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Effects of Outreach Visits by Trained Nurses on Cardiovascular Risk-Factor Recording in General Practice

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Effects of outreach visits by trained nurses on cardiovascular risk-factor recording in general practice

A controlled trial

Bernard B. van Drenth, Marlies E.J.L. Hulscher, Henk G.A. Mokkink, Eloy H. van de Lisdonk, Johannes C. van der Wouden, Richard P.T.M. Grol

Objectives: To study the effects of outreach visits by trained nurses on cardiovascular risk-factor recording. This strategy was compared with a strategy composed of more commonly used methods to improve the quality of care in general practice such as written feedback.
Methods: A controlled trial was conducted, in which 33 practices were visited by a trained nurse, 31 practices received written feedback and 31 other practices served as controls. To assess the level of risk-factor recording a chart audit was carried out before and after 18 months of intervention. A sample of medical records of patients aged 30 to 60 was evaluated looking for risk-factor entries: their presence, their combined presence, and their signal function to indicate a risk patient. Risk factors considered were: blood pressure, individual (medical) history as well as family history of cardiovascular diseases, smoking status, serum cholesterol, body weight and alcohol intake.
Results: In practices visited by a trained nurse, a significant increase in the recording of most risk factors was found for the presence, the combined presence as well as the signal function. The increase in the presence of entries was consistent in all risk factors and independent of the baseline level. Changes in the group receiving written feedback were inconsistent and statistically not significant.
Conclusions: Outreach visits by trained nurses is an effective tool to increase cardiovascular risk-factor recording in general practice.
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Introduction

Health policies in many Western countries are more and more aimed at preventive care. General practice is considered to play a prominent role.[1,2] To detect subjects at high risk of cardiovascular diseases, an individual approach is required. This approach is particularly feasible when subjects have been listed at the same practice for a longer period of time. These conditions make general practice a suitable place to implement preventive care. To target preventive actions effectively, information on risk status is essential. However, a systematic and comprehensive approach towards cardiovascular disease (CVD) prevention is not yet routine in general practice.[3,4] Effective strategies are needed to enhance systematic assessment and recording of the CVD risk status of patients by general practitioners. To be effective, a combination of methods is used to change professional behaviour.[5,6] Providing personal support such as face-to-face instruction, academic detailing, outreach visits or support by trained nurses is reported to have promising results.[7,8] Fullard et al. reported a mean increase of 20% in risk-factor recording after 30 months of support by a trained nurse.[9] Personal support requires substantial cost and use of resources. The additional effects of this strategy compared to more commonly used methods such as written feedback remain unclear. A controlled trial was conducted assessing the value of personal support to increase risk-factor recording. The question dealt with in this study was: what are the effects of outreach visits by a trained nurse on cardiovascular risk-factor recording in general practice compared to written feedback and to no intervention at all?

Methods

Study design

A controlled trial was conducted to implement practice

Table 1. Study design (number of records analysed).

Measurements	Outreach visits (33 practices)	Written feedback (31 practices)	Control group (31 practices)
Baseline	6915	1550	-
Follow-up	6935	1550	1550

guidelines for CVD prevention in general practice. These guidelines dealt with the conditions for systematic case-finding and monitoring of subjects at high risk. To implement these guidelines practices were supported either by outreach visits by a specially trained nurse or by written feedback on practice performance. The participating practices were assigned to either of the intervention conditions or to the control group. To assess the level of risk-factor recording a measurement was taken at baseline (T_0) which was followed by a follow-up (T_1) measurement after 18 months of intervention.

