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Awareness, use and applicability of online risk calculators for non-communicable diseases—A cross-sectional study

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ABSTRACT

Chronic non-communicable diseases (NCDs) are the major reason for death and morbidity worldwide. As many NCDs are initially asymptomatic, online risk calculators with easy and inexpensive access have been developed and validated in order to facilitate early NCD detection and prevention. The aim of this study was to assess the awareness, use and applicability of NCD risk calculators among physicians in private practice in the canton of Bern, Switzerland. This was a cross-sectional cohort study of general practitioners and specialists in general internal medicine and gynaecologists. The questionnaire covered questions on the number of NCD risk calculators known and used, and barriers to their daily use during counselling. Awareness of NCD risk calculators was high. They were considered to be part of a routine preventive "check-up" by general internal medicine specialists and general practitioners but not by gynaecologists. AGLA® was the most known and used NCD risk calculator. However, 20-30% of physicians considered themselves non-users, and said they would be so even if access to online NCD risk calculators was made easier. More education on the benefits and better access to the NCD risk calculators are needed.

1. Introduction

In Western countries, life expectancy and thus the significance of (chronic) non-communicable diseases (NCD) have increased [1–3]. Nowadays, NCDs are the major reason for death, morbidity, loss of independency and public health cost [4]. For example, in Swiss women NCD account for 75% of mortality and 56% of years of life lost due to premature death. In 2013, the Swiss Department of Health initiated a nationwide strategy to reduce the individual and public health burden caused by NCD with the focus lying on cardiovascular, pulmonary and musculoskeletal diseases as well as on diabetes mellitus and cancer [5]. As NCD mostly develop silently and chronic-progressively early detection and intervention are warranted. There are several ways for early NCD detection and their risk factors, respectively, such as imaging techniques (e.g. mammogram screening, bone densitometry), endoscopy (e.g colonoscopy) and blood testing (e.g. serum lipids, HbA1c). In addition, there are so-called (online) risk calculators for various NCDs. Based on lifestyle, personal and family history, clinical examination and blood tests, risk calculators may estimate the individual chance to develop a certain disease within a defined period of time. Taking the information from these tools together allows the physician and the patient to develop an individual health prevention and promotion strategy with the main focus being on self-empowerment and lifestyle (e.g. physical activity, smoking, alcohol, nutrition, body weight). However, it is not known which NCD risk calculators are known and used by Swiss physicians during counselling. Therefore, the aim of this survey was to assess the awareness, adherence and applicability of the most important and already available NCD risk calculators in physicians in private practice in the canton Bern in Switzerland. This information would allow to set up a pioneering project involving various medical disciplines to easily improve prevention strategy and quality of patient-centered care at low cost.

2. Material and Methods

This was an observational cross-sectional study in general practitioners/specialists in general internal medicine and gynaecologists working in private practice in the canton Bern, Switzerland. Their contact data were collected by an online search (http://www.doctorfmh.ch). All identified physicians were sent a questionnaire in German by conventional mail or offered to fill in the questionnaire online (http://bit.ly/risikorechner). Participation in the study was

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voluntary and anonymous. Therefore, approval by the cantonal ethics committee was not necessary (Basec-Nr.: Req-2017-00787). Data collection was performed between January and April 2016. The non-validated questionnaire comprised 12 multiple choice questions with single (n = 8) or multiple (n = 4) answer options and two open questions (supplementary file 1). Questions addressed awareness level of NCD risk calculators, their applicability and frequency of use in daily practice and if calculated risks had an impact on counselling and treatment. Furthermore, participants were asked about their sex (female, male), age (age 30-50, > age 50), and board certified medical specialization, respectively.

Statistical analysis was performed using SPSS software (version 22). Descriptive means and standard deviations were calculated for ordinal data, differences in these data were shown by Mann-Whitney U test. Frequencies and percentages were calculated for ordinal and nominal data. Chi-Square test was used to determine the significance of any differences between rates. A p-value less than or equal to 0.05 was considered statistically significant (two-side).

3. Results

3.1. Subjects' characteristics

The questionnaire was sent to 1058 physicians working in private practice in the canton Bern. Of those, 398 filled in and sent back the questionnaire (response rate 37.6%). Three respondents were excluded as they had not finished their residency yet, leaving 395 data sets for analysis. 69.3% of respondents were male and 30.7% female (2% missing information). 132 respondents (33.5%) were within the age group 30 to 50 years while 262 respondents (66.5%) were above age 50 years, respectively (0.3% missing information). The respondents' sex was not homogenously distributed across age groups as there were significantly more females in the younger age group of 30 to 50 years (56.3%) and more men in the age group above 50 years (75.7%) ($p < 0.001$). The majority of physicians were board certified for general internal medicine (GIM) (n = 328, 83.0%). The remainder were either board certified for obstetrics and gynaecology (ObGyn) (n = 50, 12.7%) or general practitioners (GP) (n = 32, 8.1%). 19 participants classified themselves as board certified for GIM and GP. Some of the respondents were also specialists in other medical fields (n = 61, 15.4%) such as for cardiology (n = 6), angiology (n = 3), rheumatology (n = 3), psychosomatic medicine (n = 2), dermatology (n = 1), gastrointestinal medicine (n = 1), oncology (n = 1), pneumology (n = 1), urology (n = 1), infectious diseases (n = 1) and homeopathy (n = 1). Sex distribution was homogenous for GIM specialists and GPs while there were significantly more female than male ObGyn specialists ($p = 0.037$). Age distribution was homogenous for the main three medical disciplines.

