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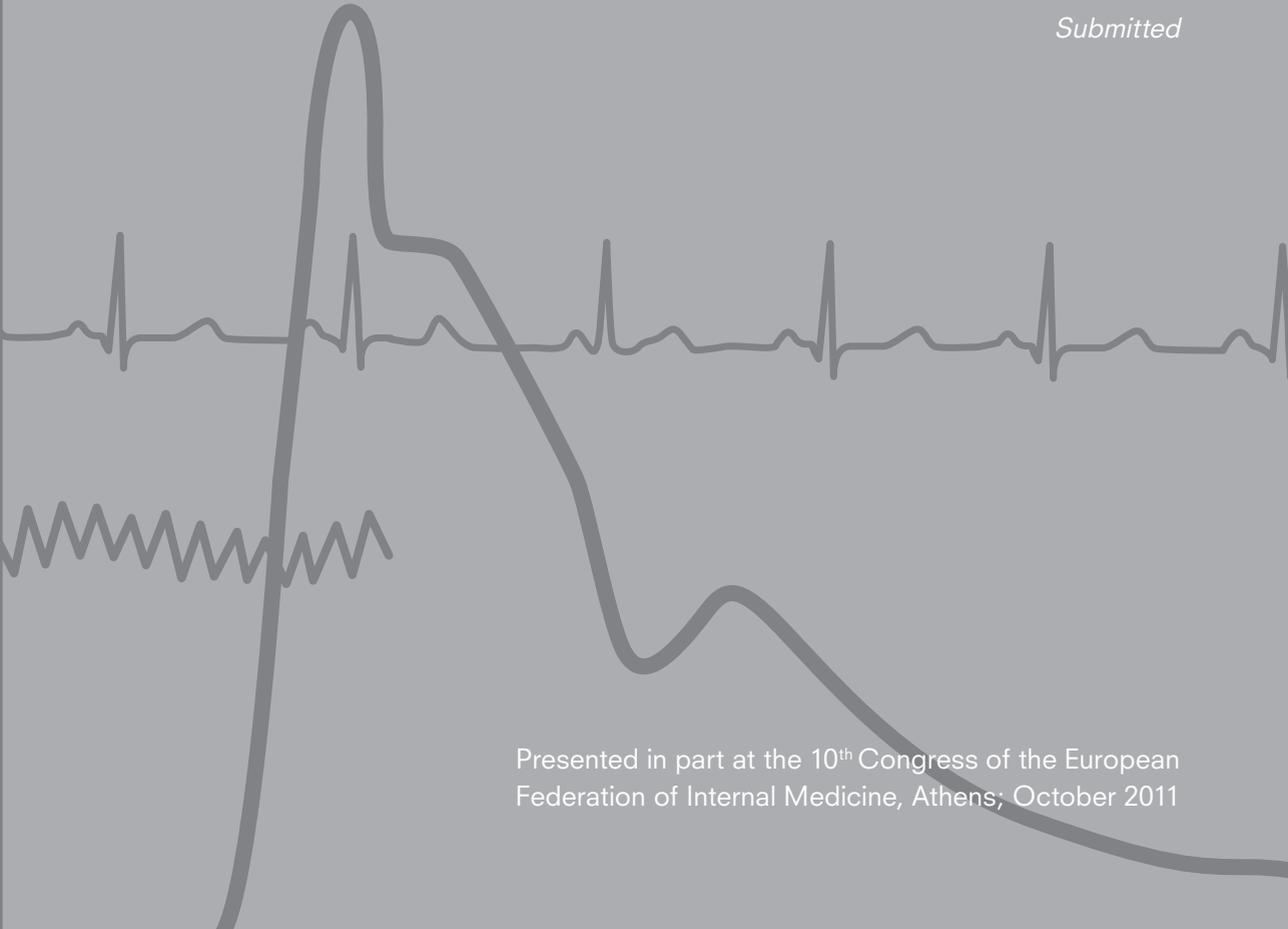
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Chapter 3

Health risk factors in the anaesthesia population

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ABSTRACT

Introduction: Lifestyle risk factors in the non-cardiac surgery population contribute to perioperative morbidity, but the prevalence of these factors is unknown. We investigated the prevalence of lifestyle risk factors in patients admitted to our preoperative assessment outpatient clinic, and compared patient self-reports and anaesthetist reports of health risk factors to evaluate the patient self-image of preoperative health status.

