

RESEARCH LETTER

## GP-delivered secondary prevention cardiovascular disease programme; early predictors of likelihood of patient non-adherence

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### Abstract

**Introduction:** The aim of this study was to determine how routinely recorded data could predict early the likelihood of patient non-adherence to a primary care-delivered secondary prevention programme for established coronary heart disease (CHD), with patients with CHD (10 851) invited to attend four times per year. **Method:** Non-adherence was defined as attending no more than three GP visits ever. The study sample was selected to allow a possible two-year recorded follow-up period in which patients could take up invitations. Administrative recordings of visit dates and intervals between visits, baseline results of key parameters and early changes were examined using logistic regression to determine independent predictors of non-adherence. **Result:** Longer interval between early visits, no family history of CHD, smoking and being outside target for exercise at baseline were independently associated with non-adherence.

**Conclusion:** Early identification by GPs of those who fail to attend on time or who defer appointments, in addition to persistence of lifestyle factors unchanged by a prior serious cardiac event should serve as a warning sign that targeted interventions to maintain adherence in primary care-delivered secondary prevention programmes are necessary.

### Introduction

Although there has been a reduction in coronary heart disease (CHD) in recent decades, it remains a major cause of morbidity and mortality in Ireland (1). There is strong evidence from randomised controlled trials and meta-analyses for the benefit of secondary preventive therapeutic measures in patients following acute myocardial infarction (MI), percutaneous coronary intervention (PCI) or coronary artery bypass graft surgery (CABG) (2,3). Changes in lifestyle and risk factors also have a positive influence (4,5).

On the recommendation of Ireland's National Cardiovascular Health Strategy, the Heartwatch programme of secondary prevention for cardiovascular disease was established by the Department of Health & Children, local health boards, the Irish College of General Practitioners (ICGP) and the Irish Heart Foundation, delivered through primary care (6). It was implemented in 2003 under the ICGP auspices.

Patients recruited have significant proven CHD, i.e. a history of MI, CABG or PCI. The programme

involved 20% of general practices (480 general practitioners (GPs)). Participating patients were invited to attend on a quarterly basis over a number of years, with continuing care being implemented according to defined clinical protocols. GPs provided information to patients on lifestyle factors, notably, smoking, diet and physical activity. Practices had access to and could refer patients to community services, including smoking cessation, physical activity and dietary advice.

The aim of this study was to determine how routinely recorded data could predict early the likelihood of patient non-adherence to a primary care-delivered secondary prevention programme for established coronary heart disease (CHD), with patients with CHD invited to attend four times per year.

### Methods

#### Study design

GP-recorded data held in the central database enabled analysis of association of early administrative,

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socio-demographic and clinical factors with subsequent programme non-adherence. The study sample was selected to allow a possible two-year recorded follow-up period in which patients could take up invitations.

### Measurements

Administrative recordings of visit dates and intervals between visits, baseline results of key parameters and early changes were examined in relation to non-adherence. Delay in attending was based on mean interval of all patients between visits. The targets were those recommended by the Third Joint Task Force of the European Society of Cardiology (7): total cholesterol < 5 mmol/l, LDL cholesterol < 3 mmol/l, non-smoker, systolic blood pressure < 140 mmHg, diastolic < 90 mmHg, fasting blood glucose < 6 mmol/l, exercise  $\geq$  210 min/week. Having a general medical card (GMS card, awarded based on means-tested eligibility for free medical services) was used as a proxy for social deprivation in those aged under 70 years. At the time of the study, all those aged 70 years or older were automatically awarded a GMS card.

### Outcome and statistical analysis

Non-adherence was defined as attending no more than three GP visits ever; chosen as it represented less than one year's engagement with what was intended to be a long term secondary prevention programme. Factors associated with programme non-adherence on univariate analysis were entered into a backward stepwise logistic regression to determine independent factors. SAS statistical software (SAS version 9, SAS, North Carolina, USA) was used.

## Results

In the study 10 851 patients were included. Most patients were male (75.8%); mean age was 66.2 (range: 41–85). 1330 patients (12.3%) attended  $\leq$  3 visits ever.

On univariate analysis, longer interval (> mean) between visits 1 and 2, being a smoker, being advised about smoking cessation, level of exercise outside target at first visit, being referred for additional exercise, total cholesterol level outside target, referral to a dietician and not having a family history of CHD were each significantly associated with non-adherence on univariate analysis (Table I).

