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The implementation of a tobacco dependence education curriculum in a Swiss Dental Hygiene School – an 8-year review

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Abstract: *Objective:* The aim of our investigation was to review the implementation of a comprehensive tobacco dependence education (TDE) curriculum at the Medi School of Dental Hygiene (MSDH), Bern, Switzerland, 2001–2008. *Methods:* In 2001, new forms to record patients' tobacco use history and willingness to quit were created for all the MSDH patients. In 2002, a new theoretically based tobacco dependence treatment protocol was implemented into the MSDH curriculum. Students received instruction on how to provide brief tobacco use dependence interventions as well as maintain detailed records of patient tobacco use and cessation interventions for every smoker at all dental hygiene visits. *Results:* In 2002, 17 lecture hours were added to the following subjects: pathology, periodontology, preventive dentistry, pharmacology and psychology. During the same time period, 2213 patients (56.9% women) have visited the MSDH. Smoking status was recorded in 85.7% of all the patients (30.2% smokers). Brief tobacco use interventions were recorded in 36.8% of all smokers while 7.6% of these have reported to quit smoking. *Conclusions:* Overall, the new TDE curriculum was successfully implemented and accepted by the MSDH faculty. Applications in the clinical practice, however, may still be improved to better identify smokers and increase initial and follow-up interventions potentially leading to higher quit rates.

Key words: curriculum implementation; dental hygiene education; tobacco cessation; tobacco dependence education

Background

The use of tobacco continues to be the number one preventable cause of death worldwide. With an annual estimate of 511 000 deaths in the United States (1) and 6 million globally, (2), there remains a clear mandate to address this widespread, and for the most part, legal addiction on multiple levels. In addition to the public health policies addressing indoor-air quality and tobacco-advertising laws, effective tobacco treatment needs to be expanded into every clinical interaction when tobacco users seek medical or dental care. With over 4000 chemicals in tobacco smoke, every cell in the body is negatively affected by inhaling smoke directly or indirectly resulting in damage to the heart, lungs and other essential organ systems (3). Specifically, the oral cavity is negatively affected as evidenced by an increase in periodontal disease, tooth loss, delayed surgical healing, implant failure and oral cancer (4, 5).

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Although the negative effects of tobacco use have been documented for over 50 years, healthcare providers continue to report limited tobacco treatment interventions often consisting of the identification of tobacco use followed by the recommendation to make a quit attempt (6–8). While even a brief intervention has been shown to improve the rate of successfully quitting, a more behaviourally based, intensive intervention yields a much higher level of success (9). Given nicotine dependence is classified as a chronic, relapsing disease (10), much greater emphasis on counselling, follow-up and relapse prevention is needed before tobacco treatment will be effective in addressing this addiction. Joseph *et al.* (11) found that when healthcare providers used a chronic disease model to treat nicotine dependence in over 400 smokers, an increase was seen in both short- and long-term abstinence from smoking.

Although the current training of dental professionals has been shown to be somewhat efficacious (12), a higher level of provider training could result in greater confidence and possibly an increased offering of tobacco cessation activities once in practice (13, 14). Unfortunately, educators in both medical and dental education continue to offer only limited training in comprehensive tobacco treatment instruction with the primary emphasis on the health effects of tobacco use, identifying tobacco use and recommending the patient quit (15–18). Reasons for this shortcoming may be that didactic and clinical educators do not receive the behaviourally based training necessary to teach or model these skills in the classroom and clinical setting and therefore do not feel confident enough to provide this type of instruction. Furthermore, within many dental hygiene schools, the curriculum is viewed as already full with limited time to add anything *anew*. Focus is often placed on basic subjects such as oral hygiene instructions and manual debridement. In recent years, however, dental education researchers have reported encouraging results with the implementation of specific tobacco dependence education (TDE) programmes aimed at addressing various barriers resulting in the improvement of students' attitudes towards the provision of tobacco treatment (19, 20).

Initially, the measures for primary and secondary prevention of oral diseases at the Medi School of Dental Hygiene (MSDH), Bern, Switzerland, were mainly targeting plaque and calculus control, applications of fluoride or dietary elements. With the establishment of the Swiss Task Force 'Smoking – Interventions in the Dental Practice' in the autumn of 2001, the tobacco prevention and cessation strategies published by Fiore *et al.* (21) were adopted for use by dental practices in Switzerland. Subsequently, the MSDH curriculum was revised to implement a more comprehensive TDE curriculum to include new theoretical content and clinical skills training.

