Effectiveness of counselling patients on physical activity in general practice: cluster randomised controlled trial

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Abstract

Objective To assess the long term effectiveness of the "green prescription" programme, a clinician based initiative in general practice that provides counselling on physical activity.
Design Cluster randomised controlled trial. Practices were randomised before systematic screening and recruitment of patients.
Setting 42 rural and urban general practices in one region of New Zealand.
Subjects All sedentary 40-79 year old patients visiting their general practitioner during the study's recruitment period.
Intervention General practitioners were prompted by the patient to give oral and written advice on physical activity during usual consultations. Exercise specialists continued support by telephone and post. Control patients received usual care.
Main outcome measures Change in physical activity, quality of life (as measured by the "short form 36" (SF-36) questionnaire), cardiovascular risk (Framingham and D'Agostino equations), and blood pressure over a 12 month period.
Results 74% (117/159) of general practitioners and 66% (878/1322) of screened eligible patients participated in the study. The follow up rate was 85% (750/878). Mean total energy expenditure increased by 9.4 kcal/kg/week (P=0.001) and leisure exercise by 2.7 kcal/kg/week (P=0.02) or 34 minutes/week more in the intervention group than in the control group (P=0.04). The proportion of the intervention group undertaking 2.5 hours/week of leisure exercise increased by 9.7% (P=0.003) more than in the control group (number needed to treat=10). SF-36 measures of self rated "general health," "role physical," "vitality," and "bodily pain" improved significantly more in the intervention group ($P < 0.05$). A trend towards decreasing blood pressure became apparent but no significant difference in four year risk of coronary heart disease.
Conclusion Counselling patients in general practice on exercise is effective in increasing physical activity and improving quality of life over 12 months.

Introduction

Physical inactivity is an independent risk factor for cardiovascular and other diseases.[1] Interventions using physical activity can help to reduce cardiovascular risk factors, diabetes, obesity, osteoporosis, and symptoms of depression.[1] Such interventions can also improve quality of life, which is an important predictor of physical functioning among older age groups.[2]

General practice in New Zealand and the United Kingdom is an ideal setting to identify sedentary adults and deliver brief interventions advising on physical activity as more than 80% of adults visit at least once a year.[3] Although gains in physical fitness and activity have been reported after such interventions in general practice,[4–6] health benefits have not. Findings from previous studies have had limited generalisability because patients were drawn from only one or two practices,[5 6] or were mostly volunteers from high socioeconomic groups.[4] This study assessed the effectiveness of a sustainable, clinician based initiative providing advice on physical activity, the "green prescription" (see box), by using a screening process for physical inactivity and delivery of the intervention during typical consultations in general practice among a diverse population.

Methods

Design and participants

We used a cluster randomised controlled trial design and invited all urban and rural general practitioners in the central and eastern Waikato region of New Zealand to participate. All patients aged 40-79 years who attended the participating practices during a five day period received a screening form, based on currently recommended levels of physical activity,[1] to establish eligibility.

Patients were excluded if practice personnel considered them to be too unwell to participate, if they had a debilitating medical condition or a known unstable cardiac condition, if they did not understand English, or if they were expecting to leave the region. Patients remained blind to whether they had been allocated to the intervention during screening for activity and enrolment. No patients were excluded after enrolment.

Measures

Primary outcome measures, evaluated at baseline and at 12 month follow up, included change in total expenditure of energy and leisure time expenditure of energy,[7] cardiovascular risk (as assessed by systolic and diastolic blood pressure and coronary heart disease risk), and quality of life.[8] Measures of potential harm

