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Knowledge, attitude and practice of family physician regarding global cardiovascular risk assessment in PSMMC primary health care centers in Riyadh, Saudi Arabia

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Abstract
Background: Most cardiovascular diseases (CVD) can be prevented by addressing their risk factors. The conventional clinical approach to primary prevention of cardiovascular disease relies on identification and treatment of individual risk factors. There are several guidelines that recommend CV risk assessment tools to support CV prevention strategies (ATP III, European guidelines that include Systematic Coronary Risk Evaluation SCORE 2003, ACC/AHA cardiovascular disease risk 2013 based on Framingham risk score. This study aimed to assess knowledge, attitude and practice of family physician regarding global cardiovascular risk assessment, aiming to improve cardiovascular prevention services.
Method: A cross-sectional study conducted among family physicians working in family medicine clinics of Prince Sultan Military Medical City (Riyadh, Saudi Arabia) between November 2019 and June 2020. 188 physicians asked to fill a questionnaire that based on knowledge, attitude and practice questions regarding global CV risk assessment.
Results: A total 188 physicians were included in this study. The majority (61.2%) of the physicians were between 25 and 30 years. ASCVD of AHA was the most frequent (75.5%) cardiovascular risk assessment tool used in practice. The majority of physicians often used the cardiovascular risk assessment tools regularly (62.8%). Less than half of physicians believed that assessment tools depend on investigations that patients can afford (46.8%). The majority (58.5%) of the physician had unsatisfactory self-assessment of own knowledge and skills.
Unsatisfactory self-assessment of own knowledge and skills was significantly associated with lower knowledge and attitude (49.5% versus 68.1%, p=0.004). Satisfactory self-assessment of own knowledge and skills was significantly associated with higher knowledge and attitude (50.5% versus 29.7%, p=0.004).
Conclusion: A high proportion of physicians reported using clinical guidelines for primary CVD prevention. However, laboratory investigations and time constrain were common reasons for not using global CV risk assessment tools. Unsatisfactory self-assessment of own knowledge and skills was significantly associated with lower knowledge and attitude of physicians.

Keywords: Atherosclerotic cardiovascular disease, ten-year risk score, cardiovascular disease prevention

Introduction

In the current days many tools are available to measure the cardiovascular risk in our practice. These tools are designed to guide us in the management and to improve the outcome of those patients whom at cardiovascular risk which used internationally and approved by many world health organizations. The close sustained contact of family physician with their patients and local community makes preventive care an integral part of their routine work. Cardiovascular diseases remained the leading causes of death globally in the last 15 years, taking an estimated 17.9 million lives each year. The increasing incidence of CVD is expected to continue, due not only to the increased prevalence of obesity, diabetes, and metabolic syndrome but also to population aging.
The past two decades have witnessed a steep rise in global population aging [1, 2]. CVDs are a group of disorders include coronary heart disease, cerebrovascular disease, rheumatic

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heart disease and other conditions [3]. Presence of the different risk factors affects the CHD mortality, especially high blood pressure, cholesterol level, smoking, physical inactivity, stress and diet. Up to 90% of mortality cases have a risk factor or more because of their different living style [4, 5]. Men, as well as women should be more aware of their own risk of developing CHD and of the manifestations of CHD. Family physicians should ask patients more deeply and comprehensively about their illnesses understanding, beliefs, and attitudes to check their knowledge, and define the barriers to risk reduction [6].

This survey was conducted to evaluate knowledge, attitude and practice of primary health care physicians toward Global Cardiovascular risk assessment in prince sultan military medical city primary health care centers in Riyadh, the capital city of Saudi Arabia.

Literature review
In Saudi Arabia, it is estimated that 34% of deaths from non-communicable diseases in 2016 are due to cardiovascular diseases according to WHO [7]. In a survey was done in Saudi Arabia 2010 showed that hypercholesterolemia was the 11th ranked risk factor for disability adjusted life years (DALYs) in kingdom of Saudi Arabia. High cholesterol accounted for 2.2% and 1.6% of DALYs for males and females which is strongly associated with high risks of chronic diseases including atherosclerosis [8].

Al-Dahi S *et al*. 2013 [8] found that prevalence of CVD risk factors is high among militaries in the Kingdom of Saudi Arabia, showed that 9.1% of the sample population had 10% or higher Framingham 10-year office-based CVD risk score [9].

