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Can Computerized Risk Profiles Help Patients Improve Their Coronary Risk? The Results of The Coronary Health Assessment Study (CHAS)[1]

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Background. **The Coronary Health Assessment Study (CHAS) was developed to determine the feasibility of using patient-specific, multifactorial computerized coronary risk profiles as a clinical decision aid to support primary prevention of CHD.**

Methods. **Study participants included 253 community based physicians, randomized into profile and control groups, and 958 of their patients. The profile group physicians received coronary risk profiles for their patients within 10 working days after the baseline patient assessment providing early feedback. The control group received their profiles only if the patient was clinically reevaluated during a 3-month follow-up visit. Patients' coronary risk factors were evaluated at baseline and at follow-up.**

Results. **The profile group had a significantly higher ($P < 0.05$) ratio of high-risk/low-risk patients who returned for a follow-up visit compared to the control group (1.23 vs 0.77). The patients in the profile group also had significantly ($P < 0.05$) greater mean reductions in total cholesterol (−0.5 vs −0.1 mmol/L), LDL cholesterol (−0.4 vs 0.0 mmol/L), the total cholesterol/HDL ratio (−0.6 vs −0.2), and the predicted 8-year coronary risk (−1.8 vs −0.3%).**

Conclusions. **Computer-generated coronary risk profiles can be effective in assisting physicians to identify high-risk patients. Their use is also associated with significantly greater improvements in the serum lipid profiles and the overall coronary risk of these patients.**

Key Words: **Computers; coronary disease; patients; prevention; risk factors.**

INTRODUCTION

Coronary heart disease (CHD) is a major cause of death and disability in our society. Given the substantial impact of CHD and the high prevalence of modifiable risk factors, both physicians and the general public receive a tremendous amount of health information surrounding CHD prevention. Often this information results in conflicting messages, such that consensus guidelines have been developed to support physicians' clinical decisions [*1–3*]. But even these expert recommendations may be difficult to follow for busy office-based clinicians. Moreover, specific guidelines may be less than completely accurate in identifying high-risk patients [*4*].

We have previously demonstrated that physicians are aware of the relative importance of the various risk factors for CHD but they are poor at estimating CHD risk when multiple risk factors are present [*5*]. Accordingly, there remains substantial confusion among both physicians and their patients that may explain, in part, the suboptimal public response to CHD prevention recommendations [*6–8*]. Among the possible solutions, advocates of cardiovascular disease prevention are recommending that patient treatment in primary prevention should be based on an assessment of global risk rather than individual risk factors [*2,9–11*]. However, there is

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a need to examine the feasibility of using a global risk assessment approach in primary care practices.

Shared decision making between physicians and patients offers a second solution [*12*]. When dealing with multiple risk factors there are various treatments that may improve a patient's coronary risk. Informing patients about the potential benefits of treating specific risk factors and then allowing them to be involved in developing the treatment plan may improve treatment compliance and in turn enhance coronary risk reduction. Shared decision making must also be systematically evaluated.

The Coronary Health Assessment Study (CHAS) is one of the first studies to determine the feasibility of using patient-specific, multifactorial computerized coronary risk profiles as a clinical decision aid to support the primary prevention of CHD. The computer-generated risk profiles provide physicians with a visual teaching tool and allow them to demonstrate the potential for CHD risk reduction with various interventions (i.e., smoking cessation, blood pressure reduction, cholesterol reduction, etc.). This study examines the degree to which family physicians are willing to adopt a new diagnostic tool into their busy clinical practice. It also examines the patient response to this new approach and provides a preliminary evaluation of its effectiveness in terms of risk factor modification.

METHODS

Physician Recruitment

Twenty-four urban and rural communities throughout the provinces of Ontario and Quebec, Canada, were selected for physician recruitment. Community based family practitioners who were interested in cardiovascular disease prevention were targeted for study participation. Study sites were randomly allocated to a profile group or a control group after blocking for urban status according to the presence or absence of a medical school in the designated community. Randomization occurred at the level of the meeting to keep the control group blinded. Twice as many sites were allocated to the profile group to maximize physician and patient feedback regarding the feasibility and usefulness of the risk profiles.

