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Current and future cardiovascular disease risk assessment in the European Union: an international comparative study

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Abstract

Background

Risk assessment is central to primary prevention of cardiovascular disease, but there remains a need to better understand the use of evidence-based interventions in practice. This study examines: a) the policies and guidelines for risk assessment in Europe, b) the use of risk assessment tools in clinical practice and c) the barriers to, and facilitators of, risk assessment.

Methods

Data were collected from academics, clinicians and policymakers in an online questionnaire targeted at experts from all EU member states, and in eight in-depth country case studies that were developed from a targeted literature review and 36 interviews.

Results

The European Society of Cardiology produces European guidelines for CVD risk assessment and recommends the Systematic COronary Risk Evaluation (SCORE) tool, which is the most widely used risk assessment tool in Europe. The use of risk assessment tools is variable. Lack of time and resources are important barriers. Integrating risk assessment tools into clinical systems and providing financial incentives to carry out risk assessments could increase implementation. Novel biomarkers would need to be supported by evidence of their clinical effectiveness and cost-effectiveness to be introduced in clinical practice. These findings were consistent across Europe.

Conclusion

Efforts to improve the assessment of CVD risk in clinical practice should be carried out by, or in collaboration with, the European Society of Cardiology. Increasing the use of existing risk assessment tools is likely to offer greater gains in primary prevention than the development of novel biomarkers.

Keywords: risk assessment, primary care, primary prevention, cardiovascular disease, health policy

Introduction

Cardiovascular disease (CVD) is the leading cause of death in Europe and accounts for 1.9 million deaths per year in the European Union (EU).[1] In the past 30 years, CVD mortality has declined in most countries because of improved survival after coronary events and falling CVD prevalence.[1-3] Healthier lifestyles, reductions in risk factor prevalence (particularly smoking) and pharmacological interventions for high blood pressure and high cholesterol primarily explain these improvements.[4]

Since the financial crisis, healthcare budgets in Europe have fallen in line with falling tax revenue.[5] Some health services, such as the NHS in England, have increasingly focused on disease prevention to reduce demands on health services and decrease costs.[6] Risk assessment remains central to primary prevention of CVD. It is carried out to encourage the modification of behavioural risk factors,[7] guide equitable and cost-effective healthcare delivery and inform clinical decision making.[8] CVD risk assessment may also influence clinicians' prescribing behaviour.[9]

Numerous tools exist to estimate CVD risk.[10] The Systematic COronary Risk Evaluation (SCORE) tool estimates the 10-year risk of fatal cardiovascular disease.[11] Others, such as QRISK2[12] and Framingham-based risk scores[13], estimate the 10-year risk of experiencing any CVD event. The predictive ability of existing tools varies, and novel biochemical and genetic biomarkers to improve cardiovascular risk prediction are currently being studied.[14]

However, there is often a disconnect between academic research and the use of evidence-based interventions in practice.[15] This study was designed to address that problem in the European context. An online questionnaire targeted at experts across Europe and detailed country case studies were used to answer three research questions: 1) What policies and guidelines exist for CVD risk assessment? 2) How is CVD risk assessment implemented in practice? 3) What are the barriers to, and facilitators of, CVD risk assessment, including the use of novel biomarkers?

Methods

Data were collected from academic, clinical and policy experts in all 28 EU member states in an online questionnaire and from eight in-depth country case studies.

Online Questionnaire

The aim of the questionnaire was to improve our understanding of differences in attitudes towards, and policies for, CVD risk assessment in all member states, rather than to provide an accurate appraisal of each individual country. Participants were purposively sampled to ensure a range of expert views were captured. A scoping literature review of the use of, and guidelines for, CVD risk assessment tools in Europe informed the development of the questionnaire. An initial draft was circulated to the Public Health Genomics Foundation, the Andalusian School of Public Health in Granada and senior academics in health services research. The questionnaire (Supplementary material 1) was refined on the basis of comments received.

Referencing the publicly funded healthcare system in their countries, respondents were asked to answer questions on guidelines and tools for CVD risk assessment, current use of risk assessment tools in clinical practice, barriers and facilitators of risk assessment in general, and specifically, for the use and potential uses of novel biochemical and genetic biomarkers.

