FCTC IMPLEMENTATION: THE ROLE OF STATE OR NON-GOVERNMENT ORGANIZATIONS? AN EXAMPLE OF THE CZECH REPUBLIC

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SUMMARY

Objectives: Smoking is the leading cause of premature mortality and morbidity. The aim of this study was to provide the first national description of organizational capacity and involvement in tobacco control (TC) measures outlined by the WHO Framework Convention on Tobacco Control (FCTC) within the Czech Republic.

Methods: Data were collected in a national cross-sectional survey of all 14 organizations engaged in TC activities within the Czech Republic. Organizational capacity (defined as skills, supports, partnerships, resources, and leadership) to implement TC activities, and level of involvement in key FCTC measures were assessed and compared across organizations.

Results: Despite the high economic costs of tobacco use, few organizations were involved in TC activities. 50% of all organizations involved in TC activities were non-government or non-profit organizations. Less than one third of organizations reported having a sufficient number of staff or adequate funding to work effectively. Skills for chronic disease prevention (CDP) practice including assessment, identifying relevant practices, developing and implementing initiatives were rated more favourably than skills to evaluate these activities. Level of involvement was ranked highest for activities that focused on creation of smoke-free environments and lowest for activities that focused on raising taxes and sales to minors. Organizations tended to be more involved in individual, rather than population-level prevention strategies. Inadequate funding, insufficient number of staff dedicated to working on TC, and lack of political will were major barriers.

Conclusions: This paper provides the first national description of organizational capacity and level of involvement in FCTC measures within the Czech Republic.

Key words: FCTC, tobacco control, capacity assessment, smoking, public health

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INTRODUCTION

Tobacco use is the leading cause of preventable death, disease and impoverishment globally (1). According to the World Health Organization (WHO), Europe has the highest prevalence of tobacco smoking among adults (28%) and among the highest prevalence of tobacco use by adolescents (2). In the Czech Republic, tobacco consumption ranks about 25% in the population aged 15–65 years, and tobacco control (TC) measures rank among the poorest globally (3–5). Among all tobacco related chronic diseases, smoking is responsible for one in every six deaths in the Czech Republic (6). The burden of tobacco use on the Czech healthcare system and other tobacco-related costs call for growing urgency to invest in evidence-based measures that will decrease the demand for tobacco (7).

Tobacco use is a complex societal problem, influenced by an array of factors – many of which lie outside the influence of the health sector. TC requires comprehensive and integrated action across sectors to improve coherence, effectiveness and efficiency of policies (8–9). The WHO Framework Convention on Tobacco Control (FCTC) and its guidelines provide the foundation for countries to implement and manage tobacco control (10). The FCTC outlines six evidence-based measures that are best buy interventions, proven to reduce the demand for tobacco (11). These measures are referred to collectively by the acronym MPOWER which stands for Monitor tobacco use and prevention policies, Protect people from tobacco smoke, Offer help to quit tobacco use, Warn about the dangers of tobacco, Enforce bans on tobacco advertising, promotion and sponsorship, and Raise taxes on tobacco (11).

In order to work effectively on TC related activities outlined by the FCTC, organizations must have the capacity to do so, in terms of resources, skills, leadership and supports. Within the Czech Republic, little is known about what types of organizations are involved in tobacco control; the capacity these organizations may have in terms of structures, supports, resources and skills to work on TC related activities or; their level of involvement in evidenced based TC activities.

Given the Czech Republic's history of weak TC, our aim was to conduct a capacity assessment to better understand the strengths and limitations of current TC efforts as they relate to the FCTC (4, 11). We conducted a cross sectional survey of all known organizations (N = 20) involved in activities that address tobacco use. Our findings describe key determinants of organizational capacity including organizational supports, partnerships, resources, leadership, and chronic disease preveniton (CDP) skills to carry out TC activities. We also examined organizations level of involvement across settings, strategies used, and their level of involvement in MPOWER measures. Our findings provide data, which identifies strengths and gaps in organizational capacity, and provide an evidence base to help guide decision makers to identify strategic priorities. To our knowledge, this is the first national survey of organizational capacity and involvement in the Czech Republic, focused specifically on TC.

MATERIALS AND METHODS

Between June and November 2017, cross-sectional data were collected in a survey of all organizations in the Czech Republic that fit our inclusion criteria. Our inclusion criterion was that organizations must be engaged in primary or secondary prevention activities relating to TC at a national level, in the three years prior to data collection. Organizations were first identified by local TC experts, and then through an exhaustive Internet search using purposive sampling. Organizations included government ministries, offices and departments, public health organizations clinics, centres and commissions, herein referred to collectively as government organizations (GOV), non-government and non-profit organizations, alliances, networks, professional associations and societies, and health agencies, herein referred to collectively as non-government organizations (NGO).

Prior to data collection, key informants with an in-depth knowledge of TC in the Czech Republic validated the final list of organizations to be included in the study. A total of 20 organizations fit our inclusion criteria. This represented a complete census of all known organizations engaged in primary or secondary prevention of tobacco use in the Czech Republic at a national level. We excluded any organizations that operated at a regional or community level only, as well as primary care facilities such as hospitals that focus mainly on tertiary prevention.

In this study, organizational capacity was conceptualized to include leadership, supports, skills, partnerships and resources. Tobacco related activities were defined as any programmes, policies, strategies, initiatives, or interventions that focus on reducing the demand for tobacco. Our survey tool was developed based on a comprehensive review of peer-reviewed literature and published reports of organizational capacity for CDP and healthy lifestyle promotion (12–15). Survey questions were drawn from a psychometrically sound scale developed by Hanusaik et al. (16) to measure determinants of organizational capacity for CDP, and adapted to focus specifically on TC related activities. Four internationally recognized TC experts helped established face validity of the questionnaire. The final working version of the survey was pilot tested with public health practitioners working in TC in three district health authorities in Nova Scotia, Canada.

The final version of the questionnaire consisted of 25 questions. The questionnaire gathered information about organizational characteristics and supports of capacity (leadership, skills resources and partnerships). We asked organizations to rate their skill level for core CDP skills including assessment, identification of relevant practices, development of action plans, implementation of activities, and evaluation. We also gathered data on level of involvement in population and individual intervention strategies, MPOWER measures, involvement across settings, and barriers faced by organizations. Most response sets were five-point Likert scales, with level of agreement response formats ranging from 1 (very low/strongly disagree) to 5 (very high/strongly agree).

A certified Czech translator translated the questionnaire from English to Czech. Researchers at the Centre for Tobacco-Dependent at Charles University and the General University Hospital in Prague reviewed the questionnaire to ensure cross-cultural adaptation of all questions.

Organizations were initially contacted by email to solicit their participation in the study. A Czech-speaking interviewer followed up with each organization by phone or email, to confirm their participation and to set a date for data collection. One key informant per organization completed the survey. The survey respondent was identified by the head of the organization as most knowledgeable about the organization's TC related activities. One survey was completed by each organization; with exception of two GOV organizations that worked closely on tobacco related activities and requested to complete one survey together. These two organizations were counted as a single organization in the analysis. Any incomplete data or inconsistencies were resolved with a follow up telephone call or e-mails.

Statistical Analyses

Since this study reports data collected in all organizations involved in TC at a national level (not a sample), significance testing was not relevant. Data analyses were conducted using IBM SPSS Statistics software, version 25.

Ethical Approval

The study received ethical approval from the General University Hospital in Prague (Study no. 39/16 S-IV). The head of each organization, as well as the survey respondent, provided written consent to participate in the study.

RESULTS

A total of 20 organizations met the inclusion criteria for the study. These organizations represented a complete census of all known organizations actively engaged in TC activities, at a national level in the Czech Republic in the three years prior to data collection. All eligible organizations were invited to participate in the study. Fourteen organizations agreed to take part in the study.

Our final census included an equal number of GOV (n = 7) and NGO (n = 7) organizations. Organizational characteristics are presented in Table 1. Overall organizations tended to rate their level of involvement in TC related activities as 'high' and TC was rated as a 'moderate' to 'very high' priority for all organizations.

Table 1. *Characteristics of organizations involved in TC related activities in the Czech Republic according to type of organization (N = 14)*

	Type of organization[a]		
	Total N = 14	**GOV n = 7**	**NGO n = 7**
Size, median (range)			
Number of FTEs employed by organization [b]	2 (0–5,000)	651 (23–5,000)	0 (0–2)
Number of individuals working on TC within organization [c]	7.5 (0–25)	10 (0–25)	4 (1–12)
Number of FTEs work on TC within organization	0 (0–5)	0 (0–5)	0
Target population served by organizations			
Organizations that served general population [d], %	71.4	71.4	71.4
Organizations that served specific subpopulation [e], %	28.6	28.6	28.6
Organization's level of involvement in TC [f], mean (SD)	4.0 (1.1)	3.7 (1.4)	4.3 (0.7)
TC's level of priority for the organization [f], mean (SD)	4.5 (0.7)	4.3 (0.9)	4.7 (0.5)

[a]GOV – government ministries, offices and departments, public health organizations, clinics, centres and commissions; NGO − non-government and non-profit organizations, alliances, networks, professional associations and societies, and health agencies
[b]FTEs – full-time equivalents (paid employees)
[c]TC – tobacco control. This includes paid or unpaid individuals working full time or part time.
[d]Organizations whose TC activities mainly serve general population.
[e]Organizations whose TC activities mainly serve specific subpopulations (e.g., health care professionals, individuals with mental illness, or those with substance abuse problems.
[f]five-point Likert scale: 1 – very low; 2 – low; 3 – moderate; 4 – high; 5 – very high

Table 2. *Levels of determinants (organizational supports, partnerships, financial resources) of organizational capacity for FCTC related activities in the Czech Republic according to type of organization (N = 14)*

