

Potential impact of a pilot training program on smoking cessation intervention for tuberculosis DOTS providers in Malaysia

Ahmed Awaisu · Mohamad Haniki Nik Mohamed · Noorliza Mohamad Noordin ·
Noorizan Abd. Aziz · Syed Azhar Syed Sulaiman · Abdul Razak Muttalif ·
Aziah Ahmad Mahayiddin

Received: 5 August 2009 / Accepted: 22 October 2009 / Published online: 25 November 2009
© Springer-Verlag 2009

Abstract

Background The association between tuberculosis (TB) and tobacco smoking is becoming increasingly important. Smoking cessation may yield substantial positive effects on TB treatment outcomes, relapse, and future lung disease. Thus, TB directly observed therapy, short-course (TB DOTS) providers are uniquely positioned to intervene with those TB patients who are smokers. Unfortunately, most health care professionals are inadequately trained to provide such service.

A. Awaisu (✉) · N. A. Aziz · S. A. S. Sulaiman
Department of Clinical Pharmacy, School of Pharmaceutical
Sciences, Universiti Sains Malaysia,
11800 Minden,
Penang, Malaysia
e-mail: pharmahmed@yahoo.com

M. H. N. Mohamed
Department of Pharmacy Practice, Kulliyah of Pharmacy,
International Islamic University Malaysia,
Jln Sultan Ahmad Shah, Bandar IM,
25200 Kuantan, Malaysia

N. M. Noordin
Department of Health Economics & Finance, Institute for Health
Management, NIH, Ministry of Health,
Jln Rumah Sakit, off Jln Bangsar,
59000 Kuala Lumpur, Malaysia

A. R. Muttalif
Department of Respiratory, Penang Hospital,
Jln Residensi,
10990 Penang, Malaysia

A. A. Mahayiddin
Institut Perubatan Respiratori,
Jln Pahang, Wilayah Persekutuan,
53000 Kuala Lumpur, Malaysia

Aim This study aimed to determine the feasibility of developing and implementing a customized training program related to the delivery of an integrated smoking cessation intervention (SCI) for TB DOTS providers and to evaluate its potential impact on their knowledge, attitudes, and perceived competence.

Method We developed and delivered a structured training program and materials about treating tobacco use and dependence in TB settings. The training was offered to DOTS providers from six chest clinics in Penang and Wilayah Persekutuan Kuala Lumpur health districts, Malaysia, who were planned to be involved in a larger project, known as the SCIDOTS Project. A pretest-posttest survey of a single group was conducted. Changes in scores before and after the training program in knowledge and attitude were measured.

Results Ten DOTS providers participated in the program and completed both the pretest and posttest survey questionnaire. The trainees' median scores in knowledge of health risks of tobacco and tobacco-related diseases, the association between TB and tobacco, and overall knowledge significantly increased compared to the baseline ($p < 0.05$). Upon completion of the program, the majority of the trainees (70–100%) believed that they were competent and confident in performing most SCI activities.

Conclusion This preliminary study suggests that a customized in-service training program on SCI designed for and delivered to TB DOTS providers could significantly improve their knowledge, attitude, and practice related to SCI. It has also highlighted the gap related to SCI in nursing education and calls for urgent curricula reforms.

Keywords Smoking cessation intervention · Tuberculosis · DOTS providers · Nurses · Training

Introduction

The two colliding epidemics of tuberculosis (TB) and tobacco smoking are becoming increasingly important (Pai et al. 2007). This is especially apparent with the increasing body of evidence on the association between smoking and the risk of *Mycobacterium tuberculosis* infection, developing clinical TB disease, and dying from it (Gajalakshmi et al. 2003; Davies et al. 2006; Bates et al. 2007; Lin et al. 2007; Slama et al. 2007e). In 2006, about 9.2 million new cases and 1.7 million deaths from TB occurred globally, whereas tobacco now kills over 4 million people worldwide (1:10 of all adult deaths) (WHO 2008a, b). In parallel, much of the morbidity and mortality due to TB occur in low-income and middle-income countries where smoking is widely prevalent (WHO 1997; Gajalakshmi et al. 2003; WHO 2008b). Furthermore, a considerable proportion of the global burden of TB may be attributed to tobacco use (Yach 2000; Schneider and Novotny 2007). Therefore, tobacco control in TB care is an important public health agenda globally. Health care professionals working in TB settings should be actively involved in smoking cessation activities.