The questionnaire was sent to at least one senior stakeholder in CVD prevention at a government agency, regulatory agency, professional association, research organisation or patient group in every member state. Contacts were identified from national cardiology and hypertension societies, European cardiovascular foundations and charities, authors of academic publications on CVD prevention and risk assessment (indexed in PubMed) and a small number of additional experts that were identified on an ad-hoc basis through the authors' personal contacts. An initial invitation email was sent, with up to three follow-up reminders to non-respondents. Study information was provided to invitees at the start of the online questionnaire. The questionnaire was circulated online, in English, using Select Survey[16] from November 2014 to March 2015.

Case-studies

The eight case studies were selected to reflect variation in: geographical location within Europe, health system financing mechanisms, the role of general practitioners (GPs)[a] as "gatekeepers", the impact of the financial crisis, CVD mortality, the burden of CVD and the cost of CVD (Appendix). The case studies were based on interviews and a targeted review of the relevant country-specific literature, including documents identified by interviewees and respondents to the questionnaire.

The interviews were semi-structured, including open-ended questions and prompts (Supplementary material 2). Interviewees were asked about policies and guidelines for CVD risk assessment, barriers and facilitators of risk assessment, current monitoring of biomarkers (biochemical and genetic) and potential barriers to the use of more sophisticated CVD risk assessment tools. All interviewees gave verbal consent for their interview to be recorded and transcribed and were sent a copy of the case study to which their interview contributed.

Interview participants were identified by the same means as those invited to respond to the questionnaire, with the aim of recruiting five interviewees per country, including at least one academic, clinical and policy expert. Potential interviewees were sent an invitation email and topic guide. The research team carried out the interviews in English, by telephone, between May and October 2015.

Analysis

Respondents to the questionnaire who only completed the initial question about country of residence were excluded from the analysis. Responses to each question were analysed independently and non-response was considered on a question-by-question basis. Descriptive statistics by respondent and country were calculated and free-text responses were summarised.

Interview transcripts were coded into organising themes using NVivo[17] and emerging findings were discussed with the wider study team. Country reports for each case study were developed using a

[a] Or equivalent primary care doctor in other European countries (e.g. family doctor)

narrative synthesis approach based on the interview transcripts, relevant free-text responses to the questionnaire and literature review and written using the same template. The eight reports were then thematically coded in a cross-country analysis using NVivo.[17]

Results

Participants and respondents

The questionnaire was sent to 560 experts across Europe. There were 163 responses to the first question about availability of guidelines in the respondent's country. There were 135 responses (24% response rate) to at least one subsequent question, with respondents covering all member states except Austria. A median of three responses per country was received, ranging from one (Estonia, Romania, Slovakia) to 23 (United Kingdom). Respondents were mostly academics (58%) and/or clinicians (66%) and a small number were involved in policy (8%) (Supplementary material 3).

Country case studies included Bulgaria, England, Finland, Germany, Greece, Latvia, Spain and Sweden. Thirty-six telephone interviews (3 to 5 per country) were conducted. Each country had at least one academic, clinical and policy representative. Table 1 provides a summary of key findings from the eight case studies; the full case studies can be accessed online (Supplementary material 4).

Stakeholders, guidelines, and choice of risk assessment tool

The majority of national cardiology societies endorse the European Society of Cardiology (ESC) prevention guidelines. Questionnaire respondents from most countries reported having national guidelines and respondents from two-fifths of countries reported having regional guidelines; although respondents from most countries reported that the national and international guidelines were used most frequently (Table 2). These findings are consistent with the case studies (Table 1) in that interviewees from most countries reported that the ESC is the key organisation in the development of European guidelines for the prevention of CVD and that national guidelines for CVD risk assessment are often based on the ESC guidelines.

