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The effect of smoking on post-operative complications of selected surgical interventions and on their cost analyses

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ABSTRACT

This paper studies the effect of smoking on post-operative complications in certain surgical interventions in Czech hospitals. Patients were divided into three groups – smokers, ex-smokers and non-smokers. The first part was a retrospective study of cholecystectomies performed in Jihlava Hospital. The hospital provided anonymised data concerning 253 patients who were operated on in 2014, including 61 smokers, 15 ex-smokers and 177 non-smokers. Consequently, a prospective observational study of the effect of smoking on complications after planned hip or knee replacement surgeries was carried out. The study included all patients of the orthopaedic departments of the University Hospital Královské Vinohrady and the Regional Hospital Mladá Boleslav; those included were scheduled for planned surgeries in January or February 2017, and signed the informed consent for participation in the study. Data concerning a total of 61 patients, including 27 non-smokers, 25 ex-smokers and 9 smokers were collected. This study, the first of its kind in the Czech environment, found neither a higher percentage of complications after the studied surgical interventions in smokers, nor any positive effect of short-term smoking cessation on post-operative complications. Both the results of a literary review and expert opinions of surgeons vary. Above all, Scandinavian authors have defended the positive effect of a short-term smoking cessation before surgery. However, this position seems to be in a conflict with the results of our study, which found the highest incidence of post-operative complications in ex-smokers. The study indicates a need for a carefully designed and sufficiently large research focusing on ex-smokers and the impact of the pre-operative smoking cessation, which would yield statistically significant results (whether positive or negative).

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Introduction

Smoking cigarettes is a major risk factor [1] that increases the number of complications after surgical interventions [2–7]. Wounds heal more slowly and are affected by more complications due to poorer tissue oxygenation and microcirculation disorders [8]. There are many studies indicating that the cessation of smoking even shortly before a surgery positively impacts a patient's post-operative state [3,8–10]. The lower lung capacity may increase after six to eight weeks of abstinence [8].

Møller et al. [3] studied the effect of smoking cessation on post-operative complications. In a randomised trial conducted in three Danish hospitals, patients scheduled for a hip or knee replacement quit smoking before their scheduled surgery. The study followed 120 patients for a period of 6–8 weeks before the surgery, all of whom had either quit smoking completely or reduced the number of cigarettes smoked by 50%. The patients were randomly divided into two groups: one group went through the process of smoking cessation, while the others created the control group. The authors reported that patients who quit smoking eight weeks before the surgery had fewer lung complications than those still smoking, and that a pre-operative intervention programme reduces the post-operative morbidity. The study also found that patients who quit smoking three weeks before the surgery showed improved healing after the operation (collagen and immune capacity restoration). The authors also reported that patients who did not receive the smoking cessation intervention stayed in the hospital for a longer period, which means higher costs for the hospital.

In an anonymous survey in the United States, chest surgeons were asked about the effect of pre-operative smoking cessation. Most clinicians (98%) believed that smoking before surgery creates a risk factor for post-operative complications. Smokers were most typically offered a pharmacological intervention. According to the surgeons, the ideal time to stop smoking is 2–4 weeks before the surgery [11].

According to a Czech study conducted by Zajak et al. [7], hospitalisation time decreased proportionately to the number of days of pre-operative abstinence. Patient-smokers who did not smoke for a period of 31–90 days before the surgery stayed in the hospital for 7 days on average. Smokers who abstained for 91–183 days before their surgery were hospitalised for 5.5 days. The length of the hospitalisation of smokers who abstained for 184 days or longer was identical to that of non-smokers (i.e. 3 days). The sample consisted of 877 patients, including 279 smokers, 274 ex-smokers and 324 non-smokers. The authors also studied the incidence of early infections, which was higher in smokers (7.5%) compared to non-smokers (4.6%). A significantly higher percentage of lung complications was also shown in smokers – 3.9% compared to 0.9% in non-smokers.

The opinion that there are a smaller number of post-operative complications in non-smokers or patients who abstain from smoking for a certain period before the surgery is supported by numerous clinicians around the world [5,6,12], but others tend to be more sceptical about such interventions [13]. Most of the supporting studies can be linked to the Danish group of Hanne Tønnesen [3,8–10,14]. The issue of short-term abstinence from smoking before planned surgeries requires further research.

This paper presents the results of two student projects [15,16] that attempted to study the effect of smoking on post-operative complications in cholecystectomies and hip or knee replacement surgeries performed in Czech hospitals. While these studies failed to reveal new clear evidence in favour of a short-term abstinence from smoking, they are interesting from the point of view of a study design in this area.

Materials and methods

Methods

In 1990, the World Health Organisation initiated the international HPH network (Health Promoting Hospitals and Health Services) [17]. Eight Czech hospitals [18] participated in HPH's Recognition Project in 2011–2015. Following the Recognition Project, two of the hospitals (Jihlava Hospital and Motol University Hospital) participated in a retrospective observational study that focused on the effect of smoking on post-cholecystectomy complications. This diagnosis was selected in order to ensure a sufficiently large patient sample from both participating hospitals. Patient records were used to collect anonymised cholecystectomy data for 2014 (access to such data for research purposes was secured by the HPH project). Jihlava Hospital also provided data for an economic analysis of the intervention. The cost data were collected in 2015 and processed using standard methods of mathematical statistics and cost-consequence analysis (CCA).

Following the rather discouraging results of the above described analysis, it was decided to carry out a prospective observational study of planned surgery outcomes in the other project. In agreement with the paper by Møller et al. [3], the total hip or knee replacement surgeries were chosen. The orthopaedic departments of two hospitals – the University Hospital Královské Vinohrady and the Regional Hospital Mladá Boleslav – participated in this study. The sample included all patients of these hospitals scheduled for a planned total hip or knee replacement surgery in January or February 2017, and who had signed an informed consent for participation in the study. The expected sample size was 200 patients. The Ethics Committee of the University Hospital Královské Vinohrady approved the prospective study on November 2nd, 2016.

Patients scheduled to have the planned surgery in January or February 2017 received a questionnaire designed to take their detailed smoking history. They also received a cover letter explaining the purpose of the survey, an informed consent form, and a reply envelope. The questionnaires were distributed 3–6 weeks before the scheduled surgery. The patients were asked to return the completed questionnaires by mail, or to hand them to the hospital staff at the moment of admission to the hospital. In the case of the University Hospital Královské Vinohrady, the questionnaires were sent by the orthopaedic department office together with letters of invitation to the surgery. In the case of the Regional Hospital Mladá Boleslav, the questionnaires were sent by the researchers.

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