The "green prescription" intervention

- Primary care clinicians are offered four hours of training in how to use motivational interviewing techniques to give advice on physical activity and the green prescription
- Patients who have been identified as "less active" through screening at the reception desk and who agree to participate receive a prompt card, stating their stage of change, from the researcher, to give to the general practitioner during consultation
- In the consultation, the primary care professional discusses increasing physical activity and decides on appropriate goals with the patient. These goals, usually home based physical activity or walking, are written on a standard green prescription and given to the patient
- A copy of the green prescription is faxed to the local sports foundation with the patient's consent. Relevant details such as age, weight, and particular health conditions are often included
- Exercise specialists from the sports foundation make at least three telephone calls (lasting 10-20 minutes) to the patients over the next three months to encourage and support them. Motivational interviewing techniques are used. Specific advice about exercise or community groups is provided if appropriate
- Quarterly newsletters from the sports foundations about physical activity initiatives in the community and motivational material are sent to participants. Other mailed materials, such as specific exercise programmes, are sent to interested participants
- The staff of the general practice is encouraged to provide feedback to the participant on subsequent visits to the practice

included change in injuries and falls in the previous month and admission to hospital in the previous year.

Delivery of intervention

After we had enrolled patients, those receiving the intervention used a form given by the researcher to prompt their general practitioner or practice nurse during the consultation to deliver the green prescription programme. General practitioners in the control group delivered usual care to participants in the study.

Analysis

All outcome analyses were by intention to treat. We adopted a conservative method whereby baseline observations were carried forward for missing data of all outcome variables except four year risk of coronary heart disease. For this variable, mean increase in risk in the control population was used for participants who failed to attend follow up. We adjusted analysis of blood pressure for changes in medication.

Results

Sixty six per cent of screened eligible patients (878/1322) were enrolled in the study. Follow up at 12 months was completed in 85% (750/878) of participants.

Of the 451 intervention patients, 385 received the intervention from a general practitioner and 66 from a practice nurse. Subsamples of 31 general practitioners and 19 nurses estimated spending an average of 7 minutes and 13 minutes per patient, respectively, delivering the intervention.

Characteristics of intervention and control groups matched well at baseline (see bmj.com). Most primary outcome measures improved in both groups over 12 months. However, physical activity during leisure time and total expenditure of energy increased more in the intervention group than in the control group, as did the "general health," "role physical," "vitality," and "bodily pain" scores on the SF-36 questionnaire (table). Systolic and diastolic blood pressure improved significantly from baseline in the intervention group, but the change did not differ significantly from that achieved in the control group. The difference in the change of risk of coronary

Mean changes (95% confidence intervals) in physical activity, cardiovascular, and quality of life outcomes in the control and intervention groups, at 12 months

Measure	Intervention* (n=451)	Control*	Difference between groups† (n=878)	P value
Primary outcomes:				
Total energy expenditure (kcal/kg/week)	9.76 (5.85 to 13.68)	0.37 (–3.39 to 4.14)	9.38 (3.96 to 14.81) (975 kcal/week)	0.001‡
Leisure physical activity (kcal/kg/week)	4.32 (3.26 to 5.38)	1.29 (0.11 to 2.47)	2.67 (0.48 to 4.86) (247 kcal/week)	0.02§
Leisure exercise (minutes/week)	54.6 (41.4 to 68.4)	16.8 (6.0 to 32.4)	33.6 (2.4 to 64.2)	0.04§
Systolic blood pressure (mm Hg)	–2.58 (–4.02 to –1.13)	–1.21 (–2.57 to 0.15)	–1.31 (–3.51 to 0.89)	0.2
Diastolic blood pressure (mm Hg)	–2.62 (–3.62 to –1.61)	–0.81 (–1.77 to 0.16)	–1.40 (–3.35 to 0.56)	0.2
4 year risk of coronary heart disease (%)	0.42 (0.23 to 0.60)	0.52 (0.32 to 0.72)	–0.10 (–0.43 to 0.23)	0.6
SF-36 quality of life scores:				
Physical functioning	3.16 (1.61 to 4.71)	1.63 (–0.04 to 3.31)	1.23 (–1.35 to 3.81)	0.3
Role physical	10.53 (6.8 to 14.3)	4.16 (0.63 to 7.68)	7.24 (0.16 to 14.31)	0.045§
Bodily pain	6.51 (4.28 to 8.74)	2.50 (0.15 to 4.86)	4.01 (0.78 to 7.24)	0.02§
General health	5.95 (4.43 to 7.47)	1.60 (0.22 to 2.99)	4.51 (2.07 to 6.95)	0.000‡
Vitality	5.36 (3.76 to 6.96)	3.06 (1.44 to 4.68)	2.30 (0.03 to 4.57)	0.047§
Social functioning	3.02 (0.68 to 5.36)	2.85 (0.57 to 5.13)	0.36 (–3.53 to 4.26)	0.9
Role emotional	5.32 (1.43 to 9.21)	5.70 (2.07 to 9.32)	–0.38 (–5.70 to 4.94)	0.9
Mental health	2.61 (1.17 to 4.04)	1.63 (0.28 to 2.98)	0.98 (–0.99 to 2.95)	0.3
Other variables:				
Body mass index (kg/m^2)	–0.11 (–0.25 to 0.02)	–0.05 (–0.18 to 0.07)	–0.06 (–0.24 to 0.12)	0.5
Cholesterol concentration (mmol/l)	–0.019 (–0.08 to 0.05)	0.01 (–0.05 to 0.06)	–0.02 (–0.12 to 0.09)	0.7

