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Organisational determinants of cardiovascular prevention in general practice

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Objective – To assess organisational determinants in the prevention of cardiovascular disease.

Design – A cross-sectional study.

Setting and subjects – 130 general practices in The Netherlands. Data were collected using questionnaires. A causal model was designed and analysed by path analysis.

Main outcome measures – Relationships between preventive activities, practice management and practice characteristics.

Results – Important differences between adequacy of equipment and practice organisation were found. Record-keeping was significantly better when working experience of the GPs was less than 15 years, when the practice consisted only of female GPs, and when the practice had written protocols for cardiovascular disease management and the staff held regular scheduled meetings (teamwork). Teamwork also showed a significant relation with follow-up activi-

ties. The influence of non-measured variables in the model was considerable.

Conclusion – In exploring the organisational setting as a barrier to prevention and disease management, the designed model showed no major effects. Despite the wide variety of practice organisational items investigated, a strong influence of non-measured variables was evident. Teamwork in the practices proved to be related to both follow-up and record-keeping. Younger and female GPs were further predictors of adequate record-keeping.

Key words: cardiovascular care, general practice, organisation, prevention.

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Cardiovascular disease represents 39% of total mortality in The Netherlands (1). Delivery of preventive services can reduce cardiovascular morbidity and mortality. Despite a high level of support for the importance of prevention, physician delivery of preventive services falls far below recommended levels (2). Barriers to prevention can be divided into barriers related to the physician, to the patient and to the organisational setting within the practice (3,4). The organisational setting requires more extensive research in order to show how it can contribute to more effective preventive services. Systematic prevention and disease management requires adequate practice management (4–6) and adequate organisation of medical practice (7,8), for example, by systematic delegation of health promotion activities to the ancillary staff (9, 10). Written protocols on prevention, and the degree to which the general practitioners (GPs) and ancillary staff work as a team are also important, as these foster teamwork and provide a sense of direction (6,11).

Background characteristics of GPs and practices associated with cardiovascular prevention may contribute substantially to variations in healthcare delivery (12) and are associated with adherence to preventive guidelines (13). Quality improvement initia-

tives will be more efficient when we know which GPs or practices are most, or least, likely to comply with clinical prevention.

In order to improve preventive activities, we need to identify the relations between practice characteristics, practice management and preventive services. For this purpose, we designed a model in which practice management features are intermediate conditions towards preventive activities. Our hypothesis is that practice characteristics are causally more remote from preventive activities than practice management features and operate through them.

In the present study, we divided the organisational activities related to cardiovascular preventive care into four practice management features: tasks performed by the practice assistant, presence of separate clinics, availability of instruments and materials, and team-

Cardiovascular prevention is an important task in general practice, and organisational requirements for optimal performance of this task are seldom met.

- The most important determinant for well-organised preventive care is the presence of young and/or female GPs in the practice.
- Teamwork is important.

work within the practice (9,10). We selected three preventive activities as indicators for quality of care: case finding, follow-up and record-keeping. The underlying assumption is that adequate performance of these activities will improve the quality of care provided. As an important feature of practice management, a teamwork approach can promote strong commitment toward prevention and disease management (10). Our focus on teamwork is justified by studies showing the value of unity of effort for the promotion of clinical prevention (14–16).

The aim of the present study was to describe and test a model designed to assess which organisational determinants are related to performance of preventive activities.

MATERIAL AND METHODS

Study design

A total of 130 general practices located in the southern half of The Netherlands participated in this cross-sectional study, which served as a baseline for an intervention trial designed to optimise the quality of cardiovascular care. Practices were recruited via bulletins and personal mailings until the number needed for the trial was sampled. Practices had to meet the inclusion criteria of presence of a computer system and of ancillary staff. Questionnaires were mailed to the practices to assess practice characteristics and adherence to practice management features. One GP and one practice assistant per practice were asked to complete these questionnaires for their practice. Two weeks after the mailing, research assistants collected the questionnaires. Data were collected from November 1996 until March 1997.

