Relationship between practice organization and cardiovascular risk factor recording in general practice

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SUMMARY

Background. *Research findings suggest that the level of cardiovascular risk factor recording in general practice is not yet optimal. Several studies indicate a relation between the organization of cardiovascular disease prevention at practice level and cardiovascular risk factor recording.*

Aim. *To explore the relation between the organization of cardiovascular disease prevention and risk factor recording in general practice.*

Method. *A cross-sectional study was conducted using data on adherence to selected practice guidelines and on cardiovascular risk factor recording from 95 general practices. Practice guidelines were developed beforehand in a consensus procedure. Adherence was assessed by means of a questionnaire and practice observations. Risk factor recording was assessed by an audit of 50 medical records per practice.*

Results. *Factor analysis of risk factor recording revealed three dimensions explaining 76% of the variance: recording of health-related behaviour, recording of clinical parameters, and recording of medical background parameters. Adherence to the guideline 'proactively invite patients to attend for assessment of cardiovascular risk' was related to a higher recording level in all three dimensions. Practice characteristics did not show a consistent relationship to the level of risk factor recording.*

Conclusion. *This study indicates that the presence of a system of proactive invitation was related to the recording of cardiovascular risk factors in medical records in general practice.*

Keywords: practice organization; cardiovascular disease; risk factors.

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Introduction

THE role of the general practitioner (GP) in cardiovascular disease prevention is widely acknowledged.[1,2] However, there is evidence that in reality the care provided falls short of what is considered to be possible.[3,4] This gap suggest that barriers to preventive care exist in general practice.

Adequate information about a subject's risk status is essential for the detection and monitoring of subjects at high risk. Systematic assessment and subsequent recording of relevant risk factors is needed to obtain this information. Risk status information enables effective targeting of preventive interventions. This applies not only to cardiovascular disease prevention but also to other preventive areas, such as cervical cancer and influenza.

Research findings suggest that the level of cardiovascular risk factor recording in eligible subjects in general practice is not yet optimal. The mean recording level observed in several studies varies, being 12% for smoking, 25% for weight,[5] and 68% for blood pressure.[6] Practices differ substantially in their recording level.[6] The question is raised as to how these differences can be explained.

Several studies indicate a positive relation between the organization of cardiovascular disease prevention at practice level, such as (computer-assisted) monitoring[7] and systematic case-finding (screening),[8] and the availability of cardiovascular risk status information. Practices with organized systems of data collection showed higher levels of risk factor recording than those without.[6,8] Other elements of such organization may include a follow-up system, a system to monitor preventive activities, and the involvement of auxiliary staff.

A better understanding of the factors determining the availability of information on a subject's risk status can help to optimize preventive care. The objective of this study was to explore the relationship between the organization of cardiovascular disease prevention and risk factor recording in general practice.

Method

Study design

A cross-sectional study was conducted using data on adherence to selected guidelines for the organization of preventive services[9] and on cardiovascular risk factor recording from 95 general practices.[10] The term '(practice) guideline' in this article refers to a specific condition or procedure for organizing services in general practice that is deemed to be necessary to deliver adequate care. These practice guidelines had previously been developed by consensus by a different group of experienced general practitioners (GPs) and practice assistants (Table 1).

Practices were recruited in equal numbers in two regions in The Netherlands: one in the western part of the country (Rotterdam) and one in the eastern part (Nijmegen). Practices were invited to participate in this study on the basis of their interest in improving cardiovascular disease prevention.

Variables and instruments

The organization of cardiovascular disease prevention in general

practice was assessed by questionnaire and by observations during practice visits. One GP and one practice assistant in each practice completed a questionnaire about the practice organization. The following aspects were measured: detection of patients at high risk, follow-up of patients, registration of preventive activities, and teamwork within the practice (Table 1). Data were dichotomized, i.e. practices either did or did not adhere to a guideline.[9]

To assess risk factor recording, a random sample of medical records of patients aged 30 to 60 years was taken in each practice. The records were examined by trained observers visiting the practices. The sample size was set at 50 records per practice; more records were available in some practices, but the number was reduced to 50 by random sampling. The recording of cardiovascular risk factors was assessed by scoring the presence of one or more entries in the medical records over the preceding five years. The following risk factors were taken into account: blood pressure; individual (medical) history of cardiovascular disease; family history of cardiovascular disease; smoking status; serum cholesterol; body weight; and alcohol intake. In every record, the presence or absence of risk factor entries was assessed, regardless of whether or not the entry indicated an elevated risk.[10]

