# Improving the health behaviours of elderly people: randomised controlled trial of a general practice education programme

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## Abstract

**Objectives** To establish the effect of an educational intervention for general practitioners on the health behaviours and wellbeing of elderly patients.
**Design** Randomised controlled trial with 1 year follow up.
**Setting** Metropolitan general practices in Melbourne, Australia.
**Subjects** 42 general practitioners and 267 of their patients aged over 65 years.
**Intervention** Educational and clinical practice audit programme for general practitioners on health promotion for elderly people.
**Main outcome measures** Patients' physical activity, functional status, self rated health, immunisation status, social contacts, psychological wellbeing, drug usage, and rate of influenza vaccination. Primary efficacy variables were changes in outcome measures over 1 year period.
**Results** Patients in the intervention group had increased *(a)* walking by an average of 88 minutes per fortnight, *(b)* frequency of pleasurable activities, and *(c)* self rated health compared with the control group. No change was seen in drug usage, rate of influenza vaccination, functional status, or psychological wellbeing as a result of the intervention.
Extrapolations of the known effect of these changes in behaviour suggest mortality could be reduced by 22% if activity was sustained for 5 years.
**Conclusions** Education of the general practitioners had a positive effect on health outcomes of their elderly patients. General practitioners may have considerable public health impact in promotion of health for elderly patients.


## Introduction

Threats to the health of elderly people and targets for health promotion include low rates of uptake of influenza vaccination[1] and exercise,[2] increased drug use,[3] and social isolation.[4] As elderly people attend general practices frequently, general practitioners are well placed to deliver interventions for such people,[5] and trials have shown positive outcomes of interventions on smoking and alcohol use in elderly patients.[6 7] If an intervention as part of the usual educational programme for general practitioners were successful, it could be easily disseminated. We assessed the impact of an educational intervention for general practitioners on the health behaviours and wellbeing of elderly non-institutionalised patients.

## Participants and methods

### General practitioners

Our project received the approval of the University of Melbourne human ethics committee. We assigned a number to 398 general practitioners from a list of a regional grouping in metropolitan Melbourne, Australia, then randomly selected 193 of these to be recruited by telephone. Eligibility criteria were: working more than 12 hours per week, not planning to move or retire in the next 2 years, one general practitioner per practice site, and no computerised recall system for influenza vaccination. We excluded 6 general practitioners (3%) who were uncontactable, 25 (13%) who had either moved practice or died, 28 (15%) whose partners were already enrolled in our trial, 25 (13%) who worked less than 12 hours per week, 7 (4%) who were retiring, 13 (7%) who had either no elderly patients or patients who did not speak English, and 7 (4%) who had computerised recall systems.

Overall, 42 of 82 eligible general practitioners (6 females and 36 males) were enrolled (51% participation rate), of whom 17 (40%) were the sole doctor in their practice. The 40 general practitioners who declined to participate (50% returned a survey) had been at their current practice a shorter time ($t = 2.03$; $P < 0.05$) and were less likely to charge their patients ($\chi^2 = 4.57$, $P = 0.03$) than those who participated.

### Patients

After informed consent of the participating general practitioners, all practice records were counted (average 6657, range 938-66 000 records). On the basis of patient eligibility criteria for the trial (≥65 years, English speaking, community dwelling, attended the practice in the past 18 months, attended the enrolled general practitioner for three of the past five consultations) and a random number table, we selected and viewed an average of 397 (range 50-2000) records per practice, and we identified 10 elderly patients per participating general practitioner. Overall, 267 patients agreed to participate in the trial when invited to do so by post (participation rate 64%). Patient non-participants (60% (92 of 153) contacted by telephone) were more likely to be dependent for transportation ($P = 0.003$) and shopping ($P < 0.0001$) but were otherwise indistinguishable from participants. After 1 year, 34 patients (13%) were not followed up (see website).

### Randomisation and blinding

An independent research assistant at a distant site used computer randomisation to allocate general practitioners to intervention or control group and this was concealed until the intervention began. Interviewers evaluating outcomes were blinded to the intervention group of patients and general practitioners at all times, and patient's were unaware of the group allocation of their general practitioner.

### Outcomes

Patient outcomes were evaluated by trained interviewers during home visits at baseline from November

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website *e*xtra

*The sample size calculation and flow of patients through the trial appear on the BMJ's website*

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1995 to February 1996, and at 1 year follow up from December 1996 to April 1997. Outcomes were *(a)* patients' recall of discussions with their general practitioner; *(b)* patients' self reported evaluation of physical activity on the basis of questions used in previous surveys[8 9]; *(c)* reports of frequency and duration of activity episodes in the previous fortnight (walking, sports and exercises, gardening, housework and home maintenance), which were multiplied to obtain total minutes per fortnight; *(d)* extent of walking the day before (walking yesterday) using a previously validated question[10]; *(e)* frequency of social contact from asking how often patients did something they really enjoyed; *(f)* validated measures for psychological wellbeing (psychological subscale of the sickness impact profile)[11] and functional status (human activities profile)[12]; patients' self rated health by asking if, in general, they rated their health as excellent, very good, good, fair, or poor, and by asking how they would rate their health in general now compared with 12 months earlier; *(g)* total number of drugs taken: psychotropics, non-steroidal anti-inflammatories, and analgesics (coded by NK) as viewed and recorded by interviewers; and *(h)* patients' self report of influenza vaccination status.

