BMJ Open

EMPOWERING HEALTHCARE PROVIDERS THROUGH SMOKING CESSATION TRAINING: IMPACT ON KNOWLEDGE, ATTITUDE & SELF-EFFICACY. Word Count: 3063

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-030670
Article Type:	Research
Date Submitted by the Author:	26-Mar-2019
Complete List of Authors:	Hasan, Siti Idayu; University of Malaya, Social & Preventive Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Mohd Hairi, Farizah; University of Malaya, Social & Preventive Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Ahmad Tajuddin, Amani @ Natasha; University of Malaya, Primary Care Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Amer Nordin, Amer Siddiq; University of Malaya, Psychological Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS
Keywords:	program evaluation, smoking cessation, helathcare providers, knowledge, attitude, self-efficacy

TITLE: EMPOWERING HEALTHCARE PROVIDERS THROUGH SMOKING CESSATION TRAINING: IMPACT ON KNOWLEDGE, ATTITUDE & SELF-EFFICACY.

SITI IDAYU HASAN [1,4] , FARIZAH MOHD HAIRI [1,4] NUR AMANI @ NATASHA AHMAD TAJUDDIN [2,4] & AMER SIDDIQ AMER NORDIN [3,4],

[1]Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[2]Department of Primary Care Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[3]Department of Psychological Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[4]Nicotine Addiction Research Group UMCAS, University of Malaya, Jalan Pantai Baharu, Kuala Lumpur, Malaysia.

Authors:

Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Siti Idayu Hasan, PhD student, University of Malaya.

Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Farizah Mohd Hairi, Associate Professor/Public Health Physician & Consultant, University of Malaya.

Department of Primary Care Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Nur Amani @ Natasha Ahmad Tajuddin, Family Medicine Specialist, University of Malaya.

Department of Psychological Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Amer Siddiq Amer Nordin, Associate Professor/Consultant Psychiatrist and Addiction Medicine Specialist.

Correspond to : Farizah Mohd Hairi at farizah@um.edu.my

Word count: 3063

References count: 35

Abstract

Objectives: Health care providers sit in an ideal position to advise their patients to quit smoking by providing effective smoking cessation intervention. Thus, we evaluate the effectiveness of a one-day training program in changing the knowledge, attitude and self-efficacy of health care providers in smoking cessation intervention.

Methods: A pre-post study design was conducted in 2017. Eight-hour smoking cessation training comprised of lectures, practical session and role-play session was offered to 207 health care providers. A validated evaluation tool, ProSCiTE was administered to assess the impact of training on knowledge, attitude, and self-efficacy on smoking cessation intervention.

Results: After SCOPE training, knowledge score significantly increased from 7.96 ± 2.34 to 10.35 ± 1.57 ($p<0.001$). Attitude and self-efficacy in smoking cessation intervention also increased significantly from 34.32 ± 4.12 ± 37.04 ± 3.92 ($p<0.001$) and 40.31 ± 8.61 to 54.67 ± 7.45 ($p<0.001$) respectively.

Conclusion: This study demonstrates that SCOPE training could improve health care providers' knowledge, attitude and self-efficacy on smoking cessation intervention. Future training is recommended to equip health care providers with current knowledge, right attitude and high self-efficacy to successfully integrate what they have learned into their practice.

Keywords: program evaluation, smoking cessation, healthcare providers, knowledge, attitude, self-efficacy

Strengths and limitations of this study

- Healthcare providers often discuss about smoking with their patients, however, they have lack of necessary skills to help patients due to limited training.
- Actual ability of healthcare providers to provide effective intervention and needs of the patients still remain unknown.
- We evaluate the effectiveness of an eight-hour SCOPE training with combination of lectures, practical, and role-play sessions in terms of knowledge, attitude and self-efficacy among health care providers to deliver smoking cessation intervention.
- Our results indicate that SCOPE training improves healthcare providers' knowledge, attitude, and particularly confidence to provide smoking cessation intervention.
- Our findings suggest that tailored smoking cessation training should emphasize on practical skills to ensure healthcare providers adequately equipped to provide effective smoking cessation intervention.
- This study relies on self-reported response from healthcare providers thus data must be carefully analysed.

Introduction

Tobacco use is one of the leading preventable causes of death and disease globally. Approximately, six million people die from tobacco related diseases every year and these caused one in 10 deaths among adult worldwide [1]. More than 600,000 people die each year from exposure to second hand smoke and it is estimated that by 2030, the annual death could rise to eight million [1]. The Surgeon General on ''The Health Consequence of Smoking – 50 Years of Progress'' 2014 report concluded that smoking can cause cancer, respiratory disease, cardiovascular disease, reproductive disease, dental disease, inflammatory bowel disease, diabetes and autoimmune disease [2]. Cochrane reviews provided concrete evidence that stopping smoking could reduce smoking related diseases [3]. More importantly, offering help to quit smoking by healthcare providers has been proven an effective strategy to combat tobacco related problem. Increasing the amount of behavioural support by healthcare providers is likely to increase the chance of success by about 10%-25% [4].

In order to tackle serious health problem arising from smoking, all healthcare providers are encouraged to actively involve in smoking cessation services. The U.S. Public Health Service has recommended the use of clinical practice guidelines for tobacco cessation. The tobacco cessation clinical practice guideline is a brief intervention known by the acronym of the ''5 A's'' has been effective to use both in research and clinical practice [5, 6]. Healthcare providers reported they performed the first two ''A''s which are ''Ask'' and ''Advise'' [7]. However, not many evidence reporting the performance on the three remaining steps which are ''Assess'', ''Assist'' and ''Arrange''.

In addition, translating this guideline into practice remains a challenge because nicotine dependence is a chronic relapsing condition that requires continuous effort over time to achieve success therefore preventing relapse. Thus, to ensure successful and effective intervention, healthcare providers require skill to help smokers to overcome the ambivalence to change and guide them to appropriate counselling and pharmacotherapy treatments [8].

According to the 4th Edition of Tobacco Atlas, doctors often informed patients about the harmful effect of smoking but they lack in training necessary to help their patients to stop using tobacco products. Therefore, there is a huge gap between the needs of the patients and the actual ability of the healthcare providers to help them [9]. In order to taper the gap, various trainings including face-to-face and online trainings have been developed to improve smoking cessation competency and proficiency. These training programs have shown to be effective in enhancing the counselling knowledge, skills and confidence of healthcare providers and their performance in smoking cessation intervention [10-15]. Meta-analysis by Cochrane Collaboration also showed healthcare providers who received specific training had higher probability of performing tasks required to help their patients to stop smoking compared to their untrained controls counterparts [3, 16].

One of the key resources needed to implement Article 14 of the WHO Framework Convention for Tobacco Control (FCTC) is sufficient numbers of healthcare providers trained to assess tobacco use and deliver brief advice about smoking cessation [17]. In line with this, Malaysia has developed a National Strategic Plan for Tobacco Control to achieve a tobacco free nation by 2045 with the target of less than 5% tobacco use prevalence. Currently, Smoking Cessation Organizing, Planning & Execution (SCOPE) training has been successfully developed and introduced since 2009 by a group of researchers from Nicotine Addiction Research Group of UMCAS. SCOPE is part of mQuit services recognized as one of the three pathways to become a certified smoking cessation provider in Malaysia. [18].

The purpose of this study was to assess the effectiveness of SCOPE training on smoking cessation in terms of knowledge, attitude and self-efficacy among healthcare providers.

Methods

Development of SCOPE training

SCOPE is a comprehensive, one-day program. It consists of the latest update of evidence-based information on smoking cessation. This module was developed from our previous study 'Empowering Dentist into Smoking Cessation Program' (2009 -2013) by Nicotine Addiction research Group of UMCAS team where the need to offer intensive smoking cessation counselling was found to be important [19]. The content of the training includes knowledge in the basic science of tobacco use and clinical science of tobacco treatment. This training includes interactive lectures (questions and answer sessions, video presentation and quiz), practical session and role-play demonstration. The lectures consist of Introduction, Tobacco control and policy, National strategic plan, Harm to health, Smoking as an addiction, Pharmacological therapy and Behavioural therapy in smoking cessation. Practical and assessment on how to use tobacco dependence instrument, Fagerstome Test Nicotine Dependence (FTND) and how to monitor carbon monoxide level using smokerlyser as well as on how to run the quit smoking clinic was also included in this training. The goal of role-play session was to provide participants with guided, hands-on practise in addressing tobacco treatment with patients. Forty-five minutes session of role-play representing various cases of tobacco treatment with three different scenarios (for example, patient at different level of stages of change). Role-play was based on 5 A's counselling approach where the participants acted as smoking cessation providers, and the facilitator acted as a patient. Afterwards, the facilitators led a brief discussion on healthcare providers-delivered tobacco treatment challenges.

Study design and participants

A pre-post study design was conducted among healthcare providers who attended the 8-hour SCOPE training over a period of three months starting from December 2016 to February 2017. The study population comprised of a group of healthcare providers with different grades and specialities working at government health clinics in Malaysia. A total of 207 healthcare providers who completed the training and returned the pre- and post-survey were included in this study. The healthcare providers consist of medical doctors, medical assistants, pharmacists and nurses.

Evaluation tool

A validated evaluation tool called ProSCiTE was administered to the participants before and after training program [20, 21]. This tool was designed based on previous studies and further modified to meet the objective of this study. The questionnaire included demographic background, knowledge, attitude and self-efficacy on smoking cessation intervention. Demographic characteristics assessed were age, gender, education level, working experience, smoking status and type of profession. Knowledge is *an information, understanding or skill that healthcare providers get from experience or education*. Knowledge on smoking cessation withdrawal symptoms was assessed with 12 items with Yes/No response. Attitude is *the tendency, based on trust and experience, to respond to smoking cessation intervention with specific methods and approaches*. Attitude was assessed with 8 items rated by 5 point Likert scale ranging from *''not agree at all''* to *''absolutely agree''*. Self-efficacy is *one's belief in one's ability to succeed in specific situations or accomplish a task in smoking cessation intervention*. Self-efficacy was assessed with 13 items by 5 point Likert scale ranging from ''*not agree at all*'' to ''*absolutely agree*''.

Construct validity based on eigenvalues and factor loadings to confirm the factor structure (knowledge, attitude, self-efficacy) was acceptable. The internal consistency reliability of

factor construct was excellent for knowledge (α = 0.93) and self- efficacy (α = 0.93) and good for attitude (0.88) [21].

Study procedures

All healthcare providers were scheduled and invited to join this study. They were explained on the purpose of the study prior the training. The providers were awarded with Continuing Professional Development (CPD) credit after completing the training. The pre-test survey was administered immediately before the training and post-test survey was administered immediately after the training.

Ethical approval

This study was approved by the Ministry of Health Malaysia and Medical Ethics Committee of University of Malaya (Reference number: UM.TNC2/RC/H&E/UMREC-118) and of Ministry of Health Malaysia (Reference number: NMRR-16-2144-32353 (IIR)). Healthcare providers were informed and they gave consent before the pre-training survey prior to the SCOPE training.

Data analysis

Data were analysed with IBM SPSS version 22. Descriptive analyses were ~~conducted~~ performed on the demographic items. Paired samples t-tests were used to compare pre- and post-test results. The level of statistical significance was set to $p < 0.05$ for all analyses.

Results

Healthcare provider characteristics

Nearly half of the healthcare providers were doctors. Their mean age was 32.59 (6.69) ranging from 23 to 55 years old. Almost two quarters were female and almost half of them held bachelor degree. Majority of the healthcare providers have working experience more than seven years. Majority of them reported that they are non-smokers and there are no current smokers in all profession except for medical assistant. (See Table 1).

Table 1: Healthcare providers' characteristics

Variables		n (%)
Age Mean (SD)		32.59 (6.69)
Working experience Mean(SD)		7.26 (5.80)
Gender	Male	77 (35.3)
	Female	141 (64.70)
Ethnicity	Malay	181 (83.00)
	Chinese	16 (7.30)
	Indian	21 (9.60)
Religion	Muslim	179 (82.10)
	Buddhist	8 (3.70)
	Christian	12 (5.50)
	Hindu	19 (8.70)
Education	Diploma	73 (33.50)
	Bachelor	100 (45.90)
	Master	45 (20.60)
Profession	Nurse	34 (15.60)
	Medical Assistant	44 (20.20)
	Pharmacist	42 (19.30)
	Doctor	98 (45.00)
Smoking* status	Smokers	6 (2.80)
	Former smokers	18 (8.40)
	Non smokers	191 (88.80)

n = frequency
% = percentage

Changes in knowledge, attitudes and self-efficacy on smoking cessation intervention due to training

A paired t-test was performed to compare pre- (7.96 ± 2.34) and post-training (10.35 ± 1.57) on knowledge scores. Participants' post-training average scores were 2.39 higher compared to their pre-training scores (95% CI 2.25, 0.16). The difference was statistically significant, t (206) = 15.32, p = <0.001. Each item in knowledge significantly increased after the training. It was also showed that healthcare providers' knowledge on mouth ulcers as a withdrawal symptom for nicotine addiction gains the greatest change in score followed by diarrhea. Before the training, most of healthcare providers did not know that diarrhea was the one of the withdrawal symptoms for nicotine addiction. (See Table 2).

Table 2: Paired sample t-test comparing pre- and post-tests for each item and total knowledge score.

Variables	**Pre-training Mean (SD)**	**Post-training Mean (SD)**	***p*-value**
1. Irritability	0.99 (0.10)	1.16 (0.50)	<0.001
2. Depression	0.98 (0.15)	1.34 (0.60)	<0.001
3. Restlessness	0.99 (0.10)	1.05 (0.30)	0.006
4. Poor concentration	0.99 (0.12)	1.12 (0.43)	<0.001
Increased appetite	0.85 (0.36)	1.55 (0.61)	<0.001
Weight gain	0.82 (0.38)	1.56 (0.63)	<0.001
Light headedness	0.96 (0.20)	1.26 (0.59)	<0.001
Night time awakening	0.90 (0.30)	1.49 (0.72)	<0.001
Constipation	0.84 (0.37)	1.74 (0.78)	<0.001
Diarrhea	0.27 (0.45)	2.01 (0.68)	<0.001
Mouth ulcers	0.80 (0.40)	1.86 (0.69)	<0.001
Urge to smoke	0.98 (0.15)	1.07 (0.32)	0.001
Total knowledge	7.96 (2.34)	10.35 (1.57)	<0.001

SD: standard deviation

Before the training, the mean score of total attitude was 34.32 ± 4.12 while after completing the training, the mean score of total attitude increased to maximum score, 37.04 ± 3.92. On average, participant's post-training score was 2.72 higher than their pre-training score (95% CI 2.07, 3.37). The difference was statistically significant, t (201) = 8.23, p = <0.001. Each item in attitude significantly increased after the training. Attitude of healthcare providers

towards patients/clients want them to advise patients to stop using any tobacco products gained the greatest change in score followed by patient /client's chance of quitting smoking increases if the healthcare provider advises patients to quit. Before the training, it showed that attitude towards asking parents/guardian on the effect of second-hand smoke were lowest. However, after the training, the attitude towards second-hand smoke increased. (See Table 3).

Table 3: Paired sample t-test comparing pre- and post-tests for each item and total attitude score.

Items	**Pre-training Mean (SD)**	**Post-training Mean (SD)**	***p*-value**
1. A patient /client's chance of quitting smoking increases if the healthcare provider advises him/her to quit.	3.85 (0.89)	4.52 (0.67)	<0.001
2. Patients/clients want you to advise them to stop using any tobacco products.	3.59 (0.86)	4.34 (0.75)	<0.001
Healthcare providers like you should….			
3. get specific training on smoking cessation counselling techniques.	4.56 (0.60)	4.72 (0.57)	0.002
4. set a good example for their patients/clients and public by not using any tobacco products.	4.64 (0.58)	4.75 (0.55)	0.029
5. routinely ask patients/clients about tobacco use.	4.38 (0.66)	4.69 (0.59)	0.006
6. routinely ask parents/guardians about tobacco use during paediatric visits.	4.29 (0.75)	4.61 (0.7)	<0.001
7. routinely advise patients/clients who use any tobacco products to quit.	4.49 (0.650	4.72 (0.59)	<0.001
8. routinely assist patients/clients using any tobacco products to quit.	4.52 (0.64)	4.71 (0.60)	0.001
Total Attitude	34.32 (4.12)	37.04 (3.92)	<0.001

SD: standard deviation

A significant increase in healthcare providers' self-efficacy was also found when pre- and post-training was compared. For pre-training, the mean score of total self-efficacy was 40.31 ± 8.61 while at post-training the mean score increased to 54.67 ± 7.45. On average, healthcare providers' post-training score was 14.36 higher than their pre-training score, 95% CI (0.63, 0.84). The difference was statistically significant, t (205) = 23.22, p = <0.001. Each item in self-efficacy significantly increased after the training. Practical and assessment module on how to detect Carbon monoxide in breath using smokerlyser depicted greatest

change in score followed by pharmacological therapy to assist smokers to quit and behavioral therapy to prescribe medication to treat smokers. Healthcare providers have lowest confidence in using smokerlyser before the training. However, it showed greater improvement from the practical session in the training. (See Table 4).

Table 4: Paired sample t-test comparing pre- and post-tests for each item and total self-efficacy score

Items	**Pre-training Mean (SD)**	**Post-training Mean (SD)**	***p*-value**
1. I know appropriate questions to ask my patients/clients.	3.78 (0.84)	4.45 (0.60)	<0.001
2. I am able to motivate my patients/clients who are interested to quit smoking.	3.85 (0.81)	4.40 (0.62)	<0.001
3. I am able to assist patients/clients to quit even if the patient thinks that it is difficult to give up.	3.68 (0.81)	4.27 (0.65)	<0.001
4. I have the pharmacological therapy skills to assist patients/clients to quit smoking.	3.35 (1.06)	4.15 (0.87)	<0.001
5. I have the behavioral therapy skills to assist patients/clients to quit smoking.	3.28 (0.96)	4.14 (0.72)	<0.001
6. I can advise patients/clients to consider smoking cessation.	4.14 (4.14)	4.50 (0.56)	<0.001
7. I can provide counselling when time is limited.	3.18 (0.97)	3.89 (0.94)	<0.001
8. I can counsel patients/clients who are not interested in quitting.	3.31 (0.94)	4.05 (0.82)	<0.001
9. I know how to prescribe medication (nicotine replacement therapy/bupropion) to treat tobacco dependency.	2.93 (1.26)	3.81 (1.07)	<0.001
10. I can assess patient's/client's different stages of readiness to quit smoking.	3.50 (0.96)	4.17 (0.75)	<0.001
11. I can assess patient's level of nicotine dependency using the Fagerstrom test.	3.43 (1.21)	4.30 (0.86)	<0.001
12. I can use smokerlyzer to determine patient's/client's carbon monoxide level.	2.63 (1.34)	4.28 (1.07)	<0.001
13. I can assist recent quitters to learn how to cope with situations or triggers that might lead them to relapse to using tobacco.	3.37 (1.02)	4.28 (0.70)	<0.001
Total Self-efficacy	40.31 (8.61)	54.67 (7.45)	<0.001

SD: standard deviation

Discussion

This study established an evaluation of a tailored-smoking cessation training for healthcare providers based on lecture, practical and role-play. Our study showed significant improvement in healthcare providers' knowledge, attitude and self-efficacy in smoking cessation intervention. Importantly this was also the first evaluation of such a training intervention among healthcare providers using the 5 A's in a Malaysia context. This study results suggested that training the healthcare providers in smoking cessation is effective in the short term and can results in significant integration of 5A's in smoking cessation intervention. This study is consistent with international findings that have demonstrated smoking cessation training can be effective in providing smoking cessation intervention [3, 15, 22-25].

In this present study, significant improvement of knowledge, attitude and self-efficacy was found after the SCOPE training. It is in agreement with previous studies in which heath care providers have reported improved in knowledge, attitude and self-efficacy in smoking cessation intervention after training [26-29]. This result suggested that healthcare providers have good knowledge in smoking cessation.

This study also discovered the smoking status among SCOPE participants, whereby there are no current smokers in the doctors, pharmacists and the nurses groups. When compared with a study conducted in Bosnia Herzegovina, where there is no established smoking cessation program yet, more than half of the nurses who worked at the Family Medicine teaching centre smoke, and about 40% physicians smoke. In terms of attitude, the ever smokers among these professionals would most likely not advocate their patients for smoking cessation despite agreeing that smoking is harmful to health and would not advise young adults to start smoking [30]. Previous studies also reported that non-smokers healthcare providers had more positive attitude towards the hospital's smoke-free policy

compared to smokers [31, 32]. With the SCOPE program, in the attitude component, the training has improved their attitude towards advocating and advising patients to stop smoking. This evidently showed the importance of having a structured and well-organized smoking cessation program, to better assist healthcare providers in Malaysia in helping patients to quit smoking.

When participants were asked to give their responses to their attitude towards providing smoking cessation intervention to their patients, it showed significant improvement post training particularly for second-hand smoke. This evidence supports the importance of identifying and advising parents on the harmful effect of second-hand smoke. However, this study could explore more in terms of their attitude towards smoking cessation advice, where in depth questions or qualitative approach would help answer this section on attitude. A systematic review on belief and attitude of physicians in United Kingdom revealed that the three most prevalent negative beliefs concerned the time needed to discuss smoking, a perceived lack of effectiveness of such discussions, and a perceived lack of skill in conducting such discussions [33]. As skill is concerned, training in smoking cessation program can increase the level of confidence among quit smoking providers, and in with experience, can reduce the consultation time and increase the effectiveness of consultation. Although most healthcare providers already have positive attitude scores towards smoking cessation intervention at pre training, the mean total attitude scores increased significantly at post training. This reflected that the training could help healthcare providers to understand their role in providing smoking cessation intervention. Thus, it is important to equip them with skills to competently assist smokers to quit [34].