TB and tobacco interventions in health care settings, however, remain largely separated. In response to this, researchers and relevant health organizations continually advocate and call for urgent attention to address smoking in TB settings (Slama et al. 2007a, c, e; WHO and IUATLD 2007; Slama et al. 2008; Siddiqi and Lee 2009). These clarion calls and initiatives have highlighted the needs for integrated and concerted approaches to lung health that require addressing both of these major threats (Yach 2000; Siddiqi and Lee 2009). The directly observed therapy, short-course (DOTS) strategy for TB offers access to smokers and guarantees regular patient-provider interaction. Therefore, the providers of DOTS for TB patients are in an ideal position to intervene with those who are smokers and have an unprecedented opportunity to deliver an integrated cessation service effectively. However, studies consistently demonstrate that students in the health professions receive insufficient training for providing comprehensive tobacco cessation counseling. This calls for the needs to establish in-service training programs that are customized to providing an integrated intervention in TB care. These health professionals providing care to TB patients need to know what they are expected to do and to have the necessary cognitive skills and tools to provide smoking cessation services (Slama et al. 2007c). Unfortunately, most health professionals in Malaysia are inadequately trained to provide such interventions, mainly due to the lack of comprehensive tobacco-related courses and training as part of most local universities' curricula. In Malaysia, in-service training and continuing professional development (CPD)

programs for treating tobacco dependence are also scanty (Rigotti et al. 2009). However, there is a paucity of information about the tobacco-related knowledge, attitudes, and practices (KAP) of nurses and more specifically those working in TB settings.

This report was part of a larger study known as the SCIDOTS Project (unpublished), the aim of which was to evaluate the impact of an integrated smoking cessation intervention (SCI) plus DOTS on clinical, humanistic, and economic outcomes of TB among smokers. This phase of the study was aimed to develop and deliver a structured training program and materials regarding SCI for health professionals who provide TB DOTS in Malaysia, predominantly nurses. It further aimed to evaluate the potential impact of the training program by comparing the KAP of the trainees regarding SCI before and after the educational series.

Methods

Study population

The participants were selected from among TB DOTS providers practicing in six chest clinics of respective hospitals by the hospitals management: five clinics in the state of Penang and one in Wilayah Persekutuan Kuala Lumpur. The criteria used for selection were a minimum of 3 years post-registration experience, job competence, and previous experience in clinical research. The number of TB DOTS providers selected to form the pilot sample of ten participants was in proportion to the total number of DOTS providers who satisfied the above criteria from each hospital. Accordingly, one participant each from four hospitals and two and four participants from one hospital each were selected.

Study design and procedures

This was a pretest-posttest (before-after) survey of a single group. Figure 1 is a flow diagram of the study methodology.

1. Educational materials for training health professionals working in TB settings on tobacco smoking cessation as well as relevant questionnaires for KAP assessment were developed and validated.
2. A pre-training KAP of the trainees was evaluated via a questionnaire that was designed in English, validated, and subjected to a standard linguistic validation process into the Malay language. The pretest survey was administered on the first day of the training.
3. Training: The training program was delivered over a period of 3 consecutive days. Ten registered nurses who

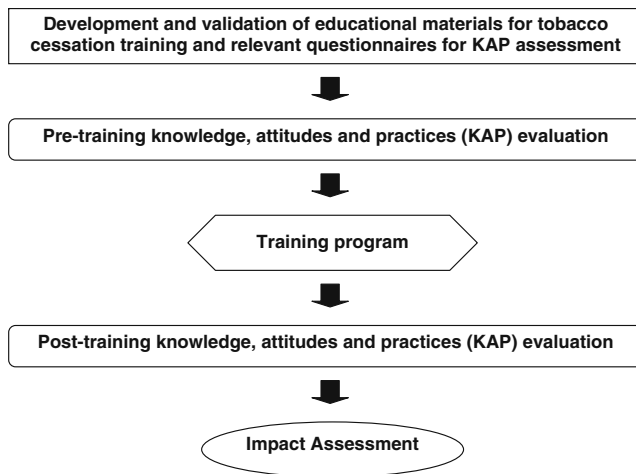


Fig. 1 Flowchart of the study methodology

provide DOTS to TB patients were selected from six chest clinics at various government hospitals located within two states (Penang and Wilayah Persekutuan Kuala Lumpur).

4. Impact of the training program: A post-training assessment of KAP was conducted following the educational intervention on the last day of the training program.

Description of the training program on tobacco cessation

This was an in-service training program adapted from our established *Certified Smoking Cessation Service Provider Program (CSCSP)* for health professionals in Malaysia. The course was offered to selected nurses who provide care to TB patients in respective study centers that were planned to be involved in the SCIDOTS Project. The content of the educational materials was customized to include issues on tobacco control in TB settings. The materials were delivered through didactic lectures, demonstrations/role-plays, and video shows. Experiential learning components included hands-on attachment at a specified quit smoking clinic (QSC). Each DOTS provider trained was assigned to one of the QSC for additional mentoring and guidance beyond that which was taught theoretically. Participants were expected to gain leadership roles in the integration of tobacco cessation and control in TB care.

The program was delivered over 3 days with a total of 14 contact hours. The course was aimed to provide participants with the knowledge of tobacco use treatment and the necessary skills to provide SCI for TB patients who are smokers. The key learning outcomes of the course included: understanding the colliding epidemics of tuberculosis and tobacco, evidence of their association, and the

provision of tobacco cessation via cognitive behavioral therapy and pharmacotherapy. Details on the didactic lecture topics are presented in Table 1.