	Type of organization		
	Total N = 14	**GOV n = 7**	**NGO n = 7**
Organizational supports to guide TC activities, mean (SD) [a]			
Strategic priorities	3.9 (1.1)	3.9 (1.2)	4.0 (0.9)
Leadership	4.0 (0.9)	4.0 (1.1)	4.0 (0.8)
Managerial	4.1 (0.6)	4.3 (0.5)	4.0 (0.8)
Professional development opportunities	3.9 (0.7)	4.1 (0.6)	3.7 (0.7)
Adequate number of staff	2.4 (1.2)	2.7 (1.3)	2.0 (0.9)
Specialized knowledge and skills	3.6 (0.6)	3.7 (0.7)	3.4 (0.5)
Equipment and tools	3.4 (0.9)	4.0 (0.8)	2.9 (0.6)
Partnerships			
Organizations that had formed partnerships, %	64.3	57.1	71.4
Partnership effectiveness [a], mean (SD)	3.5 (1.0)	3.7 (0.9)	3.4 (1.0)
Partnerships formed across sectors [a], mean (SD)	2.9 (1.1)	3.0 (1.2)	2.9 (1.0)
Financial resources			
Funding adequacy [b], mean (SD)	1.8 (0.7)	2.0 (0.5)	1.5 (0.8)
Funding stability [c], mean (SD)	2.5 (1.3)	3.1 (1.2)	1.6 (0.8)
Availability of external funding sources [a], mean (SD)	2.1 (1.3)	2.3 (1.6)	1.8 (0.9)

[a]Scored on a five-point Likert scale: 1 – totally or strongly disagree; 2 – disagree; 3 – neither agree nor disagree; 4 – agree; 5 – totally or strongly agree
[b]Scored on a five-point Likert scale: 1 – much less than adequate; 2 – less than adequate; 3 – neutral; 4 − adequate; 5 – more than adequate
[c]Scored on a five-point Likert scale: 1 – very unstable; 2 – somewhat unstable; 3 – stable; 4 – somewhat stable; 5 – very stable

Organizational capacity for involvement in FCTC measures was conceptualized to include leadership, supports, skills, partnerships and resources (Table 2). Among the indicators for internal organizational supports, strategic priorities, leadership, managerial support, and professional development opportunities were rated relatively high. Only half of organizations reported confidence in their staff's knowledge and skills to work effectively on tobacco control-related issues. In terms of access to necessary equipment and tools (e.g., software, computers, literature, etc.), this was not reported as a major barrier, but NGO tended to rate this lower than GOV.

Partnerships were assessed as an indicator of external support for FCTC activities (Table 2). More than half of all organization had formed partnerships of some kind to work on TC related

activities. Although, NGO tended to form more partnerships than GOV, partnership effectiveness was rated slightly lower. Formation of cross sector partnerships was rated very low by all organizations.

The majority of organizations rated their funding to support TC activities as 'less than adequate' or 'much less than adequate'. Funding stability was rated lower by NGO than GOV. Availability of external sources of funding to support TC related activities was rated low by all organizations.

CDP practice skills including assessment, identifying relevant practices, developing and implementing initiatives were rated more favourably than skills to evaluate these activities (Table 3). Only half of all organizations reported confidence in their skills to evaluate the impact of their TC work.

Among all organizations, involvement in TC activities was highest in government settings, followed by healthcare settings. NGO reported greater involvement in these settings, compared to GOV. Few organizations were involved in TC activities in workplaces or schools, with the lowest level of involvement in the community at large.

Overall, organizations reported the highest level of involvement in individual-level strategies focused on public education to raise awareness. Less than half of all organizations were 'very involved' in population-level strategies, such as policy development, advocacy and creation of healthy environments.

Level of involvement in MPOWER measures was highest for activities that focused on creation of smoke-free workplaces and public places, followed by health information and warnings on packages, and monitoring of tobacco use (Table 4). Half of all organizations reported that they were 'very involved' in activities that focused on helping smokers to quit. Organizations reported the lowest level of involvement in MPOWER measures that focused on raising taxes, enforcing bans on tobacco advertising, promotion and sponsorship, and sales to minors.

Organizations reported a range of barriers (Table 4). Insufficient funding, inadequate number of staff dedicated to working on TC, lack of political will and competing priorities, as well as strong interference from the tobacco industry were reported as major barriers.

DISCUSSION

To our knowledge, this is the first national survey of organizational capacity and level of involvement in FCTC measures among organizations in the Czech Republic. Our findings show that

Table 3. *Skill level for core chronic disease prevention practices to address tobacco use, levels of involvement in specific settings, and intervention strategies used according to type of organization (N = 14)*

	Type of organization		
	Total N = 14	**GOV n = 7**	**NGO n = 7**
Core CDP practice skills specific to tobacco control activities [a], mean (SD)			
Assessment	3.8 (1.4)	4.1 (1.4)	3.2 (1.3)
Identifying relevant practices	3.9 (1.3)	3.3 (1.6)	4.4 (0.5)
Developing action plans	4.1 (1.1)	4.0 (1.4)	4.2 (0.7)
Implementation of activities	4.2 (1.1)	4.0 (1.4)	4.4 (0.5)
Evaluation	3.1 (1.4)	3.2 (1.3)	3.0 (1.5)
Level of involvement in specific settings [b], mean (SD)			
Schools	2.1 (1.3)	2.6 (1.3)	1.7 (1.2)
Workplaces	2.6 (1.4)	2.9 (1.6)	2.4 (1.3)
Health care	3.3 (1.4)	3.1 (1.6)	3.4 (1.2)
Community at large	2.1 (1.0)	2.1 (1.1)	2.1 (0.8)
Government settings	3.5 (1.5)	3.1 (1.5)	3.9 (1.4)
Level of involvement in intervention strategies targeting individual level [c], mean (SD)			
Public education	2.7 (0.6)	2.6 (0.7)	2.9 (0.3)
Programmes to build skills at individual level	2.3 (0.8)	2.3 (0.9)	2.3 (0.7)
Service provider skill building	2.3 (0.8)	2.2 (0.9)	2.4 (0.7)
Clinical interventions and treatment of individuals	2.3 (0.8)	2.2 (1.0)	2.3 (0.7)
Level of involvement in intervention strategies targeting population level [c], mean (SD)			
Public policy change and advocacy	2.4 (0.8)	2.5 (0.8)	2.2 (0.7)
Creating healthy environments	2.4 (0.6)	2.4 (0.7)	2.4 (0.5)

[a]Scored on a 5-point Likert scale: 1 – poor; 2 – fair; 3 – moderate; 4 – good; 5 – very good. Response categories "not our role" and "don't know" were also included as options. In these cases organizations were excluded from the calculated mean.
[b]Scored on a 5-point Likert scale: 1 – very low; 2 – low; 3 – moderate; 4 – high; 5 – very high. Response categories "don't know" and "not involved" were also options. In these cases, the response was classified as 1 – very low.
[c]Scored on a 3-point scale: 1 – not at all involved; 2 – somewhat involved; 3 – very involved. Response category "don't know" was also included as option. In these cases the response was excluded from the calculated mean.

Table 4. *Level of involvement in MPOWER measures and barriers faced according to type of organization (N = 14)*

	Total N = 14	GOV n = 7	NGO n = 7
Level of involvement in MPOWER measures[a], mean (SD)			
Raise taxes on tobacco	2.0 (0.8)	2.0 (0.8)	2.0 (0.8)
Smoke-free workplaces and public places	2.7 (0.6)	2.6 (0.7)	2.9 (0.3)
Health information and warnings on tobacco packages	2.4 (0.8)	2.6 (0.7)	2.3 (0.9)
Enforce bans on tobacco advertising, promotion and sponsorship	2.1 (0.8)	2.2 (0.9)	2.0 (0.8)
Monitor tobacco use	2.4 (0.9)	2.7 (0.7)	2.0 (0.9)
Offering smokers help to quit tobacco use	2.2 (0.9)	2.3 (0.9)	2.1 (0.8)
Sales to minors	1.8 (0.8)	2.3 (0.7)	1.3 (0.5)
Barriers, %			
Insufficient funding	57.1	57.1	57.1
Insufficient number of staff	57.1	71.4	42.9
Lack of political will or competing priorities	42.9	57.1	28.6
Tobacco industry interference	28.6	28.6	28.6

[a]Scored on a 3-point Likert scale 1 – not at all involved; 2 – somewhat involved; 3 – very involved. Response category "don't know" was also included as option. In these cases the response was excluded from the calculated mean.

despite the high economic costs of tobacco use, few organizations were involved in key evidence-based tobacco control measures as outlined by the FCTC. TC activities were underfunded and most organizations did not have sufficient human resources dedicated to working on TC to achieve their objective. Furthermore, many Czech organizations were highly involved in intervention strategies that focus too far downstream to have any real impact on population health outcomes (17).

In terms of organizational supports, most organizations had strategic priorities and good leadership to guide their TC related work. Professional development opportunities were available, but less so to NGO. Less than one third of organizations had a sufficient number of staff dedicated to working on TC related activities and many did not have the proper equipment or tools (e.g., software, computers, literature, etc.) to work effectively. In addition to developing a critical mass of professionals dedicated to working on tobacco control, there is also a need to invest in helping these professionals to develop the specialized skills, knowledge, and tools to support evidence-based practices and policy decisions relating to tobacco control (18).

Partnerships

More than half of all organizations had formed partnerships to work on TC activities, but cross-sector partnerships were less common. Because tobacco use is a complex societal problem, and smoking rates are determined by an array of factors – many of which lie outside the influence of the health sector, diverse multi-sectorial partnerships are key to achieving better outcomes. Diversity improves collective understanding and problem solving capacities (19). Our findings suggest that greater cooperation within and across sectors is needed within the Czech TC community in order to effectively implement FCTC measures. Success stories of partnership and collaboration in other countries provide an excellent example of how organizations can engage, share resources and enhance knowledge exchange to build capacity and advance the national TC agenda (20).