This 8-year, retrospective study provides important foundational information on lessons learned during the process of moving the MSDH from a complete lack of tobacco education to a comprehensive curriculum that included new theoretical content and treatment protocols for our dental hygiene students. The primary aim of this implementation study was to conduct a process evaluation identifying the strengths and

weaknesses of the newly developed evidence-based, comprehensive TDE curriculum. Consequently, it may serve as a reference for other dental hygiene schools while moving their own curriculum forward.

Methods

Retrospective study design

To review the implementation of a TDE curriculum at the MSDH, Bern, Switzerland, a retrospective process evaluation study of both before and after course schedules plus clinical records was undertaken. Curriculum-related information was collected from the MSDH curriculum database while patient-related data were gathered from patients undergoing dental hygiene treatment at the MSDH over the years 2001–2008.

Implementation in the spring of 2001

In April 2001, two new items were added to the general medical history form (GMHF) designed to record patient tobacco use (Fig. 1). The following questions were added to this form: (i) 'Do you smoke?' and (ii) 'Did you ever smoke?'. In addition, smokers were asked 'How many cigarettes do you smoke per day?' while ex-smokers were asked the number of years they smoked (Fig. 2).

Implementation in 2002

In October 2002, and the subsequent months, new theoretical content was added to the dental hygiene curriculum followed by new clinical skills training introduced in December 2002 (Fig. 1). In December 2002, a tobacco use history form (TUHF) was introduced and handed out with the GMHF to all dental hygiene patients at their initial or following visit (Fig. 3). The 10-item TUHF included enquiries on (i) current smoking status, (ii) time since quitting, the duration of smoking or the number of cigarettes smoked per day, (iii) awareness of tobacco-related oral diseases, (iv) assessment of the patient's willingness to quit and (v) the number of attempts to quit or lessons learned from previous relapses.

Simultaneously, a Specific Smoking Cessation Form (SSCF) was introduced and used by dental hygiene students to record their tobacco treatment activities required on all tobacco-using patients. This form recorded evidence-based clinical treatment activities based on the 5A model of Ask, Advise, Arrange, Assist and Arrange (21). All patients were (i) *asked* about their smoking status, (ii) *advised* to quit, (iii) asked about their willingness to quit (*assess*), (iv) when willing to quit, offered behavioural support and the selection of pharmacotherapy (*assist*) and (v) followed up at their next visit (*arrange*).

Data collection

Tobacco-related data, including tobacco use and motivation to quit, were collected from clinical records and patient surveys

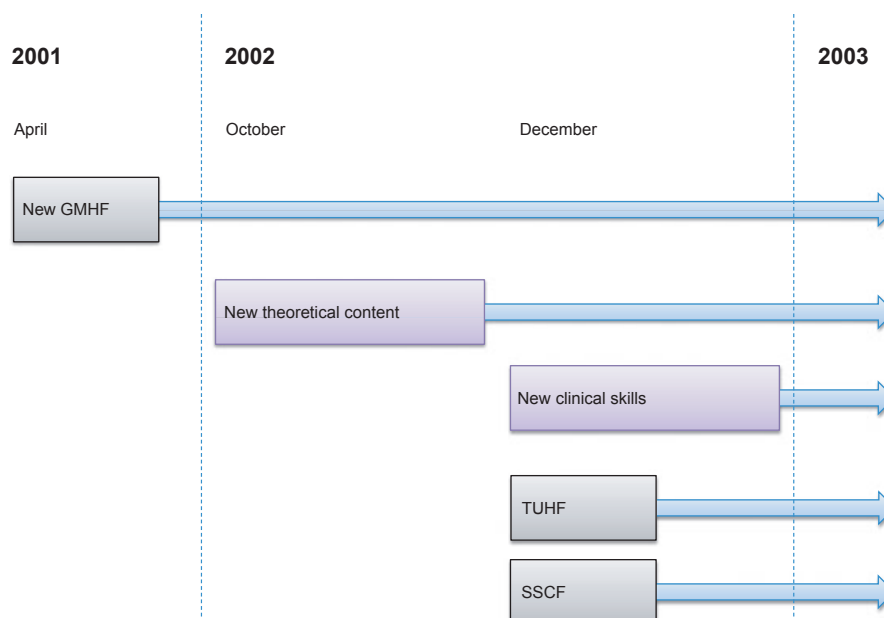


Fig. 1. Implementation of a tobacco dependence education curriculum at the Medi School of Dental Hygiene (MSDH) in 2001 and 2002. GMHF, general medical history form; TUHF, tobacco use history form; SSCF, specific smoking cessation form.