The study findings also suggested that there is a huge potential benefit by training all healthcare providers, particularly in self-efficacy. However, when self-efficacy was explored

by each item, it was apparent that they lacked in confidence about the 5A's component at pre-training with ''Ask'' and ''Advise'' being higher and ''Assess'', ''Assist'' and ''Arrange'' somewhat lower. The confidence level was increased for all these 5 A's after the training especially ''Assist ''and ''Assess''. It showed that SCOPE training have potential in increasing knowledge, attitude and self-efficacy of healthcare providers. Our result was in accordance with previous study suggesting that simple activities like ''Ask'' and ''Advise'' supported by existing systems that prompt good performance whereas ''Assess'', and ''Assist'' require more complex skill sets. Additional to that, higher degree of coordinated clinic system needed for ''Arrange'' for follow up cases for clinicians. Integrated system-based approach involving multiple top down stakeholders and environmental factors with the goal of connecting administrators, clinicians and staff to develop effective strategies to provide smokers with smoking cessation intervention is indeed needed [24]. Apart from that, updated clinical practice guideline for treating tobacco use and dependence has emphasized the increasing evidence that healthcare system significantly affects the likelihood that smokers receive effective smoking cessation intervention [6]. We suggest that video demonstration, role-play [35] and practical session play a very important role to help in increasing confidence of healthcare providers in providing more complex 5 A's components. It was also observed that healthcare providers could provide effective intervention, as they were more confident to assess and assist patients from ambivalence stage to change and then offering them with appropriate behavioural and pharmacotherapy intervention.

With respect to the self-efficacy, SCOPE training particularly increased healthcare providers' confidence to use smokerlyser followed by behavioural therapy and pharmacotherapy thus suggesting that more emphasize should be made for these training module as the pre-training score is lowest compared to others. This again supported the evidence that training on smoking cessation should be widely and continuously provided to all healthcare providers

to help increasing their performance using more complex components in the 5 A's smoking cessation intervention.

Nevertheless, our study has some limitations that should be addressed. Firstly, it relies on self-reported response from our healthcare providers. Data must be carefully analysed as they healthcare providers tend to over-report the frequency of smoking cessation intervention. The healthcare providers involved in this study were only from three out of fourteen states in Malaysia. Thus, generalizability to overall population of healthcare providers should be cautioned. Future study should consider having a control group, preferably in a larger sample to improve the significance of this study.

Conclusion

In conclusion, this study demonstrates that SCOPE training improved healthcare providers' knowledge, attitude and self-efficacy on smoking cessation intervention. Future training is recommended to better equip healthcare providers with the latest knowledge, right attitude and high self-efficacy to successfully integrate what they have learned into their practice.

Conflict of interest

The other authors have no competing interest to declare.

Funding

This study was funded by University of Malaya Grand Challenge Research Grant, Wellness Cluster (GC004A-15HTM).

Acknowledgements

The authors would like to express our sincere gratitude to the speakers from NARCC group and healthcare providers for their generous contribution to this project.

Author statement

Siti Idayu was responsible for study design, data collection, analysis and drafted the manuscript. Farizah was responsible for developing training module, supervising and reviewing manuscript. Nur Amani @ Natasha was involved in the reviewing manuscript. Amer Siddiq was responsible for developing training module, supervising and reviewing manuscript as well as investigator for this study. All authors critically reviewed the manuscript and approved the final version.

References

1. WHO, *WHO global report on trends in prevalence of tobacco smoking 2015. .* 2015.
2. Alberg, A.J., D.R. Shopland, and K.M. Cummings, *The 2014 Surgeon General's Report: Commemorating the 50th Anniversary of the 1964 Report of the Advisory Committee to the US Surgeon General and Updating the Evidence on the Health Consequences of Cigarette Smoking.* American Journal of Epidemiology, 2014. **179**(4): p. 403-412.
3. Carson KV, V.M., Crone MR, Brinn MP, Esterman AJ, Assendelft WJJ, Smith BJ. , *Training health professionals in smoking cessation. .* Cochrane Database of Systematic Reviews, 2012. **Art. No.: CD000214**(5).
4. Stead, L., et al., *Physician advice for smoking cessation.* Cochrane Database of Systematic Reviews, 2013. **5**.
5. Fiore, M.C., C.R. Jaén, and T.B. Baker, *Treating Tobacco Use and Dependence:2008 Update.Clinical Practice Guideline*. 2008, Rockville, MD: U.S. Department of Health and Human Services. Public Health Service.
6. Siu, A.L. and U.S.P.S.T.F. for the, *Behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women: U.s. preventive services task force recommendation statement.* Annals of Internal Medicine, 2015. **163**(8): p. 622-634.

7. Quinn, V.P., et al., *Effectiveness of the 5-As Tobacco Cessation Treatments in Nine HMOs.* Journal of General Internal Medicine, 2009. **24**(2): p. 149-154.
8. Rigotti, N.A., *Training Future Physicians to Deliver Tobacco Cessation Treatment.* Journal of General Internal Medicine, 2016. **31**(2): p. 144-146.
9. Wipfli, H., *The Tobacco Atlas, Fourth Edition.* American Journal of Epidemiology, 2012. **176**(12): p. 1193-1193.
10. Brose, L.S., et al., *Treatment manuals, training and successful provision of stop smoking behavioural support.* Behaviour Research and Therapy, 2015. **71**: p. 34-39.
11. Brose, L.S., et al., *Effectiveness of an online knowledge training and assessment program for stop smoking practitioners.* Nicotine & Tobacco Research: Official Journal Of The Society For Research On Nicotine And Tobacco, 2012. **14**(7): p. 794-800.
12. Martin, B.A., R.H. Bruskiewitz, and B.A. Chewning, *Effect of a tobacco cessation continuing professional education program on pharmacists' confidence, skills, and practice-change behaviors.* Journal of the American Pharmacists Association : JAPhA, 2010. **50**(1): p. 9-16.
13. Hayes, R.B., et al., *Teaching tobacco dependence treatment and counseling skills during medical school: Rationale and design of the Medical Students helping patients Quit tobacco (MSQuit) group randomized controlled trial.* Contemporary Clinical Trials, 2014. **37**(2): p. 284-293.
14. Ockene, J.K., et al., *Teaching Medical Students to Help Patients Quit Smoking: Outcomes of a 10-School Randomized Controlled Trial.* Journal of General Internal Medicine, 2016. **31**(2): p. 172-181.
15. Sheffer, C.E., C. Barone, and M.E. Anders, *Training Nurses in the Treatment of Tobacco Use and Dependence: Pre- and Post-Training Results.* Journal of advanced nursing, 2011. **67**(1): p. 176-183.
16. Cornuz, J., et al., *Efficacy of Resident Training in Smoking CessationA Randomized, Controlled Trial of a Program Based on Application of Behavioral Theory and Practice with Standardized Patients.* Annals of Internal Medicine, 2002. **136**(6): p. 429-437.
17. Kruse, G.R., et al., *Tobacco Dependence Treatment Training Programs: An International Survey.* Nicotine & Tobacco Research, 2016. **18**(5): p. 1012-1018.
18. Amer Nordin, A.S., F. Mohd Hairi, and N.A.N. Ahmad Tajuddin, *Malaysia: mQuit strengthens quit smoking strategy. .* Tobacco Control 2016. **25**: p. 498-501.
19. Amer Siddiq, A.N., et al., *Empowering Malaysian dentists to tobacco dependence treatment conduct.* International Dental Journal, 2014. **64**(4): p. 206-212.
20. Hasan, S.I., et al., *Content validity for the questionnaire on Knowledge, Attitude and Behaviour (KAB) towards smoking cessation intervention among health care providers* Poster presented at Society for Research on Nicotine and Tobacco 23rd Annual Meeting, 8-11 March 2017, Florence, Italy., 2017.
21. Hasan, S.I., F. Mohd Hairi, and A.S. Amer Nordin, *Construct Validity and Internal Consistency Reliabitlity of Providers Smoking Cessation Evaluation (ProSCiTE) Tool.* 12th Asia Pacific Conference on Tobacco or Health (APACT). 2018.
22. Hagimoto, A., et al., *Effects of Trained Health Professionals' Behavioral Counseling Skills on Smoking Cessation Outcomes.* Annals of Behavioral Medicine, 2018: p. kax049-kax049.
23. Malan, Z., B. Mash, and K. Everett-Murphy, *Evaluation of a training programme for primary care providers to offer brief behaviour change counselling on risk factors for non-communicable diseases in South Africa.* Patient Education and Counseling, 2016. **99**(1): p. 125-131.
24. Payne, T.J., et al., *The impact of brief tobacco treatment training on practice behaviours, self-efficacy and attitudes among healthcare providers.* International Journal of Clinical Practice, 2014. **68**(7): p. 882-889.

25. Thomas, T., et al., *Effectiveness of a tailored training programme in behaviour change counselling for community pharmacists: A pilot study*. Patient Education and Counseling, 2016. **99**(1): p. 132-138.
26. Herold, R., et al., *Structured Smoking Cessation Training for Medical Students: A Prospective Study.* Nicotine & Tobacco Research, 2016. **18**(12): p. 2209-2215.
27. Jones, L.L. and A. McEwen, *Evaluating an online training module on protecting children from secondhand smoke exposure: impact on knowledge, confidence and self-reported practice of health and social care professionals.* Bmc Public Health, 2015. **15**: p. 6.
28. Susi, A.K., et al., *Impact of Smoking Cessation Training for Community Pharmacists in Indonesia.* Asian Pacific Journal of Cancer Prevention, 2015. **16**(8): p. 3319-3323.
29. Williams, J.M., et al., *Increasing Tobacco Dependence Treatment Through Continuing Education Training for Behavioral Health Professionals.* Psychiatric Services, 2015. **66**(1): p. 21-26.
30. Hodgetts, G., T. Broers, and M. Godwin, *Smoking behaviour, knowledge and attitudes among Family Medicine physicians and nurses in Bosnia and Herzegovina.* BMC Fam Pract, 2004. **5**.
31. Chang, J.-C., et al., *Knowledge, Attitudes, and Behavior Toward Smoking Cessation among Hospital Pharmacists in Taiwan.* Journal of Experimental & Clinical Medicine, 2012. **4**(4): p. 249-254.
32. Movsisyan, N.K., et al., *Smoking behavior, attitudes, and cessation counseling among healthcare professionals in Armenia.* BMC Public Health, 2012. **12**(1): p. 1-8.
33. Vogt, F., S. Hall, and T.M. Marteau, *General practitioners' and family physicians' negative beliefs and attitudes towards discussing smoking cessation with patients: a systematic review.* 2005. **100**(10): p. 1423-1431.
34. Saba, M., R. Bittoun, and B. Saini, *A Workshop on Smoking Cessation for Pharmacy Students.* American Journal of Pharmaceutical Education, 2013. **77**(9): p. 198.
35. Stolz, D., et al., *Enhanced Didactic Methods of Smoking Cessation Training for Medical Students—A Randomized Study.* Nicotine & Tobacco Research, 2012. **14**(2): p. 224-228.

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2	pre-post study design
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3	
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5	
Objectives	3	State specific objectives, including any prespecified hypotheses	5	
Methods				
Study design	4	Present key elements of study design early in the paper	6	
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7	
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	7	
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case		
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7	
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*7*	
Bias	9	Describe any efforts to address potential sources of bias		
Study size	10	Explain how the study size was arrived at		

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8-9
		(b) Indicate number of participants with missing data for each variable of interest	
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

EMPOWERING HEALTHCARE PROVIDERS THROUGH SMOKING CESSATION TRAINING IN MALAYSIA: A PRE- AND POST-INTERVENTION EVALUATION ON THE IMPROVEMENT OF KNOWLEDGE, ATTITUDE & SELF-EFFICACY.

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-030670.R1
Article Type:	Original research
Date Submitted by the Author:	18-Jun-2019
Complete List of Authors:	Hasan, Siti Idayu; University of Malaya, Social & Preventive Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Mohd Hairi, Farizah; University of Malaya, Social & Preventive Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Ahmad Tajuddin, Amani @ Natasha; University of Malaya, Primary Care Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Amer Nordin, Amer Siddiq; University of Malaya, Psychological Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS
Primary Subject Heading:	Medical education and training
Secondary Subject Heading:	Addiction, Health policy, Public health, Smoking and tobacco
Keywords:	program evaluation, smoking cessation, helathcare providers, knowledge, attitude, self-efficacy

TITLE: EMPOWERING HEALTHCARE PROVIDERS THROUGH SMOKING CESSATION TRAINING IN MALAYSIA: A PRE- AND POST-INTERVENTION EVALUATION ON THE IMPROVEMENT OF KNOWLEDGE, ATTITUDE & SELF-EFFICACY.

SITI IDAYU HASAN [1,4], FARIZAH MOHD HAIRI [1,4] AMANI @ NATASHA AHMAD TAJUDDIN [2,4] & AMER SIDDIQ AMER NORDIN [3,4],

[1]Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[2]Department of Primary Care Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[3]Department of Psychological Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[4]Nicotine Addiction Research Group UMCAS, University of Malaya, Jalan Pantai Baharu, Kuala Lumpur, Malaysia.

Authors:

Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Siti Idayu Hasan, PhD student, University of Malaya.

Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Farizah Mohd Hairi, Associate Professor/Public Health Physician & Consultant, University of Malaya.

Department of Primary Care Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Amani @ Natasha Ahmad Tajuddin, Family Medicine Specialist, University of Malaya.

Department of Psychological Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Amer Siddiq Amer Nordin, Associate Professor/Consultant Psychiatrist and Addiction Medicine Specialist.

Correspond to: Farizah Mohd Hairi at farizah@um.edu.my

Word count: 4489

References count: 55

Abstract

Objectives: Healthcare providers sit in an ideal position to advise their patients to quit smoking by providing effective smoking cessation intervention. Thus, we evaluate the effectiveness of a one-day training program in changing the knowledge, attitude and self-efficacy of healthcare providers in smoking cessation intervention.

Methods: A pre-post study design was conducted in 2017. Eight-hour Smoking Cessation Organizing, Planning & Execution (SCOPE) training comprised of lectures, practical session and role-play session was offered to 218 healthcare providers. A validated evaluation tool, ProSCiTE was administered to assess the impact of training on knowledge, attitude, and self-efficacy on smoking cessation intervention.

Results: After SCOPE training, knowledge score significantly increased from 7.96 ± 2.34 to 10.35 ± 1.57 ($p<0.001$). Attitude and self-efficacy in smoking cessation intervention also increased significantly from 34.32 ± 4.12 to 37.04 ± 3.92 ($p<0.001$) and 40.31 ± 8.61 to 54.67 ± 7.45 ($p<0.001$) respectively. Pre- and post-training scores was significantly improved for all professions and each measure particularly in self-efficacy.

Conclusion: This study demonstrates that SCOPE training could improve healthcare providers' knowledge, attitude and self-efficacy on smoking cessation intervention. Future training is recommended to equip healthcare providers with current knowledge, right attitude and high self-efficacy to successfully integrate what they have learned into their practice.

Keywords: program evaluation, smoking cessation, healthcare providers, knowledge, attitude, self-efficacy

Strengths and limitations of this study

- This study's novelty, as this is the first study documented the changes in multidiscipline healthcare providers (doctors, pharmacists, nurses and medical assistants) on knowledge, attitude and self-efficacy to deliver smoking cessation intervention following an eight-hour SCOPE training with combination of lectures, practical, and role-play sessions.
- Since all healthcare providers were invited, there was a risk of selection bias, and there are inherent risks for inaccuracies when relying on self-reported data.
- The sample was drawn from three out of 14 states in Malaysia, thus generalizability towards the whole population should be cautious.
- The nature of pre- and post-study lacks control group for the intervention and without long term follow up does not indicate causal relationship between the impact of the training on the actual healthcare providers' behaviour and smoking cessation outcome.

Introduction

Tobacco use is one of the leading preventable cause of death and disease globally. Approximately, six million people die from tobacco related diseases every year which translates into one in 10 deaths among adult worldwide.[1] More than 600,000 people die each year from exposure to second hand smoke and it is estimated that by 2030, the annual death toll could rise to eight million.[1] The Surgeon General on ''The Health Consequence of Smoking – 50 Years of Progress'' 2014 report concluded that smoking can cause cancer, respiratory disease, cardiovascular disease, reproductive disease, dental disease, inflammatory bowel disease, diabetes and autoimmune disease.[2] Cochrane reviews provided concrete evidence that stopping smoking could reduce smoking related diseases.[3] More importantly, offering help to quit smoking by healthcare providers has been proven to be an effective strategy to combat tobacco related problem. Increasing the amount of behavioural support by healthcare providers is likely to increase the chance of success by about 10%-25%.[4]

Healthcare providers are in an ideal position to advise patients to quit smoking by providing effective brief intervention. Among all the healthcare providers, pharmacists play a major role in smoking cessation as they are easily accessible by the public,[5] able to provide counselling without prior appointment and with no additional cost to the patients.[6] In addition, they communicate regularly with patients when advising correct use of nicotine replacement therapy (NRT) products. Pharmacists receiving online training followed by role-play session can counsel excellently for smoking cessation.[7] A study by Cornuz in Switzerland showed that non-pharmacological smoking cessation interventions with active learning methods and practice with standardized patients by doctors produce better abstinence rate, provide better counselling and have higher number of smoker's willing to quit compared with other healthcare providers.[8] On the other hand, nurses are well-positioned to deliver effective smoking cessation intervention with minimal investment in training. A one-hour training of smoking

cessation has shown a significant increase in knowledge and attitude compared to prior training.[9] Family physicians also have significant opportunity to decrease smoking rate as they are well suited to offer effective counselling to their patients. First, they already have some knowledge about their patients and social environment. Second, there is already a good rapport between family doctors and their patients that will contribute to the therapeutic relationship. Third, most of the patients often come to family doctors believe that doctors can help them improve their condition.[10]

In order to tackle serious health problems arising from smoking, all healthcare providers are encouraged to be actively involved in smoking cessation services. The U.S. Public Health Service has recommended the use of Clinical Practice Guidelines (CPG) for tobacco cessation. The tobacco cessation clinical practice guideline is a brief intervention known by the acronym of the ''5 A's'' and has been effective in both research and clinical practice.[11 12] Increasing the implementation of CPG by various healthcare providers is likely to lead to more smokers exposed to evidence-based treatments, more smokers quitting and reduce the prevalence of smoking and smoking-related disease.[11] Despite many evidence that shows the effectiveness of brief interventions even in a busy clinical environment, yet dissemination is very slow and there are still many healthcare providers who do not follow the CPG.[13] Healthcare providers reported they performed the first two ''A''s which are ''Ask'' and ''Advise''.[14] However, not many evidences report on the performance on the three remaining steps which are ''Assess'', ''Assist'' and ''Arrange''.[15] According to the National Ambulatory Medical Care Survey between 2001 – 2004, 32% of patient charts did not include their smoking status, more than 80% of smokers did not receive assistance and only 0.3% and 1.8% received Nicotine Replacement Therapy (NRT) and bupropion treatments, respectively.[16] Only 19.8% of current smokers received any cessation assistance either counselling, medication or both. Even at preventive care visit, only 28.9% received cessation assistance.[17] Like many other countries, Malaysia is also facing challenges in tobacco control.

The trend of smoking prevalence captured by Global Adult Tobacco Survey 2011 and 2015 showed slight decrease in overall (from 23.1% to 22.8%) and among male (from 43.9% to 43.0%) prevalence of current smokers. However, the prevalence of smoking among women has increased (from 1.0% to 1.4%). Additionally, under smokeless tobacco there is a high increase and is suspected to be due to the use of electronic cigarettes.[18 19] In addition, the increase in smoking prevalence among girls as documented by the Global Youth Tobacco Survey in 2003 and 2009 should also be noted. Based on the recent Malaysian National Health and Morbidity Survey 2011, 67.6% of the current smokers who visited healthcare services in the past 12 months was asked about their smoking status and 52.6% was advised to quit smoking by healthcare providers.[19] In 2015, 75.4% of the current smokers who visited healthcare services in the past 12 months was advised to quit smoking by healthcare providers.[18] Unfortunately, no evidence on healthcare providers performing the three remaining steps has been documented.