With the help of medical representatives from Merck Frosst Canada, Inc., primary care physicians with busy adult practices were invited to attend a 1-h Continuing Medical Education (CME) meeting concerning cardiovascular risk assessment, after which interested physicians were invited to enroll in the study. Physicians in both arms of the study were told that this was a research study to evaluate the feasibility of using computerized coronary risk profiles to help identify and treat patients at high risk of coronary heart disease. Control group physicians were not told that they were in a control group. During the course of the study both physician groups received a monthly newsletter and had access to a toll free number which they could call with any questions regarding the study or a specific patient's risk profile. All services including the computerized risk profiles were provided free of charge but physicians were not specifically reimbursed for their participation in the study.

Patient Enrollment

Physicians were invited to select patients from their practice to participate in the study. They were told to enroll patients in whom they thought a risk profile would be clinically useful. The only inclusion criteria were that patients be between the ages of 30 and 74 years and that they be free of diagnosed cardiovascular disease. Low-risk patients were not specifically excluded so that physicians could learn to contrast between low and high-risk patients in their practice.

To order a profile, the physician first described the study to the patient and then obtained written informed consent. The patient's current risk factor data were entered on to a patient enrollment form by the physician or office staff. The patient then immediately completed the remainder of the questionnaire outlining their attitudes and knowledge surrounding cardiovascular disease prevention as well as an assessment of their current lifestyle and medical problems. This information was then mailed to the CHAS study center.

The profile group of physicians received two copies of the patient's coronary risk profile within 10 working days. One copy of the profile became part of the patient's medical record while the other copy was presented to the patient at a return visit (approximately 2 weeks following initial visit) to take home after an appropriate interpretation by the physician. Any patient could be scheduled for a follow-up visit (left to the discretion of the patient and physician) 3 to 6 months later.

During the follow-up visit a second questionnaire with the patient's new risk factor data was completed and mailed to the CHAS study center. A new risk profile was sent to the physician demonstrating any changes in risk factor status as a result of trying to modify one or more risk factors.

For the control group of physicians, the coronary risk profiles were returned to the physician only if the patient was clinically reevaluated at a follow-up visit following a minimum 3-month delay. During the initial visit, control physicians used their best clinical judgement to identify the patients at high risk and recommend appropriate therapy. The control group was used to evaluate the changes in coronary risk that occurred among patients without the benefit of feedback from the coronary risk profile.

The Coronary Risk Profile

The coronary risk profile is a one-page computer printout that displays a patient's estimated 8-year coronary risk (the probability of developing coronary disease over the next 8 years) and the amount by which this risk would be reduced if one or more risk factors were modified. These risk estimates are based on specific risk factors including a patient's age, sex, total cholesterol, high density lipoprotein cholesterol (HDL-C), smoking status, diastolic blood pressure, presence of diabetes, and left ventricular hypertrophy. The estimated risk is calculated using the previously published and validated CHD Prevention Model [*13*], which incorporates multivariate regression equations from the Framingham Heart Study. Coronary risk calculations represent predicted outcomes based on 1,000 individuals with the same risk profile. The computer profile also provides the estimated "cardiovascular age" of each patient based on the patient's chronological age, correcting for his/her calculated increased or decreased life expectancy compared to the Canadian average for individuals of the same age and sex.

Patients were classified as high or low risk based on their 8-year coronary risk. It was decided a priori that individuals in the upper tertile of risk compared to other Canadians of the same age and sex (using a random sample of 2,109 Canadians age 30–74 from the Canada Health Survey) were considered to be at high risk [*14*]. All other individuals were classified as low risk.

Data Analysis

We hypothesized that receiving a risk profile shortly after the initial visit would encourage high-risk patients to return for a 3-month follow-up while reassuring low-risk patients that such a follow-up was not necessary. As control patients only received their profile at a follow-up visit after at least 3 months, the study design encouraged a higher proportion of control patients to return for follow-up if only to receive their profile. Therefore, to determine the impact of the profile results on patient/physician follow-up decisions, we compared the likelihood of high-risk versus low-risk patients being seen at the 3-month follow-up in both arms of the study. The high-risk likelihood ratio was defined as the proportion of high-risk patients versus low-risk patients who returned for a 3-month follow-up. The impact of the risk profile on the likelihood ratios was calculated as the difference in the ratio between both arms of the study.