Age, gender, unemployment status or having a medical card (in under 70s), systolic or diastolic blood pressure outside target at first visit, change in blood pressure between first and second visits, low density lipoprotein cholesterol, body mass index, weight or waist circumference outside target at first visit, advice to lose weight at first visit and overall risk factor score at baseline were not significantly associated with non-adherence. Mean HbA1c in those who were diabetic ( $n = 3404$ ) did not differ between those who adhered or not (7.09 versus 7.12).

A longer interval between visits 1 and 2, smoking, not having a family history of CHD and being outside target for exercise at baseline remained significantly associated with non-adherence after multivariate regression (Table I).

## Discussion

### Main findings

In this study of patients with established CHD, early independent predictors of failure to adhere to the primary care-delivered secondary prevention

Table I. Association of factors with non-adherence

Variable significant on univariate analysis entered into logistic regression model	Non-adherence ( $\leq$ 3 visits)	Adherence (> 3 visits)	Univariate analysis OR (95% CI)	Multivariate analysis, final model OR (95% CI)
Interval visit 1–visit 2 > mean	474/1330 35.6%	1088/9521 11.4%	3.56 <sup>b</sup> (3.17–4.01)	3.45 <sup>b</sup> (3.05–3.91)
Smoker	203/1328 15.3%	1192/9520 12.5%	1.26 (1.07–1.48)	1.20 <sup>a</sup> (1.01–1.44)
Exercise at visit 1 outside target	747/1299 57.5%	4589/9362 49.0%	1.41 (1.25–1.58)	1.31 <sup>b</sup> (1.15–1.48)
Referred for exercise	40/1330 3.0%	179/9521 1.9%	1.62 <sup>b</sup> (1.14–2.29)	–
Total cholesterol at visit 1 outside target	477/1315 36.3%	3142/9462 33.2%	1.45 <sup>a</sup> (1.02–1.29)	–
Referred to dietician at visit 1	278/1330 20.9%	1736/9521 18.2%	1.19 <sup>a</sup> (1.03–1.37)	–
No family history of CVD	765/1243 61.5%	3681/8852 58.4%	1.14 <sup>a</sup> (1.01–1.29)	1.17 <sup>a</sup> (1.02–1.33)

<sup>a</sup> $P < 0.05$ , <sup>b</sup> $P < 0.01$ , – not included in final model.

programme were delays in attending appointments during the first months, lack of a known family history of CHD, smoking and low levels of exercise at first visit. These lifestyle risk factors have persisted post serious cardiac event plus cardiac rehabilitation for many patients prior to entry into Heartwatch.

Although in studies of cardiac rehabilitation females are less likely to adhere, (8) we did not find gender in this study to be associated with non-adherence. In this programme patients were recruited by GPs subsequent to a cardiac event and, for many, cardiac rehabilitation; female patients attend GPs more commonly than men and may have longer, more established relationships with their GPs (9) that may have assisted with adherence to the secondary prevention programme proposed.

### *Strengths and limitations*

In general it is considered that risk factor control in patients with established CHD remains poor with routine care paths alone. Studies of cardiac rehabilitation without any follow up programmes show that over time patients revert in part to previous lifestyle habits (10,11). It is recognized that sustained long-term treatment usually follows a successful negotiation between patient and general practitioner (12). While there have been studies examining adherence to hospital-delivered cardiac rehabilitation, there is little known specifically regarding predictors of adherence to subsequent secondary prevention in the GP setting at a time removed from the initial trauma of the cardiac event (13).

Calls have been made for development of standardised audit methods in the context of modern records systems (14); our finding of delays in attending for routine visits in the first year associated with subsequent failure to adhere to the programme would be easily noted using modern recording.

In this study, we used the existing database for analysis; qualitative study would allow deeper investigation of the reasons for non-adherence.

### **Conclusion**

The findings suggest that early engagement with preventive programmes and the GP and prioritising of attendance within other lifestyle priorities, are important factors in maintaining adherence. Early identification by GPs of those who fail to attend on time or who defer appointments, in addition to persistence of lifestyle factors unchanged by a prior serious cardiac event should serve as a warning sign that targeted interventions to maintain adherence in primary care-delivered secondary prevention programmes are necessary.

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