Over the past decade or more, the prevalence of traditional risk factors for atherosclerotic cardiovascular diseases has been increasing in the major populous countries of the developing world, including China and India, with consequent increases in the rates of coronary and cerebrovascular events. Indeed, by 2020, cardiovascular diseases are predicted to be the major causes of morbidity and mortality in most developing nations around the world [10]. Most cardiovascular diseases (CVD) can be prevented by addressing their risk factors. There are several guidelines that recommend different cardiovascular (CV) risk assessment tools to support CV prevention strategies like (QRISK2), European guidelines that include Systematic Coronary Risk Evaluation (SCORE 2003) and ACC/AHA cardiovascular disease risk 2013 based on Framingham risk score [11, 12, 13].

Global coronary heart disease (CHD) risk is the absolute risk of a CHD-related event over a specific period, usually 10 years. The risk estimate is based on major risk factors and is calculated using an empiric equation. In contrast, the conventional clinical approach to primary prevention of cardiovascular disease relies on identification and treatment of individual risk factors, such as hypertension and hyperlipidemia. However there is what called a non-traditional cardiovascular risk assessment like the ankle-brachial index (ABI), high-sensitivity C-reactive protein (hsCRP) level, and coronary artery calcium (CAC) score. Even with recent studies, the efficacy of non-traditional cardiovascular risk assessment cannot be established [14]. However, physicians tend to observe rather than treat small elevations in risk factors.

Although with an abundance of clinical guidance and effective interventions targeting modifiable risk factors, the majority of patients at risk do not achieve sufficient risk factor control [15, 16]. With fact that general practitioners expressed uncertainty regarding using the atherosclerotic cardiovascular disease (ASCVD) risk calculation and taking account that whether drug treatment existing or other types of prior risk modification [17].

Challenges communicating risk to patients and patients' understanding of risk or lack of a true effect. Although calibration and discrimination studies of prognostic risk score models are important, trials on the prospective use of risk scores in practice are required to determine their impact on patient outcomes [18]. There are many reasons why physicians not calculating the cardiovascular risk for their patients, one of the reasons are time constrains and limitation in the busy clinics, while there is some physicians declare they are not aware in guidelines [19]. Lack of resources and health-care systems, non-existent effective preventive strategies at a population level and lack of sustainable drug therapy, all are barriers to complete compliance with prescribed medications [20].

Recent studies showed that Framingham based risk score overestimate coronary risk in European populations, and underestimate who are socioeconomically deprived, and the accuracy of Framingham risk equations are built in a specific populations which applied [21, 22].

Health systems need a preventive tactics which focus on the population as a whole, and specifically on the people at high risk of certain diseases. Prevention can be effective but it is usually missed. More than half of deaths because of CHD occurred outside the health facilities for that, the role of primary prevention is increasing and risk factors identification and barriers to risks reduction is getting more valuable [23].

Cardiovascular diseases can be prevented through a primary care physicians. Evidence shows such interventions are excellent economic investments because if provided early to patients, they can reduce the need for more expensive treatment [24].

Methods
This study is a cross-sectional survey that was conducted between November 2019 and June 2020. All Prince Sultan Military Medical City primary care centers in Riyadh. These primary health care centers are serving more than 1500 patients daily of different ages of both genders distributed over about 60 clinics. We include 330 primary care physicians who work in PSMMC PHC. We used validated questionnaire from previous study.

Data analysis
Data where analyzed statistically by using the (SPSS).The questionnaires was coded and the data collected were entered into excel files. All categorical variables were presented as frequencies and percentage while continuous variables were presented as means and standard deviations (SD). Knowledge and attitude scores were created as the sum of points given to the answers to 6 knowledge questions and 5 attitude questions. The scores were transformed into 100-point scale for easy interpretation. Physicians were then divided into two groups based on combined knowledge and attitude score (≥ median and < median). Demographic and professional characteristics,

knowledge-related characteristics, and practice-related characteristics were compared between those who knowledge and attitude groups (Tables 4 through 6). Chi-square or Fisher's exact test, as appropriate, were used to examine differences in categorical variables while student t-test or Mann–Whitney test, as appropriate, were used to examine differences in continuous variables. To detect factors independently associated with better knowledge and favorable attitude, multivariate logistic regression analysis models were run after adjusting for the variables that were significantly associated with better knowledge and favorable attitude (Tables 4 and 5). Backward elimination was used to allow non-significant variables to leave the model. All P-values were two-tailed. P-value <0.05 was considered as significant. SPSS software (release 23.0, Armonk, NY: IBM Corp) was used for all statistical analyses.

