

Effect of non-attenders on the potential of a primary care programme to reduce cardiovascular risk in the population

Geraint Davies, Stephen Pyke, Ann-Louise Kinmonth on behalf of the Family Heart Study Group

Abstract

Objectives—To determine the feasibility of enrolling non-attenders of a population based cardiovascular risk reduction programme (the British family heart study) into a further, similar programme and to assess the effect of non-attendance on the effectiveness of the programme.

Design—Follow up of non-attenders by practice nurses, including home visits if necessary, to administer questionnaires and obtain physiological measurements.

Setting—Eight general practices across England, Scotland, and Wales.

Subjects—Non-attenders in a cardiovascular risk factor screening and intervention programme compared with attenders.

Main outcome measures—Number of non-attenders enrolled; sociodemographic characteristics; personal and family history of coronary heart disease; cardiovascular risk factors; and total coronary risk score.

Results—Data were collected from 106 (17%) of the 608 non-attending families (99 men and 42 women). Of the 543 non-attending families from five practices that attempted complete follow up, 256 had moved away or died. Only 76 were eventually enrolled into the study. The prevalence of coronary heart disease and a family history of coronary heart disease were similar among non-attenders and attenders as were the individual coronary risk factors studied except smoking. Women non-attenders were more likely to be current cigarette smokers than attenders (15/42 v 202/948, $P=0.02$).

Conclusions—The intensive follow up of non-attenders resulted in real intervention opportunities in only a small number. Since the effect of any intervention in a population is reduced by non-attendance audit of preventive medical programmes aimed at the population should allow for the effect of non-attenders on the overall results.

Introduction

Coronary heart disease is responsible for the death of more men in Britain than any other disease and has been targeted for action by the Department of Health in the *Health of the Nation*.¹ The effect of preventive programmes in primary care, however, remains controversial. Though general practitioners remain most comfortable with the concept that people at high cardiovascular risk will gain most by modifying their lifestyle, the public health message is that the population has most to gain by small improvements at all levels of risk.² The British family heart study evaluated the effect on cardiovascular risk of a population screening strategy coupled with follow up tailored to level of risk in general practice.³ The population effect, however, depends not only on the overall effect of the

intervention but also on the proportion of the population that the intervention reaches.

Non-attender studies are difficult to conduct, and little information is available on the characteristics of non-attenders, particularly in British general practice. Two studies have attempted to follow up non-attenders, one by postal questionnaires⁴ and the other by interview.⁵ Both suffered from insufficient numbers to be able to comment on cardiovascular risk status. We describe here the characteristics of non-respondents in the British family heart study and the implications of non-response for population strategies of health promotion in primary care.

Subjects and methods

The study took place alongside the British family heart study, which was a randomised controlled trial of the effect of cardiovascular risk factor screening and intervention in general practice.³ The study took place in eight of the 13 practices randomised to the screening and intervention arm of the family heart study. The feasibility of following up non-attenders was examined in three practices (Burton on Trent, Carlisle, and Dunfermline). All non-attenders were followed up in five practices (Bury, Ipswich, Newport, Poole, and Portsmouth). Practices were selected to give a good geographical spread and included those where the nurses were able to participate. The practices varied in size from four to seven partners (or their full time equivalents). All work from their own premises, three of which were purpose built. The practices at Carlisle and Portsmouth were urban and the other six were suburban.

Non-attenders included all people or families who were invited to a family health check but did not attend. They included those who refused the invitation to attend, those who failed to respond to the initial invitation in any way, those who responded but failed to arrive at an appointment with the practice nurse, and patients still registered with the practice despite having left it or died.

Follow up of non-attenders was carried out by practice nurses, all of whom were specially trained in recruitment and screening for the main study.³ Families were invited to participate in the British family heart study from a randomly ordered list of all men in the practices aged 40 to 59 years. Men and their families were invited by the practice nurse to attend a family health check lasting up to an hour and a half. Men were encouraged to bring their partners and children to appointments, but research data were recorded only for men and their partners. Families were invited by telephone when possible, or by letter if they could not be contacted in this way. Subsequently, non-attenders were approached for this study in the same way.

