

## Artykuł przeglądowy / Review article

### Profilaktyka nowotworów i zdrowie publiczne / Cancer prevention and public health

# Cancer patients and smoking cessation

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Abstinence from smoking is the most important element of cancer prevention. Tobacco smoking is responsible for at least 15 different types of cancer and almost 30% of all cancer deaths. There is evidence that not only does smoking after a cancer diagnosis pose negative effects for cancer treatment efficacy and tolerability, but quitting smoking after a cancer diagnosis has significant benefits. They include: increased survival rates and decrease overall mortality, decreased risk of another primary cancer, decreased risk of recurrence, increased tolerance to oncological treatments and increase of its efficacy, reduced pain. Quitting smoking improves quality of life too. Nicotine dependence is not only a patient's choice and lifestyle element but a chronic and relapsing disease. Failure to undertaken nicotine dependence treatment by the centre's staff may be treated as malpractice. Various evidence-based treatment options are available and they can, or even should, be adapted to the specificity of oncological patients.

**Key words:** cancer prevention, nicotine dependence, tobacco smoking, smoking cessation, cancer patients

## Introduction – tobacco smoking and the health burden

In the European Code Against Cancer the first and most important recommendation for cancer prevention is abstinence from tobacco smoking. Tobacco smoking is responsible for almost 30% of all cancer deaths worldwide and is the single most significant factor of them [1]. Tobacco smoke, containing approximately 7,000 thousand chemical compounds, is classified by IARC as a human carcinogen. The scientific evidence is so extensive that it has been included in the highest of four groups of classifications. It means that there is no doubt that exposure to it is associated with a high risk of developing cancer. Approximately 70 carcinogenic substances found in tobacco smoke act as both initiators and promoters of the carcinogenesis process [2]. There are at least 15 different cancer localization in human body with a proven causal relationship with exposure to tobacco smoke. The highest risk is observed for lung cancer, with the risk attributed to be 90% in men and over 70% in women [3].

On average, a lifetime smoker has a 20-fold higher risk of developing lung cancer, compared with a lifetime non-smoker [4]. In the whole of Europe, lung cancer accounts for 24% of all cancer-related deaths and is the most common cause of death among men. In several European countries, including Poland, it is also the leading cause of cancer death among women [5, 6]. A slightly lower attributable risk, as much as 85%, is observed for head and neck cancers, e.g. mouth, throat, larynx, nasal cavity and apart from alcohol consumption, this is their most important cause. According to the results of many years of research conducted by the International Agency for Research on Cancer, tobacco smoking is also causally associated with other cancers, i.e., pancreas, bladder, stomach, liver, renal pelvis, colon, myeloid leukemia, ovary and cervix [7]. Tobacco smoking and tobacco-attributable cancer mortality remains one of the most significant health burdens in the Polish population. Annually, more than 30 thousand Polish men and women die from cancer caused by smoking [8].

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Despite many efforts to reduce smoking around the world and many successes in this field, the smoking population was 22.3% in 2020 (36.7% of all men and 7.8% of women) [9]. The prevalence of smoking among patients diagnosed with cancer is high – over 60% of them are smokers, former smokers or recent quitters [10]. Continuing to smoke after a cancer diagnosis is particularly disturbing. It seems that patients treat a cancer diagnosis as a death sentence and a condition in which it is too late to quit smoking.

### **Risk of smoking continuation after cancer diagnosis**

Smoking has been linked not only to the development of disease, but also to prognosis upon diagnosis and risk of death during treatment. The adverse effects are found both in patients with smoking-related cancers and in those with nonsmoking-related cancers.

#### **Overall mortality**

Research data have proven that continued smoking by cancer patients is causally associated with all-cause and cancer-specific mortality. Continued smoking is among the strongest adverse predictors of survival in cancer patients [11]. For example, in patients with head and neck cancer who smoked during radiation treatment, the two-year survival rates were 39% compared to 66% in non-smokers. In a multivariate analysis, after taking into account age, disease stage and concomitant chemotherapy, the risk of death was 2.5 times higher in patients who continued smoking than in former smokers or never smokers [12].