Model

We designed a model in which practice management features are intermediate conditions towards preventive activities (Fig. 1).

To explore which determinants lead to better performance of these preventive activities, we assessed *practice characteristics*, including GP and practice assistant characteristics, as well as four *practice management* items: (a) Preventive tasks performed by the practice assistant; (b) the presence of separate preventive clinics; (c) the availability of instruments and materials in the practice needed to perform preventive tasks; and (d) teamwork done in the practice.

The following *preventive activities* were distinguished: (a) Case finding in order to detect patients with hypertension and hypercholesterolaemia in the practice; (b) adequate follow-up for cardiovascular risk patients; (c) adequate record-keeping for cardiovascular care.

The items for preventive and practice management activities were derived from guidelines developed by the Dutch College of General Practitioners and by consensus procedures (17,18).

Variables

We assessed a comprehensive set of practice characteristics (Table I). The items concerning practice management are presented in Table II(A–D). The variables concerning the preventive tasks performed by the practice assistant (Table IIA) were converted into sum scores in order to enable further analysis.

The variables concerning ‘presence of separate clinics in the practice’ also included the usage in the practice of a smoking cessation package (Table IIB) (19). To systematically perform consultations with cardiovascular (risk) patients a separate clinic is recommended. We checked for separate clinics for hypertensive and diabetic patients.

The variables concerning ‘availability of instruments and materials’ are presented in Table IIC. Before the analysis, we also converted the variables ‘instruments’ and ‘leaflets’ to sum scores. A place to work for the practice assistant was defined as availability of a consultation room for consulting patients without being disturbed.

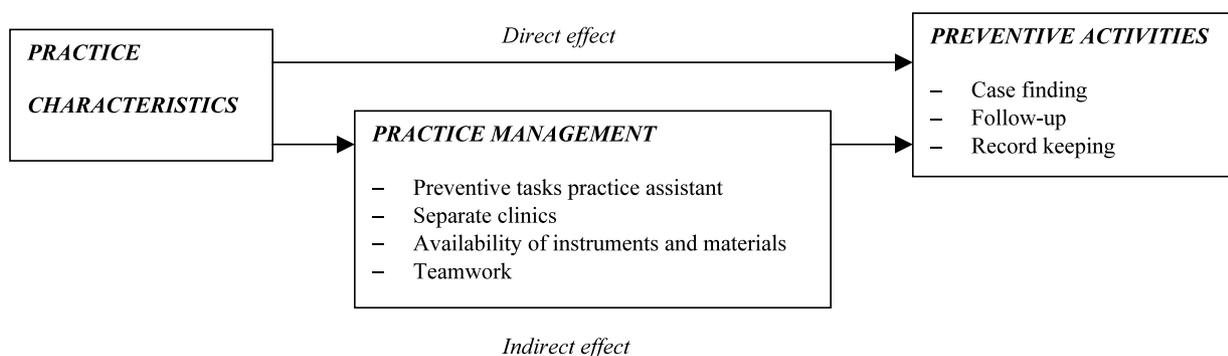


Fig. 1. Path analysis model: practice characteristics directly and indirectly affect preventive activities.

Table I. Practice characteristics of the participating practices (n = 130).

Practice characteristic		% practices
1. Setting	Single-handed	61
	Duo or group/health centre	39
2. List size (number of patients per full-time GP)	<2500	30
	≥2500	70
3. Location (addresses per km ²)	Urban = ≥1000	64
	Rural = <1000	36
4. Number of GPs	1	55
	2	34
	≥3	11
5. Number of practice assistants	1	29
	≥2	71
6. Mean age of the GPs (years)	≤45	59
	>45	41
7. Mean age of the practice assistants (years)	≤35	60
	>35	40
8. Mean working experience of the GPs (years)	≤15	55
	>15	45
9. Mean working experience of the practice assistants (years)	≤10	51
	>10	49
10. Employment of the GPs	Part-time	50
11. Employment of the practice assistants	Part-time	87
12. Gender of the GPs in the practice	Male	65
	Male and female	29
	Female	6
13. Pharmacy attached	Yes	4
14. Involved in vocational training	Yes	29
15. Certified practice assistants	Yes	85
16. Member of the Dutch College of General Practitioners	Yes	86
17. Proportion of NHS patients	≤60%	41