Seven practice characteristics were assessed. Scores were also dichotomized for type of practice (single-handed versus partnership); list size per full-time GP (<2500 versus ≧2500); employment rate of practice assistant per 2500 list size (<0.8 versus ≧0.8 full-time equivalent); involvement in GP resident training (versus non-involvement); use of a computer to record data on all patients listed with the practice (versus non-use); and practice location (rural versus urban). Finally, the mean of the mean ages of the GPs in the 95 practices was also calculated.

Table 1. Adherence to practice guidelines for a systematic approach towards cardiovascular disease prevention (percentages, $n = 95$).

	Adherence
Detection of patients at high risk	
1. Proactively invite patients to attend for the assessment of cardiovascular risk, i.e. invitation should not be guided by a patient's complaints or the GP's assumption	36
2. Make availalbe a complete complete sex–age register, computerized or otherwise	71
Follow-up of patients	
3. Make a follow-up appointment with the patient immediately after the last consultation	65
4. Provide an appointment card as a reminder to the patient	39
5. Register the reason for follow-up in the appointment book	32
6. Contact patients who fail to attend an appointment	14
Registration of preventive activities	
7. Register preventive activities in a log book systematically	2
Teamwork within the practice	
8. Delegate preventive activities to the practice assistant, i.e. the practice assistant should carry out at least four activities to prevent cardiovascular disease	29
9. Ensure written protocols for all team members are available	5
10. Hold regular, scheduled meetings, i.e. least once every three months and for at least 30 minutes	31

Before the main study, a pilot study was carried out in 12 practices to optimize the instruments and the procedures. Six trained observers collected the data. The inter-observer reliability of both the chart audit and the practice observation was satisfactory (mean kappa 0.76 and 0.82 respectively).

Analysis

The unit of analysis in this study was the practice. Adherence to the practice guidelines was assessed for each practice. If less than 10% or more than 90% of practices adhered to a guideline, that guideline was excluded from further analyses.

The presence of risk factor entries was defined as the percentage of medical records in the sample containing at least one entry; this percentage was calculated for each practice. Factor analysis was performed to explore inter-relations in the recording of the different risk factors. For each dimension in the factor analysis, the percentage of records containing an entry for at least one of the risk factors in that dimension was calculated. The coefficient of variation was chosen instead of standard deviation as the measure of variation, as the recording levels differed substantially in terms of both risk factors and dimensions. In such cases, the coefficient of variation, which is the standard deviation divided by the mean, reflects variation better than the absolute magnitude of the standard deviation.

The relationship between adherence to the guidelines and the recording scores for each dimension was then analysed bivariately. The same analysis was performed to determine the relationship between practice characteristics and recording scores.

Results

Study population

Data on seven characteristics of the 95 participating practices are presented in Table 2. Single-handed practices were slightly under-represented compared with the national figure of 49% on 1 January 1993.[11] National figures were not available for the other characteristics.

Organization of cardiovascular disease prevention

Guidelines regarding availability of a sex–age register and the making of follow-up appointments were adhered to in two-thirds of practices (Table 1). Adherence to the other guidelines was substantially lower. Two guidelines ('register preventive activities in a log book systematically' and 'ensure written protocols for all team members are available') were adhered to in fewer than 10 practices and were therefore excluded from further analyses.

The maximum number of guidelines adhered to was seven (two practices, 2%). Seven practices (7%) adhered to six guidelines and 17 practices (18%) adhered to five guidelines. Sixty-

Table 2. Practice characteristics of the study population (percentages, $n = 95$ practices).

Type of practice	Single-handed	42
List size per full-time GP	≧2500	44
Employment rate of practice assistant per 2500 list size	≧0.8 FTE[a]	77
Involvement in GP resident training	Yes	55
Use of computer	Yes	83
Practice location	Urban	56
Mean of the 95 practice GPs' mean ages	In years (SD)	41.6 (4.6)

[a]Full-time equivalent.

nine practices (73%) adhered to less than half of the guidelines (four or fewer), with three practices (3%) not adhering to any of the guidelines.