Knowledge, attitudes, and practice assessment

Instrument and data collection

The 99-item questionnaire used in this study was a modified and linguistically validated version of an English-language questionnaire used to assess the tobacco-related knowledge of nurses in Hong Kong (Chan 2001; Tsung 2002; Chan et al. 2007). The instrument consisted of eight domains to assess: (a) demographic and professional characteristics (14 items), (b) knowledge of health risks of tobacco and tobacco-related diseases (27 items), (c) knowledge of the link between TB and tobacco use (10 items), (d) attitudes and beliefs about tobacco control policies in the country (9 items), (e) the practice of SCI based on the five “A’s” (21 items), (f) tobacco-related knowledge covered in the curriculum during nursing education and current program (3 items), (g) perception of competence and confidence to deliver effective SCI (10 items), and (h) perception of enablers and barriers of the practice of SCI (4 items). The questions were in a multiple choice format and Likert-type scales.

Knowledge on the health consequences of exposure to tobacco smoke as well as on the association between TB and tobacco use was evaluated using total scores for each participant, with one point for each correct answer and zero points for each wrong answer. The possible total knowledge score for each subject for the two domains ranged from 0 to 37 points (0–27 points and 0–10 points for health risks of tobacco and TB-tobacco association domains, respectively). Attitudes and beliefs toward tobacco control policies were also evaluated in a similar fashion for each participant with one point for each positive attitude and zero points for each negative attitude (range of possible obtainable scores: 0–9 points).

Participants were asked to fill in and submit the questionnaires in a classroom setting on the spot. Anonymity and confidentiality were ensured. Approval for the conduct of the study was obtained from the Medical Research Ethics Committee (MREC) of the National Institute of Health (NIH), Ministry of Health, Malaysia.

Statistical analysis

The data were analyzed by using SPSS version 14.0 software package (SPSS Inc., Chicago, IL, USA). Both descriptive and inferential statistics were utilized where appropriate. Frequencies and percentages were used to portray the respondents’ demographic information and

Table 1 Course contents for smoking cessation service provider program for TB DOTS providers

Module	Learning objectives	Method of delivery	Duration
1. Epidemiology and impact of tobacco use	To highlight: (a) The epidemiology of tobacco use (b) The harmful effects of tobacco use vs benefits of cessation	Lecture Discussion	1 h
2. National Tobacco Control Program (NTCP)	To highlight: (a) The components of the NTCP (b) The WHO FCTC (c) The objectives and strategy of the smoking cessation program	Lecture Discussion	1 h
3. Understanding and assessment of tobacco use and dependence	(a) To explain the physical, psychological, and habitual aspects of tobacco dependence (b) To provide knowledge and skills on how to assess level of tobacco use and dependence	Lecture and discussion Video show Demonstration on the use of FTND, breath CO analyzer, and peak flow meter	1 h
4. Pharmacotherapeutic intervention for smoking cessation (nicotine-based vs non-nicotine-based therapy)	To provide knowledge and skills on: (a) Different types of therapeutic agents for tobacco cessation (b) The basic principles of product selection (c) Counseling points for each product (d) Special use of each product (during gradual reduction, combination therapy etc.)	Lecture and discussion Demonstration on NRT use: gum, patch, inhaler Individual and group work Role-play	2 h
5. Behavioral intervention for smoking cessation (1): transtheoretical model of stages of change	To provide understanding on the stages and processes of behavior change	Lecture and discussion Individual and group work Role-play	1 h
6. Behavioral intervention for smoking cessation (2): counseling practices	To provide knowledge and skills on: (a) The basic principles of counseling (b) Helping smokers to change (quit and remain abstinent) (c) Counseling techniques for smoking cessation	Lecture and discussion Individual and group work Role-play	1 h
7. Establishing a smoking cessation service	To highlight: (a) The processes of setting up a quit smoking clinic (b) The method for recruiting patients (c) Roles and responsibilities of personnel (d) Monitoring and data management	Lecture Discussion Role-play	1 h
8. The association between tobacco and tuberculosis	To provide participants with the evidence of an association between tobacco smoking and: (a) Risk of TB infection (b) Risk of developing TB disease (c) TB mortality (d) Poor TB treatment outcomes	Lecture Discussion	1 h
9. Introducing brief intervention for cessation in TB care using 5 A's	To provide an overview of: (a) The importance and potential benefits of providing SCI in TB care (b) What DOTS providers need to do (c) The necessary skills for providing SCI in TB care	Lecture Discussion	1 h

Table 1 (continued)

