

The Vale of Leven health promotion project

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SUMMARY. A two stage health promotion programme is in progress in the Vale of Leven in Dunbartonshire. The first stage has been completed within a local factory (Polaroid UK Limited), the largest private employer in the district. A total of 1205 employees, representing 87% of the workforce, took part in the programme and were initially screened for coronary artery risk factors. Blood pressure, serum cholesterol, body composition and aerobic fitness were measured and smoking habits determined. Aspects of lifestyle were assessed by questionnaire. All employees whose initial cholesterol concentration was greater than 6.5 mM were given simple dietary advice and their cholesterol concentration thereafter remeasured. Eighty-two per cent of these men and 72% of these women succeeded in reducing their cholesterol, the men by a mean of 1.3 mM, the women by a mean of 0.7 mM.

The health initiatives undertaken within the factory at the same time as screening are also described in this paper.

Introduction

THE Vale of Leven is part of the Argyll and Clyde health board, an area in which, as in the rest of the United Kingdom, coronary heart disease is the most common cause of premature adult deaths, killing 37% of men and 23% of women aged 35–64 years who died in 1986.¹ This compares with 38% for men and 20% for women in the whole of Scotland² and 37% for men and 17% for women in England and Wales.³

Given this background the aims of the Vale of Leven health promotion project were first to encourage the whole population to make the lifestyle changes required to reduce the risk of coronary artery disease and secondly to identify those members of the community at high risk because of their high levels of the known coronary artery risk factors.⁴ This dual approach, combining population and high risk strategies, is advocated by the European Atherosclerosis Society,⁵ the British Hyperlipidaemia Association,⁶ and the Scientific and Medical Advisory Committee of the Coronary Prevention Group.⁷

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The project is funded by Urban Aid, the Scottish Health Education Group and a local company (Polaroid UK Limited). It employs four staff: two social scientists, one of whom is now project coordinator, a physical educationalist and a secretary. Before the project started within the factory the aims and methods were explained in detail to the management, consultative committees and employee representatives.

The project was designed in two phases: to design and pilot health initiatives using the captive population of a local factory, and then to use the successful methods in the surrounding community. The first phase of the project in the factory has now been completed and aspects of the work are described here.

Screening of employees

Identification of risk factors

Screening was carried out department by department. First, a demonstration board of pictures and text explaining the reasons for, and exactly what was entailed in screening was displayed in each department for one week before screening started. All employees in the department including shift workers were then sent individual appointments for screening. The screening was carried out by a state registered nurse as follows:

- Administration by the nurse of a lifestyle questionnaire which had previously been piloted and tested among employees by the project staff. It included details of family history, important illnesses, smoking habits, alcohol intake, diet and exercise.
- Measurement of blood pressure with the employee sitting with one elbow resting on a table, and using the fifth phase as the diastolic measure.
- Measurement of random total serum cholesterol using a Reflotron. The Reflotron was calibrated daily using serum supplied initially by Glasgow Royal Infirmary and subsequently by Boehringer. The nurses doing the test participated throughout in quality control tests run by Wolfson Research Laboratories in Edgbaston and at all times achieved results which were within ± 0.5 mM of the values for control specimens.
- Measurement of height without shoes, weight in indoor clothing and skinfold thickness at four sites (biceps, triceps, subscapular and suprailiac), and determination of percentage body fat.⁸
- Measurement of aerobic fitness using a modification of the sub-maximal cycle ergometry procedure to predict maximal oxygen consumption^{9,10} This procedure attempts to ensure a uniform relative exertion by all subjects without exceeding a recommended age-related heart rate; it is similar to procedures adopted by the Council of Europe¹¹ and the World Health Organization¹² and it has been used in a similar factory setting.¹³

Feedback to individuals

The results were fed into a computer and a programme from the 'Good hearted Glasgow' scheme was used to calculate a 'risk' score for each individual at the time of screening and to highlight the lifestyle factors which produced the 'risk' score. The screening nurse then used this information to encourage the individual to make a start on the required lifestyle changes. A copy of all screening findings and the advice given was sent to the general practitioner of each employee.