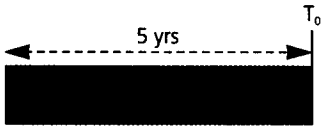
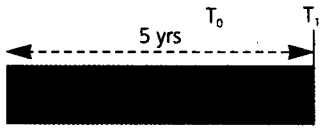
Interventions

The first type of intervention (n=33 practices) consisted of a nurse reviewing the practice organisation especially with regard to prevention. In this review the practice guidelines mentioned were used as point of reference. A random sample of medical records of patients aged 30 to 60 was analysed for entries of cardiovascular risk factors over the preceding five years. A five-year period was chosen because the risk status was expected to be assessed and its results recorded at least once in five years. Personal feedback was given on the outcomes of practice review and chart audit, which resulted in a plan of action drawn up with the practice team. The nurse supported the implementation of this plan by providing guidance and practical advice during regular visits over a period of 18 months. In this way she facilitated the process of change by focusing on problem solving. To carry out these tasks, the nurses recruited had a professional background as a practice assistant preferably in general practice. They received additional training in the project.[10]

The second type of intervention (n=31 practices) consisted of a similar practice review. The results were sent to the practice team together with reference data from practices already included in this study. Practices were also provided with detailed written advice and instruction materials on how to optimise the practice organisation according to the practice guidelines selected for this study. Practices were to decide themselves whether and to what extent they used this information. Written feedback was provided once.

In the control group (n=31 practices) no intervention was carried out. To prevent unwanted effects such as a Hawthorne effect, no baseline (T_0) measurement was performed.[11] These practices were therefore included 18 months later (T_1).

Table 2. Procedures of chart audit and aspects measured.

Measurements	Aspects of risk-factor entries measured
Baseline 	* presence
Follow-up 	* presence * combined presence * signal function

(a) Presence of risk-factor entries:
Presence (one or more entries) or absence irrespective of the entry indicating an elevated risk or not.
Unit of measurement: proportion (percentage) of medical records containing at least one entry calculated per practice for each risk factor.

(b) Combined presence of risk-factor entries:
1 Presence of (one or more) entries on all 'obligatory' risk factors i.e. blood pressure, individual history of CVD, family history of CVD and smoking status.
Unit of measurement: proportion (percentage) of medical records containing at least one entry of all (four) obligatory risk factors calculated per practice.
2 Presence of (one or more) entries on all 'conditional' risk factors i.e. serum cholesterol, body weight and alcohol intake, under the condition that one (or more) obligatory risk factor (except for smoking as an isolated risk factor) indicated an elevated risk.
Unit of measurement: proportion (percentage) of medical records containing at least one entry of all (three) conditional risk factors among those records containing one (or more) entry of an obligatory risk factor indicating an elevated risk calculated per practice.

(c) Signal function of risk-factor entries:
Recording of entries separately from the regular consultation notes, for example by means of a tag or in a problem list or on a summary sheet.
Unit of measurement: percentage of records containing at least one risk-factor entry separately from the regular consultation notes among the records containing at least one risk-factor entry calculated per practice.

Table 3. Characteristics of participating practices at the time of inclusion in the project (percentages).

Selection criteria		Outreach visits (33 practices)	Written feedback (31 practices)	Control group (31 practices)
Type of practice	Single-handed	39	42	45
List size per full-time practitioner	≥2500	45	42	45
Employment rate of practice assistant per 2500 list size	≥0.8	73	77	81
Involvement in GP resident training	Yes	48	55	61
Region	Eastern	48	48	52
	Western	52	52	48
Additional characteristics				
Mean age of practitioner(s) per practice[a]		40.9	40.7	41.6
Practice location	Urban	55	52	61
Dispensing practices		9	10	13
Practices using a computer		85	71	94[c]

[a] As practices were included at different times during the project, the mean age of the practitioner(s) was calculated using a fixed point in time (1991). Differences were not statistically significant (F-test, p>0.05).
[b] Central Statistical Office. Population of municipalities in the Netherlands at 01-01-'93. The Hague, 1993.
[c] X2, p=0.06.

Practices

Ninety-five practices were recruited in two regions in the Netherlands, one in the west and the other in the east of the country. The practices were not randomised. To enhance comparability, the participating practices were assigned proportionally to the study conditions using the following criteria: type of practice, list size, employment rate of practice assistant, participation in GP resident training and project region.

Data on these selection criteria and some additional characteristics are presented in table 3. The three groups of practices were comparable with regard to the selection criteria. This was also the case for the additional characteristics except for the percentage of practices using a computer which was larger in the control group (p=0.06). This difference disappeared when these data were compared to the percentage of practices using a computer in the nurse-visited and written-feedback group at the time of follow-up measurement. In this latter comparison, data collected at the same moment in time were compared, since data collection in the control practices took place 18 months after the baseline measurement in the intervention groups.