We follow the European Society of Cardiology guidelines. Greece is part of Europe so we follow these guidelines mainly. [Cardiologist, Academic, Greece]

Respondents from virtually all countries reported that CVD risk assessment tools are used in clinical practice and that the SCORE tool, which is recommended by the ESC, is the most frequently used, followed by Framingham-based tools. These findings were consistent across the questionnaire and case studies (Table 2). SCORE has been calibrated for high-risk (e.g. Bulgaria and Latvia) and low-risk (e.g. Finland) countries, as well as for some individual countries (e.g. Germany, Greece, Spain and Sweden). However, the British Society of Cardiology does not endorse the ESC prevention guidelines and the National Institute for Health and Care Excellence (NICE) recommends the QRISK2 tool.[12] There is also regional variation within countries; some regions in Spain recommend a Framingham-based tool or the REGICOR (*REgistre GIroní del COR,* Girona Heart Registry) calculator, which is based on a calibrated Framingham model.

Current use of CVD risk assessment tools in clinical practice

Responses to the questionnaire suggest that CVD risk assessment tools are widely used by doctors in both primary and secondary care; although respondents in just under half of countries also reported use by other health professionals, such as practice nurses and pharmacists (Table 2). This was supported by the case studies, which found risk assessment to be primarily the responsibility of GPs, usually taking place in primary care (Table 1). However, in almost all countries, other health professionals also conduct risk assessments (Table 2). Nurses undertake the majority of risk assessments for the English NHS Health Check Programme while cardiologists undertake the majority of risk assessments in Greece.

The questionnaire findings suggest that, across Europe, risk assessment is perceived to be acceptable to patients and considered of clinical value (Table 2). Interviewees reported that risk assessment tools are used in clinical consultations to guide clinical decision-making (e.g. prescribing decisions) and encourage lifestyle changes.

I have here the SCORE system and the Framingham, and the REGICOR system in my computer, so I can easily estimate the risk of my patients with the information that I have in their records, but it's not automatically something I can do… I do when I have to make some clinical decisions on that specific patient. [GP, Spain]

Variation in implementation of risk assessment

The populations targeted for risk assessment vary substantially between countries and regions, but are most commonly based on age or medical history. While little data is available on the use of risk assessment tools in Europe, the Spanish case study identified two research studies that illustrate the variability in the implementation of risk assessment. The first study found that only 36% of primary care practitioners surveyed used the Spanish adaptation of the European guidelines and only 40% calculated overall cardiovascular risk in more than 80% of their patients with at least one risk factor.[18] The second study highlighted variable CVD prevention policy across Spanish regions and patchy implementation of risk assessment for target populations.[19] Interviewees from all countries reported that risk assessment use varies between health professionals, practices, and regions.

Some use it regularly, others don't use it at all, others use it sometimes and they can use different tools. [GP, Academic, Germany]

They attributed the variation to differing attitudes towards prevention and constraints on time and resources. In some countries, interviewees also reported mixed views regarding the acceptability of risk assessment tools among clinicians (e.g. attitudes regarding clinicians' roles in primary prevention) and scepticism about the effectiveness of risk assessment.

I worry intensely about how effective it is and whether it's just people being commissioned to provide the service without any real understanding of what that service entails and how to change the individual's cardiovascular risk at the end of it. [GP, Academic, England]

Interviewees from some countries (e.g. Bulgaria, Latvia, Finland and Sweden) reported that treatment and secondary prevention are prioritised over primary prevention.

> *In some parts of the country general practices are not very well resourced and they need to concentrate on treating the sick . . . They don't have or they don't feel they have had time for preventative care. They have their hands full managing the sick patients. [Cardiologist, Finland]*

Others reported that risk assessment is often estimated based on individual risk factors, rather than using a risk assessment tool.

> *The calculation itself is not the best, the most important thing is to be alert, to be alert for risks and to give the proper advices and we make the right, take the right decisions and take the right actions to prevent and to protect. [GP, Academic, Bulgaria]*

Barriers and facilitators of CVD risk assessment

The questionnaire found that, for most countries, facilitators of risk assessment in routine practice include: guideline recommendations, training, financing, perceptions of importance to clinicians and patients, time, and the availability of information technology (Table 3a). These results were generally consistent with case study findings; although interviewees emphasised lack of time and resources as particularly important barriers. GPs, in particular, reported being overburdened and lacking time to conduct risk assessments and follow-up with high-risk patients (Table 1).