Risk factor recording

Practices differed substantially regarding the presence of risk factor entries. Blood pressure readings were found on nearly half of the records, with a wide inter-practice range (12–76%; Table 3). The numbers of entries for smoking, cholesterol, and weight were substantially lower than for blood pressure, although the variability was larger. In several practices, not a single entry for these risk factors was found in the sampled records. However, rates of risk factor entries of 91% for smoking, 89% for weight, and 54% for cholesterol were also found. Entries for family history of cardiovascular disease, individual history of cardiovascular disease, and alcohol intake were found even less frequently; the coefficients of variation of these risk factors were highest (Table 3).

Factor analysis (orthogonal rotation) revealed three independent dimensions, which together explained 76% of the total variance (Table 3). One dimension comprised the recording of smoking, alcohol, and weight; this dimension emphasizes the recording of health-related behaviour. The second dimension comprised the recording of blood pressure and cholesterol, which reflects the recording of clinical parameters. Weight could be assigned to either the first or the second dimension or both dimensions on the basis of its factor loadings. In order to distinguish separate concepts, it was chosen to assign weight to the first dimension. The third dimension comprised the recording of individual history and family history of cardiovascular disease and can be considered as the recording of medical background parameters. The risk factor 'family history' also showed substantial factor loadings in two dimensions. It not only clustered with individual history of cardiovascular disease but also showed some relationship to health-related behavioural factors.

For each dimension, the percentage of records that contained at least one entry of a risk factor in that dimension varied considerably. For the dimension 'recording of health-related behaviour', this percentage ranged from 2% to 98% in individual practices; six practices had scores higher than 50%. The dimension 'recording of clinical parameters' showed an inter-practice range of 18% to 76%. The dimension 'recording of medical background parameters' scored lowest and, in nine practices, not one single entry of risk factors in that dimension was found in the medical records.

Relationship between organization of cardiovascular disease prevention, risk factor recording, and practice characteristics

Adherence to 'proactively invite patients' revealed a significantly higher percentage of records with at least one entry of a risk factor for all three dimensions (Table 4). Adherence to 'make a follow-up appointment' and to 'provide an appointment card' showed somewhat higher recording scores in nearly all dimensions, with one significant difference.

For the 'recording of clinical parameters', the percentage of records with at least one entry of a risk factor in this dimension was slightly higher in practices adhering to a guideline than in practices not adhering (Table 4). The differences in this dimension, however, reached statistical significance only for adherence to 'proactively invite patients'. No consistent pattern in recording scores was found for adherence to the other guidelines in the other dimensions.

Analysis of the relationship between the three dimensions (recording of health-related behaviour, recording of clinical parameters, and recording of medical background parameters) and practice characteristics showed no consistent, distinct differences in recording among the seven characteristics studied.

Discussion

The level of risk factor recording was related to adherence to 'proactively invite patients to attend for assessment of cardiovascular risk'. This is in line with the report of Maitland *et al*,[6] which states that practices with organized systems of data collection had higher levels of risk factor recording than those without. Van den Hoogen and van Ree[7] reported an improved detection, follow-up, and treatment of hypertensive patients using a computer-assisted monitoring system. In our study, very few significantly higher recording levels were found in practices adhering to the guidelines concerning the follow-up of patients.

The variation in risk factor recording between practices was substantial. This variation was found in all risk factors and in all dimensions. The level of risk factor recording could not be predicted accurately by adherence to the selected practice guidelines, except for adherence to 'proactively invite patients to attend for the assessment of cardiovascular risk'. The fact that only a small number of practices adhered to more than half of the guidelines might have influenced the results. Also, other factors, such as attitude towards prevention, might have played a role.[12]

Factor analysis revealed that the recording of the different risk

Table 3. Factor analysis of risk factor recording (percentages/factor loadings).[a]