Results
A total 188 physicians were included in this analysis. Demographic and professional characteristics of the included physicians are shown in Table 1. The majority (61.2%) of the physicians were between 25 and 30 years. Males were slightly more represented than females (52.7% versus 47.3%, respectively). The most frequent qualification was the Board degree (43.9%) and the Bachelor degree (40.1%). Approximately 42.0% of the physicians were working in clinical practice for at least 5 years and 25.5% were working for 3 to 4 years. The majority (68.6%) of the physicians were working in family practice centers for 5 years or less. The average number of patients seen per week was 66.5 patients. Approximately 40.9% of the patients had hypertension and 39.5% had dyslipidemia.

Table 1: Demographic and professional characteristics of family physicians (N=188)

	Number*	Percentage
Age (Years)		
25-30	115	61.2%
31-40	50	26.6%
>40	23	12.2%
Gender		
Male	99	52.7%
Female	89	47.3%
Qualification		
Bachelor	75	40.1%
Diploma	10	5.3%
Board	82	43.9%
Master	9	4.8%
Fellowship	11	5.9%
Years of clinical practice		
1-2	61	32.4%
3-4	48	25.5%
≥5	79	42.0%
Years working in family practice centers		
≤5	129	68.6%
>5	59	31.4%
Number of patients seen per week		
Mean±SD	66.5±54.6	
<50	69	36.9%
50-99	74	39.6%
≥100	44	23.5%
Number of hypertensive patient seen per week		
1-5	33	17.6%
6-10	59	31.4%
>10	96	51.1%
Percentage of patients with		
Dyslipidemia (mean±SD)	39.5±21.4	
Hypertension (mean±SD)	40.9±19.9	

Assessment of knowledge of cardiovascular risk assessment is shown in Table 2. The questions that received highest rates of correct answers were questions about major cardiovascular risk factors (86.7%), modifiable cardiovascular risk factors (86.2%), and efforts to increase HDL cholesterol for cardiovascular risk reduction (83.4%). Assessment of attitude towards cardiovascular risk assessment is shown in Table 3. Highly favorable responses ranged between 38.8% and 62.8%.

Table 2: Assessment of knowledge of cardiovascular risk assessment among family physicians (N=188)

	Number*	Percentage
Which of the following statements regarding cardiovascular risk is true?		
A low HDL cholesterol predicts cardiovascular risk even at target LDL cholesterol levels	85	45.2%
In the presence of high TGs, direct measurement of HDL cholesterol is very accurate and reproducible	7	3.7%
Apolipoprotein A-I is a better predictor of cardiovascular risk than HDL cholesterol	15	8.0%
All of the above*	81	43.1%

Clinical data support efforts to increase HDL cholesterol for cardiovascular risk reduction		
True*	156	83.4%
False	31	16.6%
Which of the following is a diagnostic criterion for metabolic syndrome		
Waist circumference ≥ 48 inches in men	50	26.6%
HDL cholesterol < 40 mg/dL in men*	61	32.4%
HDL cholesterol < 40 mg/dL in women	21	11.2%
Triglycerides ≥ 250 mg/dL	56	29.8%
The previous risk assessment for coronary heart disease does not include		
Triglycerides	81	43.1%
Total cholesterol	42	22.3%
LDL cholesterol*	34	18.1%
Smoking	31	16.5%
Which of the following is major cardiovascular risk factors in hypertensive patients		
Dyslipidemia	5	2.7%
Family history of premature cardiovascular disease (men under age 55 or women under age 65)	18	9.6%
Physical inactivity	2	1.1%
All of the above*	163	86.7%
All of the following are modifiable cardiovascular risk factors except		
Hypertension	2	1.1%
Diabetes	4	2.1%
Cigarette smoking	20	10.6%
Family history of premature cardiovascular disease*	162	86.2%
Name risk factors used in cardiovascular risk assessment		
Cholesterol	57	62.0%
Hypertension	44	47.8%
Smoking	41	44.6%
Diabetes	40	43.5%
Age	26	28.3%
Family history	7	7.6%