• Do you smoke	<input type="checkbox"/> Yes: _____ cigarettes per day
	<input type="checkbox"/> No
• Did you ever smoke?	<input type="checkbox"/> Yes: for _____ years
	<input type="checkbox"/> No

Fig. 2. New items added to the general medical history form (GMHF) as implemented in April 2001.

from 2001 to 2008. All records were entered into a Microsoft Excel spread sheet (Microsoft Corporation, Redmond, WA, USA) and used for statistical analysis.

Ethical review and study permissions

The Swiss Ethics Committee of the Canton of Berne, Switzerland, approved the research plan. Permission to conduct the study was granted by the Swiss Ethics Committee of the Canton of Berne, Switzerland, and the MSDH, City of Berne, Switzerland.

Statistical analysis

The statistical analysis was performed using R (R-2.14.2 for Windows; Free Software Foundation, Boston, MA, USA), Statistics Department of the University of Auckland, USA. Descriptive statistics was performed to identify means, frequencies and odds ratios within the subgroups.

Results

Curriculum implementation report

In late 2001, a local coordinator responsible for curriculum change was elected to develop and implement tobacco

education at the MSDH. During the process of implementation in 2001 and the subsequent 7 years, there were no barriers or resistance to the tobacco curriculum reported by either students or faculty. Overall, seventeen lecture hours of TDE were added to the following subjects: pathology, periodontology, preventive dentistry, pharmacology and psychology. Detailed before and after TDE course hours are presented in Table 1. Tobacco dependence education curriculum-related content was implemented during the second semester in the first year of training (two lectures). The majority of theoretical content was scheduled during the second year of training (15 lectures).

A detailed outline of the new TDE curriculum-related subjects is presented in Table 2. The theoretical TDE content was embedded in the pathology, periodontology, preventive dentistry and pharmacology courses and delivered through lectures. Additionally, the pathology of tobacco-affected oral tissues was demonstrated through the use of clinical case presentations. Methods used to introduce communications skills and health behaviour change tools included lectures, role-play and video taping of patient interviews in the MSDH clinic. Dental hygiene students were instructed to keep records of brief interventions of 5–10 min at the first visit and at every follow-up visit with all patients who used tobacco.

• I am a non-smoker	<input type="checkbox"/> I have never smoked in my life
• I am an ex-smoker	<input type="checkbox"/> Yes, for less than 6 months <input type="checkbox"/> Yes, for more than 6 months
• I am a smoker	
- For how many years have you been a smoker?	For _____ years
- How many cigarettes do you smoke per day?	<input type="checkbox"/> Less than 10 <input type="checkbox"/> 10 – 20 <input type="checkbox"/> 20 – 30 <input type="checkbox"/> More than 30
- Do you think that any oral health problems you may have at the present time might have anything to do with smoking?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
- Do you think that your health would benefit from your giving up smoking?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
- Are you thinking of giving up smoking soon?	<input type="checkbox"/> Yes, I am thinking about quitting within the next 6 months <input type="checkbox"/> Yes, I am planning to quit within in the next 30 days <input type="checkbox"/> No
- How often have you already tried giving up smoking?	<input type="checkbox"/> Never <input type="checkbox"/> Once <input type="checkbox"/> 2 – 4 times <input type="checkbox"/> More than 4 times
- If you have already tried giving up and failed, why did you start smoking again?	<input type="checkbox"/> Strong craving <input type="checkbox"/> Stress situation <input type="checkbox"/> Social smoking or drinking <input type="checkbox"/> Any other situation

Fig. 3. Tobacco use history form (TUHF) as implemented in December 2002.