> *GP's also have just 15 minutes for every patient and if the patient comes with the other problem, there is no time to calculate risk. [Cardiologist, Latvia]*

Similarly, interviewees in 6 out of 8 case study countries reported shortages or underutilisation of nurses to carry out, or assist with, risk assessments (Table 1).

While respondents to the questionnaire reported that specific payments facilitate risk assessment (Table 3a), respondents from less than half of EU countries reported that specific payments exist for risk assessment (Table 2). The case studies identified three types of financial barriers. At the health system level, interviewees reported a lack of resources for primary prevention

and implementation of guidelines. At the clinician level, they reported a lack of reimbursement for time spent carrying out risk assessments.

> *In some parts of the country general practices are not very well resourced and they need to concentrate on treating the sick . . . They don't have or they don't feel they have had time for preventative care. [Cardiologist, Finland]*

At the patient level, they reported a lack of reimbursement for costs associated with tests and treatments (Table 1).

> *Yes, but for instance, statins for primary prevention they are not… I think they are not reimbursed at all. […] Nowadays statins are reimbursed for secondary prevention actually, rather than primary. [Cardiologist, Academic, Bulgaria]*

Interviewees suggested that simpler risk assessment tools that are integrated into electronic medical records might save time and increase usage.

> *If something was made so that it was integrated with the normal system then it would be much, much more likely to be used. [GP, England]*

They also suggested that calibration of tools to specific populations, increased flexibility in the setting for risk assessment, and training clinicians to use the tools would increase uptake.

Novel biochemical and genetic markers of CVD risk

While some established biomarkers (e.g. cholesterol and blood pressure) are monitored in routine clinical practice in most countries, novel biochemical and genetic markers are not routinely monitored in any country; they are used only in research. The case studies found that the main barrier to the monitoring of biomarkers is the lack of evidence on their clinical and cost effectiveness. Interviewees questioned the usefulness of additional biomarkers and reported a need to prove their clinical value, improve their sensitivity and/or specificity, prove their cost-effectiveness, and simplify their use.

Biomarkers have so far not contributed much. We went through biomarkers of different kinds, when we wrote the guidelines for management of people with diabetes, prediabetes and cardiovascular disease. And we actually couldn't find any strong evidence for any biomarkers, and there are many, which actually told us something more than how the patient lived. Their blood pressure, their glucose, lipids and so on. So biomarkers are in the general perspective, not very useful, not yet. [Cardiologist, Sweden]

Respondents to the questionnaire from most countries reported that monitoring biomarkers would be acceptable to both patients and clinicians (Table 3b) and interviewees generally did not foresee challenges regarding acceptability of novel biomarkers among patients and clinicians, provided that the conditions outlined above were met.

Questionnaire respondents reported regulatory and legal concerns associated with the monitoring of biomarkers slightly more often for genetic biomarkers compared with biochemical biomarkers (Table 3b). However, interviewees did not identify any regulatory or legal issues, even when specifically questioned on such issues.

Oh, well our data protection law is very strong, very severe, so probably, I don't know, but if the information is anonymous. You know respecting the individual data protection, that shouldn't be any trouble I think. [Cardiologist, Spain]

Discussion

This study describes how CVD risk assessment is carried out in practice across Europe. It highlights the key role of the ESC, the importance of primary care and variation both within and between countries in the implementation of risk assessment. It also confirms the need for reliable evidence on the clinical effectiveness and cost effectiveness of new interventions, such as novel biomarkers, prior to their introduction into clinical practice.

The ESC's first Joint European Guidelines for CVD prevention were published in 1994, and with the launch of a strategy in 2002 designed to "reduce cardiovascular deaths by 40%",[20] the

organisation has moved from simply providing evidence-based guidelines to influencing European cardiovascular risk management policies.[20] This study's findings, such as the widespread use of the SCORE tool and the shaping of national guidelines, reflect this broader role.