Resources

Despite TC being rated as a 'high' or 'very high' priority for most organizations, funding adequacy for TC related activities was rated low by GOV and even lower by NGO. Our findings are similar to those reported by global survey findings, which showed that despite being a high priority, less than 40% of countries (n = 65 out of 167) had allocated a specific budget for prevention and control of non-communicable disease (21). The availability of external sources of funding to support TC activities was rated very low by all organizations. Inadequate funding for TC related activities may be a reflection of chronic underfunding of the healthcare system as a whole. In the Czech Republic, the healthcare system has undergone major restructuring since the end of communism in 1989 (22). Health expenditure accounts for 7.2% of the country's GDP, but it is not known how much of this is allocated to specifically to health promotion and CDP activities that focus on TC (23). The country's high smoking rates, which increased between 2000–2011, and the high incidence of smoking related diseases (23) provide evidence that CDP efforts are under-resourced and/or may be focused too far downstream to have any real impact on population health.

Core Chronic Disease Prevention Skills

In terms of core CDP practices, evaluation skills were rated low by all organizations. Evaluation is critical to building an evidence base to inform best practices in CDP programming (24). Our findings provide evidence that organizations must put a greater emphasis on the importance of evaluation by dedicated more resources to evaluation activities and offering training in evaluation methodology. In Canada, Hanusaik et al. (16) similarly found that compared to other core CDP skills, evaluation skills were consistently rated as low among organizations engaged in CDP.

Intervention Strategies

Overall, organizations reported the highest level of involvement in individual-level strategies focused on public education

to raise awareness. Although strategies targeting individuals are important, these activities tend to be resource intensive and have limited impact on population health, largely because they depend on long term individual behavioural change (17).

In general, population-level strategies require less individual effort, and have the greatest impact on population health outcomes (17). For example, policies supporting smoke free public spaces change the environmental context to make breathing clean air the default choice, regardless of an individual's level of education, income, access to health care, or other societal factors. An individual would have to expend significant effort to not benefit from a cleaner air policy. Population level strategies improve not only individual health, but also have economic benefits by reducing healthcare spending and mitigating productivity losses (17). Less than half of all Czech organizations reported that they were 'very involved' in population-level strategies to address tobacco use.

Level of Involvement in MPOWER Measures

Evidence-based MPOWER measures outlined by the FCTC are inexpensive for countries to implement and they work (11). Czech organizations reported the highest level of involvement in measures that focused on protection from exposure to tobacco smoke through creation of smoke free workplaces and public spaces, followed by warning about the dangers of tobacco, and monitoring tobacco use. Organizations reported the lowest levels of involvement for activities that focus on sales to minors and raising taxes. Of all the MPOWER measures, increasing price through higher taxes is the single most effective way to encourage tobacco users to quit and prevent children from starting to smoke (25). Of all European countries, the Czech Republic has among the lowest cigarette prices, due to low excise taxes (26–27). While low cigarette prices decrease the demand for illegal or contraband cigarettes, cheaper prices are associated with high smoking rates, and greater uptake among youth. Higher cigarette prices are particularly effective in encouraging cessation and motivate smokers to quit, particularly young people and those living in poverty (26–28). Over time, simple and effectively implemented tax structures decrease tobacco consumption (25). Individuals living in poverty experience the greatest health disparities (29). Higher tobacco taxes help decrease health disparities and improves families' health, productivity and wage earning capacity by decreasing smoking related illness and death (25).

Barriers to Working on Tobacco Control

More than half of all organizations reported that insufficient funding and inadequate number of staff dedicated to working on TC as major barriers. Lack of political will and competing priorities, as well as interference from the tobacco industry were all named as major barriers. Our findings support previously published reports, which showed that the tobacco industry enjoys a high-level of political support in the Czech Republic and continues to actively influence TC policies (30).

Limitations

This study has several limitations. One limitation is that data were collected from one respondent per organization. Although respondents were carefully selected by the head of each organization and confirmed to be the most knowledgeable about the organization's TC related activities, responses are inevitably influenced by individual's views and experiences. Furthermore, there are no gold standard measures of organizational capacity. Ideally organizational level constructs such as leadership, supports, partnership effectiveness, resources and skills should be assessed using objective measures. However, within the domain of organizational research, self-report is the most common method of data collection. While cross sectional data are helpful in identifying strengths and gaps in organizational capacity and provide a snapshot of organizations' involvement in TC activities, longitudinal data are needed to establish any causal associations. Future research should focus on the association between organizational capacity and level of TC nationally, as well as the association with the prevalence of smoking over time. Another limitation of this study is that we did not ask organizations about facilitators to working on TC related activities. In terms of facilitators, intangible outcomes such as trust, mutual respect, transparency, resource sharing and synergy that may emerge when organizations work together are valuable assets, which contribute to organizational capacity but are difficult to measure. Finally, the extent to which these findings are generalizable to other risk factors for chronic disease, such as physical activity, healthy eating or alcohol abuse is not known.

CONCLUSION

In conclusion, this paper provides the first national description of organizational capacity and involvement in FCTC measures within the Czech Republic. Our data identify areas of TC that need improvement including the need for increased funding and resources dedicated to TC activities, as well as a need for increased involvement in population-level strategies and cross sector collaboration. These findings provide empirical evidence to local decision makers that may inform strategic priorities and help move the TC agenda forward in the Czech Republic.

Adherence to Ethical Standards

The study received ethical approval from the General University Hospital in Prague (Study no. 39/16 S-IV).

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Conflict of Interests

None declared

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Tobacco Dependence, the Most Important Cardiovascular Risk Factor: Treatment in the Czech Republic

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Summary

Smoking is the most important cardiovascular (CV) risk factor. Stopping smoking halves the CV risk. Every clinician should provide a brief intervention with smokers. Intensive treatment should be available to those who need it. There are 37 Centers for Tobacco Dependence in the Czech Republic, which offer treatment including a psychobehavioral intervention and pharmacotherapy (varenicline, nicotine, bupropion). Czech physicians, pharmacists and nurses are regularly educated about smoking cessation. We describe the results of intensive treatment offered by our centers. Treatment includes screening (1 h), an intervention (2 h), and follow-up visits during the next 12 months. Among 3532 patients, 34.3 % had CO-validated abstinence at 12-months (including 489 patients who attended the screening visit + only the 12-month follow up visit). Among patients who underwent the intervention, the abstinence rate was 38.2 %. The majority of patients who underwent the intervention (N=2470) used some form of pharmacotherapy. After one year, the abstinence rate was 43.4 %, compared to 15.9 % (N=573) without pharmacotherapy. Only 28 % of patients came on the recommendation of a physician. Despite the decrease in CV risk following smoking cessation and the effectiveness of treatment, centers are underutilized.

Key words

Tobacco dependence ξ Smoking cessation ξ Cardiovascular risk

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Introduction

The pathophysiological effects of smoking are broad due to more than 4000 chemicals, including polycyclic aromatic hydrocarbons and oxidizing gases, most of which have cardiotoxic effects (Haustein 2002, Ambrose and Barua 2004). Nicotine is a sympathomimetic agent with potential cardiovascular (increase in heart rate, blood pressure and cardiac output) and metabolic effects (increased lipolysis) (Benowitz 1998, Ambrose and Barua 2004). It appears that pure nicotine itself has no significant influence on the development of CVD. Nicotine is highly addictive and causes addiction to tobacco, which results in inhalation of tobacco smoke with noxious agents (Asplund 2003). The risk of an acute CV event is higher among smokers due to increased coagulation which leads to thrombosis (platelet activation and aggregation, activation of coagulation, increased fibrinogen level, increased levels of tissue factor, leukocyte count, and D-dimer, and plasma viscosity) (Kannel *et al.* 1987, Wilhelmsen 1988, Fuster *et al.* 1992, Ernst 1994, Sambola *et al.* 2003). Even a small dose, including passive smoking, increases platelet aggregation. These findings may at least partly

explain the higher risk of coronary thrombosis in smokers (Lee *et al.* 1995, Puranik and Celermajer 2003). Active and passive smoking are associated with endothelial dysfunction in a dose-dependent manner (Kato *et al.* 2006). There is reduced release and availability of NO and the formation of a chronic inflammatory condition (leukocytosis, elevated CRP). Smoking and hypertension have the same effect on the progression of early atherosclerosis (Csányi *et al.* 2001). Impaired relaxation of arteries observed in an animal model, suggests a possible degradation of NO by anionic superoxide of cigarette smoke (Török *et al.* 2000). *In vitro* studies have demonstrated the association between smoking with altered endothelial-derived fibrinolytic and antithrombotic factors: t-PA/PAI-I reduction, lower 1-TFPI (tissue factor pathway inhibitor), and reduced production of NO (Barua *et al.* 2002). Nicotine stimulates the production of endothelium-derived chemoattractants that enhance the migration of smooth muscle cells of blood vessels (Di Luozzo *et al.* 2005). Endogenous NO production may be a protective mechanism against endothelial damage induced by smoking (Raveendran *et al.* 2005). Nicotine increases the level of VEGF mRNA, as well as proteins in the endothelium and may increase the release of TNF-alpha and IL-1beta from macrophages (Conklin *et al.* 2002, Wang *et al.* 2004). Inhibition of endothelial cell migration in the presence of a condensate of cigarette smoke leads to a higher probability of developing complications due to incomplete reendothelialization (Snajdar *et al.* 2001). Smoking also has broad endocrine effects (Hruskovicova *et al.* 2013).

Due to CV risk all smokers, but especially those with increased CV risk, should be strongly advised not to smoke (diagnosis F17), and to avoid any exposure to tobacco including passive smoking (diagnosis E58.7), according to the International Classification of Diseases, 10th version (WHO 2008).

Every clinician (physician, nurse, pharmacist) should provide a brief intervention with smokers and intensive treatment should be available to those who need it (Fiore *et al.* 2008). Treatment that includes a psychobehavioral intervention and pharmacotherapy (varenicline, nicotine, bupropion), is offered at Centers for Tobacco-Dependence. There are currently 37 hospital-based centers across the Czech Republic. Education of Czech physicians, pharmacists and nurses in smoking cessation regularly occurs under the Society for Treatment of Tobacco Dependence (info at www.slzt.cz).