Methods: The study was performed in an academic teaching hospital in Amsterdam, the Netherlands, during three consecutive months. 1227 adult patients scheduled for surgery were screened and 1111 were included (patients being excluded where data was incomplete). Before health risk screening by an anaesthetist, patients filled out a lifestyle risk factor questionnaire including body mass index (BMI), hypertension, diabetes mellitus, smoking, physical activity, and alcohol and drug use. These were compared with risk factors stated in the preoperative assessment report of the anaesthetist.

Results: The study population was aged 51 ± 17 years with a BMI of 25.6 ± 4.7 kg/m². The most frequently lifestyle risk factors reported by the anaesthetist were overweight and obesity (47.5%), smoking (25.3%) and hypertension (23.7%). The prevalence of no, one or two lifestyle risk factors in the preoperative assessment outpatient clinic population was respectively 30.1%, 35.6% and 18.5% reported by the anaesthetist and 36.4%, 36.7%, 18.6% reported by the patients. Patients with more lifestyle risk factors were older with a higher BMI and ASA classification. Differences in reporting of lifestyle risk factors between patients and anaesthetist occurred especially with overweight (26.5% vs 47.5%).

Conclusions: The prevalence of lifestyle risk factors in perioperative patients is high, and differences in reporting between patients and anaesthetists may suggest that patients are unaware of or ignore their unhealthy state. Further studies are warranted to investigate the association between the lifestyle risk factors and outcome in the anaesthesiology setting.

INTRODUCTION

Lifestyle risk factors like overweight, smoking, excessive alcohol use and inactivity are increasingly prevalent in the general patient population undergoing non-cardiac surgery [1]. The societal and economic impact of these risk factors is high while they may lead to lifestyle-related disease in the long run [1-3]. Moreover, the incidence of perioperative and postoperative complications related to an unhealthy condition of the patient is ubiquitous, and may contribute to prolonged hospital stay, delayed patient recovery and deterioration of postoperative health [2-4].

A limited number of studies have shown an association of lifestyle risk factors like smoking, excessive alcohol consumption and physical inactivity with perioperative complications and postoperative recovery [5-9], while cessation of smoking in the weeks before surgery may improve intraoperative and postoperative outcome in surgical patients [5-7]. Furthermore, one out of five surgical patients uses excessive amounts of alcohol, which is associated with higher risk of infections, cardiovascular complications and delirium [8-9].

Interestingly, there are several studies showing that improvement of preoperative health by prehabilitation may contribute to improved recovery after major surgery [10-12]. However, there is only limited insight into the prevalence of lifestyle risk factors in the non-cardiovascular surgical population due to the lack of population studies. While health risk evaluation is standard care during preoperative anaesthesia assessment, and commonly includes medical history, patient self-reported lifestyle risk factors, and medication use, anaesthetists frequently overlook health risk factors due to lifestyle, such as overweight and physical inactivity. Furthermore, although preoperative health assessment is frequently based on patient self-reports, it is unclear how the self-image of patients of their health status affects the reported prevalence of preoperative lifestyle risk factors.

The aim of the present study was therefore to gain insight into the burden of lifestyle risk factors on the health condition of non-cardiovascular surgery patients visiting a preoperative assessment outpatient clinic (PAOC) population in an urban teaching hospital. We further compared the prevalence of lifestyle risk factors by patient self-reports and during the preoperative risk assessment evaluated the patient self-image of preoperative health status. We hypothesised to find a high prevalence of health risk factors in our non-cardiosurgical population, and a moderate validity of patient self-reporting of their health risks.

METHODS

Ethical approval

This population study was performed in accordance with the regulations of the local Institutional Review Board. Ethical approval was provided by the Ethical Committee of the VU University Medical Centre, Amsterdam, the Netherlands, and informed consent was waived (2012/268).

Study design

This study was designed as retrospective evaluation of a cross-sectional survey.