We found little published evidence on CVD risk assessment in clinical practice across Europe. Consistent with the findings from this study, recent research from the Netherlands highlights the gap between positive policy intent and implementation of CVD risk assessment in practice,[21] with patient, organisation and health system factors all influencing implementation in primary care. A systematic review of breast cancer risk prediction models found that the model most widely implemented in practice was the one that was most widely available, rather than the model with the best predictive ability.[22] This is consistent with findings from this research, where it was reported that embedding risk prediction into routine electronic patient records is a facilitator of use in practice and that the use of the SCORE tool is widespread despite being limited to the prediction of fatal cardiovascular events.

Despite widespread endorsement and acceptance of ESC guidelines, this study identified important variations in the implementation of risk assessment, such as the populations targeted and variable implementation across health professionals, practices and regions. This variation across and within countries was primarily attributed to differing attitudes towards the effectiveness of risk assessment and the prioritization of treatment and secondary prevention over primary prevention. Such attitudes are likely an important barrier to CVD risk assessment and important for policy makers to note, although assessing the pervasiveness of such views was beyond the scope of this study.

The barriers and facilitators to the implementation of risk assessment identified in this study mirror those observed for risk models for type 2 diabetes[23] and the implementation of the NHS Health Check programme in England.[24] Implementation was influenced by the perceived advantages (simplicity, ease of use, and predictive ability) and disadvantages (workload, and implications of managing a positive score) of the tools. These in turn are affected by factors such as clinicians' skills, influence or endorsement of tools, healthcare system design and external policies, incentives and

competing priorities. This study highlighted three levels of financial barriers that would need to be addressed to improve the implementation of CVD risk assessment: resources for primary prevention and implementation of guidelines at the health system level; reimbursement for time spent carrying out risk assessments at the clinical level; and reimbursement for costs associated with tests and treatment at the patient level. These findings suggest that overcoming the financial barriers to risk assessment is a key policy area.

Investigations into the utility of novel factors for the assessment of cardiovascular risk are being undertaken. Many studies that have claimed that additional factors could offer further predictive value beyond the Framingham algorithm have well-documented flaws.[25] Further work employing multiple biomarkers has found only limited predictive benefit over conventional risk scores.[26] This study emphasises the need to demonstrate the predictive value and cost-effectiveness of novel biomarkers prior to their implementation.

The main strength of this research is the inclusion of opinions from academic, clinical and policy experts from virtually all EU member states, using a wide-ranging questionnaire and in-depth case studies. Although responses are always prone to subjectivity, the expertise of the respondents means that the results of this study are likely to reflect practice. Differences in the results between the questionnaire and case studies highlight the strength of using different methodologies to gain a clearer understanding of opinion.

However, this study also has important limitations. Identifying stakeholders, academic literature and guidelines for some countries was challenging, which could reflect the language barriers of the research team or possibly a lack of resources for, or engagement with, cardiovascular risk assessment in some countries. Although the response rate was in line with expectations for this type of study[27,28] and the questionnaire was not intended to be representative of all member states, the response rate was nevertheless low and variable across countries, which may be due to the questionnaire being written in English or the response burden because of the length of the questionnaire. The participation of civil servants and representatives of health ministries and

regulatory agencies in the questionnaire was unexpectedly low and thus not fully captured by the questionnaire findings; however, policy stakeholders participated in interviews for all of the country case studies such that the views of this stakeholder group were included in the analysis. However, we also cannot rule out selection bias; it is conceivable that the respondents who viewed the ESC and other guidelines most favourably may also have participated in the development of the guidelines. Very few stakeholders from CVD charities and patient organisations participated in the questionnaire and interviews, despite being invited to participate, such that this research lacks a strong patient voice.

This study provides valuable insight into CVD risk assessment across Europe, which will hopefully act as a useful baseline and provide reference data upon which future studies can draw. The ESC has a central role in informing practice in Europe, and efforts to improve CVD prevention are likely to benefit from being carried out by, or in collaboration with, the ESC. Although integration of risk assessment tools in clinical computer systems may improve uptake, there remain significant barriers to the widespread implementation of risk assessment tools, including lack of funding. Despite considerable interest in developing novel biomarkers to optimise cardiovascular risk assessment, it is likely that focusing efforts on increasing implementation of existing risk assessment tools will offer the greatest gains in primary prevention of cardiovascular disease.