Methods

To demonstrate the efficacy of intensive treatment, we present a cohort of patients who visited the Center for Tobacco Dependence in the Czech Republic. Smokers were self referred or referred by a physician to the center for treatment. We compared one year abstinence rates in the following groups of patients: those who only came to the center for the initial screening visit + the 12-month follow-up visit, and those who also underwent the intervention (screening, intervention and attended at least one 12-month follow-up visit). Within the group that underwent the intervention, we also compared patients who used pharmacotherapy (varenicline, nicotine, and/or bupropion) versus those who did not.

The treatment in our center starts with an initial 1-h screening visit. Each patient's level of nicotine dependence is assessed using a series of measures, including the Fagerström Test of Cigarette Dependence (FTCD) (Fagerström *et al.* 2012), CO in expired air, the number of cigarettes smoked in the past 12 h, Beck Depression Scale II (BDI-II) (Beck *et al.* 1996), and the Minnesota Withdrawal Scale (Hughes 2007). Within one week of the initial screening visit, patients undergo a 2-h intervention with a physician. There is a mean of 4 follow-up visits during the next 12 months. The first follow-up visit usually occurs within 2 weeks of the intervention, and monthly thereafter.

The intervention with a physician is performed individually or in small groups with 4-5 individuals. Following the intervention, based on our recommendation, the patient is offered either varenicline, nicotine replacement therapy or bupropion and/or a combination. We set a quit date. Follow-up visits take about 30 min and include checking the patient's weight, blood pressure, and heart rate. We measure CO in expired air and discuss withdrawal symptoms, as well as we check the treatment.

The visit schedule and intervention structure are described in Table 1.

This analysis was approved by the Ethics Committee of the General University Hospital in Prague, registration FWA 00003027 – according to the Office for Human Research Protections, U.S. Department of Health and Human Services, under No. IRB 00002705. The General University Hospital is registered under No. IORG 0002175.

Standard descriptive statistics were used to characterize the sample data set. Statistical significance of differences in 12-month abstinence rate by gender and the type of pharmacotherapy used were assessed by Fisher-exact test. Statistical significance of differences in baseline characteristics between groups of patients who had undergone the intervention and those who did not was assessed by Mann-Whitney test or Pearson Chí-square test. A significance level of alpha = 0.05 was used.

Table 1. Visit schedule for patients of the Center for Tobacco-Dependence.

Screening visit	vital signs, weight, height, heart rate, blood pressure, personal history and social background, CO in expired air, withdrawal symptoms, and other tests
Intervention visit (usually within one week of the initial screening visit)	heart rate, blood pressure, CO in expired air, withdrawal symptoms. Intervention structure: - Introduction. Explain to the patient that the intervention is meant to be interactive and that they should feel free to discuss how they are feeling and ask questions at any time. - Patient's expectations and how the treatment will proceed. - Patient's smoking history including the total the number of cigarettes smoked per lifetime, the association between smoking and other routine activities (e.g. having a coffee). - Patient's experiences with previous attempts to quit and reasons for relapse. - The principles of nicotine dependence. How smoking is a learned behavior and changes that occur in the brain. - Identifying with being smoke-free and enjoying it. - Specific health consequences of smoking based on the patient's condition to help improve motivation, including improved mental health. - Provides brochure titled "My Way to Smoke-Free". - Patient's decision to quit smoking, including readiness, confidence in their ability to succeed, and their main source motivation. Responses are based on a 10 point-likert scale and responses may be revisited again at a later date. - The principal behind measuring breathe CO. Patient's specific CO values and how this relates to estimated nicotine intake from cigarettes. - The importance of behavioral support and typical smoking situations they will encounter (coffee, alcohol, smoking environment, food, stress, peace/rest, waiting, in the car, in the restaurant...). Work with the patient to prepare smoke-free solutions in advance and encourage them to look forward to these situations. - The importance of rewarding yourself for small successes. - Strategies to prevent weight gain, as well as the connection between smoking and stress. - Alternative relaxation techniques (deep breathing, yoga, Jacobson, etc). - Possible barriers to quitting, and how being aware of these barriers can decrease the likelihood of relapse. - The importance of social support, as well as strategies for living and/or working with other smokers. How to refuse a cigarette. - Withdrawal symptoms. - The principles of physical dependence, and the specific FTCD score of the patient. Show video demonstrating the effect of smoking on dopamine release. - Pharmacotherapy options. Drug's mechanism of action and any possible side effects. - The cost of pharmacotherapy and possibility of reimbursement. - Indication for use of pharmacotherapy and the recommended length of treatment. - Quit date, highlighting that any smoking is smoking. - Date of the next visit (usually within two weeks after the initial intervention).
Follow-up visits (based on the patient needs, but usually within 2 weeks of the quit date, then about 3x monthly, then at 6 and 12 months after the quit date)	heart rate, blood pressure, CO in expired air, withdrawal symptoms collected at each visit

Table 2. A. Selected characteristics of patients of the Center for Tobacco Dependence.

Characteristics	Complete record (N=3043)	Incomplete record (N=489)	p-value[1]
Gender			
Male	1526 (50.1 %)	255 (52.1 %)	0.412
Female	1517 (49.9 %)	234 (47.9 %)	
Age at first visit			
≤ 29	475 (15.6 %)	92 (18.8 %)	
30-39	841 (27.6 %)	113 (23.1 %)	
40-49	550 (18.1 %)	80 (16.4 %)	0.057
50-59	581 (19.1 %)	110 (22.5 %)	
≥ 60	596 (19.6 %)	93 (19.0 %)	
Education			
Basic	288 (9.5 %)	59 (12.1 %)	
Secondary	1905 (62.6 %)	328 (67.1 %)	**0.002**
University	850 (27.9 %)	102 (20.9 %)	
Daily smoked cigarettes			
Up to 10	253 (8.4 %)	62 (13.0 %)	
11-20	1578 (52.1 %)	233 (48.7 %)	
21-30	750 (24.8 %)	110 (23.0 %)	**0.018**
31-40	332 (11.0 %)	51 (10.7 %)	
> 40	116 (3.8 %)	22 (4.6 %)	
FTCD			
0-1 points	144 (4.8 %)	40 (8.6 %)	
2-4 points	823 (27.4 %)	118 (25.3 %)	**0.008**
5-7 points	1345 (44.7 %)	200 (42.8 %)	
8-10 points	697 (22.9 %)	109 (23.3 %)	
BMI (kg/m^2)	25.4 (19.5 ; 34.5)	25.5 (18.9 ; 35.8)	0.976
% body fat	28.0 (14.3 ; 42.4)	28.2 (13.4 ; 43.2)	0.421
Waist-to-Hip Ratio (%)	87.6 (71.7 ; 104.6)	87.2 (71.3 ; 105.6)	0.730
CO (ppm)	17.0 (1.0 ; 38.0)	15.0 (0.0 ; 39.0)	**0.004**
COHb (%)	3.0 (0.3 ; 6.9)	2.8 (0.1 ; 6.9)	**0.020**

Patients with a complete record, who passed the intervention = at least screening, intervention and 12-month follow-up visit (N=3043). Patients with incomplete record (screening and 12-month follow up, in case of loss to follow-up, patients were considered smokers at 12 months) (N=489). [1] Differences tested according to the Mann-Whitney U test or Pearson Chí-square test; FTCD – Fagerström Test of Cigarette Dependence; BMI – body mass index; CO – carbon monoxide; COHb – carbonylhemoglobin.

Table 2. B. Cardiovascular characteristics of patients who stopped smoking (non-smokers) and patients who continued to smoke (smokers).

Characteristics	Visit	**Non-smokers** (N=1162)		**Smokers** (N=1881)[1]	
		N	**Median (Min-max)**	**N**	**Median (Min-max)**
Weight	Baseline	1158	77.0 (45.0-135.3)	1857	75.8 (41.6-187.0)
	12 months follow-up	1094	82.9 (45.0-147.0)	100	83.4 (50.0-133.0)
Pulse	Baseline	1145	72 (41-119)	1835	72 (45-116)
	12 month follow-up	879	72 (42-154)	84	72 (56-107)
Systolic pressure	Baseline	1150	125 (85-190)	1850	123 (73-220)
	12 month follow-up	885	125 (85-210)	85	126 (90-180)
Diastolic pressure	Baseline	1150	80 (50-125)	1850	80 (45-131)
	12 month follow-up	884	80 (50-111)	85	80 (54-105)

[1] Missing data in the group of smokers are due to a loss to follow-up. In such a case the patient was considered to be a smoker.

Results

Our analysis included 3532 patients who had completed the 12 month follow-up between 2005 and 2013 (intention-to-treat analysis). The abstinence rate was 34.3 % in all patients including those who had attended only the initial screening and the 12-month follow up visit, compared to 38.2 % among those who had also undergone the intervention (initial screening visit, intervention and at least the 12-month follow-up visit). For more detail see Figures 1 and 2, and Table 2A. In Table 2B selected CV risk factors are compared.

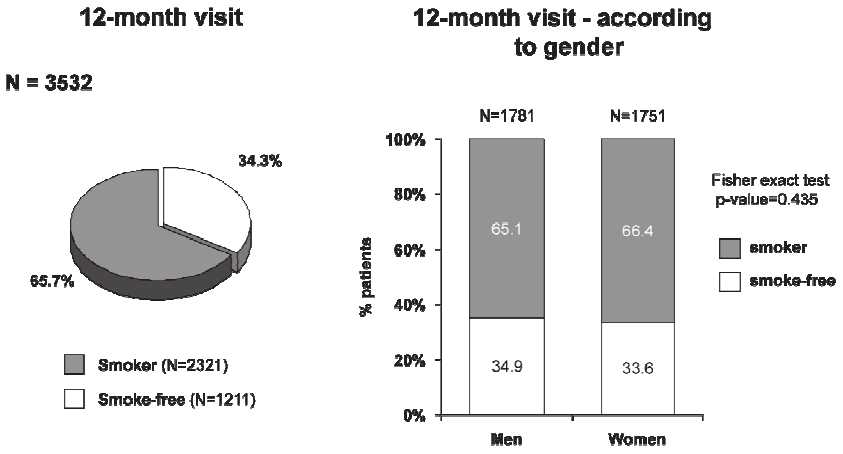

Fig. 1. 12-month abstinence rate among patients of the Center for Tobacco-Dependence in the Czech Republic between 2005 and 2013.