#### **Increased risk of second primary cancer**

There is some evidence that smoking after cancer diagnosis increases not only the incidence of a first, but also a second primary cancer. The most frequent are tobacco related malignancies such as lung, head and neck, stomach and hematological cancers. A systematic review and meta-analysis of randomized and longitudinal observational studies demonstrated a four times higher risk of developing a second primary tumor for small-cell lung cancer patients who continued smoking, than for those who quit at diagnosis. [13] In the study done by Rice et al., a prospective analysis to investigate the risk of second primary cancer in a group of 569 patients with stage I non-small cell lung cancer who had undergone complete pulmonary resection was conducted. Over a median follow-up period of 5.9 years, 15% of the patients developed second primary tumors. Over half of them (56%) were additional lung cancers. The incidence of second primary lung cancers nearly doubled among current smokers compared to those who were former smokers [14].

If the patient was treated with radiation to the chest area, the risk of lung cancer as a second primary tumor increases 13 fold, if he smokes at the same time – 21 fold, in patients undergoing chemotherapy the risk increases 9–13 fold,

and in patients who continue smoking – 19 fold [15]. Smoking by women cured of breast cancer increases the risk of lung cancer six fold, and if the patients were treated, among others, radiation to the chest area, this risk increases 9 fold [16]. Active smokers are at particularly high risk of developing lung cancer. In smokers who have been treated for Hodgkin's lymphoma in the past with, among others, radiotherapy, this risk increases 20 fold, and in the case of a combination of smoking, radiotherapy and chemotherapy with alkylating drugs, the risk increases 50 fold [16].

There is also a known relationship between smoking and the risk of prostate cancer recurrence. Men after radical prostatectomy who continue to smoke have a 30% greater risk of biochemical recurrence, a 2.5 times greater risk of resistance to anti-androgen treatment, a 2.5 times greater risk of distant metastases and a twice the risk of death during the course of cancer [17].

Stopping smoking at any stage of cancer reduces the risk of disease recurrence and secondary cancers.

#### **Decreased effectiveness of therapy**

The poorer effects of treatment with radiotherapy was observed in smoking patients compared to patients who stopped smoking or were never smokers. An adverse effect of smoking has been observed for efficacy of treatment with radiation and for systemic chemotherapy. In a study done by Browman et al. in smoking patients with head and neck cancer, the percentage of overall responses to treatment during radiation was 45% compared to 74% in non-smokers [12].

Smoking may interact with some drugs pharmacokinetics and can affect treatment outcomes, including cancer treatments. Smoking alters the drug metabolism due to affecting cytochrome P-450. Additionally, smoking increases the risk of drug resistance and the fluctuation of drug concentrations. Research on specific medications has indicated that the extent of pharmacokinetic disruption caused by smoking is comparable to that of other clinically significant drug interactions. This disruption is significant enough to influence recommended dosages. [18] Lung cancer patients who persist in smoking demonstrate a more rapid elimination of erlotinib and gefitinib compared to non-smokers, potentially necessitating the administration of higher doses of these compounds to achieve comparable systemic levels. In this patient population, pharmacokinetic and toxicity profiles for smokers receiving erlotinib at a 300 mg daily dose is similar to that in nonsmokers receiving 150 mg daily, which could suggest that the daily dose of erlotinib in current smokers should be increased to 300 mg. Tobacco smoke was also demonstrated to affect the pharmacokinetics and toxicity of irinotecan, a topoisomerase-I inhibitor used in small-cell lung cancer [11].

#### **Increased risk of complications in anticancer treatment**

In patients with head and neck cancer, smoking during radiotherapy treatment significantly heightens the likelihood

of experiencing radiotherapy-induced complications. These can include oral mucositis, weight loss, fatigue, xerostomia (dry mouth), altered taste sensation, and vocal difficulties [19]. Prostate cancer patients who were currently smoking, in contrast to those who had never smoked, exhibited a higher likelihood of encountering radiotherapy-related symptoms such as defecation urgency, diarrhea, a sensation of the bowel not being completely emptied after defecation, and abdominal cramps. On the other hand, former smokers did not show an elevated prevalence ratio for these symptoms [20].