Module	Learning objectives	Method of delivery	Duration
10. Monitoring and record keeping for smoking cessation in TB care	To educate trainees on:		
	(a) The importance of quality recording and monitoring	Lecture	1 h
	(b) How the quality of SCI in TB care can be guaranteed	Discussion	
11. Case studies	(c) The elements to monitor and provide them with some model forms used for monitoring		
	To present a case on:		
	(a) Changes and process of behavior change (C1)	Role-play	2 h
	(b) Reasons for nicotine addiction (C2)	Individual training and group work	
	(c) How to connect with smokers to help them quit (C3)		
12. Relapse prevention	(d) Skills in promoting behavior change (C4)		
	(e) Role-play on “building self-confidence” (C5)		
	To provide practical skills on relapse prevention using:		1 h
	(a) Assertive techniques	Lecture	
	(b) Relaxation exercise	Practical	

CO carbon monoxide, *FCTC* Framework Convention on Tobacco Control, *FTND* Fagerström test for nicotine dependence, *NRT* nicotine replacement therapy, *SCI* smoking cessation intervention, *TB* tuberculosis, *WHO* World Health Organization

professional characteristics, knowledge, attitudes, and practice on tobacco cessation, before and after the training. The Wilcoxon signed-rank test and the McNemar χ^2 test were used to measure the impact of the training program on knowledge, attitudes, tobacco-related topics learned, and perceived confidence and competence of performing SCI activities. The Wilcoxon signed-rank test was applied instead of the paired *t* test, for total knowledge and attitudes scores, because these variables were not normally distributed. Thus, the knowledge and attitude scores were presented as median and interquartile ranges. In addition, the McNemar χ^2 test and the Wilcoxon signed-rank test were used for tobacco-related topics learned (dichotomous variable) and confidence/competence of performing SCI (ordinal variable), respectively. The statistical significance level was set a priori at $p < 0.05$.

Results

Demographic characteristics

All of the trainees were females and had completed both the pretest and posttest survey questionnaire. Prior to the current training, none of the participants had received any formal training on treating tobacco use and dependence. Table 2 summarizes pertinent information related to the characteristics of the trainees.

DOTS providers' performance in knowledge and attitude domains

Changes in scores of knowledge and attitude for three domains of the survey instrument were measured (knowledge of health risks of tobacco and tobacco-related diseases, knowledge of the link between TB and tobacco use, and positive attitudes and beliefs about tobacco control policies). The median knowledge score of the health risks of tobacco after the training significantly increased from 16.5 to 21.5 ($p = 0.003$), whereas the median score on the association between TB and tobacco rose from 5.5 to 9.5 ($p = 0.01$). However, there was no significant improvement in positive attitudes and beliefs on tobacco control policies among the participants ($p = 0.14$) (Table 3). Moreover, the DOTS providers' performance on knowledge items related to the association between tobacco use and TB, pre-training and post-training is summarized in Table 4. There were improvements in the proportions of participants having correct responses in almost all of the items, although some of the differences were not statistically significant.

Practice of SCI

The five “A’s” strategy (ask, advise, assess, assist, arrange) was used to evaluate the respondents' clinical activities related to smoking cessation. Only one fifth to two fifths of

Table 2 Demographic and smoking-related characteristics of TB DOTS providers involved in the training program

Characteristics	Response rate, <i>N</i> (%)
Age	
26–30 years	2 (20.0)
31–35 years	1 (10.0)
36–40 years	1 (10.0)
41–45 years	1 (10.0)
46–50 years	3 (30.0)
Above 50 years	2 (20.0)
Basic nursing education	
General nursing certificate/diploma	10 (100.0)
Degree in nursing	0 (0)
Years post-registration	
3 years	1 (10.0)
4 years	1 (10.0)
10 years	1 (10.0)
15 years	1 (10.0)
18 years	1 (10.0)
22 years	1 (10.0)
24 years	2 (20.0)
27 years	1 (10.0)
30 years	1 (10.0)
Smoking status	
Smoker (ex and current)	0 (0)
Never	10 (100.0)
Exposure to secondhand tobacco smoke	
Yes	8 (80.0)
No	1 (10.0)
Not sure	1 (10.0)
Place of exposure to secondhand smoke	
Home	4 (44.4)
Others	5 (55.6)
Reaction to secondhand smoke exposure	
Move away	7 (70.0)
Ask smoker to move away	1 (10.0)
Advise smoker to quit	2 (20.0)
Previous training on smoking cessation	
Yes	0 (0)
No	10 (100.0)

the DOTS providers frequently (on a daily basis) “asked” patients about the use of tobacco products. None of them frequently assessed the level of nicotine dependence and half of them never assessed this. Furthermore, only 30–40% of the nurses frequently “advised” patients about the dangers of smoking. Thirty percent claimed that they frequently “advised” patients to quit smoking. However, 0–20% frequently “assessed” patients’ willingness to quit

smoking. About one fifth to one third of the nurses seldom discussed patients’ smoking behaviors with their families and 30–40% never referred them to other health professionals for cessation interventions. Nearly half of the trainees had never developed a cessation plan or arranged for follow-up or offered self-help materials for quitting smoking.