In three towns (Burton on Trent, Carlisle, and

Members of the study group are listed at the end of the paper.

Primary Medical Care and Preventive Cardiology, Faculty of Medicine, University of Southampton, Southampton

Geraint Davies, joint lecturer in preventive cardiology and primary medical care
Ann-Louise Kinmonth, professor, primary medical care

Medical Statistics Unit, London School of Hygiene and Tropical Medicine, University of London, London

Stephen Pyke, lecturer

Correspondence to: Professor Kinmonth, Primary Medical Care, Alderbrook Health Centre, Southampton SO16 5ST.

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Dunfermline) non-attenders were randomly selected until about 10 from each town had been interviewed. In the other towns (Bury, Ipswich, Newport, Poole, and Portsmouth) all non-attenders were followed up. Non-attenders were identified and approached six to 12 months after their first invitation.

The practice computer and the notes were first checked to see whether the man was still registered with the practice. If a telephone number was available from the practice records, the telephone directory, or directory inquiries two attempts were made, on different days and at different times of day, to telephone the family to make an appointment to attend the surgery. If this invitation was declined a home visit was offered. All those who could not be contacted on the telephone were followed up by up to two home visits, and if the family was available and willing cardiovascular risk was assessed at home or an appointment was made for a more convenient time.

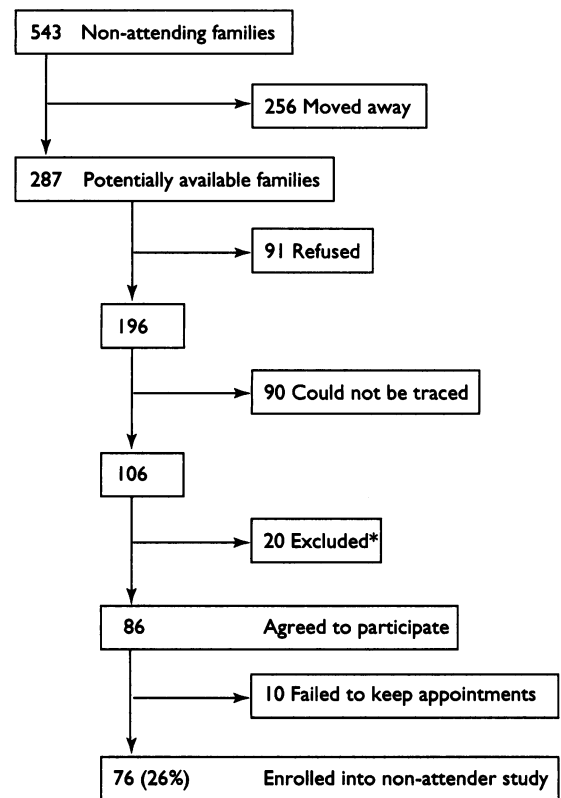
Assessment of risk was by questionnaire and physiological measurements similar to those used in the British family heart study.³ The questions asked about social and demographic details, smoking habit, medical history, and family history. The nurse measured blood pressure (Takeda automatic digital sphygmomanometer); height and weight (Seca digital physician's scale and telescopic measuring rod); exhaled carbon monoxide concentration (Bedfont smokerlyzer); and waist:hip ratio and took a capillary blood sample for assessing blood cholesterol and glucose concentration (Reflotron desk top analyser).

The mean difference in coronary risk score between attenders and non-attenders was calculated by using the Dundee risk score,⁶ a weighted sum of risk factor levels based on blood cholesterol concentration, systolic blood pressure, and reported smoking history with an adjustment for age and sex. Differences between attending and non-attending subjects were adjusted for the possible confounding effect of town by regression (comparison of means) or stratified Pearson χ^2 statistics (comparison of proportions).

Results

In the three towns where only a random selection of non-attenders were followed up 901 families were invited to the family heart study programme. A total of 583 families attended and 133 families refused the invitation. Of the remaining 185 families, 65 were approached in random order for the non-attenders study and 30 families were recruited. In the five towns in which all non-attenders were followed up 1743 families were invited to family health checks; 869 families attended and 331 refused. Attempts were made to invite all the remaining families for a health check.