An additional important issue is also the increased risk of surgical complications in smoking patients. Postoperative healing complications occur significantly more often in smokers compared with nonsmokers and in former smokers compared with those who never smoked. In a total of 140 cohort studies involving 479,150 patients, smokers and non-smokers were compared revealing the increased risk for following complications: almost a 4-fold risk of necrosis, double the healing delay and dehiscence, wound complications, hernia, and almost two and half times greater risk of lack of fistula or bone healing. The surgical site infection in smokers was almost twice that among non-smokers or ex-smokers [21].

In a population of 140,000 patients undergoing major surgical procedures, including oncological ones, cigarette smoking significantly increased the risk of at least one postoperative complication. The following oncological procedures were included in the analysis: removal of the esophagus, stomach, large intestine, pancreas, removal of the kidney or bladder, removal of the uterus and lung resection. In active smokers, compared to never smokers or smokers in the past, the following complications were significantly more common: cardiovascular, pulmonary, neurological, thromboembolic, septic (including septic shock), renal failure, urinary tract infections, need for blood transfusion, the need for reoperation, the need for rehospitalization, smokers required longer hospitalizations; only differences in peri-procedural mortality did not achieve statistical significance [22].

### **Quality of life and pain**

Compared to never or former smokers, patients with head and neck cancer and lung cancer who continued smoking had poorer physical health, self-perception of their general health, emotional and social functioning, and vitality. Patients who continue smoking after a diagnosis of cancer also experience higher levels of cancer-related symptoms than nonsmokers or former smokers. Compared to never or former smokers, cancer patients who continued smoking have worse physical health, self-perception of their general health, and both social and emotional functioning. They also experience less vitality [23–25].

### **Smoking cessation and benefits for cancer patients**

According to studies, evidence is sufficient to infer that smoking cessation reduces the risk of the following cancers: lung,

laryngeal, oral cavity and pharynx, esophageal, pancreas, bladder, stomach, colon, liver, cervix, kidney and acute myeloid leukemia [26]. Apart from disease site and stage, abstinence from smoking is considered the strongest predictor of survival in cancer patients who have ever smoked [11]. Stopping smoking is associated with improved outcomes even among patients diagnosed with the most attributable to smoking cancer, i.e. lung cancer. Quitting smoking prolongs survival and reduces the incidence of cancer recurrence in this population of patients. A review of the literature showed that in patients diagnosed with early-stage non-small cell lung cancer, smoking cessation reduced overall mortality by 66% and the risk of recurrence or secondary lung cancer by 46%, compared to those who continued smoking. Similarly, in patients with small-cell lung cancer, smoking cessation reduced overall mortality by 46% and the risk of recurrence or primary lung cancer by 77% [27].

In a study examining the effectiveness and complications of radiotherapy in patients with advanced head and neck cancer, stopping smoking for at least one month was associated with a significant reduction in the duration of mucositis after radiotherapy [16].

In a study described by Daniel et al., moderate to severe pain was reported by 60% of persistent smokers with lung cancer while only 37% of nonsmoking patients reported it [28].

In summary – smoking cessation after cancer diagnosis is connected with many significant benefits like reduced risk of death by 30-40%, reduced risk of recurrence and second primary cancer, reduced risk of treatment complications, increased response for treatment, better quality of life and less pain. Although the benefits of smoking abstinence are evident regardless of stage and prognosis, they are undervalued by both health professional and patients themselves. In most cases the advice on smoking cessation provided by medical staff contains the information about risk of continuation of smoking rather than the information about benefits of quitting smoking. However, good medical practice requires informing the patient not only about the risk of deterioration of prognosis if they continue smoking, but also about the improved chance for anticancer treatment results.