The variables of 'teamwork in the practice' are presented in Table IID. The combined variable 'written protocols' included protocols on diabetes mellitus, hypertension or detection of patients at risk.

Preventive activities. The items concerning preventive activities are presented in Table III.

We considered systematic entries (flags or ICPC code) of hypertension, diabetes mellitus, cardiovascular history and cardiovascular family history as adequate. A risk profile should at least include blood pressure, smoking and the cardiovascular history, and these should be recorded separately from the regular consultation notes.

Analysis

The unit of analysis was the practice. Data gathered on an individual level (practice staff members) were aggregated to practice characteristics by taking the average of the individuals per practice. Adherence

to practice management items and preventive activities was assessed for each practice. The data were dichotomised: a practice either did or did not adhere.

We performed factor analysis on all practice management characteristics to obtain four comprehensive variables. This was also done with the variables concerning preventive activities to obtain three variables. Only 'adequate ancillary staff present' showed an opposite sign in the component matrix and had to be omitted from further analysis. All calculated factor scores were used for further analysis.

In trying to disentangle the potentially complex set of relationships, we performed three path analyses with each of the three preventive activities as dependent variables. Practice management items that showed univariately a significant relation ($p < 0.05$) with a dependent variable were entered into the model. The same was applied to practice characteristics that had a significant relation either with the

Table II. Adherence to organizational requirements for a systematic approach to cardiovascular risk reduction: practice management.

Practice management	Percentage present (n = 130)
<i>A. Preventive tasks performed by the practice assistant</i>	
1. Measurements taken	
- blood pressure	83
- glucose	92
- cholesterol	38
- height	19
- weight	47
- body mass index	12
2. History questions asked	
- cardiovascular history	22
- cardiovascular family history	20
- smoking habits	30
- alcohol intake	11
3. Advice given on	
- diet	57
- smoking	30
- losing weight	37
- exercise	27
- alcohol	13
<i>B. Presence of separate clinics</i>	
1. Separate clinics for	
- hypertensive patients	13
- diabetic patients	22
2. Use of smoking cessation package (MIS) ¹	20
<i>C. Availability of instruments and materials</i>	
1. Instruments:	
Doppler device	40
Cholesterolmeter	40
Body mass table	73
Nomogram	25
2. Leaflet ²	
Hypertension	89
Cholesterol	87
Angina pectoris	37
Peripheral arterial disease	19
Transient ischaemic attack	14
Diabetes mellitus	82
Heart failure	33
Smoking	83
Diet	85
Exercise	38
3. Adequate ancillary staff present ³	65
4. Separate room for the practice assistant ⁴	95
<i>D. Teamwork in the practice</i>	
1. Written protocols ⁵ on	
- diabetes mellitus	26
- hypertension	19
- detecting patients at risk	4
2. Hold regular, scheduled meetings ⁶	39

¹The Minimal Intervention Strategy is a smoking cessation package shown to be feasible and effective.²Checked by observation whether the leaflets were within reach during the consultation.³Adequate ancillary staff present = 0.8 full-time equivalent practice assistance per 2500 patients (norm).⁴A place to work for the practice assistant = a well-equipped consultation room for consulting patients without being disturbed.⁵Written protocols support the practice assistant with her tasks and enable the GP to survey the activities done by the practice assistant.⁶Scheduled meetings are those scheduled in advance and in which the tasks performed by the practice assistant are evaluated.