Acknowledgements

This study complied with the Declaration of Helsinki. It was subject to RAND Europe's internal ethics process, and informed consent was obtained from all subjects.

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Conflicts of interest

None declared.

Keypoints

- The European Society of Cardiology is important in CVD risk assessment and any changes in European risk assessment policy should be made by, or in collaboration with, the ESC.
- Guideline implementation and use of CVD risk assessment tools in practice is often suboptimal.
- Lack of funding for risk assessment and following up patients identified as at risk is a key barrier to widespread implementation of CVD risk assessment in Europe.
- Novel biochemical and genetic markers of CVD risk are not currently used in routine clinical practice; such biomarkers would need to be endorsed in clinical guidelines and shown to be both effective and cost-effective in order to be introduced into routine clinical practice in Europe.

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Table 1: Key findings from case-studies

Case study themes	Country							
	Bulgaria	Germany	UK	Greece	Spain	Finland	Latvia	Sweden
Policies and guidelines								
ESC prevention guidelines are endorsed	X	X		X	X	X	X	X
Also have national guidelines		X	X	X	X	X	X	X
Also have regional guidelines					X			X
The SCORE risk assessment tool is recommended	X	X		X	X	X	X	X
Alternative risk assessment tools in addition to / instead of SCORE are also recommended			X		X	X		
Financial incentive for risk assessment			X				X	
Current practice								
Risk assessment is primarily the responsibility of general practitioners and mostly takes places in primary care	X	X	X		X	X	X	X
CVD risk assessment is acceptable to patients	X	X	X	X	X	X	X	
CVD risk assessment is targeted at specific population groups	X	X	X	X	X	X	X	X
Use of risk assessment is variable between health professionals, practices and regions and often is not frequently used	X	X	X	X	X	X	X	X
Risk assessment is often estimated based on risk factors rather than formally calculated	X	X	X	X	X			
Treatment and secondary prevention are prioritised	X		X			X	X	X
There are mixed views regarding the acceptability of risk assessment tools for use in practice	X	X	X	X	X	X		
Barriers								
Time constraints and clinician workload	X	X	X	X	X	X	X	X
Shortage/underutilisation of nurses	X			X	X	X	X	X
Funding for risk assessment and follow-up	X		X	X	X		X	
Lack of reimbursement of medicines prescribed for primary prevention	X			X				
Lack of awareness of risk assessment among clinicians	X	X		X				X
Lack of awareness of risk assessment among patients	X	X						X
Facilitators								
Simple risk assessment tools		X	X	X				X
Incorporation of risk assessment tools into electronic medical records	X		X	X	X	X		
Calibration of risk assessment tools to national populations		X	X					
Flexibility in the setting for risk assessment			X			X		X
Training for clinicians			X	X	X			X
Awareness raising activities	X			X	X	X	X	
Novel biochemical and genetic markers								
Novel biomarkers not routinely monitored	X	X	X	X	X	X	X	X
Novel biomarkers primarily used in research	X					X	X	X
Lack of evidence on effectiveness of monitoring novel biomarkers		X	X		X	X		X

Likely cost of monitoring novel biomarkers would be a barrier	X	X	X	X	X		X	
Novel biomarkers would need to be clinically useful			X	X	X	X		X
Novel biomarkers would need to improve the sensitivity and/or specificity of existing risk assessment tools	X		X	X	X			
Novel biomarkers would need to be cost-effective	X		X	X	X	X		X

Table 2. CVD risk assessment across Europe, guidelines and current practice (questionnaire findings)