Topics covered during nursing training and during current training program

The participants admitted that most of the topics related to tobacco use and cessation were not taught during their general nursing training and that their level of preparation for the delivery of tobacco cessation interventions prior to the current training was not adequate. For instance, only a few respondents reported that they had received training on the health hazards of active smoking (40%) and passive smoking (30%), and nicotine addiction, dependence, and related withdrawal symptoms (30%). However, 60–100% of the DOTS providers believed that the tobacco-related topics were covered during the training program. All of the respondents reported educational contents on the global tobacco epidemic, the health hazards of active and passive smoking, nicotine replacement therapy (NRT), the five A’s, carbon monoxide (CO) monitoring to measure exhaled CO level of patients, and training on the use of the trans-theoretical model of behavior change. A comparison of the responses before and after the educational series is presented in Table 5. There were significantly higher proportions of DOTS providers indicating that specific tobacco-related contents were taught during the current training program when compared with those indicating the same topics had been taught during their nursing education (Table 5).

Competence in performing SCI

This domain assessed self-perceived confidence and competence in performing tobacco cessation activities, both prior to and after the educational intervention program. The domain used a 5-point rating scale for the DOTS providers to indicate their level of confidence and competence in ten SCI skills (Table 6). In the data presented in Table 6, we collapsed very confident and confident as well as very competent and competent. Before the training program, at least 50% of the TB DOTS providers reported that they were not competent and confident in performing most aspects of tobacco cessation and control activities. However, upon completion of the training program, a larger proportion of the trainees believed that they were competent and confident in performing most SCI activities.

Table 3 TB DOTS providers’ knowledge scores in three domains before and after the training

Knowledge/attitude domain	Min.–max. obtainable score before and after educational series	Median score before educational series (IQ range)	Median score after educational series (IQ range)	<i>p</i> value ^a
Knowledge of health risks of tobacco and tobacco related diseases	0–27	16.5 (11.75–19.25)	21.5 (20.00–24.00)	0.003
Knowledge of the link between TB and tobacco use	0–10	5.5 (5.00–10.00)	9.5 (8.00–10.00)	0.01
Total score of knowledge	0–37	22.5 (17.75–26.00)	31.0 (29.50–33.25)	0.002
Attitudes and beliefs about tobacco control policies in the country	0–9	8.0 (6.00–9.00)	8.0 (8.00–9.00)	0.14

Min. minimum, *max.* maximum, *IQ* interquartile

^a Wilcoxon signed-rank test was used and *p*<0.05 was considered statistically significant

Discussion

Health care professionals working in TB settings have an unprecedented opportunity and can have an important public health impact by helping those patients who are tobacco users. Quitting smoking can have a significant impact on improving the outcomes of care and preventing future relapses of TB. The educational materials used for the current training were adapted from previous ones that were used for an established smoking cessation service provider certification program in Malaysia. The contents were modified to suit health care providers in TB settings who assist patients to quit smoking.

The study suggests that TB DOTS providers had serious deficits in knowledge of tobacco use and related diseases,

including the association of TB and tobacco use, and that the structured program in the form of modules might have had a significant impact on improving these deficiencies. Given that the evidence of an association between tobacco use and TB is overwhelming and tobacco cessation has potential positive benefits on short- and long-term outcomes of TB treatment as well as future lung health, health professionals working in TB settings must be actively involved in intervening with vulnerable groups. However, there are individual and contextual barriers to the adoption of new routines in health care (Slama et al. 2007c). Health professionals working in TB care are unlikely to adopt SCI unless they understand the importance of such interventions, feel that doing them will produce results, and are convinced that the interventions should be used (Slama et al. 2007c).

Table 4 Comparison of TB DOTS providers’ knowledge of the link between TB and tobacco use before and after the educational series

Statement	Correct response, before intervention, <i>N</i> (%)	Correct response, after intervention, <i>N</i> (%)	<i>p</i> value ^a
Epidemiological and laboratory evidence has shown a consistent association between tobacco smoking and TB	7 (70.0)	10 (100.0)	0.250
Tobacco smoking is associated with both latent TB infection and clinical TB disease	5 (50.0)	10 (100.0)	0.043
Tobacco smoking is positively associated with TB mortality	4 (40.0)	9 (90.0)	0.043
Smoking is also a risk factor for poor TB treatment outcomes	9 (90.0)	10 (100.0)	1.000
There is a dose-response relationship between cigarettes smoked per day and risk of TB	3 (30.0)	9 (90.0)	0.031
Passive or secondhand smoking is another risk factor for TB	5 (50.0)	7 (70.0)	0.625
Smoking cessation might provide benefits for global TB control in addition to those for chronic diseases	10 (100.0)	9 (90.0)	1.000
Exposure to tobacco impairs the normal clearance of secretions on the tracheobronchial mucosal surface	6 (60.0)	9 (90.0)	0.250
Cigarette smoke impairs the function of pulmonary alveolar macrophages	9 (90.0)	10 (100.0)	1.000
Nicotine is hypothesized to act directly on nicotinic ACh receptors to decrease tumor necrosis factor- α production	3 (30.0)	8 (80.0)	0.043