In addition, translating this guideline into practice remains a challenge because nicotine dependence is a chronic relapsing condition[11] that requires continuous effort over time to achieve success therefore preventing relapse. Although in many countries, more than half of the current smokers want to quit smoking, and one-third had made at least three quit attempts, less than half of smokers succeed in quitting smoking before the age of 60[18-22]. A number of barriers to intervene smokers has been discussed in the previous literatures including lack of knowledge, negative healthcare providers' attitude, low self-efficacy, lack of training,[23] competing priorities and believing that counselling was not an appropriate service,[24] barriers of time, manpower and finance, lack of skills, concern for the clinician-patient relationship and perception of insufficient patient motivation, intervention rate are low.[25] Smoking among healthcare providers also has been prevalent in many countries and those who smoked were less likely to advise patients to stop smoking.[26] Healthcare providers also claimed that they lack knowledge in smoking cessation counselling techniques and confidence in smoking

cessation program.[27] The most significant barrier in providing smoking cessation intervention reported by previous study is due to limited training of healthcare providers.[3 8 28] Thus, to ensure successful and effective intervention, healthcare providers require knowledge, good attitude and intervention skill to help smokers to overcome the ambivalence to change and guide them to provide appropriate counselling and pharmacotherapy treatments.[15]

According to the 4th Edition of Tobacco Atlas, doctors often informed patients about the harmful effect of smoking but they lack in smoking cessation behavioural and pharmacotherapy intervention training to help their patients to stop using tobacco products.[29] Therefore, there is a gap between the needs of the patients and the actual ability of the healthcare providers to help them.[20] In order to taper the gap, various trainings including face-to-face and online trainings have been developed to improve smoking cessation competency and proficiency. These training programs have shown to be effective in enhancing the counselling knowledge, skills and confidence of healthcare providers and their performance in smoking cessation intervention.[9 30-34] Meta-analyses by Cochrane Collaboration also showed healthcare providers who received specific training had higher probability of performing smoking cessation intervention to help their patients to stop smoking compared to their untrained controls counterparts.[3 8] Unfortunately, evidence suggest that very minimal number of healthcare providers have received even minimal training on smoking cessation treatment.[35]

Article 14 of the World Health Organisation (WHO) Framework Convention on Tobacco Control (FCTC) states that "each Party shall develop and disseminate appropriate, comprehensive and integrated guidelines based on scientific evidence and best practices, taking into account national circumstances and priorities, and shall take effective measures to promote cessation of tobacco use and adequate treatment for tobacco dependence".[36] One of the key resources needed to implement Article 14 is sufficient numbers of healthcare providers trained to assess tobacco use and deliver brief advice about smoking cessation.[37]

In line with this, Malaysia has developed a National Strategic Plan for Tobacco Control to achieve tobacco free nation by 2045 with the target of less than 5% tobacco use prevalence. Currently, a smoking cessation training program called "Smoking Cessation Organizing, Planning & Execution (SCOPE)" has been successfully developed and introduced since 2009 by a group of researchers from Nicotine Addiction Research Group of University of Malaya Centre for Addiction Sciences (UMCAS). SCOPE is part of mQuit services recognized as one of the three pathways to become a certified smoking cessation provider in Malaysia.[38] Since majority of the primary care providers play an important role as front liners in promoting smoking cessation and offering support to tobacco users, the SCOPE module has been designed for different disciplines of healthcare providers (e.g., doctors, dentists, pharmacists, nurses, medical assistants) to increase knowledge and best practices in smoking cessation in Malaysia.[38] Evidence suggest that, intervention delivered by any single type of healthcare providers (e.g., doctors, dentists, nurses, psychologists) or multiple healthcare providers improve abstinence rate compared with no intervention without healthcare providers (e.g., self-help).[11] Higher cessation rate will be achieved with more intensive and frequent contacts with healthcare providers.[4] Thus, the purpose of this study was to assess the pre- and post-training results from a series of eight-hour SCOPE training on smoking cessation. We hypothesized that the training would increase smoking cessation-related knowledge, attitude and self-efficacy for all disciplines of healthcare providers including doctors, pharmacists, medical assistants and nurses.

Methods

Development of SCOPE training

SCOPE is a comprehensive, one-day program developed from previous study 'Empowering Dentist into Smoking Cessation Program' (2009 -2013) by Nicotine Addiction Research Group of UMCAS team where the need to offer intensive smoking cessation counselling was found

to be important.[39] The module was primarily developed by two authors – ASAN, a Psychiatrist and Addiction Medicine Specialist and FMH, a Public Health Specialist and Tobacco Control Expert. The module was reviewed and vetted by local and international experts to strengthen the content. The primary aim of the SCOPE training was to prepare healthcare providers to be competent and confident to assist smokers to quit through evidence-based smoking cessation treatment.

The content of the training includes knowledge on the basic science of tobacco use and clinical science of tobacco treatment. This training outlined three components including interactive lectures (questions and answer sessions, video presentation and quiz), practical session and role-play demonstration. The lectures consist of the following topics: Introduction, Tobacco control and policy, National strategic plan, Harm to health, Smoking as an addiction, Pharmacological therapy and Behavioural therapy in smoking cessation. Practical session and assessment on how to use tobacco dependence instrument, Fagerstrom Test Nicotine Dependence (FTND) and how to monitor carbon monoxide level using smokerlyser as well as on how to run the quit smoking clinic was also included in this training. The goal of role-play session was to provide participants with guided, hands-on practise in addressing tobacco treatment for patients. A forty-five minutes session of role-play representing various cases of tobacco treatment with three different scenarios (for example, patient at different level of stages of change – pre-contemplation, contemplation, preparation, action and maintenance). Role-play was based on 5 A's counselling approach where the participants acted as smoking cessation providers, and the facilitator acted as a patient. Afterwards, the facilitators led a brief discussion on healthcare providers-delivered tobacco treatment challenges.

Education materials provided to the healthcare providers included digital and print copies of SCOPE handbook. A copy of screening tool for nicotine dependence, Fagerstrom test and

smokerlyser chart for monitoring carbon monoxide level in the lung was given to each healthcare provider to facilitate the process of smoking cessation intervention. Healthcare providers attended only one training session led by ASAN or FMH without booster sessions, reminder or other follow up training sessions.

Study design and participants

A pre-post study design was conducted among healthcare providers who attended the 8-hour SCOPE training over a period of three months starting from December 2016 to February 2017. The study population comprised of a group of healthcare providers with different grades and specialities working at government health clinics in Malaysia. A total of 218 healthcare providers who completed the training and returned the pre- and post-survey were included in this study. The healthcare providers consist of medical doctors (n=98), medical assistants (n=44), pharmacists (n=42) and nurses (n=34).

Evaluation tool

A validated evaluation tool called ProSCiTE (supplementary file) was administered to the participants before and after training program.[40 41] ProSCiTE is an acronym for Provider's Smoking Cessation Training Evaluation. ProSCiTE was originally developed and validated by SIH. It consists of 67 items which is divided into five main constructs including knowledge (12 items), attitude (8 items), self-efficacy (13 items), behaviour (19 items) and barriers (15 items) on smoking cessation intervention. However, only demographic background and three constructs (knowledge, attitude and self-efficacy) was measured in this study to determine the immediate impact of SCOPE training. Demographic characteristics assessed were age, gender, education level, working experience, smoking status and type of profession. Knowledge is *an information, understanding or skill that healthcare providers get from experience or education*. Knowledge on smoking cessation withdrawal symptoms was

assessed with 12 items with Yes (1) or No (0) response which yielded a total maximum score of 12. Attitude is *the tendency, based on trust and experience, to respond to smoking cessation intervention with specific methods and approaches*. Attitude was assessed using eight items rated by a five-point Likert scale from strongly disagree (1), disagree (2), neither disagree/agree (3), agree (4) and strongly agree (5) which yielded a total maximum score of 40. Self-efficacy is *one's belief in one's ability to succeed in specific situations or accomplish a task in smoking cessation intervention*. Self-efficacy was assessed using 13 items by a five-point Likert scale from certainly not (1), probably not (2), neutral (3), probably (4) and certainly (5), which yielded a total maximum score of 65. Construct validity based on eigenvalues and factor loadings to confirm the factor structure (knowledge, attitude, self-efficacy) was acceptable. The internal consistency reliability of factor construct was excellent for knowledge ($\alpha = 0.93$) and self- efficacy ($\alpha = 0.93$) and good for attitude (0.88).[41]

Study procedures

A representative sample from each health clinic was randomly selected from the list of healthcare providers provided by the State Health Department. The eligible healthcare providers including local healthcare providers working in government sector and never attended SCOPE training were invited and scheduled for this study. The participation in this study was on voluntary basis. They were explained regarding the purpose of the study before the training was conducted. The providers were awarded with Continuing Professional Development (CPD) credit after completing the training. The pre-test survey was administered immediately before the training and a post-test survey was administered immediately after the training.

Ethical approval

This study was approved by the Medical Ethics Committee of University of Malaya (Reference number: UM.TNC2/RC/H&E/UMREC-118) and of the Ministry of Health Malaysia (Reference number: NMRR-16-2144-32353 (IIR)). Healthcare providers were informed, and they gave consent before the pre-training survey prior to the SCOPE training.

Data analysis

Data were analysed with IBM SPSS version 22. Descriptive analyses were performed on the demographic items. Paired samples t-tests were used to compare pre- and post-test results. The level of statistical significance was set to $p < 0.05$ for all analyses.

Patient and public involvement

This is a pre- and post-study from different disciplines of healthcare providers including doctors, pharmacists, medical assistants and nurses. Therefore, there is no patient involvement in this study. All eligible healthcare providers were briefed on the purpose of the study, benefit of the study and potential harm for them. The study findings will be disseminated through academic publications and presentations, newspapers, printed and digital media, media interview and presentation to Ministry of Health Malaysia.

Results

Healthcare provider characteristics

Nearly half of the healthcare providers were doctors. Their mean age was 32.59 (6.69) ranging from 23 to 55 years old. Almost two quarters were female and almost half of them obtained bachelor's degree. Majority of the healthcare providers have working experience more than

seven years. Majority of them reported that they are non-smokers and there are no current smokers in all profession except for medical assistant. (See Table 1).

Table 1: Healthcare providers' characteristics

Variable		All trainees	Nurses	Medical Assistant	Doctors	Pharmacists
Total trainees		n (%)	n (%)	n (%)	n (%)	n (%)
		218 (100)	34 (15.60)	44 (20.2)	98 (44.9)	42 (19.3)
Age (years old) Mean (SD)		32.59 (6.69)	32.64 (8.03)	29.47 (4.58)	35.21 (7.09)	29.67 (2.91)
Working experience Mean (SD)		7.26 (5.80)	8.56 (7.57)	5.25 (3.90)	8.83 96.29)	4.64 (1.95)
Gender	Male	77 (35.3)	2 (5.9)	40 (90.9)	27 (27.6)	8 (19.0)
	Female	141 (64.7)	32 (94.1)	4 (9.1)	71 (72.4)	34 (81.0)
Ethnicity	Malay	181 (83.0)	33 (97.1)	43 (97.7)	77 (78.6)	28 (66.7)
	Chinese	16 (7.3)	0	0	7 (7.1)	9 (21.4)
	Indian	21 (9.6)	1 (2.9)	1 (2.3)	14 (14.3)	5 (11.9)
Religion	Muslim	179 (82.1)	33 (97.1)	43 (97.7)	76 (77.6)	27 (64.3)
	Buddhist	8 (3.7)	0	0	2 (2.0)	6 (14.3)
	Christian	12 (5.5)	0	0	7 (7.1)	5 (11.9)
	Hindu	19 (8.7)	1 (2.9)	1 (2.3)	13 (13.3)	4 (9.5)
Education	Diploma	73 (33.5)	32 (94.1)	40 (90.9)	1 (1.0)	0
	Bachelor	100 (45.9)	2 (5.9)	4 (9.1)	60 (61.2)	34 (81.0)
	Master	45 (20.6)	0	0	37 (37.8)	8 (19.0)
Smoking* status	Current smokers	6 (2.8)	0	6 (13.6)	0	0
	Former smokers	18 (8.4)	1 (3.1)	12 (27.3)	5 (5.2)	0
	Non-smokers	191 (88.8)	31 (96.9)	26 (59.1)	92 (94.8)	42 (100.0)

n, frequency; %, percentage; *n, 215; diploma, In the Malaysia context, diploma is a qualification obtained during tertiary education and minimum qualification to be employed as nurse or medical assistants in the government sector. It is of a level below the bachelor's degree qualification.

Changes in knowledge, attitudes and self-efficacy on smoking cessation intervention due to training

A paired t-test was performed to compare the pre- and post-training scores. Participants' post-training average scores on knowledge were 2.39 points higher compared to their pre-training scores (95% CI 2.25, 0.16). The difference was statistically significant, t (206) = 15.32, p = <0.001, and large, d = 1.3. Each item in knowledge significantly increased after the training. It was also found that healthcare providers' knowledge on mouth ulcers as a withdrawal symptom for nicotine addiction gains the greatest change in score followed by diarrhoea. Before the training, most of healthcare providers did not know that diarrhoea was one of the withdrawal symptoms for nicotine addiction. (See Table 2).

Table 2: Paired sample t-test comparing pre- and post-tests for each item and total knowledge score.

Variables	Pre-training Mean (SD)	Post-training Mean (SD)	*p*-value
1. Irritability	0.99 (0.10)	1.16 (0.50)	<0.001
2. Depression	0.98 (0.15)	1.34 (0.60)	<0.001
3. Restlessness	0.99 (0.10)	1.05 (0.30)	0.006
4. Poor concentration	0.99 (0.12)	1.12 (0.43)	<0.001
5. Increased appetite	0.85 (0.36)	1.55 (0.61)	<0.001
6. Weight gain	0.82 (0.38)	1.56 (0.63)	<0.001
7. Light headedness	0.96 (0.20)	1.26 (0.59)	<0.001
8. Night time awakening	0.90 (0.30)	1.49 (0.72)	<0.001
9. Constipation	0.84 (0.37)	1.74 (0.78)	<0.001
10. Diarrhea	0.27 (0.45)	2.01 (0.68)	<0.001
11. Mouth ulcers	0.80 (0.40)	1.86 (0.69)	<0.001
12. Urge to smoke	0.98 (0.15)	1.07 (0.32)	0.001
Total knowledge scores	7.96 (2.34)	10.35 (1.57)	<0.001

SD, standard deviation; Knowledge items were measured by Yes (1) or No (0) with a total maximum score of 12.

Before the training, the mean score of total attitudes was acceptable while after completing the training, the mean score of total attitudes increased to maximum score. On the average,

participant's post-training score was 2.72 points higher than their pre-training score (95% CI 2.07, 3.37). The difference was statistically significant, t (201) = 8.23, p = <0.001, and medium, d = 0.68. Each item in attitude significantly increased after the training. Attitude of healthcare providers towards patients want them to advise patients to stop using any tobacco products gained the greatest change in score followed by patient chance of quitting smoking increases if the healthcare provider advises patients to quit. Before the training, it showed that attitude towards asking parents/guardian on the effect of second-hand smoke were lowest. However, after the training, the attitude towards second-hand smoke increased. (See Table 3).

Table 3: Paired sample t-test comparing pre- and post-tests for each item and total attitude score.

Items	**Pre-training Mean (SD)**	**Post-training Mean (SD)**	***p*-value**
1. A patient's chance of quitting smoking increases if the healthcare provider advises him/her to quit.	3.85 (0.89)	4.52 (0.67)	<0.001
2. Patients want you to advise them to stop using any tobacco products.	3.59 (0.86)	4.34 (0.75)	<0.001
Healthcare providers like you should….			
3. Get specific training on smoking cessation counselling techniques.	4.56 (0.60)	4.72 (0.57)	0.002
4. Set a good example for their patients and public by not using any tobacco products.	4.64 (0.58)	4.75 (0.55)	0.029
5. Routinely ask patients/clients about tobacco use.	4.38 (0.66)	4.69 (0.59)	0.006
6. Routinely ask parents/guardians about tobacco use during pediatric visits.	4.29 (0.75)	4.61 (0.7)	<0.001
7. Routinely advise patients/clients who use any tobacco products to quit.	4.49 (0.650	4.72 (0.59)	<0.001
8. Routinely assist patients using any tobacco products to quit.	4.52 (0.64)	4.71 (0.60)	0.001
Total Attitude scores	34.32 (4.12)	37.04 (3.92)	<0.001

SD, standard deviation; Attitude items were measured by using a 5-point Likert scale strongly disagree (1), disagree (2), neither disagree/agree (3), agree (4) and strongly agree (5) with a total maximum score of 40.

A significant increase in healthcare providers' self-efficacy was also found when pre- and post-training was compared. Amongst the three measures, self-efficacy scores provide greatest changes after the training. On the average, healthcare providers' post-training score was

14.36 points higher than their pre-training score, 95% CI (0.63, 0.84). The difference was statistically significant, t (205) = 23.22, p = <0.001, and large, d = 1.78. Each item in self-efficacy significantly increased after the training. Practical and assessment module on how to detect carbon monoxide in their breath using a smokerlyser depicted greatest change in score followed by pharmacological therapy to assist smokers to quit and behavioral therapy to prescribe medication to treat smokers. Healthcare providers have lowest confidence in using the smokerlyser before the training. However, it showed greater improvement from the practical session in the training. (See Table 4)

Table 4: Paired sample t-test comparing pre- and post-tests for each item and total self-efficacy score

Items	**Pre-training Mean (SD)**	**Post-training Mean (SD)**	***p*-value**
1. I know appropriate questions to ask my patients.	3.78 (0.84)	4.45 (0.60)	<0.001
2. I am able to motivate my patients who are interested to quit smoking.	3.85 (0.81)	4.40 (0.62)	<0.001
3. I am able to assist patients to quit even if the patient thinks that it is difficult to give up.	3.68 (0.81)	4.27 (0.65)	<0.001
4. I have the pharmacological therapy skills to assist patients to quit smoking.	3.35 (1.06)	4.15 (0.87)	<0.001
5. I have the behavioral therapy skills to assist patients to quit smoking.	3.28 (0.96)	4.14 (0.72)	<0.001
6. I can advise patients to consider smoking cessation.	4.14 (4.14)	4.50 (0.56)	<0.001
7. I can provide counselling when time is limited.	3.18 (0.97)	3.89 (0.94)	<0.001
8. I can counsel patients who are not interested in quitting.	3.31 (0.94)	4.05 (0.82)	<0.001
9. I know how to prescribe medication (nicotine replacement therapy/bupropion) to treat tobacco dependency.	2.93 (1.26)	3.81 (1.07)	<0.001
10. I can assess patient's different stages of readiness to quit smoking.	3.50 (0.96)	4.17 (0.75)	<0.001
11. I can assess patient's level of nicotine dependency using the Fagerstrom test.	3.43 (1.21)	4.30 (0.86)	<0.001
12. I can use smokerlyzer to determine patient's carbon monoxide level.	2.63 (1.34)	4.28 (1.07)	<0.001
13. I can assist recent quitters to learn how to cope with situations or triggers that might lead them to relapse to using tobacco.	3.37 (1.02)	4.28 (0.70)	<0.001
Total Self-efficacy scores	40.31 (8.61)	54.67 (7.45)	<0.001

SD: standard deviation; Self-efficacy items were measured by using a five-point Likert scale from certainly not (1), probably not (2), neutral (3), probably (4) and certainly (5), with a total maximum score of 65.

Changes in knowledge, attitudes and self-efficacy on smoking cessation intervention due to training for each profession

Paired sample t-test in Figure 1 revealed significant increases in all four professions and measures. Nurses obtain the largest changes for knowledge score with an increase of 2.76 points, followed by medical assistants (2.72), doctors (2.28) and pharmacists (2.05). On the attitude, medical assistants gain the largest changes with an increase of 2.87 points, followed by doctors (2.75), pharmacist (2.62) and nurses (2.58). Similar result was also found for self-efficacy, where nurses gain the largest changes with an increase of 15.24 points, followed by doctors (15.01), pharmacists (14.71) and medical assistants (11.69).

Post-training results showed that doctors and pharmacists obtain the highest score for knowledge, pharmacists for attitude and doctors for self-efficacy. Lowest score for nurses and medical assistant were seen in both pre-training and post-training for all measure.

Discussion

This study established an evaluation of a tailored-smoking cessation training for healthcare providers based on lecture, practical and role-play. Our study showed significant improvement in healthcare providers' knowledge, attitude and self-efficacy in smoking cessation intervention. Importantly this was also the first evaluation of such training intervention among healthcare providers using the 5 A's approach in the Malaysian context. This study also indicate that knowledge, attitude and self-efficacy did not differ much among the different disciplines of healthcare providers and significantly improved as a result of their participation in SCOPE training. Prior to the training, pharmacists had higher score on both knowledge and attitude while doctors had higher score on self-efficacy related to smoking cessation. After the training, a higher knowledge score obtained by both pharmacists and doctors, attitude score by pharmacists and self-efficacy score by doctors. Although nurses and medical assistants

had slightly lower score for each measure, however, they gain the largest change after the training. The gaps in baseline score among medical assistants and nurses indicated that these groups had minimal exposure on smoking cessation prior to the training. This finding is also in line with a study in Arkansas, United States, where they found that nurses' score on knowledge and self-efficacy was lower than doctors.[13] The results from this study suggested that training in smoking cessation is effective in the short term and can provide better knowledge, positive attitude and improve their confidence level in assisting smokers in quitting smoking using the 5A's smoking cessation intervention particularly among the nurses and medical assistants. This study is consistent with international findings that have demonstrated smoking cessation training can be effective in providing smoking cessation intervention.[3 9 42-45]

In this present study, significant improvement in knowledge, attitude and self-efficacy were found after the SCOPE training. It is in agreement with previous studies in which healthcare providers have reported improvements in knowledge, attitude and self-efficacy in smoking cessation intervention after training.[46-49] This study suggests that the smoking status among SCOPE participants is important, whereby there are no current smokers among the doctors, pharmacists and the nurses groups. When compared with a study conducted in Bosnia Herzegovina, where there is no established smoking cessation program yet, more than half of the nurses who worked at the Family Medicine teaching centre smoke, and about 40% of their doctors smoke. The ever smokers among these professionals would most likely not advocate their patients for smoking cessation despite agreeing that smoking is harmful to health and would not advise young adults to start smoking.[50] Previous studies also reported that non-smokers healthcare providers had more positive attitude towards the hospital's smoke-free policy compared to smokers.[51 52] With the SCOPE program, in the attitude component, the training has improved their attitude towards advocating and advising patients to stop smoking. This evidently showed the importance of having a structured and well-organized smoking

cessation program, to better assist healthcare providers in Malaysia in helping patients to quit smoking. When participants were asked to give their responses regarding their attitude towards providing smoking cessation intervention to their patients, it showed significant improvement post training particularly for second-hand smoke. This evidence supports healthcare providers are aware on the importance of identifying and advising patients on the harmful effect of second-hand smoke. More positive attitude particularly among medical assistants which was observed after the training also suggested that our healthcare providers are aware of their role and they are ready to implement smoking cessation in practice.