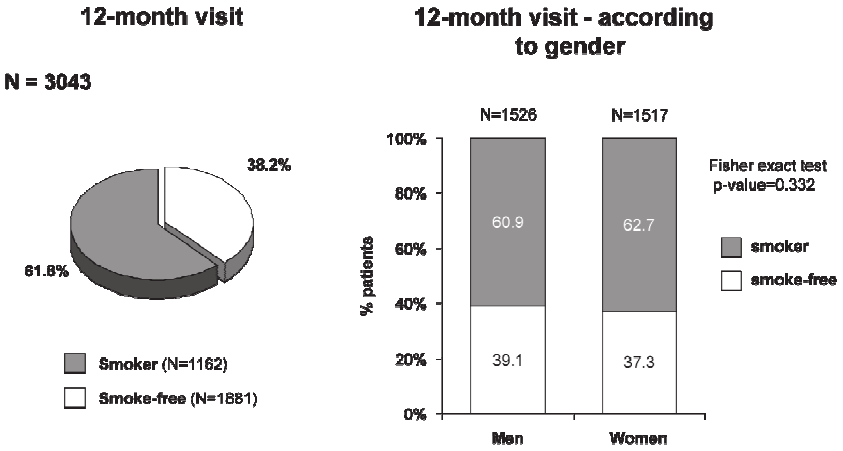

Fig. 2. 12-month abstinence rate among patients of the Center for Tobacco-Dependence who underwent an intensive intervention.

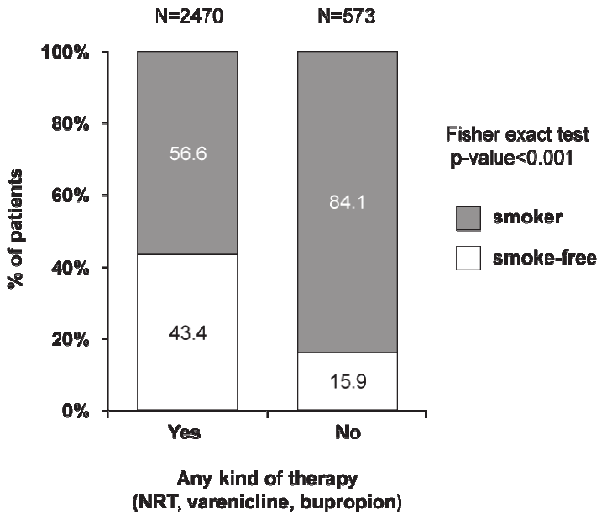

Fig. 3. 12-month abstinence rate among patients of the Center for Tobacco-Dependence who underwent an intervention according to pharmacotherapy use.

Pharmacotherapy (any kind) significantly increased the abstinence rate. The majority, 81 % of patients used some form of pharmacotherapy. Among patients who had used some form of pharmacotherapy the abstinence rate was 43.4 %, compared to 15.9 % among patients who tried to stop smoking without pharmacotherapy (Fig. 3).

Although health was the most frequent reason to stop smoking – in 68 %, only 28 % of patients said their physician had recommended they visit our center. Most patients learned about our center by way of media, including Internet – 49 %, followed by the recommendation of other patient's – 18 %. The rest learned about our center from other sources (5 %).

For a more detailed description of our patients and results, including abstinence rates according to

pharmacotherapy used, psychiatric comorbidity or CV risk factors see our other publications (Zvolska *et al.* 2012, Kralikova *et al.* 2013, Stepankova *et al.* 2013, Kmetova *et al.* 2014).

Discussion

Stopping smoking without any help has a low long-time success rate, about 5 % (Fiore *et al.* 2008). Intensive treatment may increase the number of former smokers substantially. Brief smoking cessation interventions are still not a usual part of clinical practice. Eighty percent of Czech physicians report asking about tobacco use and advising patients to stop smoking, but the next steps of the brief intervention are rarely followed. It is necessary to offer help in quitting (recommend treatment or refer the patient to a Center for Tobacco-Dependence), and to plan follow-up visits (Kralikova *et al.* 2011). For a center located in a large hospital we would expect more than 28 % of patients would be referred based on a physician's recommendation. The majority of smokers learn about intensive treatment possibility from sources other than their physician, which may suggest that brief smoking cessation intervention is not regularly used in clinical practice.

Also the diagnosis Z58.7 (passive smoking) may be a teachable moment, if used. Currently, this diagnosis is not used at all in the Czech Republic. Only 1.5 % of hospitalized patients was diagnosed F17 (tobacco dependence) in 2011 (Zvolsky *et al.* 2012) – despite a 30 % smoking prevalence in the population with about 80 % of smokers being dependent (Sovinova and Csémy 2013). A similar situation was described in psychiatric care in the USA with an 88 % prevalence of tobacco use among psychiatric patients, while only 2 % were diagnosed. Among psychiatric patients who smoke, even more than 80 % were dependent (Peterson *et al.* 2003).

Our results are comparable with international results. For patients receiving outpatient treatment at the Nicotine Dependence Center (NDC) of the Mayo Clinic in Minnesota, USA, the 6-month smoking abstinence rate has been reported ranging from 22 % to 25 %. The 1-year smoking abstinence rate for patients who enter the residential treatment program at NDC is reported to be 52 %. But, one limitation is that abstinence is verified there mainly by telephone only (Hurt *et al.* 2009).

Choice of medication depends on the intensity of addiction, but also on the patient's previous experiences, preferences, financial options, etc. Interestingly there is a fear of adverse effects with smoking cessation pharmacotherapy (either nicotine, varenicline or bupropion) among patients as well as physicians, though no adverse cardiovascular (Mills *et al.* 2013) or neuropsychiatric effects (Thomas *et al.* 2013) have been proven.

Smoking cessation intervention is a missed opportunity in cardiology despite many pathophysiological CV links that could be used to enhance patients' motivation to stop smoking. The possibility of intensive treatment of tobacco dependence could be used more broadly especially in CV patients or patient with elevated CV risk.

Conflict of Interest

EK, AK, LŠ, KZ, VF, SK received payment for clinical studies and educational activities from pharmaceutical companies producing smoking cessation medication.

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CONTINUED SMOKING IN LUNG TRANSPLANT PATIENTS: A CROSS SECTIONAL SURVEY

NADALJNJE KAJENJE PRI PACIENTIH PO PRESADITVI PLJUČ: PRESEČNA ŠTUDIJA

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ABSTRACT

Introduction. Smoking is associated with a higher incidence of post-lung transplantation complications and mortality. Prior to inclusion on the lung transplant waiting list in the Czech Republic, patients are supposed to be tobacco free for at least 6 months. Our aim was to determine the prevalence of smoking, validated by urinary cotinine, among patients post lung transplantation and prior to inclusion on the transplant waiting list.

Methods. Between 2009 and 2012, we conducted a cross-sectional survey of urinary cotinine to assess tobacco exposure in 203 patients in the Lung Transplant Program in the Czech Republic. We measured urinary cotinine in 163 patients prior to inclusion on the transplantation waiting list, and 53 patients post bilateral lung transplantation.

Results. 15.1% (95% CI 0.078 to 0.269) of all lung transplant recipients had urinary cotinine levels corresponding to active smoking; and a further 3.8% (95% CI 0.007 to 0.116) had borderline results. Compared to patients with other diagnoses, patients with COPD were 35 times more likely to resume smoking post- transplantation (95% CI 1.92 to 637.37, p-value 0.016). All patients who tested positive for urinary cotinine levels were offered smoking cessation support. Only one Tx patient sought treatment for tobacco dependence, but was unsuccessful.

Conclusion. Smoking resumption may be an underrecognized risk for lung transplantation recipients, particularly among patients with chronic obstructive pulmonary disease. More rigorous screening, as well as support and treatment to stop smoking among these patients are needed.

Keywords: smoking, transplantation, lung

IZVLEČEK

Uvod. *Kajenje po presaditvi pljuč je povezano z višjo incidenco komplikacij in stopnjo umrljivosti. Pacienti pred vključitvijo na čakalno listo za presaditev pljuč v Češki republiki ne smejo kaditi vsaj 6 mesecev. Naš cilj je določiti prevalenco kajenja, potrjeno s stopnjo kotinina v urinu, pri pacientih po presaditvi pljuč in pred vključitvijo na čakalno listo za presaditev.*

Metode. *Med 2009 in 2012 smo izvedli presečno študijo o vsebnosti kotinina v urinu, da bi za 203 paciente, vključene v program za presaditev pljuč v Češki republiki, ocenili izpostavljenost tobaku. Vsebnost kotinina smo izmerili pri 163 pacientih pred vključitvijo na čakalno listo za presaditev in pri 53 pacientih za obojestransko presaditev pljuč.*

Rezultati. *15,1% (95 CI 0,078 do 0,269) vseh pacientov za presaditev pljuč je imelo stopnjo kotinina v urinu, ki je kazala na aktivno kajenje; nadaljnjih 3,8% (95% CI 0,007 do 0,116) pa je beležilo mejne vrednosti. V primerjavi s pacienti z drugimi diagnozami imajo pacienti s kroničnimi obstruktivnimi pljučnimi boleznimi 35-krat večjo verjetnost, da bodo nadaljevali s kajenjem po presaditvi (95% CI 1,92 do 637,37, p-vrednost 0,016). Vsem pacientom, ki so imeli pozitivne stopnje vsebnosti kotinina v urinu, je bila ponujena pomoč za opustitev kajenja. Samo en pacient je obiskoval zdravljenje od odvisnosti od tobaka, a je bil neuspešen.*

Zaključek. *Nadaljevanje s kajenjem je morda premalo poudarjeno kot tveganje za paciente po presaditvi pljuč, še posebej med pacienti s kronično obstruktivno pljučno boleznijo. Potrebno je bolj temeljito presejanje, kot tudi podpora in zdravljenje za opustitev kajenja pri teh pacientih.*

Ključne besede: *kajenje, transplantacija, pljuča*

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1 INTRODUCTION

Cigarette smoking is the single greatest modifiable risk factor for death and illness due to lung disease (1). The benefits of smoking cessation are well established. Despite advances in medical therapy, lung transplantation (Tx) remains the best treatment option for patients with end-stage lung disease. The demand for lung transplantation greatly exceeds availability, yet developing rigorous selection criteria and methods to identify suitable transplant recipients continues to present unique challenges.