All employees were given a healthy lifestyle information package which consisted of information about the accepted risk factors for coronary heart disease, and about a healthy diet and the value of exercise. This was tailored to the needs and interest of each individual by adding, for example specific information about a low cholesterol diet, or a fitness programme designed around the type of exercise most likely to be followed by that person. Dietary advice was based on the National Advisory Committee on Nutrition Education (NACNE) guidelines.¹⁴

Each employee with a serum cholesterol level at initial screening of over 6.5 mM was given a list of simple dietary substitutes and was encouraged to lower his or her intake of dietary cholesterol. Individuals were given an opportunity to return one month later to have their cholesterol level checked. This was repeated at monthly intervals until the cholesterol level was under 6.5 mM or until the employee felt that no reasonable further changes in diet were possible.

Changes within the factory

The individual instructions about diet were emphasized and supported by changes made, with the help of a dietician, in the menu in the factory cafeteria. The changes were in line with the NACNE recommendations. A grading system using up to three red crosses for food high in fat and up to three green ticks for food high in fibre was introduced to the menu board. No items were removed, but healthy alternatives were introduced alongside higher fat items, for example baked potatoes beside chips and wholemeal pizza alongside meat pies. With the introduction of baked potatoes, the consumption of chips reduced by 30%. With the availability of wholemeal rolls, the consumption of the previously universally eaten white roll dropped by 40%. Employees have accepted that only semi-skimmed milk is used within the factory in food preparation and is available to drink.

While screening was progressing, other health related changes took place within the factory. The company introduced a no smoking policy based on the adverse effects of passive smoking. The first phase was introduced on national no smoking day in March 1988. All conference rooms and 75% of the cafeteria became 'no smoking' areas and smoking was banned in offices at meetings of two or more people. By March 1990 smoking will be allowed only in separately ventilated designated smoking zones.

A stress survey was carried out throughout the factory by a clinical psychologist. This set out to assess the levels and causes of stress within the workforce. With the help of the psychologist, the company has subsequently begun stress awareness and relaxation training. Eight employees chosen from different areas within the factory are initially being taught the skills which will in turn enable them to lead groups of interested colleagues in their own departments. The company has also introduced a counselling service using an employee who has been given further training by the psychologist. This training has all been funded separately by the company and will be made available to all employees in the future.

Exercise groups have been established within the workforce, catering for swingnastics, weight training, and jogging. Employees preferring to exercise by themselves have had individual fitness programmes constructed for them. Early in the programme, an exercise break of seven minutes was introduced into part of one division of the company, during which music was played and the employees (mainly women in this division) were given the opportunity to do some light mobility exercising beside their work bench. This was greeted with enthusiasm by the employees initially but interest fell off over a period of six months. The reason for the loss of interest in this aspect of exercise is not clear.

In 1987 and 1988 the company sponsored a 10 km road race and fun run in the Vale of Leven. In 1988 421 people took part in the 10 km race and 350 took part in the fun run, while the spectators were given an opportunity to see demonstrations of fitness related activities by community based groups.

Risk factors

Initial risk profiles

In total 1205 employees, representing 87% of the total workforce, took up the invitation to be screened. Some subjects elected not to be measured on certain variables, in particular the cycle ergometer test where, in addition, a small number were excluded for medical reasons. The proportion of the screened population with risk factor values above the cut-off points is shown on Table 1.

Table 1. Proportion of workforce at risk on initial screening.

Risk factor	No. (%) of employees at risk	
	Men (n = 553-500)	Women (n = 646-455)
Systolic blood pressure >160 mmHg	9 (1.6)	5 (0.8)
Diastolic blood pressure >95 mmHg	22 (4.0)	16 (2.5)
Body mass index >25.0 for men, >23.8 for women	211 (38.8)	247 (38.2)
VO ₂ max <33 ml kg ⁻¹ min ⁻¹ for men, <25 ml kg ⁻¹ min ⁻¹ for women	206 (41.2)	133 (29.2)
Serum cholesterol >6.5 mM	132 (24.0)	99 (15.0)

n = total number of employees (data missing for some measures).

Effect of intervention on cholesterol levels

Of the 132 men and 99 women whose serum cholesterol level was initially greater than 6.5 mM, 124 (94%) men and 86 (87%) women returned at least once to have a further check done. Among the men the cholesterol level fell for 108 (82% of all those with an initial cholesterol greater than 6.5 mM), showed no change in two and rose in 14 employees. Among the women the cholesterol level fell in 72 (73% of the total with initial cholesterol greater than 6.5 mM), showed no change in six and rose in eight employees.

Table 2 shows the number and percentage of employees who had a cholesterol concentration greater than 6.5 mM before and after intervention, by age and sex. It can be seen from this that the number of men with this level of cholesterol fell from 132 to 54, a drop of 59%, and the number of women fell from 99 to 55, a drop of 44%.