HDL, high-density lipoprotein, LDL, low-density lipoprotein

Table 3: Assessment of attitudes towards cardiovascular risk assessment among family physicians (N=188)

	Number*	Percentage
How regular do you use the cardiovascular risk assessment tools?		
Often	118	62.8%
Rarely (once a month)	67	35.6%
Never	3	1.6%
Application of cardiovascular risk assessment tools is time consuming		
Agree all time (with every patient \ every time with the same patient)	27	14.4%
Agree most of the time (in most of the patient \ most of the times with the same patient)	88	46.8%
Do not agree	73	38.8%
Patient may not want to know their individual risk		
Agree all time (with every patient \ every time with the same patient)	17	9.0%
Agree most of the time (in most of the patient \ most of the times with the same patient)	70	37.2%
Do not agree	101	53.7%
Tools may depend on investigation that patient could not afford		
Agree all time (with every patient \ every time with the same patient)	24	12.8%
Agree most of the time (in most of the patient \ most of the times with the same patient)	76	40.4%
Do not agree	88	46.8%
Risk assessment is of no use if not accompanied by preventive measures		
Agree	83	44.1%
Disagree	56	29.8%
Not sure	49	26.1%

Average knowledge and attitude scores for cardiovascular risk assessment are shown in Figure 1. The average scores were 62.2% for knowledge, 74.3% for attitude, and 67.7% for combined knowledge/attitude. A total 97 (51.6%) had combined knowledge/attitude ≥ median score which was 68.5%. The next tables (4 through 6) compared different characteristics by knowledge and attitude groups (≥ median and < median).
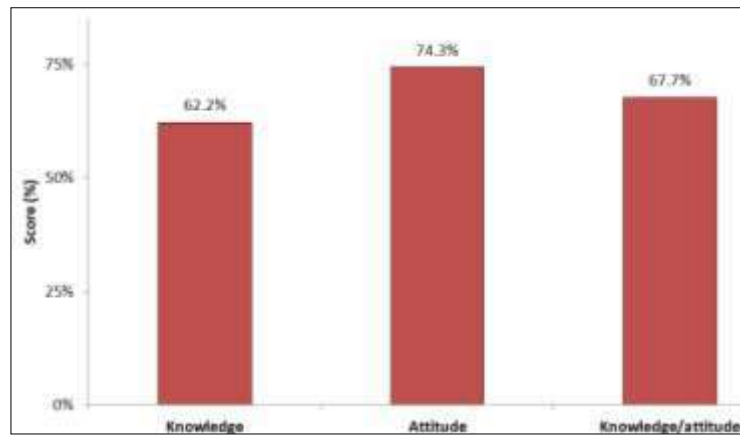
Fig 1: Average knowledge and attitude scores for cardiovascular risk assessment among family physicians (N=188)

Table 4 shows knowledge-related characteristics by knowledge and attitude groups. The majority (58.5%) of the physician had unsatisfactory self-assessment of own knowledge and skills as indicated by their need for more knowledge and training, followed by satisfactory (40.4%) and mastering (1.1%) self-assessment of own knowledge and skills. Unsatisfactory self-assessment of own knowledge and skills was significantly associated with lower knowledge and attitude (49.5% versus 68.1%, p=0.004). Satisfactory self-assessment of own knowledge and skills was significantly associated with higher knowledge and attitude (50.5% versus 29.7%, p=0.004). The most frequent source of information about cardiovascular risk assessment was updated knowledge from internet (66.5%).

Table 4: Knowledge-related characteristics by knowledge and attitude groups among family physicians (N=188)

	Knowledge and Attitude Score			p-value
	≥ median (N=97)	<median (N=91)	Total (N=188)	
Self-assessment of own knowledge and skill about cardiovascular risk assessment				
I need more knowledge and training	48 (49.5%)	62 (68.1%)	110 (58.5%)	0.004
I am satisfied with my current knowledge and skills	49 (50.5%)	27 (29.7%)	76 (40.4%)	
I am mastering management of cardiovascular risk assessment	0 (0.0%)	2 (2.2%)	2 (1.1%)	

Table 5 shows practice-related characteristics by knowledge and attitude groups. ASCVD of AHA was the most frequent (75.5%) cardiovascular risk assessment tool used in practice. According to physicians, opinions of experts and colleagues were the most important helping item in providing optimal cardiovascular risk assessment for their patients (68.9%), followed by clinical practice guidelines (64.6%), CME activities (51.8%), and finally journal articles with new trial data (14.5%).