^a The McNemar χ^2 test was applied to compare the difference in knowledge of TB and tobacco association pre- and post-training

Table 5 Tobacco-related topics learned during nursing training vs during the training program

Tobacco-related topic learned	During nursing training, N (%)	During current training, N (%)	<i>p</i> value ^a
The tobacco epidemic worldwide	2 (20.0)	10 (100.0)	0.008
The politics of tobacco control and legislative measures	2 (20.0)	7 (70.0)	0.063
The health hazards of active smoking	4 (40.0)	10 (100.0)	0.031
The health hazards of passive or secondhand smoking	3 (30.0)	10 (100.0)	0.016
The health benefits of smoking cessation	2 (20.0)	10 (100.0)	0.008
Nicotine addiction, tolerance, dependence, and related withdrawal symptoms	3 (30.0)	10 (100.0)	0.016
Different types of nicotine replacement therapy (NRT) and their uses	2 (20.0)	10 (100.0)	0.008
National (Malaysian) or international guidelines for smoking cessation	2 (20.0)	9 (90.0)	0.016
5 A's: ask, advise, assess, assist, arrange	2 (20.0)	10 (100.0)	0.008
Behavioral techniques to help smokers stop smoking	2 (20.0)	10 (100.0)	0.008
The use of carbon monoxide (CO) monitoring to measure CO level of patients	2 (20.0)	10 (100.0)	0.008
Different approaches to SCI, e.g., interview, telephone, counseling, etc.	2 (20.0)	9 (90.0)	0.016
Community resources for smoking cessation	2 (20.0)	6 (60.0)	0.125
Others	0 (0)	0 (0)	1.000

^aThe McNemar χ^2 test was used to compare the tobacco-related topics learned before and after the training program

Knowledge, skills, and positive attitudes toward tobacco cessation can be gained during undergraduate education and in-service training. However, it is documented that universities provide inadequate tobacco cessation counseling training in the curricula of undergraduate programs (Hudmon et al. 2003). Although, health care professionals can have an important public health impact by helping to counter tobacco use, studies consistently demonstrate that students in the health professions receive insufficient training for providing comprehensive tobacco cessation counseling (Richmond et al. 1998; Hudmon et al. 2003,

2005; Reichert et al. 2008; Chatkin and Chatkin 2009). Similarly, it is clear through our academic experience in Malaysian medical and pharmacy schools and communications with colleagues in related disciplines that most of the schools do not include in-depth topics and training on tobacco control. A study conducted among respiratory physicians caring for TB patients in Morocco indicates that only 5.3% believed that they were adequately trained to help smokers to stop (Amara et al. 2008). Findings from our study corroborate this in that none of the TB DOTS providers had prior training to provide smoking cessation

Table 6 Confidence and competence of performing SCI activities

Knowledge item	Confident, <i>N</i> (%)			Competent, <i>N</i> (%)		
	Before	After	<i>p</i> value ^a	Before	After	<i>p</i> value ^a
Teaching smokers the physiology of smoking	7 (70.0)	8 (80.0)	0.461	2 (20.0)	7 (70.0)	0.167
Teaching smokers the general health risk of smoking	8 (80.0)	9 (90.0)	0.414	4 (40.0)	7 (70.0)	0.461
Finding out smokers' belief about smoking and health	6 (60.0)	8 (80.0)	0.194	5 (50.0)	8 (80.0)	0.680
Counteracting smokers' negative attitude about giving up smoking	3 (30.0)	4 (40.0)	0.317	1 (10.0)	6 (60.0)	0.202
Advising smokers on how to stop smoking	7 (70.0)	8 (80.0)	0.257	4 (40.0)	8 (80.0)	0.167
Negotiating a quit date	6 (60.0)	10 (100.0)	0.036	4 (40.0)	8 (80.0)	0.221
Discussing different methods to quit smoking	5 (50.0)	9 (90.0)	0.036	3 (30.0)	10 (100.0)	0.023
Giving advice about NRT	7 (70.0)	10 (100.0)	0.102	3 (30.0)	8 (80.0)	0.202
Using leaflet or other written materials on ways to quit smoking	6 (60.0)	9 (90.0)	0.157	3 (30.0)	9 (90.0)	0.121
Using carbon monoxide monitoring to assess patients' CO level	5 (50.0)	4 (40.0)	0.458	2 (20.0)	2 (20.0)	1.000

N = number of observations

^aThe Wilcoxon signed-rank test was applied to test the difference in confidence and competence of performing SCI activities pre- and post-training

services. A customized and integrated tobacco cessation curriculum that meets the needs of TB settings should therefore be designed and used for in-service training and for health professional schools. The present study made an attempt to design modules that were tailored towards TB care (Table 1). Participants were also given references to key educational materials and guidelines for tobacco cessation, specifically designed for TB settings (Chiang et al. 2007a,b; Enarson et al. 2007; Slama et al. 2007a, b, c, d; WHO and IUATLD 2007; Slama et al. 2008).