3.2. Physicians' awareness of NCD risk calculators

Physicians were asked if they had ever come across the term "medical" or "NCD" risk calculator. 362 subjects (91.6%) replied to this question of whom the majority (n = 345, 95.3%) agreed. The respondents' age, sex and medical specialisation did not have an impact on their awareness of NCD risk calculators. Obviously, the awareness level and prevalence of NCD risk calculator use also depend on the physicians' attitude towards NCD risk calculators as being part of a routine preventive "check-up". Interestingly, opinions were very divergent with 51.8% of respondents agreeing and 47.7% disagreeing. Age ($p_{chi} = 0.076$) and sex ($p_{chi} = 0.089$) did not modify that viewpoint. However, attitudes were influenced by the medical discipline and if someone already used at least a NCD risk calculator during counselling. Accordingly, NCD risk calculators were looked upon as an integral part of a routine preventive "check-up" by board-certified GIM specialists (55.6%) and GPs (53.3%) and by those that already used at least two NCD risk calculators during counselling (63%). In contrast, most board-certified ObGyn specialists (78.3%) were not convinced that the use of NCD risk calculators should be part of a preventive "check-up". When being asked for which medical conditions risk calculators should be applied the following NCDs were reported in descending order: cardiovascular disease (82.4%), osteoporosis (63.5%), diabetes mellitus (28.3%), cancer (21.2%) and dementia (18.1%). There were also suggestions for risk calculator use in other medical conditions such as venous thromboembolism, obstructive sleep apnoea, chronic obstructive pulmonary disease, osteoarthritis, and depression.

Table 1
Names of NCD risk calculators that respondents had heard of and used before. Multiple positive answers were possible. Abbreviations: AGLA: Swiss Atherosclerosis Association; CHA2DS2: CHA2DS2-VASc-Score; FRAX: Fracture Risk Assessment Tool; Framingham: Framingham Risk Score (Framingham Heart Study); TOP: Tool Osteoporosis Platform of the Swiss Society of Rheumatology; Heart Score: Heart Score of the European Society of Cardiology; DiabRT: Diabetes Risk Score of the Swiss Diabetes Society; Swiss Heart-Coach: Swiss Heart Test of des Swiss Heart Foundation; CCRAT: Colorectal Cancer Risk Assessment Tool of the National Cancer Institute; ANU-ADRI: Alzheimer's Disease Risk Index of the Australian National University; ARRIBA: ARRIBA for General Internal Medicine/General Practitioners in Germany; GAIL Model: Breast Cancer Risk Assessment Tool of the National Cancer Institute; HDRI: Harvard Disease Risk Index; C-T Model: Cuzick-Tyrer Model of the International Breast Cancer Intervention Study; MyLungRisk: Liverpool Lung Project.

Question: Have you heard of the risk calculator [name] before?		
Name of risk calculator (RC)	Answer yes: n (%)	If the answer was yes: number (%) of subjects that also used the specific RC
AGLA® [6]	319 (80.8)	274 (85.9)
CHA2DS2-VASc Score® [7]	287 (72.7)	229 (79.8)
FRAX® [8]	215 (54.4)	125 (58.1)
Framingham risk score [9]	183 (46.3)	33 (18.0)
TOP®	125 (31.6)	69 (55.2)
HeartScore® [10]	67 (17.0)	18 (26.9)
DiabRT [11]	66 (16.7)	14 (21.2)
Swissheart-Coach® [23]	63 (15.9)	15 (23.8)
CCRAT [13]	54 (13.7)	8 (14.8)
ANU-ADRI® [14]	35 (8.9)	2 (5.7)
ARRIBA® [15]	21 (5.3)	10 (47.6)
GAIL model® [16]	13 (3.3)	6 (46.2)
Harvard Disease Risk Index (HDRI) [17]	10 (2.5)	1 (10.0)
Cuzick-Tyrer (C-T) model [18]	5 (1.3)	4 (80.0)
MyLungR [19]	5 (1.3)	0 (0)

Next, physicians were asked which NCD risk calculator they had heard of, and in case of a positive answer they were further asked if they used this certain NCD risk calculator (Table 1). On average, participants had heard of 3.7 ± 2.0 NCD risk calculators. While sex did not effect that number, age did. Younger respondents (age group 30-50) had heard of significantly more NCD risk calculators than their older counterparts (age group > 50) (4.05 ± 1.89 vs. 3.56 ± 2.04; $p = 0.021$). Board certified GIM specialists and GPs knew significantly more risk calculators than board certified gynaecologists (GIM + GP: 4.52 ± 2.09, GIM: 4.00 ± 1.89, GP: 2.62 ± 1.71, ObGyn: 1.88 ± 1.61; $p < 0.001$). Pairwise comparisons revealed a significant superiority for board certified GIM specialists (GIM + GP vs. GP $p = 0.008$, GIM + GP vs. ObGyn $p < 0.001$, GIM vs. GP $p = 0.011$, GIM vs. ObGyn $p < 0.001$). 5.1% of respondents (n = 20) did not know any of the given risk calculators.

On average, subjects used 2.1 ± 1.5 NCD risk calculators. Age and sex did not affect that number. Board-certified GIM specialists and GPs used significantly more risk calculators than board-certified gynaecologists (GIM + GP: 2.10 ± 1.52, GIM 2.30 ± 1.43, GP: 1.77 ± 1.01, ObGyn: 0.56 ± 0.91; $p < 0.001$). Pairwise comparisons revealed a significant inferiority for board certified ObGyn specialists in