### **Treatment of nicotine dependence**

Smokers with life-threatening illnesses, which may in part be attributable to their use of tobacco, still have great difficulty in achieving permanent abstinence, with as many as about 50% of lung cancer patients returning to smoking after surgery [29]. It is mainly due to the nature of nicotine – a substance acknowledged to be as addictive as alcohol, heroin or cocaine [30]. Nicotine addiction is a disease included in the 11<sup>th</sup> revision of International Classification of Diseases (6C4A.2). It is characterized by a strong internal craving and impaired control over nicotine use. The need to take nicotine becomes a priority over other activities and a persistent habit despite

the potential harm or negative consequences. The need to use nicotine results from a biological addiction, often accompanied by a subjective craving for its delivery, especially in certain social situations or emotional states. Addicted people often have physiological features of addiction, including tolerance to the effects of nicotine, withdrawal symptoms after stopping or reducing nicotine use. Withdrawal symptoms are a clinically significant set of symptoms, behaviors and physiological characteristics that occur after cessation or reduction of nicotine use in nicotine-dependent individuals. Nicotine withdrawal symptoms may include dysphoric mood, depression, insomnia, irritability, anger, anxiety, difficulty concentrating, restlessness, bradycardia, increased appetite and so-called nicotine craving. In the process of diagnosing nicotine addiction, in addition to determining its occurrence, it is recommended to determine the strength of nicotine addiction and the readiness to stop smoking. The strength of the biological addiction is assessed by the Fagerstrom Nicotine Dependence Test (FNDDT), which the patient can complete independently while waiting for the appointment. The FNDDT is widely used in clinical practice and in clinical and scientific research. The second important step is to determine the patient's readiness to stop smoking. Readiness to quit is, according to research, one of the important factors determining therapeutic success in maintaining long-term abstinence [31].

In the treatment of nicotine addiction, there is a selection of pharmacological methods available, the effectiveness and safety of which have been confirmed in clinical trials. Currently, those available are: nicotine replacement therapy (NRT), antidepressants and partial agonists of nicotine receptors.

### **Nicotine replacement therapy**

The aim of nicotine replacement therapy (NRT) is to replace the nicotine that people who smoke usually get from cigarettes, so the urge to smoke is reduced and they can stop smoking completely. The main aims of NRT are three: craving reduction, withdrawal control, and abstinence promotion [32]. Nicotine replacement therapy products are available in transdermal form (patches), oral form (gum, lozenge, tablets, inhaler), and in some countries as a nasal spray. They provide nicotine, stabilizing its level in the blood in order to avoid a withdrawal syndrome after stopping smoking. As per producer suggestion, the treatment lasts for 10–12 weeks, but it can be prolonged to 6 or even 12 months. There are two types of product depending on the way of acting – long acting administered once a day (patches) and short acting which are administered multiple times per day (lozenges, pills, spray). Using nicotine patches together with another type of NRT (such as gum or lozenges) made it 17% to 37% more likely that a person would successfully stop smoking than if they used one type of NRT alone. Very few people experienced negative effects of using NRT during the quit attempt and there is no contraindications to the use of NRT in patients with cancer.

However, the use of oral, short-acting nicotine preparations may be considered questionable or contraindicated in people with damage to the larynx, esophagus and mucous membrane of the head and neck organs resulting from cancer or oncological therapy. In these patients, it is better to use another treatment with documented effectiveness. People who decide to use nicotine patches should know that they can only be used on intact skin, so they should not be used on areas undergoing radiotherapy. The patient should be aware of the potential risk of allergies in the area where the patch is applied; cases of local loss of subcutaneous fat tissue at the site of application have also been described, so it should be systematically changed.

When determining the initial dose of nicotine, we can use one of its metabolites – cotinine. It is an alkaloid with a long half-life, so its concentration in the blood or urine reflects exposure to the parent substance – nicotine. However, these determinations are not available or cheap, and we can successfully use the estimation method, according to which the daily dose of nicotine is determined based on the number of cigarettes smoked. The latest recommendation is to start from a maximum dose of nicotine and to combine the long- and short-acting form of NRT [33].