		Dimensions in risk factor recording[b]			
Risk factor	Presence of entries[c] (CoV)[e]	Health-related behaviour	Clinical parameters	Medical background parameters	Dimension scores[d] (CoV)[e]
Smoking	11 (1.3)	***0.93***	0.03	0.14	23 (0.7)
Alcohol	5 (2.3)	***0.94***	0.02	0.06	
Weight	14 (0.9)	***0.59***	***0.63***	–0.09	
Blood pressure	44 (0.3)	0.05	***0.83***	0.05	48 (0.3)
Cholesterol level	13 (0.8)	0.04	***0.72***	0.10	
Individual history	4 (1.3)	0.08	–0.13	***0.89***	8 (0.9)
Family history	5 (1.3)	0.48	–0.02	***0.73***	

[a]Presented factor loadings after varimax rotation; loadings >0.50 are marked in bold. [b]Total explained variance: 76%. [c]Percentage of records with at least one entry of the risk factor. [d]Percentage of records with at least one entry of a risk factor in the dimension. [e]Coefficient of variation, i.e. standard deviation divided by mean value.

Table 4. Risk factor recording (percentage of records with at least one entry of a risk factor in a dimension) in relation to adherence to practice guidelines (n = 95 practices).

Practice guideline	n[a]	Dimensions of risk factor recording: Health-related behaviour	Clinical parameters	Medical background parameters
Detection of patients at high risk				
Proactively invite patients	+ 34	27[c]	53[c]	10[b]
	− 61	21	45	7
Have a sex–age register available	+ 67	23	49	7
	− 28	23	45	9
Follow-up of patients				
Make a follow-up appointment	+ 61	24	48	8
	− 33	22	47	8
Provide an appointment card	+ 37	27[c]	48	9
	− 58	21	47	7
Register the reason for follow-up	+ 29	21	49	8
	− 63	24	48	8
Contact non-attenders	+ 13	22	49	7
	− 82	23	47	8
Teamwork within the practice				
Delegate preventive activities	+ 28	21	48	8
	− 67	24	48	8
Hold regular team meetings	+ 29	27	48	8
	− 66	21	48	8

[a]Number of practices adhering (+) and number not adhering (−). The sum total does not always adds up to 95 because of missing values. [b]$P< 0.01$, Wilcoxon two-sample test. [c]$P< 0.05$, Wilcoxon two-sample test.

factors studied represented three dimensions: recording of risk factors indicating health-related behaviour, clinical parameters, and medical background parameters. The clinical parameters (blood pressure and cholesterol) may reflect a more curative approach, whereas the risk factors concerning the medical background parameters (individual and family history of cardiovascular disease) and health-related behavioural factors (smoking, alcohol intake, and weight) reflect a more preventive approach.

The risk factor 'weight' showed high factor loadings in two dimensions. On the one hand, weight can be viewed as a lifestyle indicator representing food intake and exercise behaviour; on the other hand, it can be considered an important clinical parameter, for example in cardiac failure and diabetes mellitus.

Practice characteristics did not show a consistent relationship to the level of risk factor recording. Fleming *et al*[8] reported higher recording levels for blood pressure and smoking (no significance) in training practices in the United Kingdom (UK). This cannot be confirmed in this study. The report of Fleming *et al*[8] also states that decreasing levels of risk factor recording were related to increasing list sizes. In this study, in which practice characteristics were reduced to dichotomous scores, the results indicate lower recording levels in practices with a larger list size.

The practices in this study had an interest in cardiovascular disease prevention. This may have caused a bias, as these practices might measure cardiovascular risk factors more often and organize prevention better. Considering the risk factor recording levels, the adherence to the practice guidelines, and the variation between practices found in this study, we do not expect this to have influenced the findings to a great extent.

The practice guidelines were developed as a coherent set by means of a literature review and a consensus procedure, and they can be viewed as indicators of the quality of the practice organization for systematic cardiovascular disease prevention. Adherence to the practice guidelines in this study was low; three-quarters of the practices adhered to fewer than half of the guidelines. Adherence to the guidelines does not automatically imply their systematic use in cardiovascular disease prevention, as intended by the investigators. External stimuli may be needed to enhance their use in this respect. By their nature, some of the guidelines (such as those encouraging systematic invitation of patients for screening for cardiovascular risk factors) have a more direct relationship to the recording of risk factors,. It was observed that adherence to this guideline did indeed showed higher recording levels.

This study indicates that practice organizational barriers may be held at least partially responsible for the lack of adequate information about a subject's risk status. There is still ample room for improvement, and further research on the influence of practice organizational barriers is recommended.

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