Table 1. **Before (and after) implementation course schedule hours of the tobacco dependence education curriculum-related subjects at the Medi School of Dental Hygiene (MSDH), Bern, Switzerland**

	1st year of training		2nd year of training		3rd year of training	
Semester	1	2	3	4	5	6
Number of weeks	20	18	20	15	20	17
Tobacco dependence education curriculum-related subjects						
Pathology		34 (+2)	34 (+2)			
Periodontology	40	36	38 (+2)	26 (+2)		
Preventive dentistry	40	36	40	24 (+4)		
Pharmacology			29 (+1)			
Psychology	40	36	40	24 (+4)	12	
Other subjects	373	282	247	242	57	16
Total hours of theoretical curriculum	493	424 (+2)	428 (+5)	316 (+10)	69	16
Total hours of clinical courses	200	226	260	176	716	708
Total hours	693	650 (+2)	688 (+5)	492 (+10)	785	724

Patient demographics

A total of 2213 patients (age: 47.2 years; age range, 8–96 years) visited the MSDH between 2001 (January 1) and 2008 (December 31). Dental hygiene students provided care for 954 men (43.1%, mean age: 47.3 years) and 1259 women (56.9%, mean age: 47.1 years) (Table 3). The gender and age distribution from the sample were normally distributed and

were representative of the Swiss population between 2001 and 2008 (22).

Identification of the tobacco use status

Using the new GMHF, a total of 1896 patients (85.7%) were identified as smokers ($n = 573$, 30.2%), ex-smokers ($n = 418$,

Table 2. New theoretical content and clinical skills outlined per subject as implemented in October and December of 2002

Tobacco dependence education curriculum-related subjects	New theoretical content attained through frontal lectures	New clinical skills gained through clinical instruction (CI) and practice (CP)
Pathology		
Impact of tobacco use on systemic health	✓	✓ (CI)
Impact of tobacco use on oral health		
Aetiology and pathogenesis	✓	✓ (CI)
Oral mucous membrane	✓	✓ (CI)
Saliva, dental caries and others	✓	✓ (CI)
Impact of tobacco use cessation on systemic and oral health	✓	✓ (CI)
Periodontology		
Impact of tobacco use on periodontal health		
Aetiology and pathogenesis	✓	✓ (CI)
Periodontal and peri-implant tissues	✓	✓ (CI)
Oral hygiene and dental aesthetics	✓	✓ (CI)
Preventive Dentistry		
Tobacco culture and psychosocial aspects of tobacco use		
History of tobacco products	✓	
Tobacco use patterns	✓	
Tobacco prevention organizations	✓	
Tobacco industry, marketing and promotion	✓	
Tobacco prohibition and control policies	✓	
Effective pharmacotherapies for tobacco use cessation	✓	✓ (CP)
Strategies for prevention of tobacco use	✓	✓ (CP)
Pharmacology		
Tobacco use and nicotine dependence		
Initiation and progression of tobacco use	✓	
Individual tobacco use profile	✓	
Nicotine metabolism	✓	
Physical dependence	✓	
Psychological dependence	✓	
Withdrawal symptoms	✓	
Biochemical validation	✓	
Psychology		
Methods of motivating quit attempts in patients	✓	✓ (CP)
Communication skills	✓	✓ (CP)
Health behaviour change tools	✓	✓ (CP)
Integration of tobacco use cessation into dental practice	✓	

Table 3. Identifications of the patients' smoking status as attained through the general medical history form (GMHF)

Group	<i>n</i>	%	%
All patients (mean age 47.2 years, range 8–96 years)	2213	100.0	
Male	954	43.1	
Female	1259	56.9	
No identification	317	14.3	
Identifications	1896	85.7	100.0
Non-smokers	905		47.8
Ex-smokers	418		22.0
Smokers	573		30.2

22.0%) or non-smokers ($n = 905$, 47.8%) (Table 3). Information was not collected if the patient did not check the GMHF box. Additional information on the smoking status was obtained from the TUHF (Table 4). Although the dental hygiene students were instructed to hand out the TUHF to all the patients, the form was collected from only 636 patients

(28.7%) with the majority being smokers ($n = 290$, 45.6%) followed by non-smokers ($n = 206$, 32.4%) and ex-smokers ($n = 140$, 22%). No further bias was detected concerning the usage of the TUHF when related to age or gender.