*Unadjusted for clustering.
†Adjusted for clustering by medical practice.
‡Significant at 0.01 level.
§Significant at 0.05 level.

heart disease between the two groups did not reach significance. The odds ratios of having a fall or injury in the previous month or being admitted to hospital over the previous year at follow up compared with baseline were not significantly different between intervention and control groups.

The proportion of participants in the intervention who achieved 2.5 hours of moderate or vigorous leisure physical activity per week increased by 66/451 (14.6%) compared with 21/427 (4.9%) in the control group (P=0.003), with a number needed to treat of 10.3. Increases in occupational activity contributed substantially to the additional increase in total energy expenditure ($P < 0.001$), although domestic and transport activity did not.

Discussion

The green prescription intervention in general practice is effective in increasing participants' physical activity and improving quality of life over 12 months without evidence of adverse effects. A trend towards decreasing blood pressure also became obvious, but we detected no significant change in the risk of coronary heart disease.

For every 10 green prescriptions written, one person achieved and sustained 150 minutes of moderate or vigorous leisure activity per week, at 12 months. Achieving this amount of activity (using up an additional 1000 kcal/week) is associated with a 20-30% risk reduction in all cause mortality compared with sedentary individuals.[9]

Limitations

This study did not have sufficient statistical power to detect a change in blood pressure of 1.4 mm Hg as sample size calculations used larger estimates from previous reviews of exercise and blood pressure.[10] The clinical significance of such a small change in blood pressure across a population is also questionable. However, a reduction of diastolic blood pressure of 2 mm Hg in an adult population could lower the prevalence of hypertension by 17%, the risk of coronary heart disease by 6%, and the risk of strokes and transient ischaemic attacks by 15%.[11] Changes in blood pressure in this study resemble long term changes achieved by other lifestyle interventions such as weight loss or salt reduction programmes.[12]

Strengths

The findings of this study have widespread generalisability as the study included a socioeconomically diverse sample from a large geographical region, and rates of participation were high. The green prescription intervention is sustainable and has been used by more than 50% of general practitioners in New Zealand.[13] This study used a true control group, and the patients prompted their usual general practitioner or nurse to deliver the intervention. Thus it differs from previous studies that did not find a change of outcome of physical activity in the long term and may indicate the importance of prompting by the patient and the role of the usual practitioner as an agent of intervention, as opposed to a visiting activity specialist.[14]

Implications

To evaluate cardiovascular benefits, larger samples capable of detecting smaller blood pressure changes and longer follow up periods are recommended. Alternatively, more intensive continuing support may improve compliance and the health benefit, as has been shown elsewhere.[4] However, this study has shown that prompting the usual general practitioner for brief advice, coupled with ongoing telephone support, can change people's behaviour with respect to physical activity and improve self rated variables including general health, vitality, role physical, and bodily pain for at least a year. If implemented widely, such a strategy could result in major health benefits for sedentary people.