Table III. Adherence to organizational requirements for a systematic approach to cardiovascular risk reduction: preventive activities.

Preventive activities	Percentage present (n = 130)
<i>A. Case finding</i>	
1. Case finding for	
- hypertensive patients	47
- hypercholesterolaemic patients	86
<i>B. Follow-up of cardiovascular risk patients</i>	
1. Make an appointment immediately after the visit	85
2. Make an identifiable note	25
3. Provide an appointment card for patients with:	
- diabetes mellitus	34
- hypertension	31
- cholesterol	16
- angina pectoris	19
- peripheral arterial disease	19
- heart failure	19
4. Contact patients who fail to attend an appointment	57
<i>C. Record-keeping</i>	
1. Computerized patient records ¹	81
2. Systematic entries concerning four risk factors ²	7
3. Record risk factors separately from the regular consultation notes. ³	14
4. Record diagnoses separately from the regular consultation notes. ⁴	60
5. Risk profile for cardiovascular patients. ⁵	6
6. Register preventive activities separately.	40

¹100% computerized = practices that do not use any written medical records: all patient data were entered into the computer.

²Systematic entries were at least necessary for hypertension, diabetes mellitus, individual and family cardiovascular history.

³The risk factors that had to be recorded separately were hypertension, smoking and individual cardiovascular history.

⁴The diagnoses concerned are hypertension, cholesterol and diabetes mellitus.

⁵The risk factors at least present in a risk profile for cardiovascular patients are: blood pressure, smoking, individual history.

preventive activities or with the practice management variables in the model.

The path analysis model is shown in Fig. 1. The magnitude of the effect is reflected by the path coefficient (correlation coefficient or standardised regression coefficient). Both the direct effect of the practice characteristics on the preventive activities and the indirect effect via the practice management items were determined. The indirect effect was calculated by multiplying the subsequent path coefficients. For each regression analysis the influence of non-measured variables (residual path coefficient) was calculated (20).

RESULTS

The 130 participating general practices were comparable to the average Dutch general practice with regard to setting, number of GPs and gender of the GPs in the practice; however, the GPs in our study tended to be younger, with less working experience and more practices were located in urban areas.

Adherence to organisational aspects for cardiovascular prevention

Tables II and III show the extent to which the

general practices adhered to the aspects of a systematic approach to cardiovascular prevention. Of all 130 practices, 13% had separate clinics for hypertensive patients and 22% for patients with diabetes mellitus. Written protocols were available for diabetes mellitus in 26% of the practices. A follow-up appointment immediately after the visit (Table IIIB) was made in 85% of the practices. A risk profile with at least the risk factors blood pressure, smoking and cardiovascular history was made in 6% of the practices (Table IIIC).

Relations between practice characteristics, practice management and preventive services

In univariate analyses, none of the considered practice characteristics had a significant relation with the preventive activity 'case finding', leaving only the preventive activities record-keeping and follow-up as dependent variables to be used in path analysis. Practice setting, employment of the GPs, working experience of the GPs, mean age of the GPs, number of practice assistants, number of GPs, only female GPs in the practice, mixed sexes of GPs and certified practice assistants all showed a significant relation in univariate analyses with either teamwork or with follow-up. Therefore these practice characteristics

Table IV. Results of path analysis showing direct and indirect effects of practice characteristics and practice management items on record-keeping and follow-up. Figures are path coefficients.