A total of 27.7% of smokers associated their health problems to their smoking while 48.3% did not acknowledge the relationship. Of 290 smokers, 81.0% thought their health would benefit from quitting smoking, 37.9% were willing to quit within the next 6 months and 48.3% did not want to quit. The majority of smokers (66.6%) had tried to quit at least once while 28.3% had never tried to quit before.

Tobacco use brief interventions

Of the 573 smokers identified, 36.8% were provided a brief intervention with the activity recorded by dental hygiene students. Follow-up brief interventions were noted in 10.8% of all the smokers recorded on the SSCF. A total of 34 (5.9%) of smokers visiting the dental hygiene student clinic between 2002 and 2008 reported to have quit smoking while 16 (7.6%)

Table 4. Tobacco use history, awareness of harmful impact of tobacco and willingness to quit from 290 smokers as attained through the tobacco use history form (TUHF)

Group	<i>n</i>	%
Own oral health problems associated with smoking?		
Yes	86	29.7
No	140	48.3
Don't know	42	14.5
Missing	22	7.6
Benefit from quitting smoking?		
Yes	235	81.0
No	27	9.3
Don't know	15	5.2
Missing	13	4.5
Willingness to quit smoking?		
Yes, within the next 6 months	110	37.9
Yes, within the next 30 days	25	8.6
No	140	48.3
Missing	15	5.2
Number of times tried to quit?		
Never	82	28.3
Once	71	24.5
2–4 times	95	32.8
More than 4 times	27	9.3
Missing	15	5.2

of all the patients at the MSDH receiving one or more brief intervention reported to have quit (Table 5).

In particular, heavy smokers with a consumption of more than 20 cigarettes per day were provided with brief interventions more often compared to regular smokers (OR 2.874) (Table 6). Furthermore, smokers above the age of 40 were provided with brief interventions more often than younger or adolescent smokers (OR 2.688). However, brief interventions were provided to both genders equally (OR 1.155).

Brief interventions were provided at the start of treatment to 24.5% of smokers following implementation of the TDE curriculum in 2002. The initial brief intervention was delivered in 55.8% of the smokers during the first month following treatment start, 11.8% during the *second* month and in 5.9% during the *third* month of dental hygiene care, respectively (Table 7).

In summary, of 2213 patients at the MSDH over the years 2001–2008, 85.7% were identified as smokers, non-smokers or ex-smokers. With 36.8% of all smokers identified, an initial brief tobacco use intervention was provided of which 7.6%

Table 5. Proportions of smokers with no intervention, one, two or more interventions and their self-reported quit rates

	<i>n</i>	Non-quitters (%)	Self-reported quitters (%)	OR
All smokers	573	539 (94.1%)	34 (5.9%)	
Smokers with no intervention	362	344 (95.0%)	18 (5.0%)	1.229
(A) Smokers with one intervention	149	140 (94.0%)	9 (6.0%)	
(B) Smokers with two or more interventions	62	55 (88.7%)	7 (11.3%)	1.980
(A) + (B)	211	195 (92.4%)	16 (7.6%)	

Table 6. Interventions related to demographic factors

Factor	Intervention <i>n</i>	No intervention <i>n</i>	OR
Smoking > 20 c/d*	53	37	2.874
Smoking ≤ 20 c/d*	157	315	
Age > 40	142	171	2.688
Age ≤ 40	69	191	
Gender (male)	109	174	1.155
Gender (female)	102	188	

*From a total of 11 patients, the amount of cigarettes smoked per day was not known. One of these patients received one intervention.

Table 7. First interventions from 102 smokers with treatment start after tobacco dependence curriculum implementation in 2002

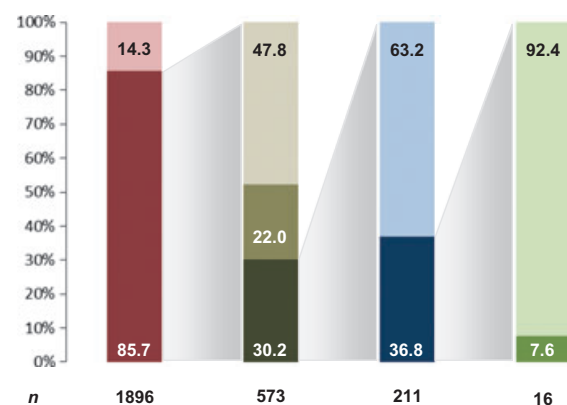
Days after treatment start	Smokers <i>n</i>	Smokers %
0 (at treatment start)	25	24.5
1–7 (week 1)	12	11.8
8–14 (week 2)	8	7.8
15–21 (week 3)	9	8.8
22–30 (week 4)	3	2.9
0–30 (month 1)	57	55.8
31–60 (month 2)	12	11.8
61–90 (month 3)	6	5.9
>90 (month 4 and later)	27	26.5

reported quitting tobacco use during treatment with the dental hygiene student (Fig. 4).