Table 5: Practice-related characteristics by knowledge and attitude groups among family physicians (N=188)

	Knowledge and Attitude Score			p-value
	≥ median (N=97)	< median (N=91)	Total (N=188)	
Cardiovascular risk assessment tool you are using in your practice				
Framingham	16 (16.5%)	25 (27.5%)	41 (21.8%)	0.054
ASCVD, AHA*	80 (82.5%)	62 (68.1%)	142 (75.5%)	
Others	1 (1.0%)	4 (4.4%)	5 (2.7%)	
Important items helping you to provide optimal cardiovascular risk assessment for your patients**				
Journal articles with new trial data	12 (14.6%)	12 (14.5%)	24 (14.5%)	0.974
Opinions of experts and colleagues	55 (67.9%)	58 (69.9%)	113 (68.9%)	0.784
Clinical practice guidelines	54 (66.7%)	52 (62.7%)	106 (64.6%)	0.591
CME activities	41 (50.6%)	44 (53.0%)	85 (51.8%)	0.759
Barriers for optimal assessment of cardiovascular risk in your patients*				
Inadequate time to assess cardiovascular risk	22 (22.7%)	31 (34.1%)	53 (28.2%)	0.083
Inadequate physician-education tools	24 (24.7%)	20 (22.0%)	44 (23.4%)	0.655
Limited knowledge and skills	14 (14.4%)	14 (15.4%)	28 (14.9%)	0.855
Deficient laboratory investigations	32 (33.0%)	32 (35.2%)	64 (34.0%)	0.753
How can we improve cardiovascular risk assessment practice in primary care setting?				
Provide physicians with standardized guidelines	75 (78.9%)	74 (81.3%)	149 (80.1%)	0.685
Continuous medical education seminars	47 (49.5%)	44 (48.4%)	91 (48.9%)	0.878
Training courses	38 (40.0%)	39 (42.9%)	77 (41.4%)	0.692
Periodic attachment to cardiovascular clinic	12 (12.6%)	20 (22.0%)	32 (17.2%)	0.091
Implement principles of continuous quality improvement	19 (20.0%)	25 (27.5%)	44 (23.7%)	0.231
Periodic re-evaluation of physicians	16 (16.8%)	24 (26.4%)	40 (21.5%)	0.114
Others	2 (2.1%)	2 (2.2%)	4 (2.2%)	>0.99

*ASCVD, Atherosclerotic Cardiovascular Disease; AHA, American Heart Association. ** Based on important and most important response.
*** Based on agree and strongly agree response

Discussion

In our self-reported study, we found that the average knowledge score for the different guidelines providing CV risk assessment among family physicians was 62.2%. And 62.8% often use CV risk assessment in practice. We believe that use of simple technology and easy access to different risk score tools play an important role in the assessment of CV risk in primary care despite a busy work.

The knowledge score for the different global CVR assessment tools in our study was low compared to other studies like Hebatallah et al. study which was done in Egypt, shows that 82% of the physicians are aware of different guidelines [25]. Another study done by Shillinglaw et al. showed that 92% of respondent physicians were aware of tools that calculate CV risk [26]. Other study showed that 73% of physicians were aware of the tool available in the computer program to estimate the cardiovascular risk, but only 35% of them use it [27]. Awareness of the guidelines in the different studies was variable from study to study, but even a high level of awareness not encourage the physicians to calculate the CV risk in practice.

Number of years in clinical practice (or physician age) didn't enhance the knowledge and attitude toward the CV risk assessment in our data. This finding contradicts what was shown in Christian AH et al. study [28] which reported that older physicians (50+ years) had higher level of awareness of CVD prevention guidelines than younger physicians. They manifested equal or poorer adherence to national CVD preventive guidelines as their younger counterparts based upon their responses to experimental case studies. Also our favorable attitude result inconsistent with the study by Hebatallah Nour Eldein et al. [19] who found that qualified physicians older than 30 year and with experience of more than 5 years has Favorable attitude.

Lake of knowledge is known to be a barrier to the use of guidelines as in EURIKA study which assessed the practice of physicians in 12 European countries in the primary prevention of CVD, 27.5% of physicians reported that one reason for not using guidelines is lack of awareness of guidelines [19].