Figure 1 shows the result of the follow up of the 543 non-attending families in the five practices which carried out complete follow up. The pattern was similar in the three practices in which only a random sample was followed up. A total of 256 families were found to have moved from the address on the practice lists or died. Of the remaining 287 families, 76 were enrolled into the study, 91 refused to participate, and 90 could not be traced. After those found to have moved were excluded the response rate to the main study in these practices rose from 50% to 58%. If all the families who could not be traced were assumed to have moved or died the response rate was 62%. The families screened as a result of this intensive follow up comprise at least 5% of all eligible families in the five practices after those who had died or moved away were excluded. To achieve these results the nurses worked full time on following up non-attenders for four to six weeks, both in the surgery and performing home visits where necessary.



* Eight patients excluded by their general practitioners because of fear of invasion of privacy, and four for psychiatric reasons; eight home visits not performed because of fears for nurse's safety

FIG 1—Results of complete follow up of non-attending families in practices in Bury, Ipswich, Newport, Poole, and Portsmouth

Across all eight towns, 99 men and 42 women were screened from 106 families. The results were compared with those in the 1367 men and 948 women from the 1448 families that had attended originally. Table I shows the sociodemographic data. Non-attenders were less likely to be home owners ($P=0.04$) and less likely to have access to cars ($P=0.008$) than attenders. The frequency of reported personal history of coronary heart disease and of family history of coronary heart disease in a first degree relative younger than 65 years old was similar in both groups (table II).

Women non-attenders were significantly more likely to be current cigarette smokers than were attenders ($P=0.02$), with similar numbers of former smokers and fewer lifelong non-smokers (table III). Male non-attenders were more likely to be current or former smokers and less likely to be non-smokers than attenders. The difference in smoking prevalence, however, was not significant ($P=0.2$). Other risk factors were similar in the two groups (table IV).

The Dundee risk score was higher among non-

TABLE I—Sociodemographic characteristics of attending and non-attending families

	No (%) of attenders (n=1448)	No (%) of non-attenders (n=106)	P value
Housing:			
Owner occupier	1296 (90)	88 (83)	} 0.04
Renting	152 (10)	18 (17)	
Occupation*:			
Employed	1216 (84)	88 (83)	} 0.2
Unemployed	73 (5)	10 (9)	
Retired	75 (5)	5 (5)	
Sick or other	84 (6)	3 (3)	
Access to car*:			
None	163 (11)	20 (19)	} 0.008
One	774 (53)	42 (40)	
More than one	511 (35)	44 (42)	

*Taken from man's response where available and women's otherwise.

TABLE II—Number (percentage) of men and women with a personal or family history of heart disease

	Men			Women		
	Attendees (n=1367)	Non-attendees (n=99)	P value	Attendees (n=948)	Non-attendees (n=42)	P value
Personal history of disease*	63 (5)	5 (5)	0.8	17 (2)	0	0.4
Family history†	368 (27)	34 (34)	0.3	281 (30)	14 (33)	0.9

*Diagnosed angina, coronary artery bypass graft surgery, or heart attack.

†First degree relative with a history of premature (under 65 years) coronary disease. Two men and 1 woman (all attendees) were adopted and had no knowledge of family history.

TABLE III—Number (percentage) of cigarette smokers among attendees and non-attendees

	Men		Women	
	Attendees (n=1367)	Non-attendees (n=99)	Attendees (n=948)	Non-attendees (n=42)
Life long non-smoker	428 (31)	21 (21)	513 (54)	16 (38)
Current cigarette smoker	323 (24)	28 (28)*	202 (21)	15 (36)†
Former cigarette smoker‡	495 (36)	42 (42)	232 (24)	11 (26)
Other	121 (9)	8 (8)	1 (0.1)	0 (—)

*P=0.2 compared with attendees.

†P=0.02 compared with attendees.

‡Excludes current pipe and cigar smokers.