Setting

Patients who were referred to the preoperative assessment outpatient clinic (PAOC) of the VU University Medical Centre in Amsterdam, the Netherlands, completed a routine preoperative health risk assessment questionnaire that is routinely used in our centre before consulting the attending anaesthetist. Preoperative screening for non-cardiovascular surgery takes place between one week and six months before surgery. The answers to the questions were stored in the electronic patient file. The attending anaesthetist uses the answers provided by the patients for preoperative risk assessment. Part of this questionnaire focuses on lifestyle risk factors, including body length, body weight, smoking, and the use of alcohol and drugs. The answers to the lifestyle questions were retrospectively evaluated for the present study.

Participants

The study included data on 1227 consecutive patients undergoing elective surgery aged 18 years or older who were referred to the PAOC. Patients undergoing cardiothoracic or major vascular surgery were not screened for inclusion. In case of insufficient comprehension of the preoperative assessment questionnaire, a PAOC representative assisted the patient to secure sufficient understanding of the questions.

Variables and data source

Lifestyle risk factors include acquired risks due to a sedentary lifestyle (obesity, diabetes mellitus), hypertension or the use of alcohol or tobacco. Patient self-report of health risk factors was assessed during the visit of the patient to our preoperative assessment outpatient clinic. The questions were part of the routine preoperative screening questionnaire in Dutch as used by our institution. The questionnaire is considered as a

routine screening by the patient, included in the logistics of the PAOC. Among other information, the questionnaire included the following items: overweight (yes/no), diagnosis of hypertension or antihypertensive therapy (yes/no), diabetes mellitus Type I or II (yes/no), moderately/intensive physical activity for minimal 30 minutes per day (yes/no), smoking behaviour (yes/no; number of cigarettes per day) and alcohol use (yes/no; number of alcoholic drinks per day). The questionnaire is validated for local use in our institution. The items in the questionnaire were asked as stated above, without further definitions, to determine the attitude of the patient on their health risk factors.

After completing the routine screening questionnaire, the anaesthetist performed preoperative risk assessment during a consultation with the patient. Data retrieved during this assessment are routinely stored in our clinical electronic patient file. The following study parameters were retrospectively obtained from the electronic patient file: gender (male/female), age (years), surgical specialty (thorax; orthopaedics/trauma; general; ENT/eye/dental; neurology/reconstructive; urology/gynaecology), body weight, body height, body mass index (BMI), diagnosis of hypertension or antihypertensive therapy (yes/no), diabetes mellitus Type I or II (yes/no), moderately/intensive physical activity for a minimum of 30 minutes per day (yes/no), smoking behaviour (yes/no; number of cigarettes a day), alcohol use (yes/no; number of alcoholic drinks a day), drug use (yes/no, times of drug use a week).

The anaesthetist used the patient questionnaire, the anamnesis of the patient, physical examination, reports of the general physician, reports of the medical specialist who referred the patient to our hospital and the medication list to estimate the perioperative health risk. The anaesthetist was not blinded for the answers to the questionnaire provided by the patient.

Study size

The study included all patients (except for patients undergoing cardiovascular surgery) who were admitted to the PAOC during a total period of 3 months.

Quantitative variables

Overweight and obesity were defined as a BMI ≥ 25 kg/m² or ≥ 30 kg/m², respectively. A physically active regime was defined as moderately to intensive physical activity for 30 minutes per day or more. Excessive alcohol use was defined as more than 3 or 4 units per day for women and men, respectively. Furthermore, the presence of risk factors like hy-

pertension, diabetes mellitus, smoking and drugs use were reported. The definitions in accordance with the definitions of the World Health Organisation (WHO), which are widely used in the United States as well as for European patient populations. To determine the prevalence of lifestyle risk factors, patients were divided into categories based on the presence of 0 - 6 lifestyle risk factors. The self-reported presence of overweight, hypertension, diabetes mellitus type, smoking behaviour, use of alcohol and inactivity by patients was compared with the lifestyle risk prevalence reported by the anaesthetist. Former smokers were categorised as "non-smoker" by the anaesthetist. Drug use was, unfortunately, not part of the questionnaire and was therefore not included in lifestyle risk factors.

Statistical methods

Patients were excluded in case of incomplete data. Statistical analysis was performed using SPSS software, version 18.0 (SPSS Inc., Chicago, IL). Data are presented as mean \pm standard deviation, frequencies or median with range. Numeric data were analysed by a one-way ANOVA, whereas non-parametric data were evaluated using a Kruskal-Wallis-H (ordinal data) or Chi-square test (nominal data). $P < 0.05$ was considered as statistically significant.