Patients who actively abuse drugs, alcohol or use tobacco products are routinely excluded from Tx waiting lists (WL), until they have been abstinent for at least 6 months. Among patients with alcoholic liver disease, many programs require a minimum of 6 months of abstinence from alcohol before placement on the transplant waiting list (2). Similar to alcohol dependence, tobacco dependence is a chronic disease characterized by relapse and remission (3). Pharmacological treatment combined with intensive counseling has been shown to improve smoking cessation rates (4-6). While the risk of smoking on post lung Tx outcomes have not yet been adequately described (7), evidence in liver, heart and renal Tx patients suggest that smoking is associated with higher incidence of post-Tx complications and mortality (8-13). Despite efficacy of current cessation therapies, compliance among transplant recipients is often poor, with 10-40% returning to smoking post- Tx (7). Few centres actively screen patients for tobacco exposure or offer cessation support to patients, particularly post Tx (8). Many centres rely on self-reported smoking status, which has previously been shown to be unreliable. (13-15).

Despite the severity of their illness and the knowledge that quitting would have important long-term benefits, many patients continued to smoke (15-17). This may not be due to the lack of motivation to stop smoking, but rather a matter of dependence for these patients (18). Furthermore, despite lung Tx candidates' reliable self-reported disclosure of active smoking, it is unlikely that their survival may depend on inclusion on the Tx WL. Due to the limited number of suitable donors and the high demand for Tx, it is important that centres are able to detect patients who deceptively report smoking behaviour in order to select patients who will have the best outcomes long term. The aim of this study was to determine the prevalence of smoking among patients post lung Tx, as well as prior to inclusion on the Tx WL, and to offer treatment of tobacco dependence to smokers. The only lung Tx center in the Czech Republic is located at the University Hospital in Motol. The centre has performed about 20 lung Tx per year since 1997. To date, physicians in the Czech Republic have relied solely on self-reported smoking status. This study is the first to measure urinary cotinine levels prior to inclusion on the Tx-WL and post lung-Tx among patients in the Czech Republic.

2 METHODS

Between January 2009 and April 2012, we conducted a cross sectional survey of urinary cotinine levels to assess tobacco smoke exposure in 203 patients in the Lung Transplant Program. The purpose was to biochemically validate self-reported smoking status in these patients and determine if ongoing screening might be necessary. All patients had been diagnosed with end-stage lung disease and were cared for by the Department of Pneumology, 2nd Faculty of Medicine, Charles University in Prague, and the University Hospital in Motol, Czech Republic.

Urine samples were obtained from patients at routine visits. 163 patients were tested prior to inclusion on the lung transplant WL. 53 patients were tested post-Tx as bi-lateral lung recipients cared for by Lung Transplant Centre, 3rd Department of Surgery, 1st Faculty of Medicine, Charles University in Prague, and Motol University Hospital, Czech Republic. 13 patients were tested both prior to inclusion on the WL and post-Tx.

Prior to inclusion on the Tx-WL, patients had to meet the following criteria: the terminal state of pulmonary disease with expectancy survival of 12-18 months; the dependence of oxygen inhalation from oxygenator; and exhaustion of all other conservative treatment options. Patients had to meet standard criteria for specific diagnoses and avoid all absolute contraindications, including: malignant tumor, progressive neuromuscular disease, severe systemic disease or infection (HIV, hepatitis B or C), multi organ failure, ideal body weight < 70% or > 130%, long term corticoids treatment > 20mg Prednisone/ day, smoking or drug use during last six months, acute infection, psychosocial instability, or diabetes mellitus with organ complications. Other relative contraindications included: age > 65, the need for invasive ventilation, cardiac disease, or renal disease with creatinine clearance < 50mg/ml/min. Prior to inclusion on the WL, all patients in our sample met the inclusion criteria, but only had to prove they had been smoke-free during the last 6 months. All patients were advised to avoid active and passive smoking. This was validated by a negative urinary cotinine result, which was an obligatory parameter for the inclusion on the transplant WL. Among patients who had a positive or borderline result, passive smoking was discussed, and they were tested again at subsequent visits. All patients were asked about the use of nicotine replacement therapy

or nicotine in other forms (none reported). Two patients reported using electronic cigarettes.

Between January 2009 and April 2012, all lung Tx recipients and patients prior to inclusion on the Tx-WL were eligible to be included in the study. All post-Tx patients were tested for urinary cotinine as a part of annual Tx follow up. The data including demographic characteristics and diagnosis was obtained from patients' charts (see Table 1). This study was approved by the ethics committee at University Hospital in Motol, Czech Republic.

Urinary cotinine (COT) was measured as a marker of smoking. Urinary cotinine levels (COT) were assessed by semiquantitatively urine enzyme immunoassay (DRI® Cotinine Assay, Microgenics Corporation, Fremont, CA, USA) (18, 19). Based on urinary cotinine levels, patients were categorized as positive (≥ 500 ng/ml), negative (< 50 ng/ml), or borderline (50-499 ng/ml), according to their level of tobacco exposure. In the case of a positive or borderline result, the measure was confirmed by LC-MS/MS (Applied Biosystems, 3200 Q Trap®, Singapore, Singapore) (19-24). Patients with a borderline or positive result were tested again at subsequent visits. Previously established urinary cotinine cut-off points were used to categorize patients as negative, borderline or positive for tobacco smoke expose (24). These cutoffs were established by Zielińska-Danch et al. (2007) to distinguish non-smokers, passive and active smokers (24). A brief cessation intervention (up to 10 minutes) was conducted with all smokers, as well as the recommendation to visit the Centre for Tobacco-Dependence.

Statistical analyses were performed using MedCalc for Windows, version 12.4.0 (MedCalc Software, Mariakerke, Belgium). For post-Tx patients and patients prior to inclusion on the WL, means and standard deviations were calculated for continuous variables, whilst frequencies and percentages were calculated for the categorical variables.

3 RESULTS

The majority of patients in both observed groups suffered from chronic obstructive pulmonary disease (COPD) or idiopathic pulmonary fibrosis. Patients with Cystic Fibrosis were on average 25.6 years younger than patients with other diagnoses (Table 1).

Table 1. Demographic characteristics of lung transplant recipients' post-transplantation and prior to the inclusion on the transplant waiting list in the Czech Republic 2009-2012.

Characteristics	Pre-WL (N=163)	Post-Tx (N=53)
Gender (% male)	67%	62%
Age (years) (mean ± SD)		
CF group	30.66 ± 10.90	28.68 ± 8.81
Non-CF group	56.28 ± 8.69	54.38 ± 8.88
Medical Diagnosis (%)		
COPD group	69 (42.3%)	26 (49.1%)
Non-COPD group	94 (57.7%)	27 (50.9%)

CF; Cystic Fibrosis; Pre-WL; pre-wait list; Post-Tx; post-transplant; COPD; Chronic Obstructive Pulmonary Disease

Among patients prior to the inclusion on the Tx waiting list, 4.9% (8/163) had at least one positive urinary cotinine test corresponding to active smoking (Table 2). Two patients reported using electronic cigarettes. Another 6.1% of patients (10/163) had borderline results, and the test was repeated. In the case of positive or repeated borderline tests, patients were not included to the WL until they had been smoke-free (negative test for urinary cotinine) for at least 6 months. Prior to inclusion on the Tx-WL, all patients were tested for cotinine in urine.

The prevalence of positive urinary cotinine among patients post-Tx was 15.1% (8/53). An additional 3.8% of post-Tx patients (2/53) had borderline results. One year post-Tx, 80% of all patients were tested for urinary cotinine during the observed period at a median of 1.4 (0.95 – 2.64) years. There was no known selection bias.

Table 2. Urinary cotinine concentrations of lung transplant (Tx) patients post-Tx and prior to the inclusion on the waiting list in the Czech Republic 2009-2012. 80% of all patients one year post-Tx were tested in the observed period.

Urinary cotinine concentrations (ng/ml)	Pre-WL (N=163)	Post-Tx (N=53)
Negative (< 50 ng/ml)	89.0% (145/163) 95% CI 0.821 to 0.921	81.1% (43/53) 95% CI 0.685 to 0.893
Borderline (50 ≤ X < 500 ng/ml)	6.1% (10/163) 95% CI 0.033 to 0.108	3.8% (2/53) 95% CI 0.007 to 0.116
Positive (≥ 500 ng/ml)	4.9% (8/163) 95% CI 0.025 to 0.094	15.1% (8/53) 95% CI 0.078 to 0.269

Pre-WL; pre-wait list; Post-Tx; post-transplant

Regarding patients' positive and borderline urinary cotinine levels, corresponding to active smoking, the prevalence of cotinine was consistently higher among patients with COPD at both time points, compared to patients with other diagnoses (Table 3). All patients who tested positive for urinary cotinine levels were offered smoking cessation support, but only one Tx patient sought treatment for tobacco dependence at the Centre for Tobacco Dependent. That patient did not quit smoking.