Instruments and variables

A random sample of medical records was taken at baseline (T_0) and at the time of the follow-up (T_1) measurement. The sample size in the nurse-visited practices was set at 10% of the target population (minimum 200 and maximum 400 records); for practical reasons the sample size in the written feedback and the control group was set at 50 records per practice. The target population consisted of all subjects aged 30 to 60 at the time of measurement.

Medical records were reviewed for cardiovascular risk-factor entries over the preceding five years, because the aim was to have the risk status assessed at least once every five years. By comparing data between baseline (T_0) and follow-up (T_1) measurement, insight into changes over a five-year period was provided. To allow for direct comparison between the intervention period (18 months) and the 18-month period directly prior to the intervention, data collection in the follow-up measurement was split into different periods (table 2).

Recording of the following risk factors was measured: (elevated) blood pressure, individual (medical) history of CVD, family history of CVD, smoking status, serum cholesterol, body weight and alcohol intake. The following variables, which reflect three different aspects of risk-factor entries, were evaluated: the presence, the combined presence and the signal function (see table 2).

The data were collected by six observers. The inter-observer reliability of the chart audit was tested and found satisfactory on most variables (mean kappa being 0.76). Both data collection procedures and interventions were piloted in 12 other practices. The data collection took place from January 1991 until January 1994.

Analysis

The unit of analysis in this study was the practice. Since many variables did not show a normal distribution, non-parametric tests were used. In analysis within groups the matched-pairs signed-ranks test was used, because data were paired. In analysis between groups, the exact two-sample test (Wilcoxon) for unpaired data was used. The p-value level for significance was set at 0.05.

To obtain insight into the pattern of change in risk-factor recording, factor analysis (principal component) was carried out using the differences in the presence of risk-factor entries between baseline (T_0) and follow-up (T_1) measurement.

The presence of entries at baseline was found to relate to age (entries of blood pressure, individual history of CVD and cholesterol were present more often with increasing

Table 4. Presence of risk-factor entries: comparison within groups of baseline (T_0) and follow-up (T_1) (five-year periods) measurements (percentages).

Risk factors	Outreach visits (33 practices)		Written feedback (31 practices)		Control group (31 practices)
	T_0	T_1	T_0	T_1	T_1
Blood pressure	44 (14)[a]	49[c] (14)	44 (14)	45 (16)	45 (14)
Individual history	3 (2)	11[c] (14)	5 (7)	4 (5)	3 (4)
Family history	3 (4)	13[c] (10)	5 (7)	5 (5)	6 (8)
Smoking	8 (9)	19[c] (14)	11 (10)	14 (11)	14 (20)
Cholesterol	12 (8)	18[c] (10)	10 (7)	14[b] (8)	15 (12)
Weight	15 (10)	20[c] (12)	12 (9)	14 (9)	15 (16)
Alcohol	4 (6)	9[c] (10)	3 (5)	3 (6)	7 (16)

[a] Numbers in parentheses represent standard deviation; [b] $p<0.05$; [c] $p<0.01$

age) as well as sex (entries of blood pressure and weight were present more often in females). For that reason the age and sex distribution of the samples of medical records in each practice were taken into account.

Results

Presence of risk-factor entries

The results of the baseline (T_0) and follow-up (T_1) measurements are presented in table 4. Blood-pressure entries were found considerably more often than entries of the other risk factors. In the nurse-visited and written-feedback groups the presence of risk-factor entries at baseline was comparable for all risk factors.

Analysis within each intervention group comparing baseline and follow-up measurements revealed the following results. Within the group visited by a trained nurse an increase was found for all risk factors after intervention. This increase was statistically significant in all risk factors. In the written-feedback group the increase was much less substantial, reaching statistical significance in cholesterol level.