Confidence intervals for all ratios were calculated by Monte Carlo simulations which provide more exact intervals compared to approximate methods based on normal or log-normal densities. A large number of simulations (25,000) were performed for each calculation, so that the Monte Carlo error was negligible. Random samples of the binomial parameters for each group were obtained from the normalized likelihood functions. Appropriate combinations of these random variables were then formed to estimate the confidence intervals for relative risks and differences between relative risks.

Independent *t* tests and the χ^2 test were used to compare continuous and categorical characteristics of control group physicians and profile group physicians, characteristics of physicians who enrolled patients versus those who did not, as well as data between reassessed and not reassessed patients in both arms of the study. Analysis of covariance was used to compare changes in specific risk factor values between the baseline and 3-month follow-up while adjusting for any significant differences in baseline values between the study arms.

Because we randomized physicians rather that patients, we analyzed the data to account for the possible dependence of outcomes for patients nested within the same physician. Given the unequal number of patients per physician we relied on the unbalanced repeated measures analysis of variance models [*15*]. In each model the patient's risk factor value at the follow-up visit was the dependent variable, while independent variables included the initial value of this risk factor treated as a within-physician covariate and physician's randomization group considered a between-physician grouping factor. The BMDP 5V program was used for these analyses. The compound symmetry covariance structure and the significance of the covariates effects were assessed using the Wald test [*16*].

RESULTS

Four hundred and forty-five physicians attended the 24 CME meetings. Two hundred and fifty-three physicians (57%) agreed to participate in CHAS, including 170 (57%) in the profile group and 83 (56%) in the control group (see Fig. 1). Randomization occurred at the level of the meeting. However, because twice as many sites were allocated to the profile group, nearly twice as many physicians were enrolled in this arm of the study.

Study Physicians

Physicians in the profile and control groups were similar on most characteristics with the following exceptions. Profile physicians were more likely to be male, younger, more recently graduated, and saw fewer ambulatory patients per week than the control group (Table 1). Only 129 (51%) physicians actually enrolled patients (97 profile and 32 control) underscoring the significant difficulties in achieving widespread adoption of this new diagnostic aid. The significantly greater percentage ($P = 0.010$) of profile physicians who enrolled patients (57%) compared to control physicians