### **Bupropion**

Bupropion is a selective inhibitor of noradrenaline and dopamine reuptake and has a minimal effect on serotonin reuptake. Bupropion is an antidepressant available in pills contains 150 mg of active substance. Bupropion administration begins 1–2 weeks before the patient's scheduled smoking cessation date. The treatment length is 12 weeks, but it can be prolonged if necessary. There is high-certainty evidence that bupropion increases smoking cessation rates when compared to a placebo or no pharmacological treatment in the general population [34]. In the cancer patient population, bupropion increases abstinence rates, lowers withdrawal, and increases the quality of life. However, abstinence rates among patients with depression symptoms were lower than in patients without depression symptoms at the beginning of treatment. Additionally, a systematic review of 7 studies proved that bupropion may be an effective and safe intervention for fatigue in cancer and non-cancer conditions. It is especially important since fatigue is a predominant and distressing symptom in cancer and non-cancer conditions for which there is a paucity of recommendations for pharmacological interventions [35]. Since bupropion is contraindicated for patients with seizure disorder, it should be avoided in patients with seizure risk, including those with brain metastases or primary brain tumors. There is evidence that bupropion combined with NRT increases the chance for successful quitting [36].

### **Partial agonists of nicotine receptor**

There are two partial agonists of the nicotine receptor available for smoking dependence treatment – cytisine (herbal)

and varenicline (synthetic). They help people to stop smoking by a combination of maintaining moderate levels of dopamine to counteract withdrawal symptoms (acting as an agonist) and reducing smoking satisfaction (acting as an antagonist). There is high-certainty evidence that varenicline helps in quitting smoking when compared to a placebo, but also shows superiority to bupropion and single form of nicotine replacement therapy. It is recommended also as safe and effective in the cancer patient population. However, varenicline has been withdrawn from the market due to Nitrosamine impurities and is no longer available. Cytisine is a herbal drug which works by the same mechanism as varenicline and is available for substantially less cost. It may lead to fewer people reporting SAEs than varenicline. There is moderate-certainty evidence (limited by heterogeneity) that cytisine helps more people quit smoking than a placebo. Based on studies that directly compared cytisine and varenicline, there may be no difference or benefit from either medication as regards quitting smoking [37]. The cytisine treatment regimen proposed by the producer is based on a very short, 25-day drug therapy. In some cases, extending the therapy helps to maintain abstinence and, consequently, increase the lasting effectiveness of the drug. Prolonged treatment could be particularly beneficial in oncological patients, but the daily dose should be limited to 6 tablets.

Although cytisine is not included in global guidelines for nicotine dependence treatment in the oncological population, it should be considered for use in cancer patients especially due safety of its use in the general population and its low price.

### **Electronic cigarettes and heat-not-burn products (HTP)**

The use of e-cigarettes and HTPs is not recommended as a way of quitting smoking. There is currently insufficient evidence regarding the safety and effectiveness of their use as a smoking cessation aid in the general population or among patients diagnosed with cancer. Patients should always be advised to use evidence-based treatments for nicotine dependence [36].

### **Specificity of nicotine dependence treatment in the cancer patient population**

Undoubtedly, cancer is connected with a particular physical and psychological burden for patients. A diagnosis of cancer requires patients and their relatives to face many challenges related to treatment, but also to face the diagnosis of a disease that can be fatal. Moreover, being diagnosed with cancers that are causally related to smoking involves the additional burden of dealing with other people's perceptions and feelings of guilt and shame. Although many diseases are related to lifestyle and daily habits, in public opinion, cancer patients, especially lung cancer patients, are most often blamed for their health problems [38]. The stigmatization of tobacco-related cancers and the self-stigmatization of patients is one of the factors that make it difficult to start treatment for nicotine dependence.