Table 3. The comparison of urinary cotinine levels among patients with COPD & Emphysema and patients with other diagnoses post-lung Tx and prior to inclusion on the Tx waiting list.

Urinary cotinine levels	COPD-group (n= 94)	Non-COPD group (n=122)
Pre-WL		
Negative (< 50 ng/ml)	81.2% (56/69)	94.7% (89/94)
Positive and Borderline (≥ 50 ng/ml)	18.8% (13/69)	5.3% (5/94)
Odds ratio	4.13	
95% CI	1.40 to 12.22	
P-value	0.010	
Post-Tx		
Negative (< 50 ng/ml)	61.5% (16/26)	100% (27/27)
Positive and Borderline (≥ 50 ng/ml)	38.5% (10/26)	0% (0/27)
Odds ratio	35.00	
95% CI	1.92 to 637.37	
P-value	0.016	

COPD; Chronic Obstructive Pulmonary Disease, Post-Tx; post-transplant, Pre-WL; pre-wait list

Post-Tx, the prevalence of smoking resumption was 15% (8/53), based on positive urinary cotinine levels. The highest prevalence post-Tx was among patients with COPD, with 38.5% (10/26) having positive or borderline urinary cotinine levels corresponding with active smoking. All patients who tested positive for urinary cotinine levels were offered smoking cessation support.

The odds of smoking resumption was not different for men or women. There was a trend towards women tending to be more likely to have a positive or borderline urinary cotinine result prior to the inclusion on the Tx WL, but the difference was not significant.

The odds of smoking resumption were higher among patients with COPD, compared to patients with other diagnoses, at both time points. Prior to inclusion on the WL, the odds of smoking resumption was 4.13 times higher among patients with COPD (Table 3), and 35 times higher post-Tx, compared to patients with other diagnoses.

4 DISCUSSION

Our most remarkable finding was the high prevalence of smoking resumption post-Tx, particularly among patients with COPD. Despite the fragility of their condition, 15% of all tested lung Tx recipients had urinary cotinine levels corresponding to active smoking; a further 3.8% had borderline results. Compared to patients with other diagnoses, patients with COPD were 35 times more likely to resume smoking post-Tx.

Our findings are similar to those of Vos et al. who found that 11% of lung Tx recipients self-reported smoking resumption post transplantation (8). Similarly, the prevalence was higher (23%) among patients with emphysema due to COPD (8). Risk factors, including shorter cessation period prior to transplantation, lower socioeconomic status, exposure to second-hand smoke, emphysema, and death of a spouse were all associated with a higher likelihood of smoking resumption post-Tx (8). In a group of 331 lung Tx patients, Ruttens et al. found that the prevalence of post-Tx smoking was 12%, and they identified peer group smoking as an important risk factor for smoking resumption (25).

Over a period of 13 years, Botha et al. covertly assessed smoking habits among cardiac transplant patients. They found that 27% tested positive for urinary cotinine levels corresponding to active smoking at least once post transplant; 15% tested positive repeatedly (12). Post cardiac transplantation, smoking shortened median survival and was the most significant determinant of overall mortality (12). Among liver transplant recipients, Lee et al. found that 12% self-reported smoking resumption post surgery (27). Bright et al. similarly found that 17% of liver transplant recipients' self-reported ongoing tobacco use (28). They also found that self-reported smoking behaviour was not the most reliable measure, as 11% of liver transplant recipients who denied tobacco use, had serum cotinine levels that corresponded to active smoking (28). Among renal transplant recipients, Nguyen et al. found that 34% of patients with serum cotinine levels corresponding to active smoking, claimed to be non-smokers (13).

Ensuring that candidates are abstinent prior to transplantation is important, but this is only half of the equation. Few centres actively screen patients for tobacco exposure or offer cessation support to patients,

particularly post transplantation (8). Until 2008, the Pneumology Clinic and the Lung Transplant Centre in Prague relied solely on patients' self-reported smoking status. No further validation was deemed necessary, as those patients were considered to be too ill to continue smoking. We found that 4.9% of transplant candidates prior to inclusion on the WL tested positive for urinary cotinine levels corresponding to active smoking; a further 6.1% had borderline results. Those findings clearly speak to the degree of nicotine dependence among some patients, the need for active screening, and the importance of offering an ongoing smoking cessation support to patients both pre- and post-Tx.

Despite the fact that patient compliance with cessation measures is often poor, this problem may be perpetuated by a number of factors. Beyond self-reported smoking status, few centers actively screen for tobacco use, or collect a comprehensive smoking history on their patients. Factors, such as the duration of abstinence period, quit attempts, the age of initiation, demographics, behavioural and psycho- sociological factors have all been shown to influence cessation (29, 30). The implementation of a more rigorous screening program will help centres identify patients who may benefit from an ongoing cessation support, and those patients who may be the most promising candidates for Tx.

To date, pharmacological treatment for nicotine withdrawal symptoms combined with intensive counseling have been shown to improve quit rates (4-6). Our findings underscore the need for physicians to proactively address smoking behaviour and screen patients for smoking at each visit. Unfortunately, many physicians are ill prepared to talk to their patients about smoking and, therefore, do not intervene (31). While physicians need support, information and training to effectively intervene, there is also the need for a reliable system of tobacco treatment centres, where patients can be referred to in order to receive the specialized cessation support they need.

Limitations of the current study include: a small sample size (dictated by the number of lung Tx in the Czech Republic, which is around 20 per year) and the availability of sociodemographic characteristic (e.g. socioeconomic status, marital status, stress/ anxiety, depression, etc.), as well as more detailed information about patients' smoking histories (e.g. quit attempts, the duration of abstinence, the age of initiation, smoking frequency, the degree of nicotine dependence, etc.). Without proper screen protocols in place, the medical staff cannot proactively identify patients who may have relapsed, or refer them to appropriate cessation supports. Another limitation is that only 80% of all patients were tested one year post-TX in the observed period. Despite results of a pilot study that showed the importance of an ongoing screening, testing may not have been perceived as a priority by staff, and, in some cases, samples were never collected. In some cases, patients did not show up for follow-up visits, or there were issues relating to handling and processing samples.

All biochemical tests can trigger false results. In the case of urinary cotinine, the use of nicotine replacement therapy or ingestion of nicotine in any form will result in a positive test, even though the patient may have quit smoking. In the case of a false positive result, the patient should be questioned about any tobacco smoke exposure in more detail, and another test should be conducted at a subsequent visit. All patients in the study were asked about the use of nicotine replacement therapy or the use of nicotine in any form; none was reported. Two patients reported using electronic cigarettes. The biological cutoffs used included a range that would account for even higher levels of exposure to environmental tobacco smoke, so there is little likelihood of a false positive result due to passive smoking. A false negative result is also possible in the case where enough time has passed for cotinine to be eliminated from the patient's system prior to the test, but this result is not likely in heavy smokers.

Despite the fragility of their condition, smoking continues to be an issue for many patients with end stage lung disease. The prevalence of smoking among patients post lung Tx, as well as prior to the inclusion on the Tx-WL, provides evidence that an ongoing screening is necessary to detect smoking resumption. The implementation of routine screening protocols may help centers identify those candidates who are likely to have the best outcomes post transplantation.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist. There was no financial relationship with any organization that might have an interest in the submitted work, or other relationship or activity that could appear to have influenced the submitted work. Authors do not have any financial conflict of interest arising from involvement with organisations that seek to provide help with, or promote, recovery from addiction.

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ETHICAL APPROVAL

The study was approved by the ethics committee at the University Hospital in Motol, Czech Republic (Reference No.: EK – 735/13).

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TREATMENT OF TOBACCO DEPENDENCE, A CRITICAL GAP IN CZECH CLINICAL PRACTICE GUIDELINES

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SUMMARY

Objective: Tobacco related comorbidities and treatment of dependence are relevant to clinicians of all disciplines. Clinicians should provide a brief intervention about tobacco use with smokers at each clinical contact (success rate of 5–10 %). Intensive treatment (success rate > 30%) should be available to those who need it. Brief intervention is not yet standard clinical practice. Our aim was to assess clinical practice guidelines (CPG) of selected medical professional societies to determine whether or not tobacco dependence treatment recommendations were included.

Methods: Between October and December 2013, we conducted a keyword search of CPG for 20 medical professional societies in the Czech Republic. We searched for the keywords "smoking", "tobacco" and "nicotine addiction" in 91 CPG documents, which were freely available on the websites of selected professional societies. We focused specifically on CPG relating to cardiovascular and respiratory diseases as well as cancer. We excluded any CPG focused on acute conditions, diagnostics only, laboratory methods, or administration.

Results: There was no mention of smoking in 27.7% (26/94) of CPG documents. Only 16% (15/94) of CPG documents listed smoking as a risk factor. 42.5% (40/94) mentioned smoking related phrases (e.g. "smoking ban"). Only 13.8% (13/94) of CPG included a section on tobacco dependence, referenced tobacco dependence treatment guidelines or mentioned specialized treatment centres where smokers can be referred.

Conclusion: Nearly one third of CPG related to cardiovascular and respiratory diseases as well as cancer made no mention of smoking. Despite the clinical significance of smoking, the majority of CPG did not adequately address tobacco dependence and its treatment.

Key words: tobacco dependence, brief intervention, treatment, clinical practice guidelines, Czech Republic

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INTRODUCTION

Smoking is the leading cause of preventable death globally (1). Cardiovascular diseases (CVD) are the most common cause of death among smokers. In the Czech Republic (CR), about 2,000 more people die annually due to CVD than to lung cancer, the most common form of cancer caused by smoking (2). Overall mortality in the CR due to smoking is about 14,000 people a year (2). Compared to developed Western countries of the EU, the prevalence of smoking in the CR is high – 29% (33% men, 24% women) (3, 4). The prevalence of smoking in the CR undoubtedly contributes to the country's high cardiovascular mortality rate, which is almost two times greater than that of other European countries (15 European Union member states before 2004) (5).