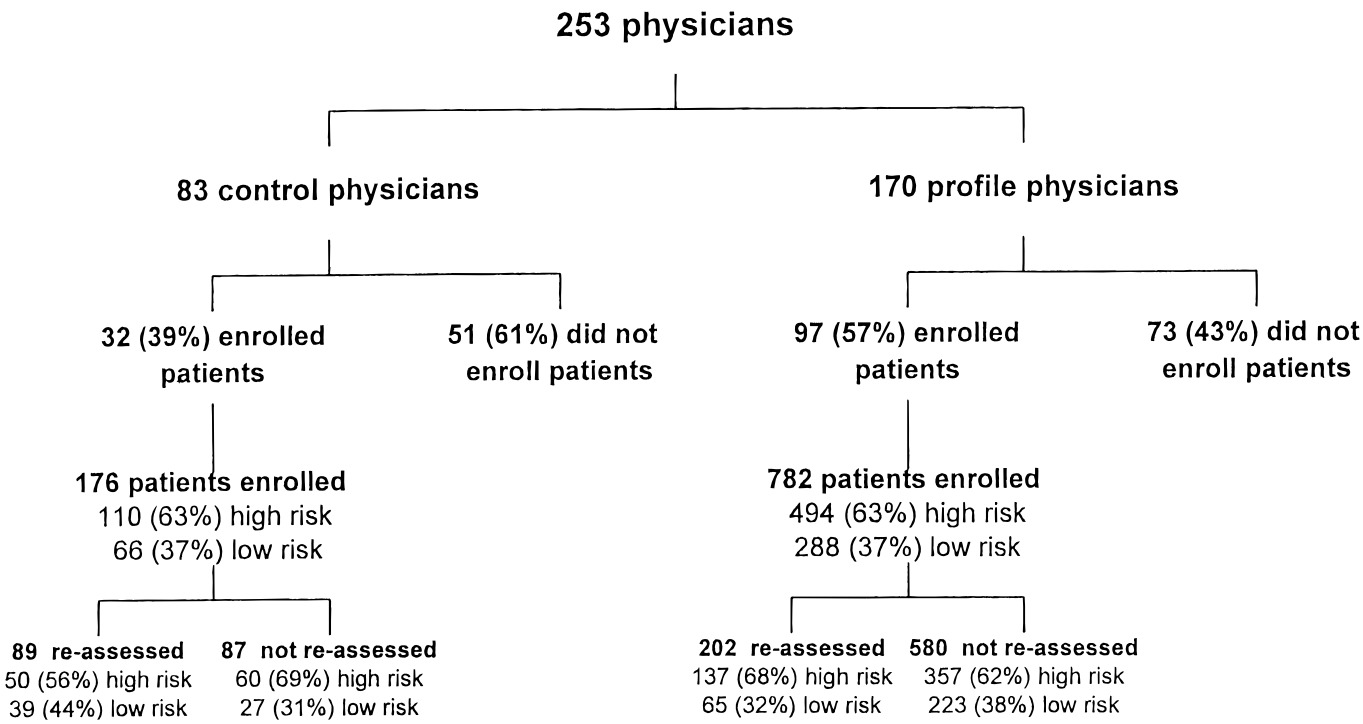

FIG. 1. Patient enrollment during CHAS.

(39%) indicates that early feedback may enhance physician participation in primary prevention clinical activities.

The characteristics of physicians who enrolled at least one patient were compared to those of physicians who did not enroll any patients. Physicians who enrolled patients were significantly younger (45.9 ± 9.7 vs 50.5 ± 10.8 years, $P < 0.001$), were more likely to be board certified (36.4% vs 17.1%, $P = 0.002$), and were more likely to be part of a group practice (48.1% vs 31.7%, $P = 0.008$). Among these physicians, the profile and control groups were similar with the exception of the average weekly number of ambulatory patients. Profile group physicians saw on average 141 ± 56 patients per week, whereas control group physicians saw 178 ± 65 ($P = 0.01$).

TABLE 1

Physician Characteristics

	Profile group		Control group	
Number of physicians	170		83	
Profile users (enrolled ≥ 1 patient)	97	(57.1%)	33	(39.8%)
Males	147	(86.5%)	61	(73.5%)*
Mean age (± SD)	46.9	(9.6)	50.6	(11.7)*
Mean year of graduation (± SD)	1972	(10)	1969	(11)*
Medical training				
General medicine	111	(65.3%)	61	(73.5%)
Board certified family medicine	47	(27.6%)	21	(25.3%)
Other specialties	12	(7.1%)	1	(1.2%)
Type of practice				
Solo	97	(57.1%)	55	(66.3%)
Group	73	(42.9%)	28	(33.7%)
Practice location				
With local medical school	121	(71.2%)	55	(66.3%)
Without local medical school	49	(28.8%)	28	(33.7%)
Mean weekly number of ambulatory patients (± SD)	141.8	(60.5)	162.1	(73.8)*
Mean proportion of time (%) spent on primary prevention (± SD)	18.7	(14.8)	17.2	(13.3)

* Group difference, $P < 0.05$.

Study Patients

Among the physicians who enrolled patients, profile physicians enrolled an average of 7.7 ± 0.6 (± SE) patients into the study compared to an average of 5.4 ± 0.7 patients per control physician ($P = 0.03$). The difference in the mean number of patients enrolled was still significantly different ($P = 0.01$) after adjusting for physician age, gender, and number of ambulatory patients seen per week. Although there were many more patients in the profile arm of the study, there were no significant differences between the profile and control groups for any patient characteristics or CHD risk factors at baseline (Table 2).

At baseline, both the profile and control groups included an equal percentage of high-risk patients, 63%. However, the two physician groups did not reassess similar percentages of patients at a follow-up visit.