TABLE IV—Mean (SE) risk factor values in attendees and non-attendees

	Men		Women	
	Attendees (n=1367)	Non-attendees (n=90)*	Attendees (n=948)	Non-attendees (n=40)*
Systolic blood pressure (mm Hg)	137.2 (0.5)	137.7 (2.5)	128.1 (0.7)	128.0 (2.9)
Diastolic blood pressure (mm Hg)	86.2 (0.3)	85.7 (1.5)	80.8 (0.4)	79.4 (1.3)
Cholesterol (mmol/l)†	5.72 (0.03)	5.91 (0.18)	5.54 (0.04)	5.39 (0.24)
Glucose (mmol/l)‡	5.35 (0.03)	5.45 (0.16)	5.31 (0.03)	5.41 (0.19)
Body mass index	26.1 (0.1)	25.8 (0.1)	25.2 (0.1)	25.6 (0.6)

*11 Non-attendees (9 men and 2 women) had no clinical measurements as they were interviewed at home.

†177 Men and 135 women attendees were randomised to receive no screening measurement for cholesterol.

‡Median values given due to highly skewed distribution.

22 Non-attendees (15 men and 7 women) did not have cholesterol or glucose measured because they did not wish to give blood. Three attendees (2 women and 1 man) did not have cholesterol or glucose measured owing to temporary equipment failure.

All comparisons between attendees and non-attendees P>0.2.

attendees than attendees. The estimated risk of a major coronary event (coronary death and non-fatal myocardial infarction) in non-attending men was about 33% higher than in attending men (estimated risk/5000 person years: 11.4 v 8.6; P=0.05) while in women the risk in non-attendees was about 36% higher than in attendees (8.7 v 6.4; P=0.1).

Discussion

Pursuing people who had initially failed to respond to an invitation to a family health check required considerable effort by the nurses and entailed resources well beyond those usually available in general practice. Despite intensive follow up by telephone and home visits in the five towns where complete follow up took place only a further 5% of families were screened. Even if screening and intervention in primary care were effective in reducing risk for coronary heart disease among those who attend, the benefit of intensive follow up of non-attendees would be small with such a low level of success.

A large proportion of non-attending families had moved away in this study, showing the importance of an accurate denominator in identifying the true response rate for preventive programmes. Since the new contract, practice lists are becoming a more accurate reflection of the population for which the practice has responsibility. Few studies have published response rates to systematic screening and intervention programmes. The two major studies that have done so, the British family heart study³ and the OXCHECK

study,⁷ have estimated response rates of 73% (over all 13 towns, including controls) and 66% respectively, once those who had moved were excluded from the family health services authority denominator and OXCHECK's method of invitation has been taken into account.

The only way for practices to improve on the response rates in these studies is to use intensive opportunistic invitation over a long time. But in our study relatively few of the non-attendees seemed to have become more ready to participate when reapproached six to 12 months after their initial non-response.

PROFILES OF RISK IN ATTENDEES AND NON-ATTENDEES

The largest reported study of non-attendees is a telephone survey of non-respondents to an American multiphasic screening programme in which no physiological measurements were made.⁸ The study found little difference in the individual coronary risk factors between attendees and non-attendees. Our findings, which included blood pressure, cholesterol and glucose concentration, and body mass index, were in general similar among attendees and those non-attendees whom we managed to recruit. However, smokers, particularly women, were slightly less likely to attend for screening than non-smokers and consequently overall coronary risk was higher among the non-attendees. Attendees seemed to be wealthier than non-attendees, particularly in terms of access to cars and home ownership.

With the exception of smoking, our results generally do not support the concern that screening programmes are attended best by those who need them least.^{8,9} However, as we were unable to screen some two thirds of non-attending families there may be a group of determined non-attendees at higher coronary risk.

EFFECTS OF NON-ATTENDANCE ON PREVENTIVE PROGRAMMES

Even if the risk factor profile of those who fail to attend a screening programme is no more adverse than that of attendees, and if the subsequent intervention is highly effective, its effect on the whole population will be limited by the size of the group who do not attend. The extent of this limitation can be considered as follows. In the five practices which attempted complete follow up of non-attendees the attendance rate (corrected for those known to have moved) was 58% so that 42% failed to participate. Thus the true mean prevalence of any risk factor in the population (RF) can be given by $RF=0.58x+0.42y$, where x is the mean risk factor level (prevalence) among attendees and y is the mean prevalence among non-attendees. Of course, y will not be known in most situations.