A systematic review on belief and attitude of physicians in United Kingdom revealed that the three most prevalent negative beliefs concerned the time needed to discuss smoking, a perceived lack of effectiveness of such discussions, and a perceived lack of skill in conducting such discussions.[53] As skill is concerned, training in smoking cessation program can increase the level of confidence among quit smoking providers, and with experience, can reduce the consultation time and increase the effectiveness of consultation. Although most healthcare providers already have positive attitude scores towards smoking cessation intervention at pre-training, the mean total attitude scores increased significantly at post training. This reflected that the training could help healthcare providers to understand their role in providing smoking cessation intervention. Thus, it is important to equip them with skills to competently assist smokers to quit.[54]

The study findings also suggested that there is a potential benefit by training all healthcare providers, particularly in self-efficacy. However, when self-efficacy was explored by each item, it was apparent that they lacked in confidence about the 5A's component at pre-training with ''Ask'' and ''Advise'' being higher and ''Assess'', ''Assist'' and ''Arrange'' somewhat lower. The confidence level was increased for all of these 5 A's approaches after the training especially

''Assist ''and ''Assess''. It showed that SCOPE training has potential in increasing knowledge, attitude and self-efficacy of healthcare providers. Our result was in accordance with previous study suggesting that simple activities like ''Ask'' and ''Advise'' supported by existing systems that prompt good performance whereas ''Assess'', and ''Assist'' require more complex skill sets. Additional to that, higher degree of coordinated clinic system is needed for ''Arrange'' for follow up cases for clinicians. Integrated system-based approach involving multiple top down stakeholders and environmental factors with the goal of connecting administrators, clinicians and staff to develop effective strategies to provide smokers with smoking cessation intervention is indeed needed.[44] Apart from that, updated clinical practice guideline for treating tobacco use and dependence has emphasized the increasing evidence that healthcare system significantly affects the likelihood that smokers receive effective smoking cessation intervention.[12] We suggest that video demonstration, role-play[55] and practical session play a very important role to help in increasing confidence of healthcare providers in providing more complex 5 A's components. It was also observed that healthcare providers could provide effective intervention, as they were more confident to assess and assist patients from ambivalence stage to change and then offering them with appropriate behavioural and pharmacotherapy intervention.

With respect to the self-efficacy, SCOPE training particularly increased healthcare providers' confidence to use smokerlyser followed by behavioural therapy and pharmacotherapy thus suggesting that more emphasize should be made for this training module as the pre-training score is lowest compared to others. This again supported the evidence that training on smoking cessation should be widely and continuously provided to all healthcare providers to help increasing their performance using more complex components (Assess, Assist and Arrange) in the 5 A's smoking cessation intervention.

Nevertheless, our study has some limitations. Firstly, it relies on self-reported response from our healthcare providers. Data must be carefully interpreted as there is the possibility of healthcare providers tend to over-report the frequency of smoking cessation intervention.[49] The healthcare providers involved in this study were only from three out of fourteen states in Malaysia. Thus, generalizability to overall population of healthcare providers should be cautioned. The nature of pre- and post-study lacks control group for the intervention and without long term follow up does not indicate causal relationship between the impact of the training on the actual healthcare providers' behaviour and smoking cessation outcome. Future study should consider having a control group, preferably in a larger sample to improve the significance of this study. This study also could explore more in terms of their attitude towards smoking cessation advice, where in depth questions or qualitative approach would help answer this section on attitude. Even though knowledge has been greatly improved in this study, the duration of the information retained is not measured as no follow-up study was done. Evidence showed that knowledge can be maintained beyond three-month follow up period except for brief advice component, which decreased at three months.[47] Thus, continuing professional course for smoking cessation should be done frequently.

Conclusion

In conclusion, this study demonstrates that SCOPE training improved healthcare providers' knowledge, attitude and self-efficacy on smoking cessation intervention. Continuous future training is recommended to better equip healthcare providers with the latest knowledge, right attitude and high self-efficacy to successfully integrate what they have learned into their practice.

Conflict of interest

The other authors have no competing interest to declare.

Funding

This study was funded by University of Malaya Grand Challenge Research Grant, Wellness Cluster (GC004A-15HTM).

Acknowledgements

The authors would like to express our sincere gratitude to the speakers from NARCC group and healthcare providers for their generous contribution to this project.

Author statement

Siti Idayu was responsible for study design, data collection, analysis and drafted the manuscript. Farizah was responsible for developing training module, supervising and reviewing manuscript. Amani @ Natasha was involved in the reviewing manuscript. Amer Siddiq was responsible for developing training module, supervising and reviewing manuscript as well as investigator for this study. All authors critically reviewed the manuscript and approved the final version.

Data sharing statement

All the data for the study is stored at the Nicotine Addiction Research Group, UMCAS in University of Malaya, Kuala Lumpur, Malaysia. Only team members have access to the raw data for the sole purpose of dissemination of the results. Data analysis is ongoing.

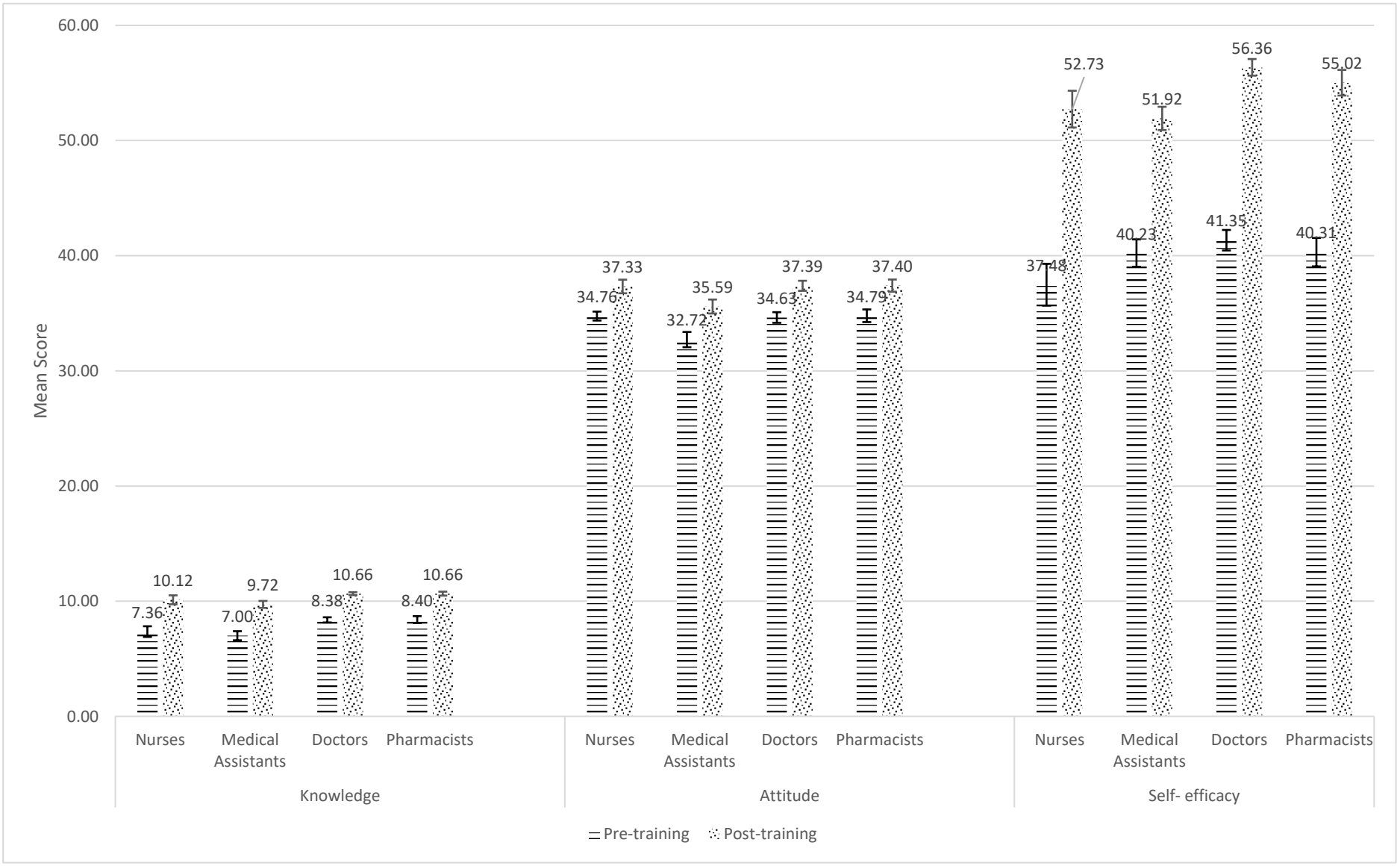
References

1. WHO. WHO global report on trends in prevalence of tobacco smoking 2015. . 2015
2. Alberg AJ, Shopland DR, Cummings KM. The 2014 Surgeon General's Report: Commemorating the 50th Anniversary of the 1964 Report of the Advisory Committee to the US Surgeon General and Updating the Evidence on the Health Consequences of Cigarette Smoking. *American Journal of Epidemiology* 2014;179(4):403-12. doi: 10.1093/aje/kwt335
3. Carson KV VM, Crone MR, Brinn MP, Esterman AJ, Assendelft WJJ, Smith BJ. . Training health professionals in smoking cessation. . *Cochrane Database of Systematic Reviews* 2012; Art. No.: CD000214(5) doi: 10.1002/14651858.CD000214.pub2
4. Stead L, Diana B, Nataly P, et al. Physician advice for smoking cessation. *Cochrane Database of Systematic Reviews* 2013;5 doi: 10.1002/14651858.CD000165.pub4.
5. Hudmon KS, Prokhorov AV, Corelli RL. Tobacco cessation counseling: Pharmacists opinions and practices. *Patient Education and Counseling* 2006;61(1):152-60. doi: 10.1016/j.pec.2005.03.009
6. Aquilino ML, Farris KB, Zillich AJ, et al. Smoking-Cessation Services in Iowa Community Pharmacies. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy* 2003;23(5):666-73. doi: 10.1592/phco.23.5.666.32192
7. Simansalam S, Brewster JM, Nik Mohamed MH. Training Malaysian Pharmacy Undergraduates with Knowledge and Skills on Smoking Cessation. *American Journal of Pharmaceutical Education* 2015;79(5):71. doi: 10.5688/ajpe79571
8. Cornuz J, Humair J-P, Seematter L, et al. Efficacy of Resident Training in Smoking CessationA Randomized, Controlled Trial of a Program Based on Application of Behavioral Theory and Practice with Standardized Patients. *Annals of Internal Medicine* 2002;136(6):429-37.
9. Sheffer CE, Barone C, Anders ME. Training Nurses in the Treatment of Tobacco Use and Dependence: Pre- and Post-Training Results. *Journal of advanced nursing* 2011;67(1):176-83. doi: 10.1111/j.1365-2648.2010.05483.x
10. Poon VHK. Model for counseling people in relationships. *Canadian Family Physician* 2007;53(2):237-38.
11. Fiore MC, Jaén CR, Baker TB. Treating Tobacco Use and Dependence:2008 Update.Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service 2008.
12. Siu AL, for the USPSTF. Behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women: U.s. preventive services task force recommendation statement. *Annals of Internal Medicine* 2015;163(8):622-34. doi: 10.7326/M15-2023
13. Sheffer CE, Barone CP, Anders ME. Training health care providers in the treatment of tobacco use and dependence: pre- and post-training results. *Journal of Evaluation in Clinical Practice* 2009;15(4):607-13. doi: 10.1111/j.1365-2753.2008.01058.x
14. Quinn VP, Hollis JF, Smith KS, et al. Effectiveness of the 5-As Tobacco Cessation Treatments in Nine HMOs. *Journal of General Internal Medicine* 2009;24(2):149-54. doi: 10.1007/s11606-008-0865-9
15. Rigotti NA. Training Future Physicians to Deliver Tobacco Cessation Treatment. *Journal of General Internal Medicine* 2016;31(2):144-46. doi: 10.1007/s11606-015-3560-7
16. Ferketich AK, Khan Y, Wewers ME. Are physicians asking about tobacco use and assisting with cessation? Results from the 2001-2004 national ambulatory medical care survey (NAMCS). *Prev Med* 2006;43 doi: 10.1016/j.ypmed.2006.07.009
17. Jamal A, R DS, Babb SD, et al. Tobacco Use Screening and Cessation Assistance During Physician Office Visits Among Persons Aged 11–21 Years — National Ambulatory Medical Care Survey, United States, 2004–2010. *MMWR Morb Mortal Wkly Rep 2014* 2014;63(2):71-79.
18. (IPH) IfPH. National Health and Morbidity Survey 2015 – Report on Smoking Status Among Malaysian Adults, Ministry of Health Malaysia. 2015

19. (IPH) IfPH. Report of the Global Adult Tobacco Survey (GATS) Malaysia, 2011, Ministry of Health Malaysia. 2011
20. Wipfli H. The Tobacco Atlas, Fourth Edition. *American Journal of Epidemiology* 2012;176(12):1193-93. doi: 10.1093/aje/kws389
21. CDC. Quitting smoking among adults — United States, 2001–2010. Morbidity and Mortality Weekly Report. 2011;60:1513–19.
22. Cosci F. Nicotine dependence and psychological distress: outcomes and clinical implications in smoking cessation. *Psychology Research and Behavior Management* 2011:119. doi: 10.2147/prbm.s14243
23. Saito A, Nishina M, Murai K, et al. Health professional's perceptions of and potential barriers to smoking cessation care: a survey study at a dental school hospital in Japan. *BMC Research Notes* 2010;3(1):329.
24. Tong EK, Strouse R, Hall J, et al. National survey of U.S. health professionals' smoking prevalence, cessation practices, and beliefs. *Nicotine & Tobacco Research* 2010;12(7):724-33. doi: 10.1093/ntr/ntq071
25. Omole O, Ngobale K, Ayo-Yusuf O. Missed opportunities for tobacco use screening and brief cessation advice in South African primary health care: a cross-sectional study. *BMC Family Practice* 2010;11(1):94.
26. Al Hosani S, Al Ali M, Al-Marashda K, et al. Smoking Prevalence, Attitudes and Behaviors Primary Healthcare Providers and its Impact on Their Smoking Cessation Counseling Practices2014.
27. Berman BA, Yancey AK, Bastani R, et al. African-American physicians and smoking cessation counseling. *Journal of the National Medical Association* 1997;89(8):534-42.
28. Taha NA, Guat Tee O. Tobacco cessation through community pharmacies: Knowledge, attitudes, practices and perceived barriers among pharmacists in Penang. *Health Education Journal* 2015;74(6):681-90. doi: 10.1177/0017896914558643
29. Rojewski AM, Bailey SR, Bernstein SL, et al. Considering Systemic Barriers to Treating Tobacco Use in Clinical Settings in the United States. *Nicotine & Tobacco Research* 2018:nty123-nty23. doi: 10.1093/ntr/nty123
30. Brose LS, McEwen A, Michie S, et al. Treatment manuals, training and successful provision of stop smoking behavioural support. *Behaviour Research and Therapy* 2015;71:34-39. doi: http://dx.doi.org/10.1016/j.brat.2015.05.013
31. Brose LS, West R, Michie S, et al. Effectiveness of an online knowledge training and assessment program for stop smoking practitioners. *Nicotine & Tobacco Research: Official Journal Of The Society For Research On Nicotine And Tobacco* 2012;14(7):794-800. doi: 10.1093/ntr/ntr286
32. Martin BA, Bruskiewitz RH, Chewning BA. Effect of a tobacco cessation continuing professional education program on pharmacists' confidence, skills, and practice-change behaviors. *Journal of the American Pharmacists Association : JAPhA* 2010;50(1):9-16. doi: 10.1331/JAPhA.2010.09034
33. Hayes RB, Geller A, Churchill L, et al. Teaching tobacco dependence treatment and counseling skills during medical school: Rationale and design of the Medical Students helping patients Quit tobacco (MSQuit) group randomized controlled trial. *Contemporary Clinical Trials* 2014;37(2):284-93. doi: http://dx.doi.org/10.1016/j.cct.2014.01.008
34. Ockene JK, Hayes RB, Churchill LC, et al. Teaching Medical Students to Help Patients Quit Smoking: Outcomes of a 10-School Randomized Controlled Trial. *Journal of General Internal Medicine* 2016;31(2):172-81. doi: 10.1007/s11606-015-3508-y
35. Steinberg MB, Alvarez MS, Delnevo CD, et al. Disparity of Physicians' Utilization of Tobacco Treatment Services. *American Journal of Health Behavior* 2006;30(4):375-86. doi: 10.5993/AJHB.30.4.4
36. WHO. Guidelines for implementation of Article 14. 2019

37. Kruse GR, Rigotti NA, Raw M, et al. Tobacco Dependence Treatment Training Programs: An International Survey. *Nicotine & Tobacco Research* 2016;18(5):1012-18. doi: 10.1093/ntr/ntv142
38. Amer Nordin AS, Mohd Hairi F, Ahmad Tajuddin NAN. Malaysia: mQuit strengthens quit smoking strategy. *Tobacco Control* 2016;25:498-501.
39. Amer Siddiq AN, Rahimah AK, Nurul Asyikin Y, et al. Empowering Malaysian dentists to tobacco dependence treatment conduct. *International Dental Journal* 2014;64(4):206-12. doi: 10.1111/idj.12110
40. Hasan SI, Mohd Hairi F, Danaee M, et al. Content validity for the questionnaire on Knowledge, Attitude and Behaviour (KAB) towards smoking cessation intervention among health care providers *Poster presented at Society for Research on Nicotine and Tobacco 23rd Annual Meeting, 8-11 March 2017, Florence, Italy* 2017
41. Hasan SI, Mohd Hairi F, Amer Nordin AS. Construct Validity and Internal Consistency Reliabitlity of Providers Smoking Cessation Evaluation (ProSCiTE) Tool. *12th Asia Pacific Conference on Tobacco or Health (APACT)* 2018
42. Hagimoto A, Nakamura M, Masui S, et al. Effects of Trained Health Professionals' Behavioral Counseling Skills on Smoking Cessation Outcomes. *Annals of Behavioral Medicine* 2018:kax049-kax49. doi: 10.1093/abm/kax049
43. Malan Z, Mash B, Everett-Murphy K. Evaluation of a training programme for primary care providers to offer brief behaviour change counselling on risk factors for non-communicable diseases in South Africa. *Patient Education and Counseling* 2016;99(1):125-31. doi: http://dx.doi.org/10.1016/j.pec.2015.08.008
44. Payne TJ, Gaughf NW, Sutton MJ, et al. The impact of brief tobacco treatment training on practice behaviours, self-efficacy and attitudes among healthcare providers. *International Journal of Clinical Practice* 2014;68(7):882-89. doi: 10.1111/ijcp.12386
45. Thomas T, Passfield L, Coulton S, et al. Effectiveness of a tailored training programme in behaviour change counselling for community pharmacists: A pilot study. *Patient Education and Counseling* 2016;99(1):132-38. doi: http://dx.doi.org/10.1016/j.pec.2015.08.004
46. Herold R, Schiekirka S, Brown J, et al. Structured Smoking Cessation Training for Medical Students: A Prospective Study. *Nicotine & Tobacco Research* 2016;18(12):2209-15. doi: 10.1093/ntr/ntw191
47. Jones LL, McEwen A. Evaluating an online training module on protecting children from secondhand smoke exposure: impact on knowledge, confidence and self-reported practice of health and social care professionals. *Bmc Public Health* 2015;15:6. doi: 10.1186/s12889-015-2488-5
48. Susi AK, Montarat T, Petcharat P, et al. Impact of Smoking Cessation Training for Community Pharmacists in Indonesia. *Asian Pacific Journal of Cancer Prevention* 2015;16(8):3319-23.
49. Williams JM, Miskimen T, Minsky S, et al. Increasing Tobacco Dependence Treatment Through Continuing Education Training for Behavioral Health Professionals. *Psychiatric Services* 2015;66(1):21-26. doi: doi:10.1176/appi.ps.201300523
50. Hodgetts G, Broers T, Godwin M. Smoking behaviour, knowledge and attitudes among Family Medicine physicians and nurses in Bosnia and Herzegovina. *BMC Fam Pract* 2004;5 doi: 10.1186/1471-2296-5-12
51. Chang J-C, Lee Y-Y, Kuo L-N, et al. Knowledge, Attitudes, and Behavior Toward Smoking Cessation among Hospital Pharmacists in Taiwan. *Journal of Experimental & Clinical Medicine* 2012;4(4):249-54. doi: http://dx.doi.org/10.1016/j.jecm.2012.06.003
52. Movsisyan NK, Varduhi P, Arusyak H, et al. Smoking behavior, attitudes, and cessation counseling among healthcare professionals in Armenia. *BMC Public Health* 2012;12(1):1-8. doi: 10.1186/1471-2458-12-1028
53. Vogt F, Hall S, Marteau TM. General practitioners' and family physicians' negative beliefs and attitudes towards discussing smoking cessation with patients: a systematic review. 2005;100(10):1423-31. doi: doi:10.1111/j.1360-0443.2005.01221.x

54. Saba M, Bittoun R, Saini B. A Workshop on Smoking Cessation for Pharmacy Students. *American Journal of Pharmaceutical Education* 2013;77(9):198. doi: 10.5688/ajpe779198
55. Stolz D, Langewitz W, Meyer A, et al. Enhanced Didactic Methods of Smoking Cessation Training for Medical Students—A Randomized Study. *Nicotine & Tobacco Research* 2012;14(2):224-28. doi: 10.1093/ntr/ntr186


60.00
50.00
40.00
30.00
20.00
10.00
0.00
Mean Score
7.36
10.12
7.00
9.72
8.38
10.66
8.40
10.66
34.76
37.33
32.72
35.59
34.63
37.39
34.79
37.40
37.48
52.73
40.23
51.92
41.35
56.36
40.31
55.02
Nurses
Medical Assistants
Doctors
Pharmacists
Knowledge
Attitude
Self- efficacy
Pre-training
Post-training

UNIVERSITI MALAYA
KUALA LUMPUR

SURVEY QUESTION: KNOWLEDGE, ATTITUDE & BEHAVIOR AMONG HEALTHCARE PROVIDERS TOWARDS SMOKING CESSATION INTERVENTION.

Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur Malaysia

THIS BOOKLET CONSISTS OF 7 SECTIONS

Section	Topic	Page
A	Demographic background	1 – 3
B	Knowledge of smoking cessation intervention	4 - 6
C	Attitude towards smoking cessation intervention	7
D	Smoking cessation intervention self-efficacy	10 - 11
E	Smoking cessation intervention behavior	8 - 10
F	Barriers to the provision of smoking cessation intervention	11 - 12

Instructions to respondents:

1) Please answer all the questions in this booklet.
2) Please consult us if you need further clarification.

All information provided by you is confidential. Identification number will not be associated with the data. We are only interested in the overall results of the questionnaire. You will not be personally identifiable. Access to the data obtained from the questionnaire is limited only to individuals involved in the data analysis. The data collected will be used in projects related to this topic.

For further information, please contact:
A/P Dr. Farizah binti Mohd Hairi (farizah@um.edu.my)
A/P Dr. Amer Siddiq bin Amer Nordin (amersiddiq@um.edu.my)
Siti Idayu binti Hasan (ayu_umcas@um.edu.my)

Name:

NRIC:

Institution/Organisation:

Phone no:

Time Point	T0	T1	T2	T3	T4

ID Number	

SECTION A: DEMOGRAPHIC BACKGROUND

Instruction: Kindly READ all questions and mark (X) accordingly.

A1. What is your current age? _____ years _____ months

A2. What is your gender? ☐ 1. Male ☐ 2. Female

A3. What is your ethnic group? ☐ 1. Malay ☐ 2. Chinese
☐ 3. Indian ☐ 4. Others
_____ (please specify)

A4. What is your religion? ☐ 1. Islam ☐ 2. Buddhism
☐ 3. Christianity ☐ 4. Hinduism
☐ 5. Others _____ (please specify)

A5. What is your highest qualification? ☐ 1. Diploma ☐ 2. Bachelor
☐ 3. Master ☐ 4. PhD
☐ 5. Others _____ (please specify)

A6. Which university did you graduate from? ☐ 1. Local ☐ 2. International

A7. Where is your practice location? ☐ 1. Urban ☐ 2. Rural

A8. Where is your current workplace? ☐ 1. Public hospital ☐ 2. Public clinic
☐ 3. Private hospital ☐ 4. Private clinic
☐ 5. Others _____ (please specify)

A9. What is your occupation? ☐ 1. Nurse ☐ 2. Medical Assistant
☐ 3. Doctor
Specialisation: _____
☐ 4. Dentist
☐ 5. Pharmacist ☐ 6. Others
_____ (please specify)

Time Point	T0	T1	T2	T3	T4

ID Number	

A10. What is your status on tobacco use (including manufactured cigarettes, hand rolled cigarettes, kretek pipes, curuts, cigars, cigarillos, shisha/hookah, e-cigarette and smokeless tobacco)?

☐ 1. Current smoker
(A person who daily or occasionally smokes any tobacco product)

☐ 2. Former smoker
(A person, who in the past, made use of at least one smoked tobacco product occasionally for a period of three months or more, or daily for a period of one month or more)

☐ 3. Non-smoker
(A person currently does not smoke at all)

A11. How many years have you been in practice? _____ years _____ months

A12. On the average, how long do you spend your time for any of your patients/clients? ☐ minutes

A13. In a typical week of practice, what percentage of your patients/clients are smokers?

☐ 1. 0-25%
☐ 2. 26%-50%
☐ 3. 51%-75%
☐ 4. 76%- 100%
☐ 5. Don't know

A14. Does your current workplace have a quit smoking clinic?

☐ 1. Yes
☐ 2. No
☐ 3. Don't know

Time Point	T0	T1	T2	T3	T4

ID Number	

A15. Have you attended any educational program on smoking cessation? ☐ 1. Yes ☐ 2. No (proceed to A16)

a. When did you went for smoking cessation training?

☐ 1. One month ago

☐ 2. 3 months ago

☐ 3. 6 months ago

☐ 4. More than 6 months ago

b. Place of training

☐ 1. Workplace

☐ 2. Outside Workplace

c. Was/were the previous training(s) adequate for you to provide smoking cessation treatment?

☐ 1. Adequate

☐ 2. Inadequate

☐ 3. Unsure

d. For question c, what is your definition of adequate?

_____

_____

_____

A16. Are you interested in upgrading your smoking cessation counselling skills?

☐ 1. Not at all interested

☐ 2. Slightly interested

☐ 3. Moderately interested

4. Extremely interested ☐

Time Point	T0	T1	T2	T3	T4

ID Number	

SECTION B: KNOWLEDGE

Based on your knowledge, answer the following questions by marking an (X) in the appropriate box.

No.	Item	Yes (1)	No (0)
a.	Irritability	☐	☐
b.	Depression	☐	☐
c.	Restlessness	☐	☐
d.	Poor concentration	☐	☐
e.	Increased appetite	☐	☐
f.	Weight gain	☐	☐
g.	Light headedness	☐	☐
h.	Night time awakening	☐	☐
i.	Constipation	☐	☐
j.	Diarrhea	☐	☐
k.	Mouth ulcers	☐	☐
l.	Urge to smoke	☐	☐

Time Point	T0	T1	T2	T3	T4

ID Number	

SECTION C: ATTITUDE TOWARDS SMOKING CESSATION INTERVENTION

Attitude is the tendency, based on trust and experience, to respond to smoking cessation intervention with specific methods and approaches.

Instruction: Please mark (X) one box per statement

No.	Item	Strongly disagree (1)	Disagree (2)	Neither disagree or Agree (3)	Agree (4)	Strongly agree (5)
C1.	A patient's/client's chance of quitting smoking increases if the healthcare provider advises him/her to quit.	☐	☐	☐	☐	☐
C2.	Patients/clients want you to advise them to stop using any tobacco products.	☐	☐	☐	☐	☐
Healthcare providers like you should….						
C3.	get specific training on smoking cessation counselling techniques.	☐	☐	☐	☐	☐
C4.	set a good example for their patients/clients and public by not using any tobacco products.	☐	☐	☐	☐	☐
C5.	routinely ask patients/clients about tobacco use.	☐	☐	☐	☐	☐
C6.	routinely ask parents/guardians about tobacco use during paediatric visits.	☐	☐	☐	☐	☐
C7.	routinely advise patients/clients who use any tobacco products to quit.	☐	☐	☐	☐	☐
C8.	routinely assist patients/clients using any tobacco products to quit.	☐	☐	☐	☐	☐

Time Point	T0	T1	T2	T3	T4

ID Number	

SECTION D: SMOKING CESSATION INTERVENTION SELF-EFFICACY

Self-efficacy is one's belief in one's ability to succeed in specific situations or accomplish a task in smoking cessation intervention.

Instruction: Please mark (X) one box per statement.

No.	Item	Certainly not (1)	Probably not (2)	Neutral or Don't know (3)	Probably (4)	Certainly (5)
D1.	I know appropriate questions to ask my patients/clients.	☐	☐	☐	☐	☐
D2.	I am able to motivate my patients/clients who are interested to quit smoking.	☐	☐	☐	☐	☐
D3.	I am able to assist patients/clients to quit even if the patient thinks that it is difficult to give up.	☐	☐	☐	☐	☐
D4.	I have the pharmacological therapy skills to assist patients/clients to quit smoking.	☐	☐	☐	☐	☐
D5.	I have the behavioral therapy skills to assist patients/clients to quit smoking.	☐	☐	☐	☐	☐
D6.	I can advise patients/clients to consider smoking cessation.	☐	☐	☐	☐	☐
D7.	I can provide counselling when time is limited.	☐	☐	☐	☐	☐
D8.	I can counsel patients/clients who are not interested in quitting.	☐	☐	☐	☐	☐
D9.	I know how to prescribe medication (nicotine replacement therapy/bupropion) to treat tobacco dependency.	☐	☐	☐	☐	☐
D10.	I can assess patient's/client's different stages of readiness to quit smoking.	☐	☐	☐	☐	☐
D11.	I can assess patient's level of nicotine dependency using the Fagerstrom test.	☐	☐	☐	☐	☐
D12.	I can use smokerlyzer to determine patient's/client's carbon monoxide level.	☐	☐	☐	☐	☐

Time Point	T0	T1	T2	T3	T4

ID Number	

D13.	I can assist recent quitters to learn how to cope with situations or triggers that might lead them to relapse to using tobacco.	☐	☐	☐	☐	☐

SECTION E: SMOKING CESSATION INTERVENTION BEHAVIOR

The way in which a person acts in response to any particular situation or stimulus regarding smoking cessation intervention.

Instruction: Please mark (X) one box per statement

No.	Item	Never (1)	Rarely (2)	Some-times (3)	Often (4)	Always (5)
In your current practice, how often do you….						
E1.	ask patients/clients whether they smoke?	☐	☐	☐	☐	☐
E2.	ask patients/clients the number of cigarettes smoked per day?	☐	☐	☐	☐	☐
E3.	advise patients/clients who smoke to quit smoking?	☐	☐	☐	☐	☐
E4.	advise female patients/clients to quit smoking if they are pregnant or planning to become pregnant?	☐	☐	☐	☐	☐
E5.	advise patients/clients to quit smoking if you think their illness is related to smoking?	☐	☐	☐	☐	☐
E6.	assess patients'/client's readiness to quit smoking?	☐	☐	☐	☐	☐
E7.	assess reasons for quitting/staying quit smoking?	☐	☐	☐	☐	☐
E8.	assist those who are not interested in quitting smoking to think about quitting?	☐	☐	☐	☐	☐
E9.	assist those who are interested in quitting smoking to develop a plan to quit?	☐	☐	☐	☐	☐
E10.	assist in setting quit dates?	☐	☐	☐	☐	☐
E11.	arrange referrals for appropriate smoking cessation services?	☐	☐	☐	☐	☐

Time Point	T0	T1	T2	T3	T4

ID Number	

E12.	provide counselling for patients/clients who want to quit smoking?	☐	☐	☐	☐	☐
E13.	provide educational materials related to smoking cessation?	☐	☐	☐	☐	☐
E14.	document tobacco-relevant discussion and plans in medical record?	☐	☐	☐	☐	☐
E15.	use Fragerstrom test to assess patient's/client's level of addiction?	☐	☐	☐	☐	☐
E16.	use smokerlyzer to determine patient's/client's Carbon Monoxide level?	☐	☐	☐	☐	☐
E17.	prescribe or recommend the purchase of nicotine replacement therapy products for patients/clients attempting to quit?	☐	☐	☐	☐	☐
E18.	provide treatment maintenance and follow-up services to those who have quit smoking?	☐	☐	☐	☐	☐
E19.	arrange a follow up visit or phone call to discuss quitting smoking?	☐	☐	☐	☐	☐

Time Point	To	T1	T2	T3	T4

ID Number	

SECTION F: BARRIERS TO THE PROVISION OF SMOKING CESSATION INTERVENTION

There are various barriers that might limit the capacity to offer smoking cessation intervention for patients. Please rate the importance of each of the following items that limit you from helping patients to quit smoking.

Instruction: Please mark (X) one box per statement

No.	Item	Not a barrier (1)	Some-what a barrier (2)	Mode-rate barrier (3)	Extreme Barrier (4)
F1.	Patients/clients are not interested in quitting smoking.	☐	☐	☐	☐
F2.	Patients/clients are not ready to change.	☐	☐	☐	☐
F3.	Patients/clients do not comply with the given pharmacological therapy.	☐	☐	☐	☐
F4.	Patients/clients do not comply with the given behavioral therapy.	☐	☐	☐	☐
F5.	Lack of impact of pharmacological therapy on patients/clients.	☐	☐	☐	☐
F6.	Lack of impact of behavioral therapy on patients/clients.	☐	☐	☐	☐
F7.	Lack of knowledge of smoking cessation.	☐	☐	☐	☐
F8.	Lack of time.	☐	☐	☐	☐
F9.	Other health problems require priority treatment.	☐	☐	☐	☐
F10.	Lack of reimbursement to healthcare providers.	☐	☐	☐	☐
F11.	Lack of community resources to refer patients/clients.	☐	☐	☐	☐
F12.	Inadequate smoking cessation pharmaceutical drugs.	☐	☐	☐	☐
F13.	Lack of patient/client education materials.	☐	☐	☐	☐
F14.	Lack of smoking cessation training.	☐	☐	☐	☐
F15.	Complexity of smoking cessation guidelines.	☐	☐	☐	☐

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1 & 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4 - 8
Objectives	3	State specific objectives, including any pre-specified hypotheses	8
Methods			
Study design	4	Present key elements of study design early in the paper	10
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	10 & 11
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	11
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10 & 11
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	10 & 11
Bias	9	Describe any efforts to address potential sources of bias	11
Study size	10	Explain how the study size was arrived at	10
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	12
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	12
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	

		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	12
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	12
		(b) Indicate number of participants with missing data for each variable of interest	12
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	14 - 17
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	17 & 18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	21
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	21
Generalisability	21	Discuss the generalisability (external validity) of the study results	21
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	22

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

EMPOWERING HEALTHCARE PROVIDERS THROUGH SMOKING CESSATION TRAINING IN MALAYSIA: A PRE- AND POST-INTERVENTION EVALUATION ON THE IMPROVEMENT OF KNOWLEDGE, ATTITUDE & SELF-EFFICACY.

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-030670.R2
Article Type:	Original research
Date Submitted by the Author:	15-Aug-2019
Complete List of Authors:	Hasan, Siti Idayu; University of Malaya, Social & Preventive Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Mohd Hairi, Farizah; University of Malaya, Social & Preventive Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Ahmad Tajuddin, Amani @ Natasha; University of Malaya, Primary Care Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS Amer Nordin, Amer Siddiq; University of Malaya, Psychological Medicine; University of Malaya, Nicotine Addiction Research & Collaboration, UMCAS
Primary Subject Heading:	Medical education and training
Secondary Subject Heading:	Addiction, Health policy, Public health, Smoking and tobacco
Keywords:	program evaluation, smoking cessation, helathcare providers, knowledge, attitude, self-efficacy

TITLE: EMPOWERING HEALTHCARE PROVIDERS THROUGH SMOKING CESSATION TRAINING IN MALAYSIA: A PRE- AND POST-INTERVENTION EVALUATION ON THE IMPROVEMENT OF KNOWLEDGE, ATTITUDE & SELF-EFFICACY.

SITI IDAYU HASAN [1,4], FARIZAH MOHD HAIRI [1,4] AMANI @ NATASHA AHMAD TAJUDDIN [2,4] & AMER SIDDIQ AMER NORDIN [3,4],

[1]Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[2]Department of Primary Care Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[3]Department of Psychological Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, Kuala Lumpur, Malaysia.

[4]Nicotine Addiction Research Group UMCAS, University of Malaya, Jalan Pantai Baharu, Kuala Lumpur, Malaysia.

Authors:

Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Siti Idayu Hasan, PhD student, University of Malaya.

Department of Social & Preventive Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Farizah Mohd Hairi, Associate Professor/Public Health Physician & Consultant, University of Malaya.

Department of Primary Care Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Amani @ Natasha Ahmad Tajuddin, Family Medicine Specialist, University of Malaya.

Department of Psychological Medicine, Faculty of Medicine, University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.
Amer Siddiq Amer Nordin, Associate Professor/Consultant Psychiatrist and Addiction Medicine Specialist.

Correspondence to: Farizah Mohd Hairi at farizah@um.edu.my

Word count: 5606

References count: 54

Abstract

Objectives: Healthcare providers are ideally positioned to advise their patients to quit smoking by providing effective smoking cessation intervention. Thus, we evaluate the effectiveness of a one-day training programme in changing the knowledge, attitude and self-efficacy of healthcare providers in smoking cessation intervention.

Methods: A pre-post study design was conducted in 2017. The eight-hour Smoking Cessation Organising, Planning & Execution (SCOPE) training comprising lectures, practical sessions and role-play sessions to 218 healthcare providers. A validated evaluation tool, Providers' Smoking Cessation Training Evaluation (ProSCiTE), was administered to assess the impact of training on knowledge, attitude, and self-efficacy on smoking cessation intervention.

Results: After SCOPE training, the knowledge score increased significantly from 7.96 ± 2.34 to 10.35 ± 1.57 ($p<0.001$). Attitude and self-efficacy in smoking cessation intervention also increased significantly from 34.32 ± 4.12 to 37.04 ± 3.92 ($p<0.001$) and 40.31 ± 8.61 to 54.67 ± 7.45 ($p<0.001$) respectively. Pre- and post-training scores improved significantly for all professions, and each measure, particularly self-efficacy.

Conclusion: This study demonstrates that SCOPE training could improve healthcare providers' knowledge, attitude and self-efficacy on smoking cessation intervention. Future training is recommended to equip healthcare providers with current knowledge, positive attitude and high self-efficacy to integrate what they have learned into practice successfully.

Keywords: programme evaluation, smoking cessation, healthcare providers, knowledge, attitude, self-efficacy

Strengths and limitations of this study

- This study is novel given that it is the first study to document the changes in multidisciplinary healthcare providers (doctors, pharmacists, nurses and medical assistants) on knowledge, attitude and self-efficacy to deliver smoking cessation intervention following eight-hour SCOPE training comprising lectures, practical sessions, and role-play sessions.
- Since all healthcare providers were invited, there was a risk of selection bias, and there are inherent risks for inaccuracies when relying on self-reported data.
- The sample was drawn from three out of 14 states in Malaysia; thus, caution should be exercised when generalising the findings to the entire population.
- The nature of pre- and post-study lacks a control group for the intervention and long-term follow-up to indicate the causal relationship between the impact of the training on the actual healthcare providers' behaviour and smoking cessation outcome.
- This study does not include implementation data and, therefore, no data is available to suggest that changes of knowledge, attitude and self-efficacy translate into practice.

Introduction

Tobacco use is among the leading preventable causes of death and disease globally. Approximately six million people die from tobacco-related diseases every year, which translates into one in ten deaths among adults worldwide [1]. More than 600,000 people die each year from exposure to second-hand smoke, and it is estimated that by 2030, the annual death toll could rise to eight million [1]. The Surgeon General in "The Health Consequence of Smoking – 50 Years of Progress" 2014 report concluded that smoking could cause cancer, respiratory disease, cardiovascular disease, reproductive disease, dental disease, inflammatory bowel disease, diabetes and autoimmune disease [2]. Cochrane reviews provide concrete evidence that stopping smoking could reduce smoking-related diseases [3]. More importantly, offering help to quit smoking by healthcare providers has been proven to be an effective strategy to combat tobacco-related problems. Increasing the amount of behavioural support by healthcare providers is likely to increase the chance of success by about 10%-25% [4].

Healthcare providers are ideally positioned to advise patients to quit smoking by providing effective brief intervention. Among all the healthcare providers, pharmacists play a significant role in smoking cessation as they are easily accessible by the public [5] and provide counselling without prior appointment and with no additional cost to the patients [6]. They communicate regularly with patients when advising the correct use of Nicotine Replacement Therapy (NRT) products. Family physicians also have a significant opportunity to decrease smoking as they are well-suited to offer effective counselling to their patients. First, they already have some knowledge about their patients and the social environment. Second, there is already a good rapport between family doctors and their patients that will contribute to the therapeutic

relationship. Third, most patients often come to family doctors believing that doctors can help them improve their condition [7].