TABLE 2

Baseline Patient Characteristics

	Profile group	Control group
Number of patients	782	176
Mean age (years)	50.5 (±10.8)	50.7 (±11.3)
Males	507 (64.8%)	114 (64.8%)
Mean cholesterol (mmol/L)		
Total	6.4 (±1.1)	6.3 (±1.1)
HDL	1.1 (±0.4)	1.1 (±0.4)
LDL	4.2 (±1.0)	4.0 (±1.1)
Total/HDL ratio	6.2 (±2.2)	6.0 (±1.8)
Mean body mass index (kg/m^2)	28.0 (±4.9)	28.2 (±4.8)
Mean systolic blood pressure (mm Hg)	130.7 (±16.4)	130.2 (±16.5)
Mean diastolic blood pressure (mm Hg)	81.7 (±9.8)	80.8 (±10.4)
Current smokers	168 (21.5%)	40 (22.7%)
Left ventricular hypertrophy on ECG	26 (3.3%)	2 (1.1%)
Glucose intolerance[a]	81 (10.4%)	24 (13.6%)
Mean 8-year coronary risk (%)	10.5 (±9.4)	10.4 (±8.9)
Mean cardiovascular age (years)[b]	51.9 (±10.5)	52.2 (±11.5)

± SD.

[a] Diabetes or glycosuria or serum glucose >6.6 mmol/L.

[b] Refer to text.

Among the profile group, 202 of 782 patients (25.8%) were reassessed at the 3-month follow-up compared to 89 of 176 control patients (50.6%). This confirms that the study design resulted in a higher proportion of follow-up visits in the control group so patients and physicians could receive the risk profile. Despite the higher follow-up rate in the control group, the likelihood of physicians reassessing high-risk versus low-risk patients was significantly greater in the profile group (1.23, 95% CI = 0.96–1.60) versus controls (0.77, 0.52–1.03) (Table 3).

Among patients in the profile group, those who were reassessed were significantly (all $P < 0.05$) older, with a higher total cholesterol, low density lipoprotein cholesterol (LDL-C), body mass index, and systolic blood pressure, resulting in a higher calculated 8-year coronary risk and cardiovascular age than patients in this group who were not reassessed. On the other hand, control group patients who were reassessed had a significantly lower total cholesterol and total cholesterol/HDL ratio compared to control patients who were not reassessed. The calculated coronary risk and cardiovascular age tended to be higher among those who were not reassessed, although these differences were not significant (Table 4).

Changes in patient's risk factors were evaluated between the baseline and follow-up visits. After adjusting for the group differences at baseline and accounting for patients nested within the same physician, the profile group patients demonstrated significantly greater reductions ($P < 0.05$) in total cholesterol, LDL cholesterol, and the total cholesterol/HDL-C ratio. This resulted in a significantly greater improvement in cardiovascular age and 8-year coronary risk compared to the control group (Table 5).

Although the patient was the unit of analysis, we recognize the essential role of physicians in the results observed. Since there were some significant differences between physicians in the profile and control arms of the study, we evaluated the possibility that these differences might be responsible for the observed results. When only physicians who actually enrolled patients were compared, the only significant difference noted was that they saw fewer weekly ambulatory patients than the control group. After stratifying patients across low volume (<150 patients/week) and high volume (<150 patients/week) physicians, the profile group still demonstrated greater absolute coronary risk reductions compared to controls (i.e., −1.9% vs −0.7% for low volume physicians and −1.5% vs 0.2% for high volume physicians).

DISCUSSION

Physicians

This study demonstrates that coronary risk profiles can help physicians discriminate between high- and

TABLE 3

Likelihood of High-Risk Versus Low-Risk Patients Returning for a Follow-up Coronary Risk Assessment

	Profile group		Control group		
	High risk[a]	Low risk	High risk	Low risk	Difference
Reassessed	137 (27.7%)	65 (22.6%)	50 (45.5%)	39 (59.1%)	
Not reassessed	357 (72.3%)	223 (77.4%)	60 (54.5%)	27 (40.9%)	
Total	494 (100%)	288 (100%)	110 (100%)	66 (100%)	
High-risk likelihood ratio[b] (95% CI)	1.23 (0.96–1.60)		0.77 (0.58–1.03)		0.46 (0.08–0.87)

[a] High-risk patients are defined as those whose calculated 8-year coronary risk places then among the top tertile for their age and sex. Low risk includes all those in the lower two tertiles.

[b] The high-risk likelihood ratio is the proportion of high-risk patients versus low-risk patients who return for a follow-up risk assessment.