Analysis between the different study groups showed that the increase after intervention was substantially higher in the group visited by a trained nurse compared to the written-feedback group. The difference in increase was significant for all risk factors, except blood pressure and body weight (table 5). The presence of entries of the follow-up measurement in the nurse-visited group also showed significantly higher recording levels than those in the control group. No significance was reached in blood pressure ($p=0.33$), whereas the p-values in serum cholesterol and alcohol intake were 0.07 and 0.06 respectively. The results of the follow-up measurement in the written-feedback group did not show any significant difference compared with the control group (table 5).

The presence of entries before and after intervention (18-month periods) revealed comparable results (results not shown). The differences in the presence of risk-factor entries could not be attributed to differences in the age or sex distribution of the samples.

Factor analysis of differences in the presence of risk-factor entries between baseline (T_0) and follow-up (T_1) measurement revealed one clear factor in the group visited by a nurse. This factor consisted solely of positive factor loadings, indicating a consistent increase in all risk factors in the follow-up (T_1) measurement compared with the baseline (T_0) level. This factor explained 73% of the total variance (table 6). The written-feedback group showed a fluctuating pattern of factor loadings, indicating some risk factors to increase and some to decrease after intervention. The maximum explained variance for one factor was 33%. Additionally, the changes in the presence of risk-factor en-

Table 5. Presence of risk-factor entries: test results[a] of comparison of baseline (T_0) and follow-up (T_1) (five-year periods) measurements[b] (p-values).

Risk factors	Mean changes outreach visits versus written feedback	Follow-up results outreach visits versus control group	Follow-up results written feedback versus control group
Blood pressure	0.15	0.33	0.61
Individual history	<0.01	<0.01	0.64
Family history	<0.01	<0.01	0.79
Smoking	<0.01	0.02	0.16
Cholesterol	0.04	0.07	0.87
Weight	0.12	0.02	0.84
Alcohol	<0.01	0.06	0.30

[a] Exact two-sample test (Wilcoxon); [b] Actual data presented in table 4.

Table 6. The pattern of change in the presence of risk-factor entries.

Risk factors	Outreach visits (33 practices)		Written feedback (31 practices)	
	Factor loadings[a]	Correlation coefficients[b]	Factor loadings[c]	Correlation coefficients[b]
Blood pressure	0.66	-0.11	0.52	-0.36 [d]
Individual history	0.90	0.00	0.76	-0.59 [e]
Family history	0.92	-0.13	0.79	-0.30
Smoking	0.94	0.04	-0.48	-0.30
Cholesterol	0.87	-0.04	-0.07	-0.34
Weight	0.87	-0.18	0.39	-0.41 [d]
Alcohol	0.82	0.05	-0.59	-0.46 [e]

[a] Factor analysis method: principal component, explained variance: 73%
[b] Changes related to baseline level: Spearman's rank correlation coefficient
[c] Factor analysis method: principal component, explained variance: 33%
[d] $p \leq 0.05$
[e] $p < 0.01$

tries were studied in relation to the recording level at baseline. No relation could be detected in the nurse-visited group, which indicates that the increase occurred independently of the recording level at baseline. The relation found in the written-feedback group indicated that the higher the baseline level was, the lower the increase (table 6).

Combined presence of risk-factor entries

At baseline, hardly any records containing at least one entry of all four obligatory risk factors were found in either of the intervention groups (<0.1%). In the nurse-visited group this proportion increased to 7% after intervention. The percentage of records with an entry of two or three obligatory factors also increased in this group. Both in the written-feedback group and in the control group, the proportion of records with an entry of all four obligatory risk factors remained low in the follow-up measurement (0.8% and 0.3% respectively). In the follow-up measurement the percentage of records with an entry of at least one obligatory risk factor indicating an elevated risk was comparable in all three groups of practices (13%). The proportion of these records with at least one entry of all (three) conditional factors was highest in the nurse-visited group (20%) compared to the written-feedback group (nearly 0%) and to the control group (3%).

Signal function of risk-factor entries

In approximately one out of every three records (35%) at least one risk-factor entry was found in both the 18-month period before and after the start of the project. In the 18 months before the project started the proportion of these records with at least one risk-factor entry recorded separately from the regular consultation notes was of comparable level in all groups (30%, table 7). After intervention this proportion was significantly higher in the nurse-visited group (42%) compared with the level before intervention. Between-group comparison of the results in the 18 months after the start of the project showed no significant difference (Kruskal Wallis test, p=0.13).