RESULTS

Participants

Adult surgical patients (n=1227) who were referred to the preoperative assessment outpatient clinic in a 3-month period filled in the routine preoperative screening questionnaire directly before consulting the attending anaesthetist. In total, 116 records were not taken into consideration because of incomplete data.

Descriptive data

The 1111 included patients represented a cross-section of our surgical population; the age range was 51 ± 17 years, and 56.6% were females. The average body mass index estimated was 25.6 ± 4.7 kg/m². The majority of patients were admitted to the PAOC by the departments of ENT/Eye/Dental (29.3%), general surgery (22.3%), urology/gynaecology (19.4%) or orthopaedic and trauma surgery (16.4%). Table 1 shows the baseline characteristics.

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Table 1.
Baseline characteristics.

	N
Total [N]	1111 (100.0%)
Females [N]	629 (56.6%)
Age (years)	51 (± 17)
ASA classification	II (I-IV)
ENT/Eye/Dental [N]	326 (29.3%)
General [N]	248 (22.3%)
Urology/Gynaecology [N]	216 (19.4%)
Orthopaedics/Trauma [N]	182 (16.4%)
Neuro/Reconstructive [N]	112 (10.1%)
Thorax [N]	27 (2.4%)

Data is represented as number of patients (percentage), mean (\pm standard deviation) or median (range).

Table 2.
Prevalence of lifestyle risk factors in the PAOC patient population based on the report of the anaesthetist and patient self-reports (N=1111).

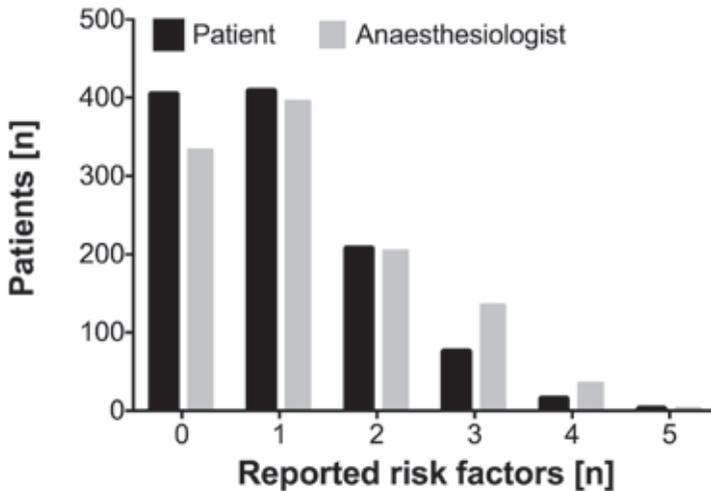
	Patient self-report	Physician report
Overweight/Obesity [N]	294 (26.5%)	528 (47.5%)
Smoking [N]	269 (24.2%)	281 (25.3%)
Hypertension [N]	218 (19.6%)	263 (23.7%)
Inactive [N]	188 (16.9%)	188 (16.9%)
Diabetes [N]	90 (8.1%)	93 (8.4%)
Drugs [N]	-	39 (3.5%)
Excessive use of alcohol [N]	58 (5.2%)	25 (2.3%)
0 risk factors [N]	404 (36.4%)	334 (30.1%)
1 risk factor [N]	408 (36.7%)	396 (35.6%)
2 risk factors [N]	207 (18.6%)	205 (18.5%)
3 risk factors [N]	75 (6.8%)	136 (12.2%)
4 risk factors [N]	15 (1.4%)	36 (4.4%)
5 risk factors [N]	2 (0.2%)	4 (0.4%)
6 risk factors [N]	0 (0%)	0 (0%)

Outcome data and mean results

Table 2 represents the prevalence of lifestyle risk factors based on patient self-reports and the lifestyle risk assessment by the anaesthetist. The most frequently reported lifestyle risk factors reported by the anaesthetist during preoperative health assessment were overweight (47.5%), smoking (25.3%) and hypertension (23.7%). Underreporting of lifestyle risk factors by patients occurred especially with overweight (26.5% vs 47.5%) or hypertension (19.6% vs 23.7%). Underreporting of lifestyle risk factors by the anaesthetist was only observed for excessive alcohol use (2.3% vs 5.2%).