TABLE 4

Baseline Risk Factors for Patients Who Were Reassessed Versus Not Reassessed[a]

	Profile group		Control group	
	Reassessed $n = 202$	Not reassessed $n = 580$	Reassessed $n = 89$	Not reassessed $n = 87$
Age (years)	52.5 (10.9)	49.8 (10.7)**	50.9 (11.0)	50.5 (11.7)
Males	129 (63.9%)	436 (65.1%)	54 (60.7%)	60 (69.0%)
Cholesterol (mmol/L)				
Total	6.55 (1.07)	6.36 (1.13)*	6.11 (1.05)	6.50 (1.20)[a]
HDL	1.13 (0.38)	1.13 (0.35)	1.16 (0.38)	1.09 (0.32)
LDL	4.37 (0.98)	4.15 (1.04)*	3.88 (1.03)	4.22 (1.14)
Total/HDL ratio	6.2 (1.7)	6.1 (2.3)	5.7 (1.7)	6.4 (1.8)[a]
Body mass index (kg/m^2)	28.6 (5.3)	27.8 (4.8)*	27.8 (4.4)	28.7 (5.2)
Blood pressure (mm Hg)				
Systolic	133.0 (15.8)	129.8 (16.6)*	129.2 (15.5)	131.2 (17.5)
Diastolic	82.3 (10.2)	81.5 (9.7)	79.8 (11.2)	81.7 (9.3)
Smokers	42 (20.8%)	126 (21.7%)	21 (23.6%)	19 (21.8%)
Left ventricular hypertrophy	5 (2.5%)	21 (3.6%)	1 (1.1%)	1 (1.2%)
Glucose intolerance	21 (10.4%)	60 (10.3%)	11 (12.4%)	13 (14.9%)
8-Year coronary risk (%)	12.1 (10.1)	9.9 (9.2)**	9.6 (8.3)	11.3 (9.5)
Cardiovascular age (years)	54.0 (10.4)	51.2 (10.5)**	52.0 (11.4)	52.4 (11.7)

[a] Mean (± SD) unless otherwise indicated.
* Reassessed different from not reassessed, $P < 0.05$.
** Reassessed different from not reassessed, $P < 0.01$.

low-risk individuals and reduce the coronary risk factors of these patients. Unfortunately, the substantial nonparticipation rate of both profile and control physicians weakens these results and illustrates the difficulties associated with introducing a new diagnostic aid into clinical practice.

With no material incentives other than CME credits, one might expect that only the more motivated physicians invested the extra time needed to actually use the coronary risk profiles. This may explain why physicians who were profile users were more likely to be younger and board certified. This percentage of participating physicians is not unusual for CME programs that are offered to self-selected groups [*17–20*]. We tried to design the study to interfere as little as possible with physician practice patterns. Given the absence of remuneration to physicians, participating in the study was a better reflection of what would happen in the "real world." While this improves the generalizability of the study, it reduced the compliance with the study protocol.

The modest participation rate underscores the practical difficulties of teaching physicians to adopt new practice habits. We also note that the quicker feedback received by the profile physicians may improve physician motivation since a significantly higher percentage of

TABLE 5

The Impact of Coronary Risk Profiles on CHD Risk Factors[a]

	Profile group ($n = 202$)		Control group ($n = 89$)		Estimated Group	
	Pretest	Absolute change	Pretest	Absolute change	Difference[b]	P value
Total-C (mmol/L)	6.55 (1.07)	−0.49 (0.99)	6.11 (1.05)	−0.09 (0.87)	−0.238	0.05
HDL-C (mmol/L)	1.13 (0.38)	0.02 (0.17)	1.16 (0.38)	0.00 (0.25)	0.013	0.55
LDL-C (mmol/L)	4.37 (0.98)	−0.40 (0.87)	3.88 (1.03)	−0.01 (0.80)	−0.226	0.05
Total-C/HDL-C ratio	6.2 (1.7)	−0.6 (1.3)	5.7 (1.7)	−0.2 (1.2)	−0.287	0.05
Systolic BP (mm Hg)	133.0 (15.8)	−2.0 (14.2)	129.2 (15.5)	−1.2 (14.1)	0.834	0.61
Diastolic BP (mm Hg)	82.3 (10.2)	−0.9 (8.1)	79.8 (11.2)	0.1 (9.8)	0.014	0.99
Body mass index (kg/m^2)	28.6 (5.3)	−0.2 (1.1)	27.8 (4.4)	−0.3 (1.2)	0.154	0.31
Smokers	42 (20.8%)	−3 (−1.5%)	21 (23.6%)	−2 (−2.3%)	0.8%	0.64
8-Year coronary risk (%)	12.0 (10.1)	−1.8 (4.7)	9.6 (8.3)	−0.3 (5.3)	−1.426	<0.01
Cardiovascular age (years)	54.0 (10.4)	−0.6 (1.8)	52.0 (11.4)	−0.1 (2.1)	−0.571	<0.01