What is already known on this topic

Counselling patients in general practice on exercise has resulted in gains in physical fitness and activity, but no health benefits have been found

What this study adds

Counselling patients in general practice on exercise is effective in increasing physical activity and improving quality of life over 12 months without evidence of adverse effects

The intervention may reduce blood pressure by an average of 1-2 mm Hg over 12 months

No changes in the risk of coronary heart disease were observed

The intervention is sustainable in usual general practice

Prompting practice staff to deliver the intervention may have increased its effectiveness

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Ethical approval: The study was approved by the Waikato Ethics Committee in 1999.

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Primary care in the United States

Innovations in primary care in the United States

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This is the last in a series of four articles edited by Andrew Bindman and Azeem Majeed

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Summary points

- Primary care in the United States is facing difficult times: doctors are overworked and dissatisfied with it, and medical students are not very interested in it
- Primary care is unable to deliver everything expected of it and offers neither timely access to acute care nor state of the art chronic care
- A redesign of the primary care sector that addresses these problems is gaining acceptance in the United States
- The redesign envisages the development of clinical teams, open access scheduling, implementation of a new model of management of chronic care, training patients to manage chronic conditions themselves, and group medical visits

It has been said that primary care in the United States faces the worst of times and the best of times.[1] Why the worst of times? Primary care was catapulted into prominence by the advent of health maintenance organisations; many of such organisations' 80 million patients were required to gain permission from their primary care physician to access laboratory, radiology, and specialty services. Because the number of people enrolled in health maintenance organisations is declining, more patients are free to move around the healthcare system. The United States may revert to its previous dispersed system of care, in which patients enter the specialty-dominated system through a variety of doors rather than through a single primary care entrance.

When health maintenance organisations moved primary care to a central position in health care, they expected primary care physicians to do far more for their patients than before,[2] yet they paid little more, if at all, for these additional tasks. Primary care physicians were looking more and more like the "hamsters on a treadmill" described in an article in the *BMJ*.[3] In California, the proportion of primary care physicians very satisfied with their work dropped from 48% in 1991 to 36% in 1996.[4] In the past few years, medical students have become less interested in making a career in primary care because of the long hours, high stress, and relatively low reimbursement of generalist physicians.[5]

The problems go beyond primary care's insecure role in the US health system: primary care is not serving patients satisfactorily. Fewer than half of patients with hypertension, diabetes, atrial fibrillation, and hyperlipidaemia—diagnoses chiefly handled at the primary care level—are well managed.[6–9] Many patients also have difficulty obtaining an appointment with their primary care practice. From 1997 to 2001, the proportion of people reporting inability to obtain a timely appointment rose from 23% to 33%.[10]

Clearly, primary care clinicians are unable to handle everything piled on to their plates. Thus, the worst of times. Why, then, the best of times? One proposition explaining the work of great artists holds that suffering breeds creativity—Beethoven and Van Gogh are cited as examples. Although the situation of US primary care physicians cannot be called "suffering," the proposition could be reformulated as follows: as primary care physicians have seen their problems mount and satisfaction fall, they have begun to create innovations in primary care practice (innovations that are sometimes more advanced in the United Kingdom). Examples of these innovations are: functioning primary care teams, open access scheduling, the chronic care model, collaborative physician-patient interaction, group medical visits, and the paperless electronic office. The potential for these innovations to improve primary care practice creates the "best of times."

Behind each specific innovation lies a global vision of primary care practice in the 21st century. Donald Berwick of the Institute for Healthcare Improvement, one architect of the new vision, explains: "We are carrying the 19th century clinical office into the 21st century world. It's time to retire it."[5] What is the vision of primary care practice in the 21st century?