They may intensify negative emotions, intensify depression and the mental crises that occur after a cancer diagnosis. Patients who feel blamed for their condition are reluctant to talk about addiction, and questions about their smoking history cause discomfort. Some patients, fearing negative evaluation, do not provide true information about addiction. The stigma associated with tobacco-related diseases may therefore significantly influence therapeutic decisions, including the decision to stop smoking. The non-judgmental attitude of medical staff and communication based on empathy and understanding of the fact that the patient is struggling with nicotine addiction is an essential condition for helping smoking cancer patients. It is important to focus on respecting the patient's subjectivity and using inclusive, non-judgmental language. Focusing solely on the negative consequences of continuing to smoke may make the patient feel judged for the development of the disease and lack understanding of how difficult it is to fight addiction. It is beneficial for the patient to discuss in detail the health benefits of quitting smoking in the context of a cancer diagnosis and the planned oncological treatment. Another key element of anti-smoking intervention is the subjective assessment of the patient's level of motivation to quit smoking. The patient's fears, resulting from, for example, past negative experiences in quitting smoking, or lack of confidence in one's own abilities, may be wrongly interpreted as a lack of motivation. Empathy, avoiding schematic thinking and authentic understanding of the difficulties encountered in quitting cigarettes (smoking, despite the harmful consequences, is defined as one of the symptoms of the disease that is nicotine addiction) are necessary conditions in communication with an addicted patient. Cancer diagnosis and anticancer treatment is considered one of the factors in the development of post-traumatic stress disorder (PTSD) [39]. At the same time, the feeling of a threat to one's life may provide an opportunity to reconsider the choice of one's basic life values and trigger changes in the area of health behavior, which may be referred to as post-traumatic growth. A traumatic event involving confrontation with the prospect of the end of life may lead to the activation of various adaptive behaviors. It is often called a teachable moment in people's life. A beneficial response style for the patient is to perceive the disease as a challenge and be ready to take active actions [40]. One such action may be trying to quit smoking. The condition is that patients understand that stopping smoking is important for the course of the disease and its treatment. The awareness that giving up cigarettes after cancer diagnosis may significantly affect the course and results of oncological treatment may be an important factor determining the motivation and willingness to change in smoking patients. Patients often think that "it is too late." Lack of understanding why quitting smoking is particularly important in the current health situation prevents people from taking the appropriate actions.

Equally important is the fact that a cancer diagnosis is a moment of loss of control and the ensuing sense of chaos. One way to regain control is to prepare for treatment and actively engage in the treatment process. Quitting smoking is an action that has a strong, positive impact on the prognosis, and can help the patient regain a sense of influence over his future. Most cancer patients quit or make an attempt to quit within a short time after diagnosis, so the most important message should be delivered as early as possible. Thus, it is necessary to involve medical staff in the process of identifying smoking cancer patients, providing non-judgmental support that includes information on the risks associated with continuing smoking after diagnosis and, above all, the benefits that the patient will receive. Unfortunately, despite the consensus that smoking cessation treatment should be an integral part of cancer care, most patients of cancer centers are not assessed for smoking-related behavior. A study carried out in Poland in 2023 shows that only 29% of oncology patients received information from medical staff about the negative impact of smoking on health, 15% received information about the negative impact of smoking on the effectiveness of oncological treatment, and 58% indicated that they were not talked to about smoking at all [41].

Obstacles to making anti-smoking interventions by medical staff may include beliefs that a cancer diagnosis is not the right time to discuss quitting smoking and talking about addiction would violate a patient's privacy, or that it is not part of their job duties. Health professionals may also have insufficient knowledge about the risks of continuing to smoke and the benefits of stopping smoking, or they may think that they do not have competence in the field of anti-tobacco interventions. Therefore, it is recommended that all physicians and other medical staff complete training in the evidence-based treatment of nicotine dependence. Increasing the level of anti-smoking counseling skills and updating knowledge on an ongoing basis are necessary to build a sense of competence among medical staff and thus ensure a readiness to discuss the issue of smoking addiction with patients. Participation in training has been shown to increase the involvement of health care professionals in smoking cessation counseling and also increase the percentage of patients quitting smoking [42]. Routine practice for cancer patients should be to identify those with an active smoking dependence, record their smoking status in the medical record, recommend smoking cessation and, ideally, offer treatment or discuss available treatment options.