Study of Greaves et al. that was done in 2020 and found that favorable attitude was seen by high level of knowledge. Those who answered knowledge-based questions about the guidelines incorrectly had lower assessment rates, and those who know how to use and proceed after using the guidelines had high assessment rates [29].

In our study the majority (58.5%) of physician had unsatisfactory self-assessment of own knowledge and skills as indicated by their need for more knowledge and training. Unsatisfactory self-assessment of own knowledge and skills was significantly associated with lower knowledge and attitude (49.5% versus 68.1%, $p = 0.004$). Satisfactory self-assessment of own knowledge and skills was significantly associated with higher knowledge and attitude (50.5% versus 29.7%, $p = 0.004$).

Nearly half of physicians in our study agree that patient want to know their risk for cardiovascular disease. This could change the perception of patients and can aid in management if accompanied with preventive measures. In another hand torley et al. study on general practitioners (GPs') views of absolute cardiovascular risk and its role in primary prevention, found that physicians see the CV risk assessment as helping in patient education rather than change in management [30].

Feasibility and simplicity of guidelines and calculators were one of the factors helping physicians to implement CV risk assessment. Previously the way assessing cardiovascular disease risk was subjectively, because of lake of time and insufficient health policy and patient compliance, alongside with unavailability of easy and simple guidelines and calculators as seen in Graham et al. study [31].

Family physicians in our study had a positive attitude toward CV risk assessment guidelines. In fact, most of them use the guidelines regularly (62.8%) even with a low level of knowledge (average 62.2%) and they disagree when they asked if the patient may didn't want to know their individual risk (53%). This finding agreed with Reiner et al. study when they found that most of the physicians agreed that CV risk assessment guidelines are useful but only half of them using guidelines in their practice [32]. Other study done by Gupta M et al. showed that most physicians (74%) perform CV risk assessment in eligible patients annually [33]. In EURIKA study among all physicians, 68.5% reported using global risk calculation tools which is near to our results [19]. The unfavorable attitude was found on other studies like Hebatalla et al. [25] which showed only 24% of physician routinely measure the risk score. The commonest sources of global CVD risk assessment information was only reported for AHA/ASCVD (75.5%), Framingham (21%) and others (2.7%).

Our data showed that 62%, 47.8% and 44.6% would always document individual risk factors as dyslipidemia, HTN and smoking status, respectively to assess CVD risk. Registration of risk factors would enhance the estimation of risk score. Unfortunately, the low use of global tools and lake of awareness of guidelines will lead the physicians to fallow their individual assessment which may not agree with recent guidelines of primary prevention and affect the proper management and general outcome of patients' health. The most frequent reported barrier for cardiovascular risk assessment was deficient laboratory investigations within primary care settings by (34%) of the participating physicians. Also the Egyptian study of Hebatallah et al., [25] showed similar result that the main barrier for cardiovascular risk assessment was the diffident laboratory investigations. Not necessary the financial resources but also the availability of lab investigations results during the clinical consultation in the primary health care visit. Still considering the financial resources as one of the important barriers as reported by Croatian study of Reiner et al. which reported that most physicians (general practitioners/family medicine specialist, internists and cardiologists) considered lake of financial recourses as the main barrier in use CVD prevention guidelines [32].

Time to calculate CVD risk score in the clinic is important value to be considered and play important role to assess CVD risk either for patients and physicians. One of the main barriers for not using global cardiovascular risk assessment in our data was lake of time which confirm the other reported studies despite the available tools that offer quick and accurate calculation of patients' CVD risk. Our study found that inadequate time was the second reported barrier by physicians (26.2%). Many researches relay on lake of time as main barrier [25, 26, 31, 34, 35, 36].

Communicating and managing cardiovascular risk is difficult. More time is needed than is available in a routine GP appointment to be effective. Anyhow even with

available time some physician do not apply the CVD risk score. 38.8% of physician don't agree that it is time consuming most of the time and only 14% agreed that it is time consuming all time. One study showed that GPs who felt there was sufficient time for assessment had higher assessment rates [19]. The present study found limited knowledge and skills was the least reported barrier by physicians (14.9%).

Conclusion
A high proportion of physicians reported using clinical guidelines for primary CVD prevention. However, laboratory investigations and time constrain were common reasons for not using global CV risk assessment tools. Unsatisfactory self-assessment of own knowledge and skills was significantly associated with lower knowledge and attitude.

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