Among men who initially had a cholesterol level greater than 6.5 mM the mean cholesterol concentration fell by 1.3 mM from 7.5 mM to 6.2 mM and among women by 0.7 mM from 7.3 mM to 6.6 mM. Men and women had similar drops in levels over all age ranges.

Discussion

The response rate to an invitation to take part in this project was 87%. This compares with a 78% response in the prospective phase of the British regional heart study⁴ suggesting that the captive population of industry is a suitable vehicle for such a study.

Table 2. Employees with cholesterol concentration greater than 6.5 mM before and after intervention.

Age (years)	Men			Women		
	n	No. (%) with cholesterol >6.5 mM		n	No. (%) with cholesterol >6.5 mM	
		Before inter-vention	After inter-vention		Before inter-vention	After inter-vention
<20	20	0 (0)	0 (0)	37	3 (8)	2 (5)
20-29	116	7 (6)	2 (2)	146	12 (8)	4 (3)
30-39	138	37 (27)	15 (11)	215	16 (7)	9 (4)
40-49	164	49 (30)	21 (13)	197	49 (25)	27 (14)
50-59	99	35 (35)	14 (14)	51	19 (37)	13 (25)
60+	16	4 (25)	2 (13)	0		
All	553	132 (24)	54 (10)	646	99 (15)	55 (9)

n = number of men or women screened.

These results of intervention on cholesterol concentrations suggest that combining the population and high risk approaches could produce meaningful changes in cholesterol levels in those groups of adults in the community who are most at risk of coronary artery disease. Serum cholesterol levels in any individual vary over short periods of time and even hourly,^{15,16} partly owing to biological variation and partly to analytical error.¹⁷ It has been shown that there is a close correlation between results obtained using a Reflotron and those using conventional wet chemistry¹⁸ and the accuracy of method in the study was subjected to quality control throughout. It seems improbable that intra-individual variations within the 210 employees who returned for a repeat cholesterol estimation would contribute meaningfully to the fall in overall mean cholesterol noted. Half of all employees who started with a cholesterol concentration greater than 6.5 mM had on retesting, a level under that figure. Rose has stated that a fall of 1 mM in population cholesterol level corresponds to a decrease of 0.64 deaths from coronary heart disease per 100 men per 10 years,¹⁹ and the lipid research clinics programme in the United States of America suggests that a 1% reduction in serum cholesterol among those with cholesterol levels initially between 6.5 and 7.8 mM yields a 2% reduction in coronary heart disease rates.²⁰ These figures suggest that if the reduction in cholesterol obtained in the first phase of this project can be maintained, a reduction in coronary heart disease rate in our community of 18% in women and 34% in men could be achieved. The real measure of our success will be seen when a sample of the factory population is remeasured in the future. A 10% random sample of all participating employees is about to be retested in all parameters.

In our view screening within the factory has served several purposes. It has identified individuals at high risk of developing coronary artery disease and has raised the awareness among the general factory population of the accepted risk factors for coronary artery disease. Perhaps most importantly, it has shown employees that relatively small changes in eating habits can produce real changes in their chance of suffering from coronary heart disease. The beneficial changes in cholesterol level achieved by some employees, motivated to make changes by their own high levels, have also shown others that these alterations are possible.

The uptake of the alternative dishes in the factory canteen demonstrates that people, if motivated and offered an attractive alternative, will eat it. By raising the awareness of individuals of their own risk factors and the ways of reducing these, there has been increase demand for, and uptake of, low fat and high fibre foods. In addition, by ensuring a demand for 'healthy' food we can ensure local traders will stock them at reasonable cost.

The awareness of risk factors also eased the introduction of a successful policy on smoking into the company. By obtaining the support of senior management and involving a committee of employees consisting of smokers, ex-smokers and non-smokers in designing and implementing it, a policy was introduced within four months. This policy has since been recognized by an award from Action on Smoking and Health.

Commercial health screening packages are available but are relatively expensive. Screening as described in this article could be undertaken by any firm willing to hire a nurse and buy the hardware. The total cost, including consumables, for a company employing 1500 people would be less than £15.00 per head.

Screening of the general community in the Vale of Leven is about to start and will draw heavily from the lessons learned within the factory. The aim will be to raise awareness of risk factors while at the same time ensuring that the opportunity to follow healthier lifestyle practices is available in the community.

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