Figure 1 shows the number of risk factors based on patient self-reports and preoperative screening by anaesthetists. Patients reported 36.4%, 36.7% and 18.6% for no, one or two lifestyle risk factors, respectively. Only 30% of the population had no lifestyle risk factors, whereas 35.6% and 18.5% of all patients had one or two lifestyle risk factors as reported by the anaesthetist. There were only four patients with five and no patients with six lifestyle risk factors based on the report of the anaesthetist. Only two patients reported five risk factors (Table 2). Patients with more lifestyle risk factors were older and had a higher body mass index and ASA classification ($P < 0.001$).

Figure 1.
Number of lifestyle risk factors as reported by patient self-reports or by the anaesthetist report.



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Table 3 is a detailed representation of the agreement and disagreement between patient self-reports and the health risk assessment by anaesthetists. The anaesthetist diagnosed a body mass index exceeding 25 kg/m^2 in 30% of the patient group that reported no overweight. The median (range) body mass index of patients who declared that they had no overweight while the anaesthetist disagreed was 26.9 kg/m^2 ($25.1 \text{ kg/m}^2 - 43.0 \text{ kg/m}^2$). For the patients who declared overweight while the anaesthetist disagreed, the median (range) body mass index was 24.6 kg/m^2 ($20.6 \text{ kg/m}^2 - 25.0 \text{ kg/m}^2$). Hypertension was reported by the anaesthetist in 63 patients (7.1%) who reported a normal blood pressure. 28 (44.4%) of these 63 patients even used antihypertensive medication. Two of the three patients who declared that they did not have diabetes used anti-diabetic medication. Although 58 patients reported excessive use of alcohol, this was only recognised or queried by the anaesthetists in 35 cases.

Table 3.
Agreement between lifestyle risk factor self-reports and the health risk assessment by the anaesthetist.

	Patient self-report (N=1111)	Anaesthetist agrees	Anaesthetist disagrees
No overweight [N]	817 (73.5%)	570 (69.8%)	247 (30.2%)
Overweight/Obesity [N]	294 (26.5%)	280 (95.2%)	14 (4.8%)
No smoking [N]	842 (75.8%)	817 (97.0%)	25 (3.0%)
Smoking [N]	269 (24.2%)	256 (95.2%)	13 (4.8%)
No hypertension [N]	893 (80.4%)	830 (92.2%)	63 (7.1%)
Hypertension [N]	218 (19.6%)	200 (91.7%)	18 (8.3%)
No diabetes [N]	1021 (91.9%)	1018 (99.7%)	3 (0.3%)
Diabetes [N]	90 (8.1%)	90 (100.0%)	0 (0.0%)
No excessive use of alcohol [N]	1053 (94.8%)	1051 (99.8%)	2 (0.2%)
Excessive use of alcohol [N]	58 (5.2%)	23 (39.7%)	35 (60.3%)

DISCUSSION

Key results

The present study shows a high prevalence of lifestyle risk factors in the general anaesthesia population scheduled for non-cardiac surgery. The most prevalent health risk factors were overweight, smoking and hypertension. The number of lifestyle risk factors increased with age and body mass index. We further showed that lifestyle risk factors like overweight and hypertension are frequently under-reported in self-reports by patients. Although it is generally known that the burden of lifestyle risk factors is high in Western societies, this is the first study to show that the perioperative patient population reflects this finding. The use of patient self-reports in the preoperative assessment outpatient clinic requires critical appraisal in order to prevent underreporting of health risks before surgery.

Limitations

Our research was performed in a university hospital in an urban setting, which may have had an influence on our research findings. Urban residents are often more higher educated than those in rural areas and are therefore more aware of the risks of an unhealthy lifestyle. The international character of the PAOC population may influence the prevalence

of lifestyle risk factors. Moreover, patients with two or more lifestyle risk factors may visit their doctor more often, and they are therefore more familiar with the impact of health risks like overweight or elevated blood pressure. Drug use was not included in the patient questionnaire and therefore played no part in the comparison between reported risk factors by anaesthetists and patients.