Discussion

Aim and primary outcome variables

The aim of our investigation was to review the implementation of a comprehensive TDE curriculum at the MSDH, Bern,



Red: Patients identified (85.7%), not identified (14.3%)

Brown: Smokers (30.2%), ex-smokers (22.0%), non-smokers (47.8%)

Blue: Smokers with one or more interventions (36.8%), no intervention (63.2%)

Green: Smokers who quit (7.6%), didn't quit (92.4%)

Fig. 4. Identification of smokers from the general medical history form (GMHF), frequency of interventions and quit rates from smokers receiving one or more interventions.

Switzerland. Both curriculum-related information as collected from the MSDH curriculum database 2001–2008 and patient-related data were evaluated.

Role of dental hygienists in tobacco use prevention and cessation

The significance of the dental hygienists to engage in tobacco use treatment activities is widely reported in the literature (14, 16, 23–26). Consequently, the implementation of TDE into dental hygiene curricula has received increased attention in the past few years (27, 28). This descriptive, behaviourally based research may assist dental hygiene schools in their process to assess, develop and implement tobacco dependence into their own curriculum.

Didactical data from the curriculum implementation report

Reflecting on the process of implementing new TDE curriculum at the MSDH, the selection of a local tobacco treatment coordinator proved to be highly effective. This person was elected with endorsement from senior faculty and therefore given the authority to (i) add additional hours to the previous curriculum; (ii) balance both theoretical content and schedule hours between various interdisciplinary subjects being pathology, periodontology, preventive dentistry, pharmacology and psychology and (iii) brief the teachers and provide information about their specific topics to be lectured. Even though a number of additional lectures had to be added into the weekly schedule, there were no barriers or resistance reported by either students or faculty. This observation may be explained by a number of possible reasons: the local ‘advocate’ or *champion* was highly committed to lead this project while keeping a good rapport with all people involved at the MSDH. Initially, a smaller number of lectures were added to the subjects of pathology and periodontology. Subsequently, more lectures were added year after year in the subject areas of preventive dentistry, pharmacology and psychology. Again, while keeping a *good relationship* between both students and faculty colleagues, the local champion was able to effectively move forward while accepting feedback from teachers and clinical faculty about what worked for them and what did not. Ease of implementation may also be attributed to the fact that dental hygienists per se are well trained in motivating their patients to adopt oral hygiene measures or dietary elements. Adding TDE to the current curriculum seemed to fit quite well in the traditional care paradigm of dental hygienists.

Patient-related data from the patient demographics

One important outcome of the implementation of the TDE curriculum was the identification of smokers, ex-smokers or non-smokers. Unfortunately, 14.3% of the boxes next to the questions asked in the GMHF (Fig. 2) were not checked. The lack of identification by the GMHF may have been the

patients’ personal resistance towards answering this question or fear of receiving quit advice by the student.

As pointed out by Fiore *et al.* (29), asking all the patients about their tobacco use is the first and foremost important step to be completed by all health professionals worldwide. Therefore, future didactic and clinical training may focus on measures to increase the initial identification of tobacco use. Instructing dental hygiene students, clinical faculty and staff to focus on the patient’s completion of the GMHF and specifically asking a patient’s smoking status at the first dental hygiene student visit may be sufficient. Bornstein and co-workers (2012) evaluated information on tobacco use status obtained in the dental setting utilizing the GMHF. In their study, tobacco use history obtained by the GMHF was highly correlated with the true prevalence of tobacco use confirmed by measurements of exhaled carbon monoxide levels (30). Interestingly, however, almost half of all the smokers did not acknowledge the relationship of smoking with their oral health. This lack of knowledge may be used to initiate the conversation about tobacco use and engage the patient to think about giving up smoking. When appropriately used, the information provided on the TUHF may save valuable time during patient care.