Such interventions should be undertaken at every visit to the doctor and during hospitalization. Research shows that providing short (3 to 5 minutes) clear advice on quitting smoking by a member of the medical team increases both the patient's motivation to try to quit and their chances of achieving and maintaining abstinence [42, 43]. It has been proven that short counseling, so-called minimal intervention (5A's) is

an effective way to initiate and monitor the effects of a quit attempt. An alternative to minimal intervention may be its shortened version called ask advise refer (AAR). The elements of the intervention include: routine assessment of smoking status among all patients and recording the information in medical records; brief, non-judgmental counseling on quitting smoking (focusing on the individual benefits of abstinence and indicating the risks associated with continuing smoking); referral of nicotine-dependent people to the National Quitline or other specialists [44].

## Conclusions

The evidence is strong enough to incorporate tobacco dependence treatment into routine cancer care, but not many cancer centers report that they effectively identified tobacco use in their patients. Thus, tobacco cessation remains a challenging issue in the oncology population. Although there are many documented benefits of stopping smoking after a cancer diagnosis and the risks associated with continuing smoking, this topic is not often discussed by medical staff. If it is done, it is only during the first visit, however, due to the fact that the readiness of patients to quit smoking is changing over time and the importance of constantly motivating patients, it should be done at every contact with the patient. The message should be framed around the benefits of quitting smoking, not just the risks of continuing to smoke. Failure to inform the patient about the importance of stopping smoking for the effects of his anticancer treatment and overall survival should be considered as malpractice. Interventions should take into account not only those elements that are important in the treatment of smoking addiction in the general population, such as the depth of addiction or readiness to quit smoking, but also the specificity of patients diagnosed with cancer. These include higher levels of stress and anxiety, symptoms of depression, feelings of guilt, and the belief that it is too late to quit smoking. Anti-tobacco interventions conducted by an oncologist may be very short (1–1.5 minutes). It should contain only information conveyed in an empathetic and friendly way about the importance of stopping smoking for the effectiveness of anti-cancer treatment and advice on making a quit attempt with the help of a specialist. A more comprehensive intervention may be provided by a nurse or other specialist available in the hospital. It is important that healthcare professionals and educators continue to provide support and information to people affected by cancer to help them make and maintain positive changes in their health behaviors.

## Recommendations

1. Nicotine addiction is a chronic and relapsing disease, thus every smoking patient should receive evidence-based treatment.
2. Nicotine dependence treatment should always include individualized pharmacotherapy, and behavioral counseling.



- This may involve referring the patient for specialist help e.g. National Quitline.
- Interventions aimed at stopping smoking should be carried out at every stage and throughout the patient's treatment process, by the entire team of the center – doctors, nurses, physiotherapists, radiotherapists, psycho-oncologists, health educators, etc.
  - Nicotine Replacement Therapy and/or cytosine should be available for patients during their stay in hospital.
  - The anti-smoking intervention should be tailored to the specificity of cancer patients, i.e. conducted in a non-judgmental way, not arousing a sense of guilt, taking into account the patient's mental state, i.e. higher levels of anxiety, depression, stress. The information should include information not only about further risks of continuing smoking but also about the benefits of quitting smoking for the effects and tolerability of cancer treatment.
  - The electronic database of patient records should enable not only the recording of the patient's smoking status, but also automatic activities supporting anti-smoking interventions for patients, such as, for example, an automatically generated referral to a specialist smoking cessation clinic, an information "leaflet" for patients about the positive impact of stopping smoking on the effects of anticancer treatment, information for primary care physicians on hospital discharge notes and others.
  - All health care professionals of cancers centers should be trained in smoking cessation intervention.

## Article information and declarations

### Author contributions

Magdalena Cedzyńska – review of the literature. writing and editing the manuscript.

Irena A. Przepiórka – review of the literature, writing the manuscript.

### Conflict of interest

None declared

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