Interpretation

Health problems as a result of aging in combination with an unhealthy lifestyle are increasingly observed in Western societies. We found that a higher prevalence of health risk factors is associated with increased age and body mass index. Consequently, patients with more health risk factors were categorised in a higher ASA classification. A national survey among the Dutch population reported an overall prevalence of overweight and obesity of 46.5% [13]. Our findings are in agreement with this. Moreover, a substantial part of the PAOC patient population was unaware of or ignored their overweight or obesity status. Furthermore, smoking was prevalent in 25% of our patient population, which accords with national reports showing a prevalence of 31% and 23% of smokers among men and women, respectively [14]. Thirteen patients were categorised as "non-smoker" by the anaesthetist while these patients defined themselves as "smoker". Probably the attending anaesthetist did not recognise the true behaviour of the patient and/or did not probe for this appropriately.

Physical inactivity may reflect the preoperative health condition of surgical patients, and is currently reported as metabolic equivalents in preoperative risk assessment reports [15]. Seventeen percent of the PAOC population reported a low daily physical activity rate, which accords with national findings [14]. Although one may assume that an increase in daily activity levels and physical condition may be beneficial for postoperative recovery in general, most literature reports focus on patients undergoing orthopaedic or cardiac surgery [10-12].

Kip et al. have shown that alcohol use may be underestimated in a general patient population, since the detection of alcohol use disorders is difficult in daily clinical routine and requires best-practice guidelines for the PAOC setting [8]. During our investigation it was noticed that patients frequently refer to social drinking, since they are unaware of the definition of excessive alcohol use. Moreover, excessive alcohol use is frequently not incorporated in the preoperative assessment questionnaire by the anaesthetist. Indeed, excessive alcohol use was only recognised in 40% of the cases by the attending anaesthetist. Overweight, smoking and

physical inactivity reflect a health condition that may influence perioperative and postoperative outcome in patients undergoing surgery [16-18].

The impact of overweight, obesity, smoking, hypertension and physical inactivity on the perioperative process and postoperative recovery has only rarely been investigated. It has earlier been shown that lifestyle risk factors like smoking, excessive alcohol consumption and physical inactivity may be associated with patient recovery after surgery [5-9]. Additionally, excessive alcohol use among the PAOC population may be associated with a higher risk of infections, cardiovascular complications and delirium [8-9]. The limited number of studies focusing on lifestyle risk factors in the surgical population may reflect the limited interest of perioperative physicians in the association between acquired health risk factors and perioperative outcome. Furthermore, most studies focusing on the impact of health risk factors on postoperative recovery are limited to the most vulnerable patients admitted for major surgery [16-18], whereas studies in patients undergoing minor or moderate surgery have not been conducted. Besides, it might be questioned whether the impact of single and multiple lifestyle risk factors varies with the extent of surgical invasiveness. However, this was beyond the scope of the present study.

Our data may suggest that patients are unaware of or ignore their health status, and are not able to recognise signals of hypertension, resulting in under-reporting of lifestyle risk factors before surgery. This might be due to rare visits to their general practitioner. Awareness of lifestyle risk factors in the surgical patient population may not only lead to improved reliability of self-reports of lifestyle risk factors, but may contribute to improvement of lifestyle in patients at risk for health problems. In this context, the anaesthetist may be perceived as a case-finder who refers patients to the appropriate health professionals in order to improve general health. Although it would be interesting to elucidate the effects of awareness of lifestyle risk factors on preoperative health, this was also beyond the scope of this study. Improvement of the physical condition through exercise may however contribute to improved postoperative recovery, as is already shown for major surgery [10-12].

This study provides insight into the reliability of patient self-reporting. Interestingly, Bowlin et al. showed low validity of self-reporting of hypertension [19]. Despite the difference in reporting lifestyle risk factors between patients and anaesthetists, the assessment of the anaesthetist was considered as gold standard in our study, and his/her anamnestic conclusion was used for further anaesthetic strategies.

In our study, the difference in reporting lifestyle risk factors between

patients and anaesthetist was most prominent for overweight and hypertension. Therefore, a questionnaire in combination with the measurement of height and weight may be an appropriate way of determining the prevalence of lifestyle risk factors for the approximate 1.400.000 operations/year in the Netherlands [20].

Generalizability

Future studies should not only reveal whether acquired health risk factors influence perioperative and postoperative recovery and complications, but could provide insight into the effect of health improvement on patient outcome.

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