Implementation of the TUHF

The TUHF implemented in late 2002 has been used far less frequently compared to the GMHF 2002–2008. This may have occurred due to the fact that the TUHF was handed out by the dental hygiene students in the clinic and therefore was used less systematically compared to the GMHF which was provided at the patient reception area. Additionally, following implementation of the forms mentioned, a possible misunderstanding among both the clinical educators and the students may have affected the utilization of the TUHF. A majority of the students appeared to understand that the TUHF was to be used with those smokers identified through the GMHF only. Furthermore, a number of items from the TUHF were asked additionally during the tobacco use brief intervention provided by the dental hygiene student in the clinic. Therefore, both educators and students may have found no additional benefit in the form and therefore did not utilize it in the clinic, even though they were instructed to do so. Further training of clinical educators should help proper utilization of the forms by both students and faculty. Nevertheless, 290 smokers received a more in-depth assessment including their tobacco use history, knowledge on the harmful impact of tobacco and willingness to quit. Whether the implementation of this form supported dental hygiene students to provide brief interventions was not assessed in this study but raises the need for further research.

Brief interventions

One or more brief interventions were recorded with only 36.8% of all the smokers during 2002–2008 while follow-up interventions were recorded in only 10.8%. Possibly, tobacco use brief interventions may not have received equal

consideration when compared to the many other tasks required during the dental hygiene appointment and thus may not have seemed to be worthy enough for recording. Clearly, this is an important area needing improvement as taking notes helps to better identify the patients' needs over long time at their follow-up visits. Therefore, when implementing a comprehensive tobacco dependence curriculum in a dental hygiene setting, one area of focus may be given to the documentation of each brief intervention in all patient records.

As an implementation process study, the amount of quit support received, the impact of the brief interventions provided and the reasons why patients quit were not investigated. Additionally, our review does not reveal any data on possible relapses or the amount of time between the first brief intervention and when a patient quit smoking.

Patient selection bias

Dental hygiene students at the MSDH provided and kept records of tobacco use brief interventions mainly in patients aged above 40 and with a consumption of more than 20 cigarettes per day. Even though most of the heavy smokers identified were more than 40 years old, any patient selection should be avoided. While giving instructions on tobacco use brief interventions, *all* patient groups equally should receive equal attention and treatment.

Quit rates and timing of first intervention

Clear evidence exists that quit rates achieved by smoking cessation counselling are generally dependent on the amount of time allowed for counselling. Overall quit rates achieved by counselling lasting for 1–3, 4–30, 31–90 and >90 min have been reported as 14.0%, 18.8%, 26.5% and 28.4%, respectively (21). In a randomized controlled study from a dental hygiene setting, Binnie *et al.* (31) reported quit rates of 15% after 3 months, 10% after 6 months and 7% after 12 1 year following intervention by the dental hygienist. A recent pilot study by Gonsenth *et al.* (32) determined quit rates of 15% after 6 months following the intervention by the dental hygienist. Even though our evaluation cannot compete with any controlled study on this matter, our data reveal similar self-reported quit rates (6.0%) in smokers receiving one intervention and increased self-reported quit rates (11.3%) in smokers receiving two or more interventions. Within the limitations of our study, it may successively be considered, that two or more interventions delivered by the dental hygiene students may increase the likelihood for success.

Conclusion

For the implementation of both theoretical and clinical TDE curriculum, the election of a local tobacco treatment coordinator appeared to be beneficial. This person was able to oversee the implementation of new curriculum schedule hours from various interdisciplinary subjects and supervised the training of clinical instructors in tobacco use brief intervention counselling skills.

Even though smokers were identified during routine care of the dental hygiene students, the recording of the actual tobacco use brief interventions was incomplete – possibly leading to minimal follow-up or even limited quit rates. Therefore, increasing initial identification rates using forms such as the GMHF should be given a priority. Furthermore, implementation of specific recording tools such as the SSCF should be encouraged. The regular use of tobacco assessment forms and recording every tobacco intervention may support and even encourage effective tobacco treatment by dental hygiene students. Implementing these strategies may improve the dental hygienists' efforts to increase quit rates with tobacco users leading to better oral health and quality of life.

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