We are most interested, however, in knowing what the effect of a screening and intervention programme will be given that only a proportion of those invited to take part will do so. The overall population change (ΔRF) in the mean prevalence of a risk factor will be given by $\Delta RF=0.58\Delta x+0.42\Delta y$, where Δx and Δy are the changes over the period of the study in attendees and non-attendees respectively. For studies of up to one year it is probably reasonable to assume that secular trends will be small and that therefore $\Delta y \approx 0$. The above equation therefore simplifies to $\Delta RF \approx 0.58 \Delta x$. So, the population effect is roughly the change achieved among attendees multiplied by the attendance rate.

To take a concrete example, the overall risk of coronary disease was found to be 12% lower in attendees who received the screening and intervention programme than in controls in the family heart study.³ Assuming this was mirrored in the five towns in the non-attendees study, and with an attendance rate of

58%, the population effect should be an overall reduction in risk of $0.58 \times 12\% = 7\%$. But to achieve an overall population reduction in risk of 12% the risk reduction in the attenders would have to be $12\% / 0.58 = 21\%$.

A graph can be constructed to assess the effect of an intervention on practice populations as response rate varies (fig 2). With an attendance rate of 100%, the slope of the graph would be 1 as risk reduction in attenders and the population is identical. As the attendance rate decreases the slope decreases, with a corresponding reduction in effect on the total practice population.

IMPLICATIONS FOR PRACTICE

Every general practitioner or practice nurse has anecdotal evidence that screening for coronary risk factors followed by appropriate intervention is effective in reducing risk in particular patients. However, even if a programme leads to change in most of those who attend its effect on the whole population will depend on the proportion who do not attend and their level of risk.

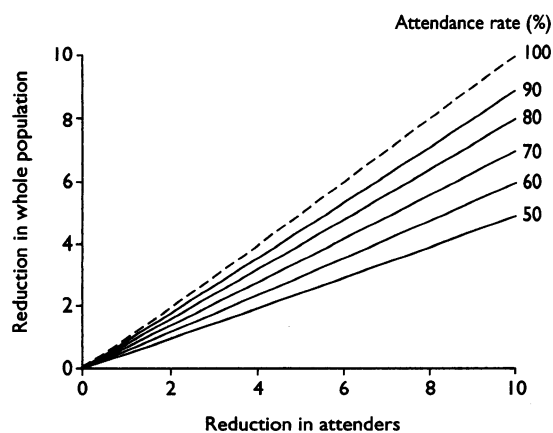


FIG 2—Effect of differing attendance rates for a screening programme on the overall effect in a population of an intervention to reduce cardiovascular risk. (The x and y scales apply to both absolute and relative (%) scales.)

If a practice decides to offer a coronary prevention service to patients careful thought should be given to the policy for non-attenders. Despite expenditure of considerable time and effort by practice nurses only a small proportion of non-attenders subsequently attended in this study. Any follow up policy will need agreed limits to avoid practice nurses spending too much time and thus reducing the services usually available to individual patients.¹⁰ Furthermore, any audit of the success of a coronary prevention clinic in reducing risk in a practice population should consider the effect not only on those who welcome the service but also on the large proportion who fail to attend.

The British family heart study is coordinated by the preventive cardiology, medicine, and primary medical care, University of Southampton; the medical statistics unit, London School of Hygiene and Tropical Medicine; and the Wolfson Research Laboratories, University of Birmingham. Members of the family heart study group are

Key messages

- Individuals at high cardiovascular risk have most to gain by lifestyle modification, but overall morbidity and mortality will drop most if risk is reduced across the whole population
- The British family heart study combined a population based screening strategy for coronary risk with risk related follow up
- In this study of non-attenders almost half were found to have moved away or died
- Despite intensive efforts information on cardiovascular risk was obtained for only about one third
- The proportion of non-attenders should be taken into account when auditing the success of coronary prevention services

D A Wood (chair), C Coles, R Cramb, G Davies, P Durrington, A-L Kinmonth, Y Kok, C Le Guen, T Marteau, A O'Dwyer, S M D Pyke, D W Steele, S G Thompson, and J Yarwood (secretary C M Bicknell).

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