In order to tackle serious health problems arising from smoking, all healthcare providers are encouraged to be actively involved in smoking cessation services. The U.S. Public Health Service has recommended the use of Clinical Practice Guidelines (CPG) for tobacco cessation. The tobacco cessation clinical practice guideline is a brief intervention known by the acronym of the "5 A's" and has been effective in both research and clinical practice [8 9]. Increasing the implementation of CPG by various healthcare providers is likely to lead to more smokers exposed to evidence-based treatments, more smokers quitting and reduce the prevalence of smoking and smoking-related disease [8]. Despite evidence that shows the effectiveness of brief interventions even in a busy clinical environment, dissemination is very slow and l many healthcare providers still do not follow the CPG [10], Healthcare providers reported they performed the first two "A"s which are "Ask" and "Advise" [11]. However, limited evidence has been reported on the performance on the three remaining steps, which are "Assess", "Assist" and "Arrange" [12]. According to the National Ambulatory Medical Care Survey, between 2001 and 2004, 32% of patient charts did not include their smoking status, more than 80% of smokers did not receive assistance and only 0.3% and 1.8% received NRT and bupropion treatments, respectively [13]. Only 19.8% of current smokers received any cessation assistance through counselling, medication or both. Even during preventive care visits, only 28.9% received cessation assistance [14].

Like many other countries, Malaysia is facing challenges in tobacco control. Based on the 2011 Malaysian National Health and Morbidity Survey, 67.6% of the current smokers who visited

healthcare services in the past 12 months were asked about their smoking status, and 52.6% was advised to quit smoking by healthcare providers [15]. In 2015, 75.4% of the current smokers who visited healthcare services in the past 12 months was advised to quit smoking by healthcare providers [16]. Unfortunately, no evidence has been documented on healthcare providers performing the three remaining steps.

Translating this guideline into practise remains a challenge because nicotine dependence is a chronic relapsing condition [8] that requires continuous effort to achieve success by preventing relapse. Although in many countries, more than half of the current smokers want to quit smoking, and one-third had made at least three quit attempts, less than half of smokers succeed in quitting smoking before the age of 60 [15-19]. Several barriers to intervention have been discussed including lack of knowledge, negative healthcare providers' attitude, low self-efficacy, lack of training [20], competing priorities and believing that counselling was not an appropriate service [21], barriers of time, manpower and finance, lack of skills, concern for the clinician-patient relationship and perception of insufficient patient motivation [22]. Smoking among healthcare providers is also prevalent in many countries, and those who smoked were less likely to advise patients to stop smoking [23]. Healthcare providers also claimed that they lack knowledge in smoking cessation counselling techniques and confidence in smoking cessation programme [24]. The most significant barrier in providing smoking cessation intervention is due to limited training of healthcare providers [3 25 26].

According to the 4th Edition of Tobacco Atlas, doctors often informed patients about the harmful effects of smoking, but they lack smoking cessation behavioural and pharmacotherapy intervention training to help their patients stop using tobacco products [27]. Therefore, there is a gap between the needs of the patients and the ability of healthcare providers to help them [17].

To address the gap, training including face-to-face and online training have been developed to improve smoking cessation competency and proficiency. These training programmes have shown to be effective in enhancing the counselling knowledge, skills and confidence of healthcare providers and their performance in smoking cessation intervention [28-33]. The meta-analyses by Cochrane Collaboration also showed healthcare providers who received specific training had a higher probability of performing smoking cessation intervention to help their patients to stop smoking compared to their untrained controls counterparts [3 25]. Pharmacists receiving online training followed by a role-play session can counsel for smoking cessation [34]. A study by Cornuz in Switzerland showed that non-pharmacological smoking cessation interventions with active learning methods and practice with standardised patients by doctors produce better abstinence rates, provide better counselling and have a higher number of smokers willing to quit compared with other healthcare providers [25].

On the other hand, nurses are well-positioned to deliver effective smoking cessation intervention with minimal investment in training. A one-hour training of smoking cessation has shown a significant increase in knowledge and attitude compared to prior training [33]. Unfortunately, evidence suggests that a minimal number of healthcare providers have received even minimal training on smoking cessation treatment [35].

Article 14 of the World Health Organisation (WHO) Framework Convention on Tobacco Control (FCTC) states that "each party shall develop and disseminate appropriate, comprehensive and integrated guidelines based on scientific evidence and best practices, taking into account national circumstances and priorities, and shall take effective measures to promote cessation of tobacco use and adequate treatment for tobacco dependence" [36]. One of the critical resources needed to implement Article 14 is sufficient numbers of healthcare providers trained to assess tobacco use and deliver brief advice about smoking cessation [37]. In line with this,

Malaysia has developed a National Strategic Plan for Tobacco Control to achieve a tobacco-free nation by 2045 with the target of less than 5% tobacco use prevalence. Currently, a smoking cessation training programme called SCOPE has been successfully developed and introduced since 2009 by a group of researchers from Nicotine Addiction Research Group of University of Malaya Centre for Addiction Sciences (UMCAS). SCOPE is part of mQuit services recognised as one of the three pathways to become a certified smoking cessation provider in Malaysia.[38]. Since the majority of the primary care providers play an essential role as front liners in promoting smoking cessation and offering support to tobacco users, the SCOPE module has been designed for different disciplines of healthcare providers (e.g., doctors, dentists, pharmacists, nurses, medical assistants) to increase knowledge and best practices in smoking cessation in Malaysia [38]. The engagement of different disciplines of healthcare providers aligns with the evidence suggesting that the intervention delivered by any single type of healthcare provider (e.g., doctors, dentists, nurses, psychologists) or multiple healthcare providers improves the abstinence rate compared with no intervention without healthcare providers (e.g., self-help) [8]. A higher cessation rate will be achieved with more intensive and frequent contacts with healthcare providers [4].

Thus, the purpose of this study was to assess the pre- and post-training results from the eight-hour SCOPE training on smoking cessation. We hypothesised that the training would increase smoking cessation-related knowledge, attitude and self-efficacy for all disciplines of healthcare providers including doctors, pharmacists, medical assistants and nurses.

Methods

Development of SCOPE training

SCOPE is a comprehensive, one-day programme developed from the 'Empowering Dentist into smoking cessation programme' (2009-2013) by the Nicotine Addiction Research Group of the UMCAS team who recognised the need to offer intensive smoking cessation counselling[39]. The module was developed primarily by Amer Siddiq Amer Nordin (ASAN), a psychiatrist and addiction medicine specialist and Farizah Mohd Hairi (FMH), a public health specialist and tobacco control expert. The module was reviewed and vetted by local and international experts to strengthen the content. The primary aim of the SCOPE training was to prepare healthcare providers to be competent and confident to assist smokers in quitting through evidence-based smoking cessation treatment.

The content of the training includes knowledge on the basic science of tobacco use and clinical science of tobacco treatment. This training outlined three components, including interactive lectures (questions and answer sessions, video presentation and quiz), practical session and role-play demonstration. The lectures consist of the following topics: introduction, tobacco control and policy, national strategic plan, harm to health, smoking as an addiction, pharmacological therapy and behavioural therapy in smoking cessation. The practical session consists of assessment on how to use tobacco dependence instrument, Fagerstrom Test Nicotine Dependence (FTND), and how to monitor carbon monoxide level using smokerlyzer as well as how to run the quit smoking clinic. A 35-minute practical session consisted of facilitators demonstrating how to use piCO^{TM} Bedfont smokerlyzer followed by a small group demonstration guided by facilitators. All the participants have the opportunity to test the device and practice using FTND. The participants are also given guidelines to set up a quit standard quit smoking clinic approved by MoH. The goal of the role-play session was to provide participants with guided, hands-on practice in addressing tobacco treatment for patients. A 45 minutes session of role-playing representing various cases of tobacco treatment with three

different scenarios (for example, patients at different stages of change – pre-contemplation, contemplation, preparation, action and maintenance). Role-play was based on the 5 A's counselling approach where the participants acted as smoking cessation providers, and the facilitator acted as a patient. Afterwards, the facilitators led a brief discussion on challenges in healthcare providers-delivered tobacco treatment.

Education materials provided to the healthcare providers included digital and print copies of the SCOPE handbook. A copy of screening tool for nicotine dependence, Fagerstrom test and smokerlyzer chart for monitoring carbon monoxide levels in the lung was given to each healthcare provider to facilitate the process of smoking cessation intervention. Healthcare providers attended only one training session led by ASAN or FMH without booster sessions, reminder or other follow-up training sessions.

Study design and participants

A pre-post study design was conducted among healthcare providers who attended the 8-hour SCOPE training over a period of three months, starting from December 2016 to February 2017. The study population comprised a group of healthcare providers with different grades and specialities working at government health clinics in Malaysia. A total of 218 healthcare providers who completed the training and returned the pre- and post-survey were included in this study. The healthcare providers consist of medical doctors (n=98), medical assistants (n=44), pharmacists (n=42) and nurses (n=34).

Evaluation tool

A validated evaluation tool called ProSCiTE (supplementary file) was administered to the participants before and after the training programme [40 41]. ProSCiTE was initially developed and validated by Siti Idayu Hasan (SIH). It consists of 67 items which are divided into five main constructs including knowledge (12 items), attitude (8 items), self-efficacy (13 items), behaviour (19 items) and barriers (15 items) on smoking cessation intervention. However, only demographic background and three constructs (knowledge, attitude and self-efficacy) were measured in this study to determine the immediate impact of SCOPE training. The demographic characteristics assessed were age, gender, education level, working experience, smoking status and type of profession. Knowledge of smoking cessation withdrawal symptoms was assessed with 12 items with Yes (1) or No (0) response which yielded a total maximum score of 12. Attitude was assessed using eight items rated by a five-point Likert scale from strongly disagree (1), disagree (2), neither disagree/agree (3), agree (4) and strongly agree (5) which yielded a total maximum score of 40. Self-efficacy was assessed using 13 items by a five-point Likert scale from certainly not (1), probably not (2), neutral (3), probably (4) and certainly (5), which yielded a total maximum score of 65. Construct validity based on eigenvalues and factor loadings to confirm the factor structure (knowledge, attitude, self-efficacy) was acceptable. The internal consistency and reliability of factor constructs were excellent for knowledge ($\alpha = 0.93$) and self-efficacy ($\alpha = 0.93$) and good for attitude (0.88) [41].

Study procedures

A representative sample from each health clinic was selected randomly from the list of healthcare providers provided by the State Health Department. The eligible healthcare providers, including local healthcare providers working in the government sector and never attended SCOPE training were invited and scheduled for this study. Participation in this study

was voluntary. Participants were briefed regarding the purpose of the study before the training was conducted. The providers were awarded Continuing Professional Development (CPD) credit after completing the training. The pre-test survey was administered immediately before the training, and a post-test survey was administered immediately after the training.

Ethical approval

This study was approved by the Medical Ethics Committee of the University of Malaya (Reference number: UM.TNC2/RC/H&E/UMREC-118) and the Ministry of Health Malaysia (Reference number: NMRR-16-2144-32353 (IIR)). Healthcare providers were informed, and they gave consent before the pre-training survey prior to the SCOPE training.

Data analysis

Data were analysed with IBM SPSS version 22. Descriptive analyses were performed on the demographic items. Paired samples t-tests were used to compare pre- and post-test results. The level of statistical significance was set to $p < 0.05$ for all analyses.

Patient and public involvement

This is a pre- and post-study from different healthcare disciplines and providers including doctors, pharmacists, medical assistants and nurses. No patients were involved in this study. All eligible healthcare providers were briefed on the purpose of the study, its benefit and potential harm. The study findings will be disseminated through academic publications and presentations, newspapers, printed and digital media, media interview and presented to the Ministry of Health Malaysia.

Results

Healthcare provider characteristics

Nearly half (44.9%) of the healthcare providers were doctors. Their mean age was 32.59 (6.69), ranging from 23 to 55 years. Their mean working experience was 7.26 (5.80), ranging from 1 to 34 years. Almost two-quarters (64.7%) were female, and almost half (45.9%) of them obtained a bachelor's degree. The majority reported that they are non-smokers (88.8%), and there are no current smokers in all professions except for medical assistants (See Table 1).

Changes in knowledge, attitudes and self-efficacy on smoking cessation intervention due to training

The results of the paired samples t-test show that mean knowledge differs before training (M = 7.96, SD = 2.34) and after training (M = 10.35, SD = 1.57) at the.001 level of significance (t = 15.32, df = 206, n = 207, $p < 0.001$, *95% CI for mean difference* 2.08 to 2.70). On average, the knowledge score was about 2.39 points higher after training. Each item in knowledge increased significantly after the training except for restlessness, diarrhoea and the urge to smoke. It was also found that healthcare providers' knowledge on mouth ulcers as a withdrawal symptom for nicotine addiction gains the greatest change in score followed by constipation. Before the training, most healthcare providers did not know that constipation was one of the withdrawal symptoms for nicotine addiction (See Table 2).

The results of the paired sample t-test also show that mean attitude differs before training (M = 34.32, SD = 4.12) and after training (M = 37.04, SD = 3.92) at the .001 level of significance (t = 8.24, df = 206, n = 207, $p < 0.001$, *95% CI for mean difference* 2.07 to 3.37). On average, the attitude score was about 2.72 points higher after training. Each item in attitude increased significantly after the training. The attitude of healthcare providers who wanted to advise patients to stop using tobacco products gained the greatest change. Also, the likelihood of patients quitting smoking increases if the healthcare provider advises patients to quit. Before the training, it showed that attitude towards asking parents/guardian on the effect of second-hand smoke was the lowest. However, after the training, the attitude towards second-hand smoke increased (See Table 3).

A significant increase in healthcare providers' self-efficacy was also found when pre- and post-training was compared. Among the three measures, self-efficacy scores provide greatest changes after the training. Results of the paired sample t-test also show that mean self-efficacy differs before training (M = 40.31, SD = 8.61) and after training (M = 54.67, SD = 7.45) at the.001 level of significance (t = 23.22, df = 206, n = 207, $p < 0.001$, *95% CI for mean difference* 13.14 to 15.58). On average, healthcare providers' post-training score was 14.36 points higher than their pre-training score. Each item in self-efficacy increased significantly after the training. Practical and assessment module on how to detect carbon monoxide in their breath using a smokerlyzer depicted the greatest change in score followed by pharmacological therapy to assist smokers in quitting and behavioural therapy to prescribe medication to treat smokers. Healthcare providers have the lowest confidence in using the smokerlyzer before the training. However, it showed greater improvement from the practical session in the training (See Table 4).

Changes in knowledge, attitudes and self-efficacy on smoking cessation intervention due to training for each profession

The paired sample t-test in Figure 1 revealed significant increases in all four professions and measures. Mean knowledge for nurses differs before training (M = 7.36, SD = 2.66) and after training (M = 10.12, SD = 2.32) at the .001 level of significance (t = 5.26, df = 32, n = 33, $p <$ 0.001, *95% CI for mean difference* 1.69 to 3.82). Mean knowledge for medical assistant differs before training (M = 7.00, SD = 2.47) and after training (M = 9.72, SD = 1.89) at the .001 level of significance (t = 7.26, df = 38, n = 39, $p < 0.001$, *95% CI for mean difference* 1.96 to 3.48). Mean knowledge for doctors differs before training (M = 8.38, SD = 2.19) and after training (M = 10.66, SD = 1.22) at the .001 level of significance (t = 10.70 df = 92, n = 93, $p < 0.001$,

95% CI for mean difference 1.86 to 2.70). Mean knowledge for pharmacists differs before training (M = 8.40, SD = 1.93) and after training (M = 10.45, SD = 1.11) at the .001 level of significance (t = 7.24, df = 41, n = 42, p < 0.001, *95% CI for mean difference* 1.48 to 2.62).

Mean attitude for nurses differs before training (M = 34.76, SD = 3.39) and after training (M = 37.33, SD = 3.53) at the .001 level of significance (t = 3.70, df = 32, n = 33, p < 0.001, *95% CI for mean difference* 1.16 to 4.00). Mean attitude for medical assistant differs before training (M = 32.72, SD = 3.80) and after training (M = 35.59, SD = 3.80) at the .001 level of significance (t = 4.15, df = 38, n = 39, p < 0.001, *95% CI for mean difference* 1.47 to 4.27). Mean attitude for doctors differs before training (M = 34.63, SD = 4.47) and after training (M = 37.39, SD = 4.22) at the .001 level of significance (t = 4.68 df = 92, n = 93, p < 0.001, *95% CI for mean difference* 1.58 to 3.92). Mean attitude for pharmacists differs before training (M = 34.78, SD = 3.56) and after training (M = 37.40, SD = 3.44) at the .001 level of significance (t = 5.03, df = 41, n = 42, p < 0.001, *95% CI for mean difference* 1.59 to 3.67).

Mean self-efficacy for nurses differs before training (M = 34.48, SD = 10.41) and after training (M = 52.73, SD = 9.17) at the .001 level of significance (t = 10.95, df = 32, n = 33, p < 0.001, *95% CI for mean difference* 12.41 to 18.08). Mean self-efficacy for medical assistant differs before training (M = 40.23, SD = 7.44) and after training (M = 51.92, SD = 6.31) at the .001 level of significance (t = 10.18, df = 38, n = 39, p < 0.001, *95% CI for mean difference* 9.37 to 14.02). Mean self-efficacy for doctors differs before training (M = 41.35, SD = 8.54) and after training (M = 56.36, SD = 6.91) at the .001 level of significance (t = 15.16, df = 92, n = 93, p < 0.001, *95% CI for mean difference* 13.04 to 16.80). Mean self-efficacy for pharmacists differs

before training (M = 40.31, SD = 8.00) and after training (M = 55.02, SD = 7.21) at the .001 level of significance (t = 10.19, df = 41, n = 42, $p < 0.001$, *95% CI for mean difference* 11.80 to 17.63).

Nurses obtain the most significant changes for knowledge score with an increase of 2.76 points, followed by medical assistants (2.72), doctors (2.28) and pharmacists (2.05). On attitude, medical assistants gained the most significant changes with an increase of 2.87 points, followed by doctors (2.75), pharmacist (2.62) and nurses (2.58). Similar results were also found for self-efficacy, where nurses gained the most significant changes with an increase of 15.24 points, followed by doctors (15.01), pharmacists (14.71) and medical assistants (11.69).

Post-training results showed that doctors and pharmacists obtained the highest score for knowledge, pharmacists for attitude and doctors for self-efficacy. The lowest scored were recorded for nurses and medical assistants seen in both pre-training and post-training for all measures.

Discussion

This study evaluated a tailored-smoking cessation training for healthcare providers based on lectures, practical sessions and role-play. Our study showed significant improvement in healthcare providers' knowledge, attitude and self-efficacy in smoking cessation intervention. This was also the first evaluation of such training intervention among healthcare providers using the 5 A's approach in the Malaysian context. These findings indicate that knowledge,

attitude and self-efficacy did not differ much among the different disciplines of healthcare providers, and improved significantly as a result of their participation in SCOPE training. Prior to the training, pharmacists had higher scores on both knowledge and attitude while doctors had higher scores on self-efficacy related to smoking cessation. After the training, a higher knowledge score was obtained by both pharmacists and doctors, attitude score by pharmacists and self-efficacy score by doctors. Although nurses and medical assistants had slightly lower score s for each measure, they gained the most significant change after the training. The gaps in the baseline score among medical assistants and nurses indicated that these groups had minimal exposure to smoking cessation prior to the training. This finding is also in line with a study in Arkansas, United States, which found that nurses' score on knowledge and self-efficacy was lower than doctors [10]. The results from this study suggest that training in smoking cessation is effective in the short-term and can provide better knowledge, positive attitude and improve their confidence level in assisting smokers to quit smoking using the 5A's smoking cessation intervention particularly among the nurses and medical assistants.

This present study recorded significant improvements in knowledge, attitude and self-efficacy after the SCOPE training. It is in agreement with previous studies in which healthcare providers have reported improvements in knowledge, attitude and self-efficacy in smoking cessation intervention after training [3 10 33 42-48]. This study suggests that the smoking status among SCOPE participants is essential, whereby there are no current smokers among the doctors, pharmacists and the nurses. When compared with a study conducted in Bosnia Herzegovina, where there is no established smoking cessation programme, more than half of the nurses who worked at the Family Medicine teaching centre smoke, and about 40% of their doctors smoke. The smokers among these professionals would most likely not advocate their patients for smoking cessation despite agreeing that smoking is harmful to health and would not advise young adults to start

smoking [49]. Previous studies also reported that non-smoking healthcare providers had more positive attitudes towards the hospital's smoke-free policy compared to smokers [50 51]. With the SCOPE programme, in the attitude component, the training improved their attitude towards advocating and advising patients to stop smoking. This showed the importance of having a structured and well-organised smoking cessation programme to better assist healthcare providers in Malaysia in helping patients to quit smoking. When participants were asked to give their responses regarding their attitude towards providing smoking cessation intervention to their patients, it showed significant improvement post-training, particularly for second-hand smoke. This evidence supports that healthcare providers are aware of the importance of identifying and advising patients on the harmful effects of second-hand smoke. The more positive attitude, particularly among medical assistants, which was observed after the training also suggests that our healthcare providers are aware of their role and are ready to implement smoking cessation in practice.

A systematic review of the belief and attitude of physicians in the United Kingdom revealed that the three most prevalent negative beliefs concerned the time needed to discuss smoking, a perceived lack of effectiveness of such discussions, and a perceived lack of skill in conducting such discussions [52]. As skill is concerned, training in smoking cessation can increase the level of confidence among quit smoking providers, and with experience, can reduce the consultation time and increase the effectiveness of consultation. Although most healthcare providers already have positive attitude scores towards smoking cessation intervention at pre-training, the mean total attitude scores increased significantly at post-training. This reflected that the training could help healthcare providers understand their role in providing smoking cessation intervention. Thus, it is vital to equip them with skills to competently assist smokers in quitting [53].