Question/option (respondents)	Number (%) of "Yes" responses*	Number of countries with at least one endorsement
Are CVD guidelines available?		
Any CVD risk assessment guidance (n=158)	143 (90.5)	27/28
National guidelines (n=163)	124 (76.1)	24/28
Regional guidelines (n=139)	93 (66.9)	11/27
Most frequently reported guidelines (where there is more than one type of guidance)		
International (n=100)	42 (42.0)	18/26
National (n=100)	53 (53.0)	17/26
Regional (n=100)	5 (5.0)	4/26
Are CVD risk assessment tools part of routine clinical practice? (n=115)	90 (78.3)	25/26
Tools reported as the most widely used by clinicians		
ASSIGN (n=128)	6 (4.7)	2/27
CUORE (n=128)	11 (8.6)	1/27
ESH risk chart (n=128)	16 (12.5)	8/27
FINRISK (n=128)	5 (3.9)	4/27
Framingham-based calculator (n=128)	38 (29.7)	15/27
PRECARD (n=128)	0 (0.0)	0/27
PROCAM (n=128)	4 (3.1)	2/27
QRISK (n=128)	20 (15.6)	2/27
Reynolds (n=128)	1 (0.8)	1/27
RISKARD (n=128)	0 (0.0)	0/27
SCORE (n=128)	89 (69.5)	26/27
WHO/ISH (n=128)	3 (2.3)	3/27
Another tool (n=128)	14 (10.9)	5/27
Endorsed more than one tool (n=55)		
Who uses CVD risk assessment tools?		
Used by GPs (n=114)	98 (86.0)	26/27
Used by Specialists in office based practice (n=110)	95 (86.4)	27/27
Used by Specialists in hospital outpatients (n=106)	92 (86.8)	27/27
Used by practice nurses (n=97)	27 (27.8)	11/26
Used by unlicensed nurse assistant/aide (n=90)	8 (8.9)	3/26
Used by pharmacists (n=98)	22 (22.4)	10/26
Current practice		
Specific payments for the use (n=113)	22 (19.5)	10/26
Considered acceptable to patients (n=110)	102 (92.7)	25/26
Considered important for patients understanding / decision making (n=110)	99 (90.0)	25/25
Considered important for healthcare professionals decision making (n=108)	95 (88.0)	25/26
Specific consultation time (n=114)	31 (27.2)	13/25
Training for clinicians (n=112)	64 (57.1)	24/26
Clinician access to computers (n=124)	121 (97.6)**	26/26

**all responses are reported on a question by question basis*

*** the three "Nos" came from Bulgaria, Spain, Cyprus*

Table 3a: Current/future facilitators of CVD risk assessment (questionnaire findings)

CVD risk assessment	Number (%) of "Yes" responses	Number of countries with any "Yes" responses
Recommendation in guidelines	113/121 (93.4)	26/26
Specific payment for use	67/112 (59.8)	23/26
Acceptable to patients	98/108 (90.7)	24/25
Important for patients understanding / decision making	107/114 (93.9)	25/26
Important for healthcare professionals decision making	101/109 (92.7)	26/26
Specific consultation time	69/107 (64.5)	21/26
Training for clinicians	98/113 (86.7)	24/26
Clinician access to computers	111/117 (94.9)	26/26

Table 3b: Novel biochemical/genetic biomarkers: future use and regulatory issues (questionnaire findings)

	Biochemical		Genetic	
	"Yes" responses/ All responses (%)	Countries with at least one "Yes response"	"Yes" responses/ All responses (%)	Countries with at least one "Yes response"
Future use				
Concerns about financing in routine practice	54/99 (54.5)	21/26	64/96 (66.7)	23/25
Acceptable to clinicians	105/109 (96.3)	26/26	71/87 (81.6)	24/25
Acceptable to patients	101/102 (99.0)	26/26	75/84 (89.3)	23/25
Existing regulatory/legal issues				
Data protection	49/101 (48.5)	20/26	64/98 (65.3)	23/25
Confidentiality	47/100 (47.0)	18/26	60/95 (63.2)	20/25
Discrimination	22/89 (24.7)	12/25	29/85 (34.1)	13/24
Professional negligence	26/77 (33.8)	13/24	28/75 (37.3)	15/24
Consent	48/94 (51.1)	18/25	66/90 (73.3)	21/25