Health professionals providing DOTS to TB patients in Malaysia (predominantly nurses and medical assistants) have unique opportunities to deliver brief or intensive SCI using the five A's strategy of ask, advise, assess, assist, and arrange for follow-up (Fiore et al. 2000) as well as pharmacotherapy. Slama and colleagues recently proposed the inclusion of brief smoking cessation advice in standard TB case management (Slama et al. 2007c, d). In fact, the International Union Against Tuberculosis and Lung Diseases (IUATLD) recently designed a serialized guide in the form of an educational series on the provision of tobacco cessation interventions for TB patients (Chiang et al. 2007a, b; Enarson et al. 2007; Slama et al. 2007a, b, c, d). The WHO had earlier advocated that physicians and public health workers should energetically apply anti-smoking interventions in populations with high levels of subclinical TB infection to help prevent activation and spread and in collaboration with the IUATLD has produced comprehensive guidelines for tobacco cessation in TB care (WHO and IUATLD 2007; Slama et al. 2008).

The results of this pilot study therefore have reaffirmed that health professionals providing DOTS to TB patients in Malaysia might be ill-equipped in terms of knowledge related to SCI. They also seemed to have had negative attitudes towards activities related to tobacco and health and seldom practice specific activities. However, the findings should be interpreted in the light of the major limitations of the pilot study, which were the small sample, short follow-up period, and lack of a control group (i.e., with no training). Therefore, the results may not be generalized to all TB settings. Future studies should involve larger samples across the country and apply more rigorous study designs. A randomized control study looking at the effects of such teaching programs on a larger number of DOTS providers with the outcomes being changes in knowledge, attitudes, and practice over a longer period of time of post-intervention may be warranted. This is to ensure retention of the KAP. It may also be worthwhile to measure the number of smokers counseled or preferably who quit smoking over the course of the TB treatment period as surrogate markers of DOTS providers' changes in practice. In general, a more established and structured program on tobacco control is urgently needed to equip TB DOTS

providers with the requisite knowledge, attitudes, and skills essential to deliver tobacco cessation services effectively. This will involve the development of content for teaching and training as part of the health-related undergraduate curricula and also for CPD programs. A number of educational programs that can be incorporated into undergraduate curricula are readily available (Hudmon et al. 2003; Karine et al. 2006). Future health care professionals, including nurses, will be equipped with the basis to ensure they have the requisite knowledge, skills, and training to help patients stop smoking.

Conclusions

A pilot program on tobacco cessation for DOTS providers involved in TB care was successfully designed and implemented. Overall, the training program seemed to have made a significant impact on improving their knowledge, attitudes, and self-confidence in helping TB smokers to quit. This preliminary study has an important implication for the feasibility of utilizing DOTS providers in addressing the two epidemics of public health importance, has highlighted the gap related to SCI in health professionals' education, and calls for urgent curricula reforms. In general, the pilot study has managed to contribute additional information regarding the KAP of TB DOTS providers in Malaysia.

Acknowledgements The SCIDOTS Project is supported by a research grant awarded by the Institute for Health Management of the National Institute of Health, Ministry of Health, Malaysia. The authors greatly appreciate this. We are thankful to all of the DOTS providers who actively participated in the training and the larger project.

Conflict of interest The authors have no competing interests to declare.

References

- Amara B, El Ghazi K, Rahimi H, Elbiaze M, Nejari C, Chakib Benjelloun M (2008) Attitudes and knowledge about smoking among Moroccan physicians looking after patients with tuberculosis (in French). *Rev Mal Respir* 25(5):569–575
- Bates MN, Khalakdina A, Pai M, Chang L, Lessa F, Smith KR (2007) Risk of tuberculosis from exposure to tobacco smoke: a systematic review and meta-analysis. *Arch Intern Med* 167(4):335–342
- Chan SSC (2001) Helping patients stop smoking: the nurses' responsibility. 6th Asia Pacific Conference on Tobacco or Health, Hong Kong
- Chan SS, Sarna L, Wong DC, Lam TH (2007) Nurses' tobacco-related knowledge, attitudes, and practice in four major cities in China. *J Nurs Scholarsh* 39(1):46–53
- Chatkin J, Chatkin G (2009) Learning about smoking during medical school: are we still missing opportunities? *Int J Tuberc Lung Dis* 13(4):429