The findings also suggested that there is a potential benefit by training all healthcare providers, particularly in self-efficacy. However, when self-efficacy was explored by each item, it was apparent that they lacked confidence concerning the component of the 5A's at pre-training with "Ask" and "Advise" being higher and "Assess", "Assist" and "Arrange" somewhat lower. The confidence level was increased for all of these 5A's after the training primarily "Assist "and "Assess". It showed that SCOPE training can increase the knowledge, attitude and self-efficacy of healthcare providers. Our result is in accordance with previous studies suggesting that simple activities like "Ask" and "Advise" are supported by existing systems that prompt good performance whereas "Assess", and "Assist" require more complex skill sets. In addition, a higher degree of coordinated clinic system is needed to "Arrange" follow-up cases for clinicians. There is a need for an integrated system-based approach involving multiple top-down stakeholders and environmental factors with the goal of connecting administrators, clinicians and staff to develop effective strategies to provide smokers with smoking cessation intervention [47]. Apart from that, updated clinical practise guidelines for treating tobacco use and dependence as emphasised the increasing evidence that the healthcare system significantly affects the likelihood that smokers receive effective smoking cessation intervention [9]. We suggest that video demonstration, role-play [54], and practical sessions play a vital role to help in increasing the confidence of healthcare providers in providing more complex 5 A's components. Role-play sessions could prepare them to provide effective intervention with more confidence to assess and assist patients from ambivalence to change, and then offering them with appropriate behavioural and pharmacotherapy intervention.

With respect to self-efficacy, SCOPE training increased healthcare providers' confidence to use a smokerlyzer followed by behavioural therapy and pharmacotherapy thus suggesting that more emphasis should be made for this training module as the pre-training score is lowest. This supported the evidence that training on smoking cessation should be widely and continuously provided to all healthcare providers to prepare them to be competent in assisting smokers using all the 5 A's smoking cessation intervention components.

Nevertheless, our study has limitations. Firstly, it relies on the self-reported response from our healthcare providers. Data must be interpreted carefully as there is the possibility of healthcare providers tending to over-report the frequency of smoking cessation intervention [45]. The healthcare providers involved in this study were only from three out of 14 states in Malaysia. Thus, generalising the findings to the overall population of healthcare providers should be done with caution. The nature of pre- and post-study lacks a control group for the intervention, and without long-term follow-up, it does not indicate a causal relationship between the impact of the training on the healthcare providers' behaviour and smoking cessation outcome. This study also does not include implementation data and, therefore, no data is available to suggest that changes of knowledge, attitude and self-efficacy translate into practice. Future study should consider having a control group, preferably in a larger sample to improve the significance of this study and patients' smoking cessation outcome. This study could explore their attitude towards smoking cessation advice, where in-depth questions or a qualitative approach would help answer this section on attitude. Even though knowledge has been greatly improved in this study, the duration of the information retained is not measured as no follow-up study was done. Evidence showed that knowledge can be maintained beyond a three-month follow-up period except for brief advice component, which decreased at three months [43]. Thus, continuing professional course for smoking cessation should be done frequently.

Conclusion

In conclusion, this study demonstrates that SCOPE training improved healthcare providers' knowledge, attitude and self-efficacy on smoking cessation intervention. Continuous future training is recommended to better equip healthcare providers with the latest knowledge, right attitude and high self-efficacy to integrate what they have learned into their practice successfully.

Conflict of interest

The authors have no competing interest to declare.

Funding

This study was funded by the University of Malaya Grand Challenge Research Grant, Health & Wellbeing Research Cluster (GC004A-15HTM).

Acknowledgements

The authors would like to express our sincere gratitude to the speakers from NARCC group and healthcare providers for their generous contribution to this project.

Author statement

SIH was responsible for the study design, data collection, analysis and drafted the manuscript. FMH was responsible for developing training module, supervising and reviewing manuscript. Amani @ Natasha was involved in the reviewing manuscript. ASAN was responsible for developing the training module, supervising and reviewing the manuscript, as well as investigating this study. All authors critically reviewed the manuscript and approved the final version.

Data sharing statement

All the data for the study is stored at the Nicotine Addiction Research Group, UMCAS in University of Malaya, Kuala Lumpur, Malaysia. Only team members have access to the raw data for the sole purpose of dissemination of the results. Data analysis is ongoing.

References

1. WHO. WHO global report on trends in prevalence of tobacco smoking 2015. 2015
2. Alberg AJ, Shopland DR, Cummings KM. The 2014 Surgeon General's Report: Commemorating the 50th Anniversary of the 1964 Report of the Advisory Committee to the US Surgeon General and Updating the Evidence on the Health Consequences of Cigarette Smoking. *American Journal of Epidemiology* 2014;179(4):403-12. doi: 10.1093/aje/kwt335
3. Carson KV VM, Crone MR, Brinn MP, Esterman AJ, Assendelft WJJ, Smith BJ. . Training health professionals in smoking cessation. . *Cochrane Database of Systematic Reviews* 2012; Art. No.: CD000214(5) doi: 10.1002/14651858.CD000214.pub2
4. Stead L, Diana B, Nataly P, et al. Physician advice for smoking cessation. *Cochrane Database of Systematic Reviews* 2013;5 doi: 10.1002/14651858.CD000165.pub4.
5. Hudmon KS, Prokhorov AV, Corelli RL. Tobacco cessation counseling: Pharmacists opinions and practices. *Patient Education and Counseling* 2006;61(1):152-60. doi: 10.1016/j.pec.2005.03.009
6. Aquilino ML, Farris KB, Zillich AJ, et al. Smoking-Cessation Services in Iowa Community Pharmacies. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy* 2003;23(5):666-73. doi: 10.1592/phco.23.5.666.32192
7. Poon VHK. Model for counseling people in relationships. *Canadian Family Physician* 2007;53(2):237-38.
8. Fiore MC, Jaén CR, Baker TB. Treating Tobacco Use and Dependence:2008 Update.Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service 2008.
9. Siu AL, for the USPSTF. Behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women: U.s. preventive services task force recommendation statement. *Annals of Internal Medicine* 2015;163(8):622-34. doi: 10.7326/M15-2023

10. Sheffer CE, Barone CP, Anders ME. Training health care providers in the treatment of tobacco use and dependence: pre- and post-training results. *Journal of Evaluation in Clinical Practice* 2009;15(4):607-13. doi: 10.1111/j.1365-2753.2008.01058.x
11. Quinn VP, Hollis JF, Smith KS, et al. Effectiveness of the 5-As Tobacco Cessation Treatments in Nine HMOs. *Journal of General Internal Medicine* 2009;24(2):149-54. doi: 10.1007/s11606-008-0865-9
12. Rigotti NA. Training Future Physicians to Deliver Tobacco Cessation Treatment. *Journal of General Internal Medicine* 2016;31(2):144-46. doi: 10.1007/s11606-015-3560-7
13. Ferketich AK, Khan Y, Wewers ME. Are physicians asking about tobacco use and assisting with cessation? Results from the 2001-2004 national ambulatory medical care survey (NAMCS). *Prev Med* 2006;43 doi: 10.1016/j.ypmed.2006.07.009
14. Jamal A, R DS, Babb SD, et al. Tobacco Use Screening and Cessation Assistance During Physician Office Visits Among Persons Aged 11–21 Years — National Ambulatory Medical Care Survey, United States, 2004–2010. *MMWR Morb Mortal Wkly Rep 2014* 2014;63(2):71-79.
15. IPH. Report of the Global Adult Tobacco Survey (GATS) Malaysia, 2011, Ministry of Health Malaysia 2011
16. IPH. National Health and Morbidity Survey 2015 – Report on Smoking Status Among Malaysian Adults, Ministry of Health Malaysia. 2015
17. Wipfli H. The Tobacco Atlas, Fourth Edition. *American Journal of Epidemiology* 2012;176(12):1193-93. doi: 10.1093/aje/kws389
18. CDC. Quitting smoking among adults — United States, 2001–2010. Morbidity and Mortality Weekly Report. 2011;60:1513–19.
19. Cosci F. Nicotine dependence and psychological distress: outcomes and clinical implications in smoking cessation. *Psychology Research and Behavior Management* 2011:119. doi: 10.2147/prbm.s14243
20. Saito A, Nishina M, Murai K, et al. Health professional's perceptions of and potential barriers to smoking cessation care: a survey study at a dental school hospital in Japan. *BMC Research Notes* 2010;3(1):329.
21. Tong EK, Strouse R, Hall J, et al. National survey of U.S. health professionals' smoking prevalence, cessation practices, and beliefs. *Nicotine & Tobacco Research* 2010;12(7):724-33. doi: 10.1093/ntr/ntq071
22. Omole O, Ngobale K, Ayo-Yusuf O. Missed opportunities for tobacco use screening and brief cessation advice in South African primary health care: a cross-sectional study. *BMC Family Practice* 2010;11(1):94.
23. Al Hosani S, Al Ali M, Al-Marashda K, et al. Smoking Prevalence, Attitudes and Behaviors Primary Healthcare Providers and its Impact on Their Smoking Cessation Counseling Practices2014.
24. Berman BA, Yancey AK, Bastani R, et al. African-American physicians and smoking cessation counseling. *Journal of the National Medical Association* 1997;89(8):534-42.
25. Cornuz J, Humair J-P, Seematter L, et al. Efficacy of Resident Training in Smoking CessationA Randomized, Controlled Trial of a Program Based on Application of Behavioral Theory and Practice with Standardized Patients. *Annals of Internal Medicine* 2002;136(6):429-37.
26. Taha NA, Guat Tee O. Tobacco cessation through community pharmacies: Knowledge, attitudes, practices and perceived barriers among pharmacists in Penang. *Health Education Journal* 2015;74(6):681-90. doi: 10.1177/0017896914558643
27. Rojewski AM, Bailey SR, Bernstein SL, et al. Considering Systemic Barriers to Treating Tobacco Use in Clinical Settings in the United States. *Nicotine & Tobacco Research* 2018:nty123-nty23. doi: 10.1093/ntr/nty123
28. Brose LS, McEwen A, Michie S, et al. Treatment manuals, training and successful provision of stop smoking behavioural support. *Behaviour Research and Therapy* 2015;71:34-39. doi: http://dx.doi.org/10.1016/j.brat.2015.05.013

29. Brose LS, West R, Michie S, et al. Effectiveness of an online knowledge training and assessment program for stop smoking practitioners. *Nicotine & Tobacco Research: Official Journal Of The Society For Research On Nicotine And Tobacco* 2012;14(7):794-800. doi: 10.1093/ntr/ntr286
30. Martin BA, Bruskiewitz RH, Chewning BA. Effect of a tobacco cessation continuing professional education program on pharmacists' confidence, skills, and practice-change behaviors. *Journal of the American Pharmacists Association : JAPhA* 2010;50(1):9-16. doi: 10.1331/JAPhA.2010.09034
31. Hayes RB, Geller A, Churchill L, et al. Teaching tobacco dependence treatment and counseling skills during medical school: Rationale and design of the Medical Students helping patients Quit tobacco (MSQuit) group randomized controlled trial. *Contemporary Clinical Trials* 2014;37(2):284-93. doi: http://dx.doi.org/10.1016/j.cct.2014.01.008
32. Ockene JK, Hayes RB, Churchill LC, et al. Teaching Medical Students to Help Patients Quit Smoking: Outcomes of a 10-School Randomized Controlled Trial. *Journal of General Internal Medicine* 2016;31(2):172-81. doi: 10.1007/s11606-015-3508-y
33. Sheffer CE, Barone C, Anders ME. Training Nurses in the Treatment of Tobacco Use and Dependence: Pre- and Post-Training Results. *Journal of advanced nursing* 2011;67(1):176-83. doi: 10.1111/j.1365-2648.2010.05483.x
34. Simansalam S, Brewster JM, Nik Mohamed MH. Training Malaysian Pharmacy Undergraduates with Knowledge and Skills on Smoking Cessation. *American Journal of Pharmaceutical Education* 2015;79(5):71. doi: 10.5688/ajpe79571
35. Steinberg MB, Alvarez MS, Delnevo CD, et al. Disparity of Physicians' Utilization of Tobacco Treatment Services. *American Journal of Health Behavior* 2006;30(4):375-86. doi: 10.5993/AJHB.30.4.4
36. WHO. Guidelines for implementation of Article 14. 2019
37. Kruse GR, Rigotti NA, Raw M, et al. Tobacco Dependence Treatment Training Programs: An International Survey. *Nicotine & Tobacco Research* 2016;18(5):1012-18. doi: 10.1093/ntr/ntv142
38. Amer Nordin AS, Mohd Hairi F, Ahmad Tajuddin NAN. Malaysia: mQuit strengthens quit smoking strategy. *Tobacco Control* 2016;25:498-501.
39. Amer Siddiq AN, Rahimah AK, Nurul Asyikin Y, et al. Empowering Malaysian dentists to tobacco dependence treatment conduct. *International Dental Journal* 2014;64(4):206-12. doi: 10.1111/idj.12110
40. Hasan SI, Mohd Hairi F, Danaee M, et al. Content validity for the questionnaire on Knowledge, Attitude and Behaviour (KAB) towards smoking cessation intervention among health care providers *Poster presented at Society for Research on Nicotine and Tobacco 23rd Annual Meeting, 8-11 March 2017, Florence, Italy* 2017
41. Hasan SI, Mohd Hairi F, Amer Nordin AS. Construct Validity and Internal Consistency Reliabitlity of Providers Smoking Cessation Evaluation (ProSCiTE) Tool. *12th Asia Pacific Conference on Tobacco or Health (APACT)* 2018
42. Herold R, Schiekirka S, Brown J, et al. Structured Smoking Cessation Training for Medical Students: A Prospective Study. *Nicotine & Tobacco Research* 2016;18(12):2209-15. doi: 10.1093/ntr/ntw191
43. Jones LL, McEwen A. Evaluating an online training module on protecting children from secondhand smoke exposure: impact on knowledge, confidence and self-reported practice of health and social care professionals. *Bmc Public Health* 2015;15:6. doi: 10.1186/s12889-015-2488-5
44. Susi AK, Montarat T, Petcharat P, et al. Impact of Smoking Cessation Training for Community Pharmacists in Indonesia. *Asian Pacific Journal of Cancer Prevention* 2015;16(8):3319-23.
45. Williams JM, Miskimen T, Minsky S, et al. Increasing Tobacco Dependence Treatment Through Continuing Education Training for Behavioral Health Professionals. *Psychiatric Services* 2015;66(1):21-26. doi: doi:10.1176/appi.ps.201300523

46. Applegate BW, Sheffer CE, Crews KM, et al. A survey of tobacco-related knowledge, attitudes and behaviours of primary care providers in Mississippi. *Journal of Evaluation in Clinical Practice* 2008;14(4):537-44. doi: 10.1111/j.1365-2753.2007.00910.x
47. Payne TJ, Gaughf NW, Sutton MJ, et al. The impact of brief tobacco treatment training on practice behaviours, self-efficacy and attitudes among healthcare providers. *International Journal of Clinical Practice* 2014;68(7):882-89. doi: 10.1111/ijcp.12386
48. Zapka JG, Fletcher KE, Ma Y, et al. Physicians and Smoking Cessation: Development of Survey Measures. *Evaluation & the Health Professions* 1997;20(4):407-27. doi: 10.1177/016327879702000403
49. Hodgetts G, Broers T, Godwin M. Smoking behaviour, knowledge and attitudes among Family Medicine physicians and nurses in Bosnia and Herzegovina. *BMC Fam Pract* 2004;5 doi: 10.1186/1471-2296-5-12
50. Chang J-C, Lee Y-Y, Kuo L-N, et al. Knowledge, Attitudes, and Behavior Toward Smoking Cessation among Hospital Pharmacists in Taiwan. *Journal of Experimental & Clinical Medicine* 2012;4(4):249-54. doi: http://dx.doi.org/10.1016/j.jecm.2012.06.003
51. Movsisyan NK, Varduhi P, Arusyak H, et al. Smoking behavior, attitudes, and cessation counseling among healthcare professionals in Armenia. *BMC Public Health* 2012;12(1):1-8. doi: 10.1186/1471-2458-12-1028
52. Vogt F, Hall S, Marteau TM. General practitioners' and family physicians' negative beliefs and attitudes towards discussing smoking cessation with patients: a systematic review. 2005;100(10):1423-31. doi: doi:10.1111/j.1360-0443.2005.01221.x
53. Saba M, Bittoun R, Saini B. A Workshop on Smoking Cessation for Pharmacy Students. *American Journal of Pharmaceutical Education* 2013;77(9):198. doi: 10.5688/ajpe779198
54. Stolz D, Langewitz W, Meyer A, et al. Enhanced Didactic Methods of Smoking Cessation Training for Medical Students—A Randomized Study. *Nicotine & Tobacco Research* 2012;14(2):224-28. doi: 10.1093/ntr/ntr186

Table 1: Healthcare providers' characteristics

Variable		All trainees	Nurses	Medical Assistant	Doctors	Pharmacists
Total trainees		n (%)	n (%)	n (%)	n (%)	n (%)
		218 (100)	34 (15.60)	44 (20.2)	98 (44.9)	42 (19.3)
Age (years old) Mean (SD)		32.59 (6.69)	32.64 (8.03)	29.47 (4.58)	35.21 (7.09)	29.67 (2.91)
Working experience Mean (SD)		7.26 (5.80)	8.56 (7.57)	5.25 (3.90)	8.83 96.29)	4.64 (1.95)
Gender	Male	77 (35.3)	2 (5.9)	40 (90.9)	27 (27.6)	8 (19.0)
	Female	141 (64.7)	32 (94.1)	4 (9.1)	71 (72.4)	34 (81.0)
Ethnicity	Malay	181 (83.0)	33 (97.1)	43 (97.7)	77 (78.6)	28 (66.7)
	Chinese	16 (7.3)	0	0	7 (7.1)	9 (21.4)
	Indian	21 (9.6)	1 (2.9)	1 (2.3)	14 (14.3)	5 (11.9)
Religion	Muslim	179 (82.1)	33 (97.1)	43 (97.7)	76 (77.6)	27 (64.3)
	Buddhist	8 (3.7)	0	0	2 (2.0)	6 (14.3)
	Christian	12 (5.5)	0	0	7 (7.1)	5 (11.9)
	Hindu	19 (8.7)	1 (2.9)	1 (2.3)	13 (13.3)	4 (9.5)
Education	Diploma	73 (33.5)	32 (94.1)	40 (90.9)	1 (1.0)	0
	Bachelor	100 (45.9)	2 (5.9)	4 (9.1)	60 (61.2)	34 (81.0)
	Master	45 (20.6)	0	0	37 (37.8)	8 (19.0)
Smoking* status	Current smokers	6 (2.8)	0	6 (13.6)	0	0
	Former smokers	18 (8.4)	1 (3.1)	12 (27.3)	5 (5.2)	0
	Non-smokers	191 (88.8)	31 (96.9)	26 (59.1)	92 (94.8)	42 (100.0)

n, frequency; %, percentage; *n, 215; diploma, In the Malaysia context, diploma is a qualification obtained during tertiary education and minimum qualification to be employed as nurse or medical assistants in the government sector. It is of a level below the bachelor's degree qualification.

Table 2: Paired sample t-test comparing pre- and post-tests for each item and total knowledge score.

Variables	**Pre-training**	**Post-training**	**95% CI for Mean Difference**	***t***
	Mean (SD)	Mean (SD)		
1. Irritability	0.89 (0.31)	0.99 (0.10)	0.05, 0.15	4.25**
2. Depression	0.73 (0.45)	0.98 (0.15)	0.18, 0.31	7.63**
3. Restlessness	0.95 (0.18)	0.99 (0.10)	0.00, 0.05	1.90
4. Poor concentration	0.92 (0.27)	0.99 (0.12)	0.02, 0.10	3.22*
5. Increased appetite	0.52 (0.50)	0.85 (0.36)	0.26, 0.39	9.83**
6. Weight gain	0.51 (0.50)	0.82 (0.38)	0.24, 0.38	8.52**
7. Light headedness	0.82 (0.39)	0.96 (0.20)	0.09, 0.19	5.20**
8. Night time awakening	0.64 (0.48)	0.90 (0.30)	0.20, 0.33	7.95**
9. Constipation	0.47 (0.50)	0.84 (0.37)	0.30, 0.44	10.2**
10. Diarrhoea	0.22 (0.42)	0.27 (0.45)	0.01, 0.11	1.51
11. Mouth ulcers	0.32 (0.47)	0.80 (0.40)	0.40, 0.55	12.38**
12. Urge to smoke	0.95(0.21)	0.98 (0.15)	0.00, 0.05	1.67
Total knowledge scores	7.96(2.34)	10.35 (1.57)	2.08, 2.70	15.32**

SD, standard deviation; Knowledge items were measured by Yes (1) or No (0) with a total maximum score of 12.
**$p < 0.001$
*$p < 0.05$

Table 3: Paired sample t-test comparing pre- and post-tests for each item and total attitude score.