Discussion

The results of our study showed that outreach visits by a trained nurse brought about a substantially larger increase in cardiovascular risk-factor recording than written feedback. Written feedback hardly produced any statistically significant changes in risk-factor recording. Written feedback based on chart audit results, however, is commonly used in quality improvement in the UK and some other countries.[12,13] Our study indicates that this method is not particularly effective in improving risk-factor recording. A more intensive intervention using different methods, among which personal support as a key element, seems to produce a more substantial improvement. Consistent increases in the presence of entries of all risk factors were found after such an intervention. Similar effects of outreach visits by trained (nurse) facilitators in general practice have been reported from the UK.[9] In the US, facilitator-led interventions in community practices also showed positive results in the uptake of screening procedures in the field of prevention and early detection of cancer.[7] Given the differences in health care systems in these countries, the similarity of the effectiveness of the method used is remarkable.

It was remarkable to find out that the higher the presence of risk-factor entries in the written-feedback group at baseline, the lower the increase after intervention. In the nurse-visited practices no relation could be detected between the increase in the level of recording after intervention and the level at baseline. Personal support may have functioned as an external stimulus making the practice guidelines the target rather than the peer-group average.

Are the effects found in our study worth the effort? Support by a trained nurse is a labour-intensive and consequently costly strategy. Given the target to assess and record the cardiovascular risk level of all subjects aged 30 to 60 at least once every five years, it was calculated that 60% of the target for the intervention period of 18 months was reached. With no additional personnel recruited, this can be seen as a substantial result.

Table 7. Signal function of risk-factor entries. Pre- and post-intervention (18-month periods) compared (percentages of records with one or more entries separately from the regular consultation notes among those records containing at least one risk-factor entry).

	Outreach visits (33 practices)		Written feedback (31 practices)		Control group (27 practices)	
	T_0 n[b]=2533	T_1 n=2712	T_0 n=514	T_1 n=525	T_0[a] n=498	T_1[a] n=493
Separate positioning	28	42[c]	35	36	28	30

[a] In the control group no intervention took place. 'T_1' here means the 18 months prior to the only assessment performed, whereas 'T_0' indicates the period of 18 months directly prior to T_1

[b] Number of records in analysis

[c] $p<0.05$, comparison within groups: signed-ranks test

The results of the presence of cardiovascular risk-factor entries indicate that there is ample room for improvement. Comparable figures were reported from the Oxford region by Fullard,[9] but the figures reported from North-East Scotland by Maitland were substantially higher.[14] In our study every risk-factor entry in the medical record over the preceding five years was taken into account, irrespective of the entry indicating an elevated risk or not. The absence of an elevated risk, for example the absence of CVD in the family history or abstinence from smoking, is not yet routinely recorded in Dutch general practice. More discipline in recording rather than a more systematic assessment of cardiovascular risk factors may have contributed to the increase in risk-factor entries in our study. Even so, systematic recording of normal findings (i.e. the absence of risk) can be profitable; entries of the absence of a positive CVD family history and of abstinence from cigarette smoking, for example, may lead to a reserved policy in the prescription of medication if an elevated blood pressure is detected.

Though risk-factor recording is an important step in targeting CVD prevention, patient-related endpoints such as compliance with advice and reduction of risk level were not measured in this study. No clear research findings are available yet to support the hypothesis that a higher level of risk-factor recording is related to a lower level of CVD risk status. Future research should focus on these aspects. Implementation studies in general practice have to take place in the context of a changing environment, where circumstances often cannot be controlled. This may be illustrated by the use of computers in general practice. In the Netherlands the degree of computerisation among general practitioners was increasing rapidly in the course of the project and accounted for the higher number of control practices with a computer.[15] Careful attention was given to external influences interfering with the study conditions, both within and between the different groups of practices, but it is not possible to rule out these influences completely.

The provision of personal support is an effective tool to increase cardiovascular risk factor-recording in general practice. We recommend further development of this method to enhance a more systematic approach towards preventive care in general practice. ■

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