Independent variables	Dependent variable			
	Record-keeping		Follow-up	
	Direct effect	Indirect effect (through teamwork)	Direct effect	Indirect effect (through teamwork)
<i>Practice characteristics</i>				
Setting 1 = solo, 2 = non-solo	-0.026	0.03	0.02	0.02
Employment of GPs 1 = full-time, 2 = part-time	-0.11	-0.004	0.20	-0.01
Working experience of the GPs 1 ≤ 15 yr, 2 > 15 yr	0.29*	0.01	-0.05	0.01
Age of the GPs 1 ≤ 45 yr, 2 > 45 yr	-0.21	-0.04	0.19	-0.04
Number of practice assistants 1 = one, 2 = more	0.02	0.02	0.06	0.02
Number of GPs 1 = one, 2 = two, 3 = three or more	0.30	0.06	-0.12	0.08
Female GPs in the practice 1 = mixed sexes/only male, 2 = female	0.22*	0.03	0.12	0.03
Mixed sexes in the practice 1 = mixed sexes/only female, 2 = male	-0.02	-0.03	-0.02	-0.03
Certified practice assistant 0 = no, 1 = yes	-0.03	0.02	0.07	0.03
Pharmacy attached 0 = no, 1 = yes	0.16	0.02	-	-
Number of NHS patients 1 < 60%, 2 ≥ 60%	0.15	0.02	-	-
<i>Practice management</i>				
Teamwork	0.20*	-	0.21*	-

*Significant ($p < 0.05$).

were entered into the model. For record-keeping, the practice characteristics 'pharmacy attached' and 'proportion of NHS patients registered in the practice' were also entered.

The magnitude of the direct and indirect effects is given in Table IV. The higher the path coefficient, the better record-keeping or follow-up is performed.

For record-keeping, practices where only women GPs worked and practices where GPs worked with a working experience of less than 15 years kept their records significantly better.

Another effect on record-keeping, though not significant, was found for the number of GPs in the practice. None of these variables played a significant role as an indirect factor (through teamwork). Teamwork, which was operationalized as having written protocols available for managing cardiovascular disease patients and having regular, scheduled meetings, showed a significant direct relationship with record-keeping.

For follow-up, none of the practice characteristics that were selected because of their relation in univariate analysis remained significant in multivariate

analyses. The exception was teamwork in the practice.

The influence of non-measured variables (residual path coefficient) was 0.9 or more in every step of the path analysis, which means that only a small proportion of variation in record-keeping and follow-up was explained by the model.

DISCUSSION

In order to explore the practice organisational setting as a barrier to prevention and disease management, we tried to conceptualise a causal model; only small effects were found. Although we selected a wide variety of practice characteristics and practice management items, there remains a strong influence of variables that were not measured. We conclude that with the chosen model the found relations are too small for causal interpretations.

Although several practice characteristics showed strong crude associations with preventive activities, the number of important predictors was reduced after simultaneous adjustment in multivariate analysis, be-

cause of associations between practice characteristics. The remaining preventive activities were record-keeping and follow-up. GPs with a working experience of less than 15 years and practices with only female GPs registered risk factors and diseases significantly better. A possible explanation for our findings is that in practices with more GPs who more often work part time, adequate record-keeping and follow-up routines are mandatory in order to provide continuity of care. We found that teamwork in the practice is an important feature of practice management. Teamwork showed significant relations with two of the preventive activities: follow-up and record-keeping policies. Apparently, preventive activities can only be performed effectively when the practice staff members communicate about their activities and have written protocols on their actions. A well-equipped practice is apparently not sufficient to perform preventive activities; practice staff need to work together in order to implement preventive care efficiently. Although the importance of teamwork has been stressed by others (14–16), it has not been conceptualised previously as an intermediate step in a causal model.

Our results on adherence to selected aspects of the organisation of preventive care show considerable variation in the degree to which practices have integrated preventive care into daily routine. We may have selected relatively well-motivated practices. This implies that, overall, an even higher proportion of practices may not have an adequate practice organisation to carry out prevention. Cardiovascular disease prevention and disease management will remain a heavy burden for the general practitioner, but if teamwork is performed in the practice this is a favourable condition for prevention. The emphasis in education is often on changing knowledge and skills; the question is whether this is an effective approach. Influence on collaboration between practice staff could contribute more to changing cardiovascular preventive behaviour in general practice.

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