[a] Mean (± SD) unless otherwise indicated.
[b] ANCOVA's were used to compare the two groups at follow-up while adjusting for any differences at baseline except for smokers where a two-sample test for equality of proportions was used.

the profile group ordered one or more profiles compared to the control group (57% vs 39%). Decreasing the time commitment of the physicians by having other health care staff or the patient fill out the risk factor forms may be another way of increasing physician compliance. More research needs to be done to determine if this intervention could be offered without relying so heavily on physician time. With less time involvement, would more physicians use the risk profiles, and in turn would more patients benefit?

Overall, a higher percentage of patients was reassessed by the control physicians at a second visit. Since the control physicians did not receive risk profiles until their patients were clinically reassessed, they may have been more motivated to schedule patients for return visits based only on physician judgement and patients wanting to know their coronary risk. Compared to low-risk patients, a lower proportion of high-risk patients returned for follow-up, suggesting that the worried well may be more likely to participate in primary prevention programs while high-risk patients are less interested in reducing their risk factors. Prompt risk assessment in the profile group appears to have modified this bias and helped to target high-risk patients for follow-up while reassuring low-risk patients.

Patients

The overall improvement in coronary risk factors among the profile patients suggests that the risk profiles may provide one tool to help patients improve their coronary risk. In this study, this improvement was due primarily to a decrease in LDL-C, which in turn decreased the total cholesterol, the total cholesterol/HDL-C ratio, and hence the calculated 8-year coronary risk and cardiovascular age. All changes in risk factors were adjusted for differences at baseline to account for changes due to regression to the mean. These results are similar to another published community intervention study where CHD risk education was associated with a decrease in total cholesterol and CHD risk score (compared to no intervention) but not blood pressure, body mass index, smoking habits, or leisure time physical activity [*21*]. The significant decreases in cholesterol that were observed in our study are even more remarkable since our control group was also advised by physicians whose awareness of coronary prevention was enhanced by the study. The only benefit they did not have was the addition of the coronary risk profile and the interpretation by the physician.

The enhanced risk reduction observed in the profile group may relate to a number of factors. A significantly ($P = 0.01$) greater percentage of patients in the profile group (67%) vs controls (52%) reported spending more than 5 min discussing their coronary risk with their physician. Profile patients were also more likely to discuss their coronary risk with family or friends (79%) compared to the control group (62%) ($P = 0.003$). Unfortunately, we were unable to identify any important "lifestyle" determinants.

We cannot identify whether the profile or the extra visit with the physician was responsible for the improvements in the profile group patients. However, the risk profile was directly responsible for the extra visit with the physician and probably increased the primary care focus on prevention. Study design limitations also do not allow us to differentiate between the actual benefit of the risk profile itself and the discussion with the physician that it stimulated. Nonetheless it appears that something constructive did take place between physicians and patients but additional work will be required to elucidate the details.

We left the decision of who returns for a second visit up to the physician and patient. Although this weakens the randomized trial design of the study, it does more closely reflect the reality of clinical practice. This study also documents the difficulties inherent in motivating busy, community based physicians to incorporate a new tool into their already tight schedules. It is against this backdrop that one should be encouraged by these preliminary results.

Patients who were exposed to the computerized coronary risk profiles improved their coronary risk significantly more than patients who were not. It is unclear from these results whether the patient improvements were due to the visual aspect of the profiles themselves, the discussion with the primary practitioner that they facilitated, or the fact that the profiles allowed patients to develop a greater role in their own health care by demonstrating the potential benefits associated with specific interventions. These results support the American Heart Association recommendations that coronary risk assessment can stimulate physician–patient discussions concerning the prevention of heart disease [*9*]. They also confirm the need for further evaluation to document increased physician and patient knowledge, enhanced communication, and better clinical care.

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