Items	Pre-training Mean (SD)	Post-training Mean (SD)	95% CI for Mean Difference	*t*
1. A patient's chance of quitting smoking increases if the healthcare provider advises him/her to quit.	3.85 (0.89)	4.52 (0.67)	0.54, 0.79	10.62**
2. Patients want you to advise them to stop using any tobacco products. Healthcare providers like you should…..	3.59 (0.86)	4.34 (0.75)	0.61, 0.88	11.05**
3. Get specific training on smoking cessation counselling techniques.	4.56 (0.60)	4.72 (0.57)	0.06, 0.27	3.20*
4. Set a good example for their patients and public by not using any tobacco products.	4.64 (0.58)	4.75 (0.55)	0.01, 0.20	2.20*
5. Routinely ask patients/clients about tobacco use.	4.38 (0.66)	4.69 (0.59)	0.19, 0.42	5.39**
6.Routinely ask parents/guardians about tobacco use during paediatric visits.	4.29 (0.74)	4.61 (0.70)	0.22, 0.45	5.23**
7. Routinely advise patients/clients who use any tobacco products to quit.	4.49 (0.65)	4.72 (0.59)	0.12, 0.33	4.24**
8. Routinely assist patients using any tobacco products to quit.	4.52 (0.64)	4.71 (0.60)	0.08, 0.29	3.42*
Total Attitude scores	34.32 (4.12)	37.04 (3.92)	2.07, 3.37	8.24**

SD, standard deviation; Attitude items were measured by using a 5-point Likert scale strongly disagree (1), disagree (2), neither disagree/agree (3), agree (4) and strongly agree (5) with a total maximum score of 40.

**$p < 0.001$

*$p < 0.05$

Table 4: Paired sample t-test comparing pre- and post-tests for each item and total self-efficacy score

Items	**Pre-training Mean (SD)**	**Post-training Mean (SD)**	***95% CI for Mean Difference***	***t***
1. I know appropriate questions to ask my patients.	3.78 (0.84)	4.45 (0.60)	0.55, 0.78	11.32**
2. I am able to motivate my patients who are interested to quit smoking.	3.85 (0.81)	4.40 (0.62)	0.43, 0.66	9.47**
3. I am able to assist patients to quit even if the patient thinks that it is difficult to give up.	3.68 (0.81)	4.27 (0.65)	0.47, 0.71	9.73**
4. I have the pharmacological therapy skills to assist patients to quit smoking.	3.35 (1.06)	4.15 (0.87)	0.65, 0.94	10.57**
5. I have the behavioural therapy skills to assist patients to quit smoking.	3.28 (0.96)	4.14 (0.72)	0.71, 1.01	11.57**
6. I can advise patients to consider smoking cessation.	4.14 (4.14)	4.50 (0.56)	0.26, 0.47	6.67**
7. I can provide counselling when time is limited.	3.18 (0.97)	3.89 (0.94)	0.55, 0.85	9.32**
8. I can counsel patients who are not interested in quitting.	3.31 (0.94)	4.05 (0.82)	0.60, 0.89	10.12**
9. I know how to prescribe medication (nicotine replacement therapy/bupropion) to treat tobacco dependency.	2.93 (1.26)	3.81 (1.07)	0.69, 1.05	9.56**
10. I can assess patient's different stages of readiness to quit smoking.	3.50 (0.96)	4.17 (0.75)	0.53, 0.79	9.89**
11. I can assess patient's level of nicotine dependency using the Fagerstrom test.	3.43 (1.21)	4.30 (0.86)	0.70, 1.03	10.35**
12. I can use smokerlyzer to determine patient's carbon monoxide level.	2.63 (1.34)	4.28 (1.07)	1.43, 1.86	15.11**
13. I can assist recent quitters to learn how to cope with situations or triggers that might lead them to relapse to using tobacco.	3.37 (1.02)	4.28 (0.70)	0.76, 1.06	11.86**
Total Self-efficacy scores	40.31 (8.61)	54.67 (7.45)	13.14, 15.58	23.22**

SD: standard deviation; Self-efficacy items were measured by using a five-point Likert scale from certainly not (1), probably not (2), neutral (3), probably (4) and certainly (5), with a total maximum score of 65.

**$p < 0.001$

*$p < 0.05$

Figure 1: Mean healthcare providers' scores on knowledge, attitude and self-efficacy at pre and post-training. Error bars represent standard errors

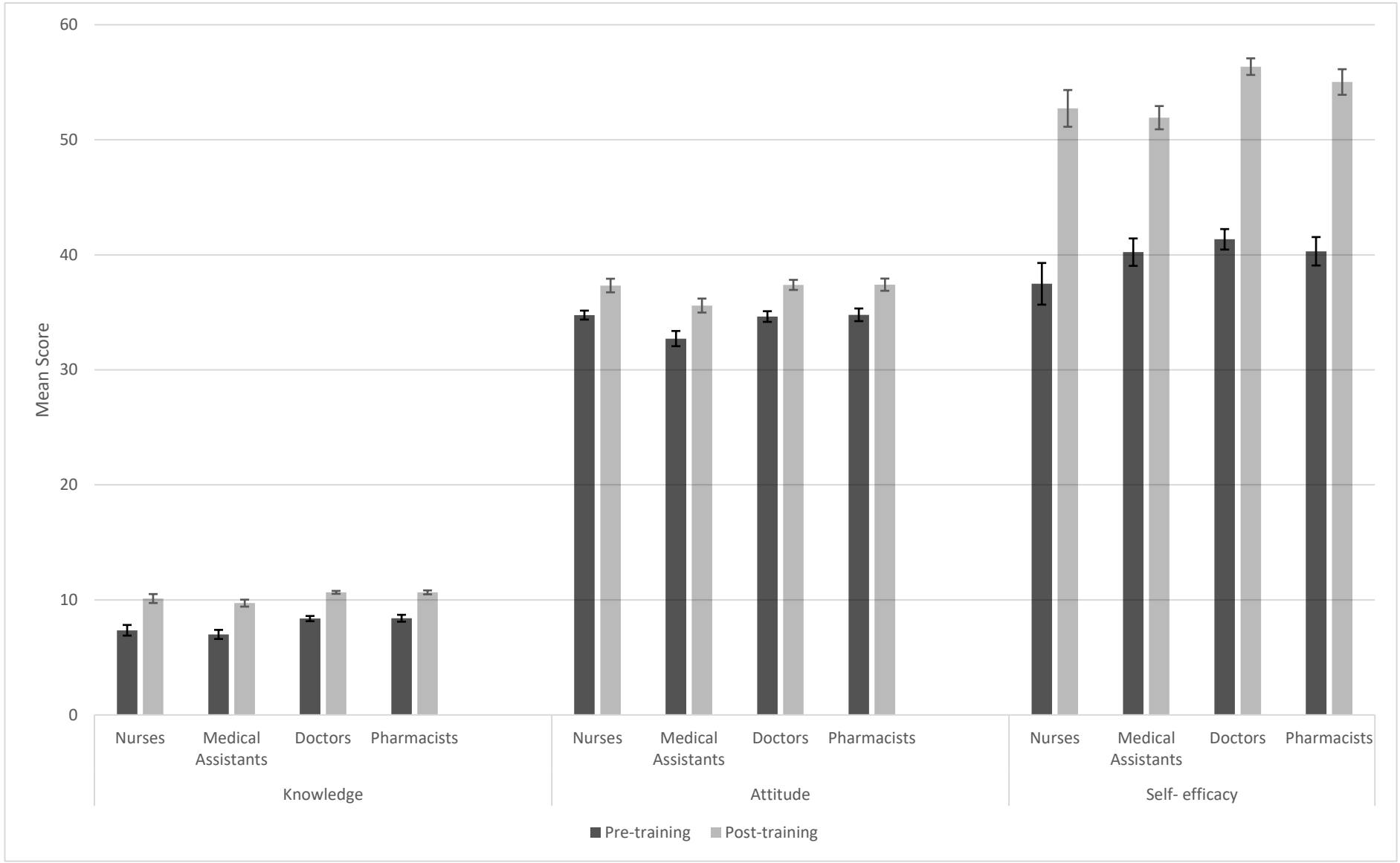


Figure 1: Mean healthcare providers' scores on knowledge, attitude and self-efficacy at pre and post-training. Error bars represent standard errors

SURVEY QUESTION: KNOWLEDGE, ATTITUDE & BEHAVIOR AMONG HEALTHCARE PROVIDERS TOWARDS SMOKING CESSATION INTERVENTION.

Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur Malaysia

THIS BOOKLET CONSISTS OF 7 SECTIONS

Section	Topic	Page
A	Demographic background	1 – 3
B	Knowledge of smoking cessation intervention	4 - 6
C	Attitude towards smoking cessation intervention	7
D	Smoking cessation intervention self-efficacy	10 - 11
E	Smoking cessation intervention behavior	8 - 10
F	Barriers to the provision of smoking cessation intervention	11 - 12

Instructions to respondents:

1) Please answer all the questions in this booklet.
2) Please consult us if you need further clarification.

All information provided by you is confidential. Identification number will not be associated with the data. We are only interested in the overall results of the questionnaire. You will not be personally identifiable. Access to the data obtained from the questionnaire is limited only to individuals involved in the data analysis. The data collected will be used in projects related to this topic.

For further information, please contact:
A/P Dr. Farizah binti Mohd Hairi (farizah@um.edu.my)
A/P Dr. Amer Siddiq bin Amer Nordin (amersiddiq@um.edu.my)
Siti Idayu binti Hasan (ayu_umcas@um.edu.my)

Name:

NRIC:

Institution/Organisation:

Phone no:

Time Point	T0	T1	T2	T3	T4

ID Number	

SECTION A: DEMOGRAPHIC BACKGROUND

Instruction: Kindly READ all questions and mark (X) accordingly.

A1. What is your current age? _____ years _____ months

A2. What is your gender? ☐ 1. Male ☐ 2. Female

A3. What is your ethnic group? ☐ 1. Malay ☐ 2. Chinese
☐ 3. Indian ☐ 4. Others
_____ (please specify)

A4. What is your religion? ☐ 1. Islam ☐ 2. Buddhism
☐ 3. Christianity ☐ 4. Hinduism
☐ 5. Others _____ (please specify)

A5. What is your highest qualification? ☐ 1. Diploma ☐ 2. Bachelor
☐ 3. Master ☐ 4. PhD
☐ 5. Others _____ (please specify)

A6. Which university did you graduate from? ☐ 1. Local ☐ 2. International

A7. Where is your practice location? ☐ 1. Urban ☐ 2. Rural

A8. Where is your current workplace? ☐ 1. Public hospital ☐ 2. Public clinic
☐ 3. Private hospital ☐ 4. Private clinic
☐ 5. Others _____ (please specify)

A9. What is your occupation? ☐ 1. Nurse ☐ 2. Medical Assistant
☐ 3. Doctor
Specialisation: _____
☐ 4. Dentist
☐ 5. Pharmacist ☐ 6. Others
_____ (please specify)

Time Point	T0	T1	T2	T3	T4

ID Number	

A10. What is your status on tobacco use (including manufactured cigarettes, hand rolled cigarettes, kretek pipes, curuts, cigars, cigarillos, shisha/hookah, e-cigarette and smokeless tobacco)?

☐ 1. Current smoker
(A person who daily or occasionally smokes any tobacco product)

☐ 2. Former smoker
(A person, who in the past, made use of at least one smoked tobacco product occasionally for a period of three months or more, or daily for a period of one month or more)

☐ 3. Non-smoker
(A person currently does not smoke at all)

A11. How many years have you been in practice? _____ years _____ months

A12. On the average, how long do you spend your time for any of your patients/clients? ☐ minutes

A13. In a typical week of practice, what percentage of your patients/clients are smokers?

☐ 1. 0-25%
☐ 2. 26%-50%
☐ 3. 51%-75%
☐ 4. 76%- 100%
☐ 5. Don't know

A14. Does your current workplace have a quit smoking clinic?

☐ 1. Yes
☐ 2. No
☐ 3. Don't know

Time Point	T0	T1	T2	T3	T4

ID Number	

A15. Have you attended any educational program on smoking cessation? ☐ 1. Yes ☐ 2. No (proceed to A16)

a. When did you went for smoking cessation training?

☐ 1. One month ago

☐ 2. 3 months ago

☐ 3. 6 months ago

☐ 4. More than 6 months ago

b. Place of training

☐ 1. Workplace

☐ 2. Outside Workplace

c. Was/were the previous training(s) adequate for you to provide smoking cessation treatment?

☐ 1. Adequate

☐ 2. Inadequate

☐ 3. Unsure

d. For question c, what is your definition of adequate?

_____

_____

_____

A16. Are you interested in upgrading your smoking cessation counselling skills?

☐ 1. Not at all interested

☐ 2. Slightly interested

☐ 3. Moderately interested

4. Extremely interested ☐

Time Point	T0	T1	T2	T3	T4

ID Number	

SECTION B: KNOWLEDGE

Based on your knowledge, answer the following questions by marking an (X) in the appropriate box.

No.	Item	Yes (1)	No (0)
a.	Irritability	☐	☐
b.	Depression	☐	☐
c.	Restlessness	☐	☐
d.	Poor concentration	☐	☐
e.	Increased appetite	☐	☐
f.	Weight gain	☐	☐
g.	Light headedness	☐	☐
h.	Night time awakening	☐	☐
i.	Constipation	☐	☐
j.	Diarrhea	☐	☐
k.	Mouth ulcers	☐	☐
l.	Urge to smoke	☐	☐

Time Point	To	T1	T2	T3	T4

ID Number	

SECTION C: ATTITUDE TOWARDS SMOKING CESSATION INTERVENTION

Attitude is the tendency, based on trust and experience, to respond to smoking cessation intervention with specific methods and approaches.

Instruction: Please mark (X) one box per statement

No.	Item	Strongly disagree (1)	Disagree (2)	Neither disagree or Agree (3)	Agree (4)	Strongly agree (5)
C1.	A patient's/client's chance of quitting smoking increases if the healthcare provider advises him/her to quit.	☐	☐	☐	☐	☐
C2.	Patients/clients want you to advise them to stop using any tobacco products.	☐	☐	☐	☐	☐
Healthcare providers like you should….						
C3.	get specific training on smoking cessation counselling techniques.	☐	☐	☐	☐	☐
C4.	set a good example for their patients/clients and public by not using any tobacco products.	☐	☐	☐	☐	☐
C5.	routinely ask patients/clients about tobacco use.	☐	☐	☐	☐	☐
C6.	routinely ask parents/guardians about tobacco use during paediatric visits.	☐	☐	☐	☐	☐
C7.	routinely advise patients/clients who use any tobacco products to quit.	☐	☐	☐	☐	☐
C8.	routinely assist patients/clients using any tobacco products to quit.	☐	☐	☐	☐	☐

Time Point	T0	T1	T2	T3	T4

ID Number	

SECTION D: SMOKING CESSATION INTERVENTION SELF-EFFICACY

Self-efficacy is one's belief in one's ability to succeed in specific situations or accomplish a task in smoking cessation intervention.

Instruction: Please mark (X) one box per statement.

No.	Item	Certainly not (1)	Probably not (2)	Neutral or Don't know (3)	Probably (4)	Certainly (5)
D1.	I know appropriate questions to ask my patients/clients.	☐	☐	☐	☐	☐
D2.	I am able to motivate my patients/clients who are interested to quit smoking.	☐	☐	☐	☐	☐
D3.	I am able to assist patients/clients to quit even if the patient thinks that it is difficult to give up.	☐	☐	☐	☐	☐
D4.	I have the pharmacological therapy skills to assist patients/clients to quit smoking.	☐	☐	☐	☐	☐
D5.	I have the behavioral therapy skills to assist patients/clients to quit smoking.	☐	☐	☐	☐	☐
D6.	I can advise patients/clients to consider smoking cessation.	☐	☐	☐	☐	☐
D7.	I can provide counselling when time is limited.	☐	☐	☐	☐	☐
D8.	I can counsel patients/clients who are not interested in quitting.	☐	☐	☐	☐	☐
D9.	I know how to prescribe medication (nicotine replacement therapy/bupropion) to treat tobacco dependency.	☐	☐	☐	☐	☐
D10.	I can assess patient's/client's different stages of readiness to quit smoking.	☐	☐	☐	☐	☐
D11.	I can assess patient's level of nicotine dependency using the Fagerstrom test.	☐	☐	☐	☐	☐
D12.	I can use smokerlyzer to determine patient's/client's carbon monoxide level.	☐	☐	☐	☐	☐

Time Point	T0	T1	T2	T3	T4

ID Number	

D13.	I can assist recent quitters to learn how to cope with situations or triggers that might lead them to relapse to using tobacco.	☐	☐	☐	☐	☐

SECTION E: SMOKING CESSATION INTERVENTION BEHAVIOR

The way in which a person acts in response to any particular situation or stimulus regarding smoking cessation intervention.

Instruction: Please mark (X) one box per statement

No.	Item	Never (1)	Rarely (2)	Some-times (3)	Often (4)	Always (5)
In your current practice, how often do you….						
E1.	ask patients/clients whether they smoke?	☐	☐	☐	☐	☐
E2.	ask patients/clients the number of cigarettes smoked per day?	☐	☐	☐	☐	☐
E3.	advise patients/clients who smoke to quit smoking?	☐	☐	☐	☐	☐
E4.	advise female patients/clients to quit smoking if they are pregnant or planning to become pregnant?	☐	☐	☐	☐	☐
E5.	advise patients/clients to quit smoking if you think their illness is related to smoking?	☐	☐	☐	☐	☐
E6.	assess patients'/client's readiness to quit smoking?	☐	☐	☐	☐	☐
E7.	assess reasons for quitting/staying quit smoking?	☐	☐	☐	☐	☐
E8.	assist those who are not interested in quitting smoking to think about quitting?	☐	☐	☐	☐	☐
E9.	assist those who are interested in quitting smoking to develop a plan to quit?	☐	☐	☐	☐	☐
E10.	assist in setting quit dates?	☐	☐	☐	☐	☐
E11.	arrange referrals for appropriate smoking cessation services?	☐	☐	☐	☐	☐

Time Point	T0	T1	T2	T3	T4

ID Number	

E12.	provide counselling for patients/clients who want to quit smoking?	☐	☐	☐	☐	☐
E13.	provide educational materials related to smoking cessation?	☐	☐	☐	☐	☐
E14.	document tobacco-relevant discussion and plans in medical record?	☐	☐	☐	☐	☐
E15.	use Fragerstrom test to assess patient's/client's level of addiction?	☐	☐	☐	☐	☐
E16.	use smokerlyzer to determine patient's/client's Carbon Monoxide level?	☐	☐	☐	☐	☐
E17.	prescribe or recommend the purchase of nicotine replacement therapy products for patients/clients attempting to quit?	☐	☐	☐	☐	☐
E18.	provide treatment maintenance and follow-up services to those who have quit smoking?	☐	☐	☐	☐	☐
E19.	arrange a follow up visit or phone call to discuss quitting smoking?	☐	☐	☐	☐	☐

Time Point	To	T1	T2	T3	T4

ID Number	

SECTION F: BARRIERS TO THE PROVISION OF SMOKING CESSATION INTERVENTION

There are various barriers that might limit the capacity to offer smoking cessation intervention for patients. Please rate the importance of each of the following items that limit you from helping patients to quit smoking.

Instruction: Please mark (X) one box per statement

No.	Item	Not a barrier (1)	Some-what a barrier (2)	Mode-rate barrier (3)	Extreme Barrier (4)
F1.	Patients/clients are not interested in quitting smoking.	☐	☐	☐	☐
F2.	Patients/clients are not ready to change.	☐	☐	☐	☐
F3.	Patients/clients do not comply with the given pharmacological therapy.	☐	☐	☐	☐
F4.	Patients/clients do not comply with the given behavioral therapy.	☐	☐	☐	☐
F5.	Lack of impact of pharmacological therapy on patients/clients.	☐	☐	☐	☐
F6.	Lack of impact of behavioral therapy on patients/clients.	☐	☐	☐	☐
F7.	Lack of knowledge of smoking cessation.	☐	☐	☐	☐
F8.	Lack of time.	☐	☐	☐	☐
F9.	Other health problems require priority treatment.	☐	☐	☐	☐
F10.	Lack of reimbursement to healthcare providers.	☐	☐	☐	☐
F11.	Lack of community resources to refer patients/clients.	☐	☐	☐	☐
F12.	Inadequate smoking cessation pharmaceutical drugs.	☐	☐	☐	☐
F13.	Lack of patient/client education materials.	☐	☐	☐	☐
F14.	Lack of smoking cessation training.	☐	☐	☐	☐
F15.	Complexity of smoking cessation guidelines.	☐	☐	☐	☐

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1 & 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4 - 8
Objectives	3	State specific objectives, including any pre-specified hypotheses	8
Methods			
Study design	4	Present key elements of study design early in the paper	10
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	10 & 11
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Not applicable Not applicable 11
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	Not applicable
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	11
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	10 & 11
Bias	9	Describe any efforts to address potential sources of bias	11
Study size	10	Explain how the study size was arrived at	10
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	12
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	12
		(*b*) Describe any methods used to examine subgroups and interactions	Not applicable
		(*c*) Explain how missing data were addressed	Not applicable
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed	Not applicable

		Case-control study—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	Not applicable Not applicable
		(*e*) Describe any sensitivity analyses	Not applicable
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	12
		(b) Give reasons for non-participation at each stage	Not applicable
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	13
		(b) Indicate number of participants with missing data for each variable of interest	13
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	Not applicable
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	Not applicable
		Cross-sectional study—Report numbers of outcome events or summary measures	13
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Not applicable
		(*b*) Report category boundaries when continuous variables were categorized	Not applicable
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	17 - 21
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	21
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	17-21
Generalisability	21	Discuss the generalisability (external validity) of the study results	21
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	22

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.