- Chiang CY, Slama K, Enarson DA (2007a) Associations between tobacco and tuberculosis. *Int J Tuberc Lung Dis* 11(3):258–262
- Chiang CY, Slama K, Enarson DA (2007b) Tobacco use and tobacco control. *Int J Tuberc Lung Dis* 11(4):381–385
- Davies PD, Yew WW, Ganguly D, Davidow AL, Reichman LB, Dheda K et al (2006) Smoking and tuberculosis: the epidemiological association and immunopathogenesis. *Trans R Soc Trop Med Hyg* 100(4):291–298
- Enarson DA, Slama K, Chiang CY (2007) Providing and monitoring quality service for smoking cessation in tuberculosis care. *Int J Tuberc Lung Dis* 11(8):838–847
- Fiore MC, Bailey WC, Cohen SJ et al (2000) Treating tobacco use and dependence. Quick reference guide for clinicians. US Department of Health and Human Services, Rockville
- Gajalakshmi V, Peto R, Kanaka TS, Jha P (2003) Smoking and mortality from tuberculosis and other diseases in India: retrospective study of 43000 adult male deaths and 35000 controls. *Lancet* 362(9383):507–515
- Hudmon KS, Corelli RL, Chung E, Gundersen B, Kroon LA, Sakamoto LM et al (2003) Development and implementation of a tobacco cessation training program for students in the health professions. *J Cancer Educ* 18(3):142–149
- Hudmon KS, Bardel K, Kroon LA, Fenlon CM, Corelli RL (2005) Tobacco education in U.S. schools of pharmacy. *Nicotine Tob Res* 7(2):225–232
- Karine B, Chris L, Caroline M (2006) Training in tobacco cessation counseling for medical, nursing, dentistry and pharmacy students: environmental scan and recommendations. Canadian Public Health Association
- Lin HH, Ezzati M, Murray M (2007) Tobacco smoke, indoor air pollution and tuberculosis: a systematic review and meta-analysis. *PLoS Med* 4(1):e20
- Pai M, Mohan A, Dheda K, Leung CC, Yew WW, Christopher DJ et al (2007) Lethal interaction: the colliding epidemics of tobacco and tuberculosis. *Expert Rev Anti Infect Ther* 5(3):385–391
- Reichert VC, Folan P, Bartscherer D, Jacobsen D, Fardellone C, Egglinger A et al (2008) Healthcare providers (prescribers versus nonprescribers) knowledge of tobacco-related issues including drug interactions with nicotine. *Chest* 134:s53003
- Richmond RL, Debono DS, Larcos D, Kehoe L (1998) Worldwide survey of education on tobacco in medical schools. *Tob Control* 7:247–252
- Rigotti NA, Bitton A, Richards AE, Reyens M, Wassum K, Raw M (2009) An international survey of training programs for treating tobacco dependence. *Addiction* 104(2):288–296
- Schneider NK, Novotny TE (2007) Addressing smoking cessation in tuberculosis control. *Bull World Health Organ* 85(10):820–821
- Siddiqi K, Lee AC (2009) An integrated approach to treat tobacco addiction in countries with high tuberculosis incidence. *Trop Med Int Health* 14(4):420–428
- Slama K, Chiang CY, Enarson DA (2007a) An educational series about tobacco cessation interventions for tuberculosis patients: what about other patients? *Int J Tuberc Lung Dis* 11(3):244
- Slama K, Chiang CY, Enarson DA (2007b) Helping patients to stop smoking. *Int J Tuberc Lung Dis* 11(7):733–738
- Slama K, Chiang CY, Enarson DA (2007c) Introducing brief advice in tuberculosis services. *Int J Tuberc Lung Dis* 11(5):496–499
- Slama K, Chiang CY, Enarson DA (2007d) Tobacco cessation and brief advice. *Int J Tuberc Lung Dis* 11(6):612–616
- Slama K, Chiang CY, Enarson DA, Hassmiller K, Fanning A, Gupta P et al (2007e) Tobacco and tuberculosis: a qualitative systematic review and meta-analysis. *Int J Tuberc Lung Dis* 11(10):1049–1061
- Slama K, Chiang CY, Enarson DA (eds) (2008) Tobacco cessation interventions for tuberculosis patients. A guide for low-income countries. International Union Against Tuberculosis and Lung Disease, Paris
- Tsung PK (2002) Nurses' role in smoking cessation: knowledge, attitudes, and behaviors. Master's dissertation, Hong Kong SAR, China, The University of Hong Kong
- WHO (1997) Tobacco or health: a global status report. WHO, Geneva
- WHO (2008a) WHO report on the global tobacco epidemic. WHO, Geneva, pp 1–329
- WHO (2008b) WHO report on global tuberculosis control. Geneva
- WHO, IUATLD (2007) A WHO/The Union monograph on TB and tobacco control. Joining efforts to control two related global epidemics, World Health Organization & International Union Against Tuberculosis and Lung Disease
- Yach D (2000) Partnering for better lung health: improving tobacco and tuberculosis control. *Int J Tuberc Lung Dis* 4(8):693–697