist	Arrange
1. Individual skills (IS)	0.341***	0.277***	0.379***	0.640***	0.642***
2. Positive organizational support (POS)	0.343***	0.445***	0.454***	0.495***	0.372***
3. Attitudes and beliefs (AB)	0.324***	0.290***	0.391***	0.520***	0.480***
4. Individual commitment (IC)	0.096*	0.080*	0.056	0.091*	0.110**
5. Organizational resources (OR)	0.098*	0.065	0.150**	0.265***	0.231***
6. Beliefs patients desire/readiness to quit (BPR)	0.458***	0.336***	0.361***	0.357***	0.235***
7. Organizational endorsement (OE)	0.004	0.010	0.054	0.052	0.047

* $p < 0.05$.
** $p < 0.001$.
*** $p < 0.0001$.

the 5 A's intervention as well as the other dimensions explored in the KABO questionnaire, and self-reported 5 A's data can be biased towards overestimating actual performance (Goldestein et al., 1997). However, we believe that the anonymous nature of the responses and the fact that participants knew their data could not be idenitified reduced this bias, and some topics were asked in both a positive and negative manner because they were reproduced from previous questionnaires. Finally, our sample included health care professionals with different roles and responsibilities (such as doctors, nurses, and others). However, smoking cessation practices are not exclusive to one professional group, and all health care workers should provide smoking cessation counselling when treating smokers (WHO Tobacco Free Iniciative, 2005).

This study also has some strengths, including the development of the KABO questionnaire which integrated previous instruments to measure cognitive and behavioral factors (Sheffer et al., 2009) as well as clinical and organizational-level characteristics previously identified in the literature (Freund et al., 2009; Leitlein et al., 2012; Sarna et al., 2009). We also included some individual and organizational factors suggested by an expert panel. Finally, we evaluated the correlation between the scores obtained in the KABO questionnaire domains and the scores given for each of the 5 A's components.

6. Conclusion

Psychometric testing indicates that the KABO questionnaire is a reliable and valid instrument for identifying barriers and facilitators to the performance of smoking cessation interventions. The KABO questionnaire can be used in implementation research to test individual and organizational factors affecting these interventions. Further research could allow for comparisons within and among individuals and organizations to detect changes before and after the implementation of evidence-based practices for tobacco control or to regularly monitor changes.

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Authors' contributions

CMM and AA designed the study, led the analytic and data interpretation plan, and drafted the manuscript. CMM, MB, AB, AF and LA led the data collection. YC, MF, and EF participated in the design of the study, reviewed the manuscript and provided review of all drafts. All authors read and approved the last version of the manuscript.

Competing interests

All authors declare that they have no competing interests.

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