Tobacco dependence is a chronic disease characterized by relapse and remission, which can be reported according to the International Classification of Diseases 10 (ICD-10) code F17 (6, 7). The quit rate among smokers who stop without help or using methods with placebo effect is about 2–5% after one year (6, 8). According to the WHO, all physicians should provide a brief intervention for tobacco use to a patient at each clinical contact. The success rate of brief intervention is 5–10% (9). A brief intervention consists of 5 points known as the "5 A's". The intervention involves asking the patient about tobacco use, advising the patient to quit, assessing readiness to quit, assisting the patient in quitting, and arranging for follow up (9). People unable to quit should be recommended to receive intensive specialized treatment. The success rate with intensive treatment (psychobehavioural therapy and pharmacotherapy) provided by specialized Centres for Tobacco-Dependent (CTD) in the CR is over 30% after one year (10, 11).

Brief intervention with patients who smoke is still not standard clinical practice in the CR. Eighty percent of Czech physicians ask about tobacco use and advise patients to quit. Beyond this, subsequent parts of the brief intervention are delivered to smokers

i.e. assessing readiness to quit, assisting the patient to quit, and arranging for follow up (12).

According to the National Institute of Health, clinical practice guidelines (CPG) are systematically developed statements to assist practitioners and patients in making appropriate decisions about health care for specific clinical circumstances (13). CPG help support the transfer of research knowledge into clinical practice. Tobacco related comorbidities and treatment of tobacco dependence are relevant to clinicians of all disciplines. According to the WHO there should be a systematic approach for incorporating brief tobacco interventions into primary health care services (11).

Our aim was to determine whether or not tobacco dependence treatment recommendations were included in selected CPG documents for cardiovascular and respiratory diseases, cancer and related comorbidities from various medical disciplines.

MATERIALS AND METHODS

In the Czech Republic, there are approximately 120 medical professional societies. Most of these societies are part of the Czech Medical Association of Jan Evangelista Purkyně (CzMA) (14). We selected 20 societies (Table 1) in the fields of internal and general medicine or oncology that had published CPG on their websites. These documents were freely accessible online as of December 2, 2013. We then selected current CPG from each society that addressed education, treatment or prevention of diseases related to smoking as a risk factor. We excluded CPG that addressed acute conditions, diagnostics only, laboratory methods, or administration.

We searched for keywords "smoking", "tobacco" and "nicotine addiction" in the full text of 94 selected CPG documents. Documents were reviewed to determine if smoking was mentioned as a risk factor (RF) or if they included any recommendations relating to intervention or treatment.

According to the results of the keyword search, we classified the CPG documents into four groups: CPG with no mention of smoking; CPG that reported smoking as a RF; CPG that included two word recommendation to stop or minimize smoking; CPG with a comprehensive approach that included recommendation to use a brief intervention, a link to the Centres for tobacco-dependent, or guidelines for tobacco dependence treatment (15, 16).

Table 1. *Tobacco dependence treatment recommendations in selected Clinical Practice Guidelines (CPG) of medical professional societies in the Czech Republic*

Medical professional society (n = 20)	Number of selected CPG				
	No mention of smoking	Smoking as a risk factor	Recommendation to stop smoking	Comprehensive approach	Total
Cerebrovascular Section of the Czech Neurological Society	0	0	6	1	**7**
Czech Society of Angiology	1	0	1	0	**2**
Czech Diabetes Society	2	3	4	1	**10**
Czech Society of Internal Medicine CzMA	0	0	2	2	**4**
Czech Society of Cardiology	2	3	4	2	**11**
Czech Society of Nephrology	0	0	1	0	**1**
Czech Society for the Study of Obesity	1	0	1	0	**2**
Czech Society for Oncology	0	0	0	1	**1**
Czech Paediatric Society	1	0	0	0	**1**
Czech Pneumological and Phthiseological Society	3	4	11	0	**18**
Czech Society for Atherosclerosis	0	0	1	1	**2**
Czech Society for Hypertension	0	0	1	0	**1**
Czech Society for Thrombosis and Haemostasis	6	0	0	0	**6**
Society of Occupational Medicine	1	0	0	0	**1**
Czech Society for Metabolic Bone Diseases	0	1	0	0	**1**
Czech Society of Gastroenterology	2	0	1	0	**3**
Czech Society of Haematology	3	0	0	0	**3**
Czech Society of Hepatology	1	0	0	0	**1**
Czech Menopause and Andropause Society	0	0	1	0	**1**
Czech Society of General Practice	3	4	6	5	**18**

RESULTS

Among all CPG documents related to cardiovascular and respiratory diseases as well as cancer, 27.7% (26/94) did not mention smoking. 16% (15/94) of documents listed smoking among risk factors. 42.5% (40/94) of CPG included some recommendation to stop or minimize smoking (e.g. "smoking ban"). 13.8% (13/94) of CPG recommended a comprehensive approach to treatment or prevention of tobacco use.

CPG documents which included no mention of smoking in the diagnosis and treatment included venous thromboembolism, diabetic retinopathy, atrial fibrillation, chronic pulmonary hypertension, obesity, cystic fibrosis, interstitial lung disease, tuberculosis, malignant pleural mesothelioma, chronic pancreatitis, colorectal cancer, malignant lymphoma, hepatocellular cancer, and dyslipidemia.

Many CPG documents mentioned smoking only as a RF in the introduction, and rarely mentioned tobacco use in terms of primary and secondary prevention.

Smoking related recommendations were often included in the non-pharmacological treatment section of CPG. The most frequently mentioned smoking related recommendations, in descending order, included; smoking ban, cessation, abstinence, elimination, and quit smoking/stop smoking. The terms smoking minimization, avoiding smoking, warning against smoking, smoking omission, give-up smoking, and restriction on smoking were each mentioned only once in the 94 CPG documents we reviewed.

Only two professional societies had a link to the Guidelines for Tobacco Dependence Treatment on their website (Czech Society of Cardiology and Czech Society for Oncology).

The Prevention of Cardiovascular Diseases in Adults – Joint Guidelines of Czech Professional Societies (2005) is the only CPG document that fully addressed tobacco dependence treatment (17).

DISCUSSION

Despite the clinical significance of smoking, few medical professional societies in the Czech Republic adequately addressed tobacco dependence and treatment in their CPG documents. One quarter of the selected CPG documents did not include any mention of smoking. Only 16% of CPG named smoking as a risk factor for cardiovascular and respiratory diseases, cancer, and related comorbidities.

Forty two percent of CPG documents contained a recommendation to quit smoking, most often using the phrase "smoking ban". Some documents used terms such as "minimize" or "restrict smoking". It would be appropriate to replace these terms with a clear recommendation for patients to stop smoking. This means zero exposure to tobacco smoke, including secondhand smoke. The ultimate goal for patients is smoking cessation, not reduction because there is no safe level of tobacco exposure (18). If we recommend that tobacco-dependent patients reduce the number of cigarettes without medication, the patient smokes the reduced number of cigarettes more intensively. This is known as compensatory smoking as it allows the patient to obtain the required dose of nicotine with fewer cigarettes and reduces withdrawal symptoms (19, 20).

The majority (80%) of smokers are physically addicted to nicotine and cannot stop smoking without help (21, 22). It is therefore important to proactively offer smokers treatment and information on where they can seek help, when they are ready to quit.

In this study, we focused on CPG because they are a key component of evidence-based medicine (23). CPG from the Czech Society of Cardiology state that "no drug can reduce cardiovascular mortality, by 25–50%, as effectively as smoking cessation" (24). Only 14% of the selected CPG documents included the points of a brief intervention, a more detailed section on tobacco dependence treatment or a link to the Guidelines for Tobacco Dependence Treatment. CPG from the UK's National Institute for Health and Care Excellence (NICE) may be a good example of how tobacco treatment guidelines can be incorporated into the Czech CPG. The NICE guidelines state that one of the points of care for the patient with a concrete diagnosis of nicotine dependence is to offer advice to quit smoking, and provides links to the guidelines for brief interventions and Smoking Cessation Services in the UK (25–27).

Limitations of this study may include the parameters of CPG documents selected, the changing number of medical professional societies, the availability of CPG freely online, as well as the number of CPG documents published by each society. We chose only CPG documents related to clinical practice of cardiovascular and respiratory diseases, and cancer. However, all physicians should intervene with smokers regardless of their area of specialization. A brief intervention for tobacco dependence is simple, quick (3–5 minutes), and effective (9). It would be well justified to recommend that a brief intervention should be conducted with all smokers. Tobacco dependence treatment guidelines should be included in all CPG, including those that were not included in this survey.

The presence of a short description of the brief intervention or reference to the Guidelines for tobacco dependence treatment in CPG documents may help remind physicians of the importance of routinely providing a brief intervention to patients who smoke. More recent research has shown a shorter form of the 5 A's model to be effective for busier clinics or providers. The Mayo Clinic, Rochester, MN, USA uses the 2 A's (Ask, Advice) and R (Refer) to the Nicotine Dependence Centre (28–30). The treatment in specialized Centres for Tobacco-Dependent (CTD) (31) in the Czech Republic is carried out according to current evidence based guidelines (9, 15).

Since 2013, the Czech Society for Tobacco Dependence Treatment has begun to advocate that professional societies include more detailed information on tobacco dependence treatment in forthcoming updates of any CPG documents.

CONCLUSION

CPG documents from selected medical professional societies in the Czech Republic did not adequately address the importance of smoking cessation. Smoking cessation should not be viewed as a mere lifestyle change, but rather imperative to good health and a necessary part of treatment for many diseases. CPG are an important source of evidence based information for clinicians. CPG should provide up to date information on tobacco dependence, treatment and highlight the importance of using brief intervention with patients who smoke at each clinical contact.

Conflict of Interests

KZ, MZ a EK are members of the Czech Medical Association of Jan Evangelista Purkyně. There are no other conflicts of interests.

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