### Intervention

General practitioners undertook an educational programme, comprising 5 stages, which began within 2 weeks of patient enrolment and spanned 2-3 months (box). All stages covered areas of social and physical activity and prescribing and vaccination practices for elderly patients. Each general practitioner in the intervention group undertook some or all of the five stages. They were expected to incorporate the intervention into their daily practice and to pass on health promotion advice to patients as appropriate.

**Five stages of educational programme**

**Clinical practice audit with feedback**
Discussion of exercise and social activity
Review of drugs and vaccination status of 50 elderly patients consulting consecutively over a 2 week period were audited (results not shown); research patients were separate from audit patients

**Educational detailing**
15 minute visit to each general practitioner by NK who:
- Outlined key points
- Distributed summary reading material
- Trained staff in prompt card use

**Card based prompt system**
Explanation of prompt card:
- Reception staff to attach yellow prompt card to the medical records of all patients over 65 years of age (reception staff trained by NK)
- Cards to contain records of discussions of physical and social activity, vaccinations, drug lists, and reviews

**Seminar or home based learning**
In May 1996, one didactic 3 hour seminar on health issues in elderly people, with presentations on:
- Exercise from a physiologist
- Social activity from a sociologist
- Prescribing from a geriatrician
- Discussion of audit feedback from NK (a home learning module was distributed to non-attendants)

**Resource directory**
Distribution of regionally based:
- Directories of health services for elderly patients
- Recreational resources for elderly people

### Analysis

We used STATA to perform an intention to treat analysis, maintaining patients in their original groups regardless of completion of trial. For those not completing the trial, a gradual decline in outcomes would be expected. We avoided an overestimation of the intervention effect by choosing the more conservative estimate of "no change" for the outcome of participants who had not completed the trial at follow up. We adjusted for the effect of clustered design with a cross sectional time series iterative generalised least squares regression.[13] For dichotomous outcomes, follow up status was regressed on status at baseline and intervention group status.[14] For continuous measures, we used the change over time as the unit of analysis. The robust option was used to allow for non-normally distributed data where appropriate.[15] We adjusted for factors unevenly distributed between the groups. Gains in physical activity were converted to estimated energy expenditure and compared to the Harvard alumni data[16] to estimate possible reductions in mortality.

## Results

### Physical activity

Baseline characteristics of the sample (table 1) were evenly distributed between the groups with the exception of practice billing style (whether the doctor billed the National Health Scheme directly for payment, termed "bulk billing," or charged the patient). After the trial period, 39 patients (32%) in the intervention group and 21 (19%) in the control group remembered discussing exercise with their general practitioner ($P=0.043$). Overall, 24 entries for discussion of physical activity appeared in the intervention group records. Nine of these patients recalled the discussion and a further 29 recalled a discussion that had not been noted by the doctor.

Intention to treat analysis showed positive effects of the intervention on patient walking, frequency of pleasurable activities, and self rated health (table 2). On average, the amount of weekly walking in the intervention group was 44 minutes more than that in the control group (95% confidence interval 7 to 168; $P<0.032$). Reanalysis of variables for physical activity on the basis of the number of people who increased their walking by discrete amounts (on the basis of quintiles and tertiles) also showed an intervention effect (table 2). Correlation between self reported walking in the past fortnight and yesterday was high at both baseline (Pearsons coefficient 0.66, $P<0.0001$) and after change (0.38, $P<0.0001$). Correlation of walking with functional status was also significant (0.22, $P<0.001$ and 0.31, $P<0.001$ for walking in the previous fortnight *v* walking yesterday respectively).

At follow up, 12 more patients (10%) in the intervention group had increased their walking and 11 more patients (9%) in the intervention group had not decreased their walking compared with the control

group (table 3). The frequency of pleasurable activities and perceived change in self rated health was increased in 20% more of patients in the intervention group than in the control group.

The intervention did not affect functional status, psychological wellbeing, immunisation rate, or total number of drugs used (table 2). Overall, immunisation rate increased from 66% at baseline to 73% at follow up. Use of psychotropic drugs including benzodiazepines, antidepressants and major tranquillisers, non-steroidal anti-inflammatories, and analgesics showed no differential changes between the groups. When sedative hypnotic drugs were analysed separately, seven more people in the intervention group started taking sleeping tablets compared with one in the control group ($P < 0.001$). On further inquiry, four of the seven patients in the intervention group initiating sleeping tablets consumed one quarter to one half a tablet fortnightly or weekly, and in two patients an operation and a death in the family had prompted use of sleeping tablets.

The average level of walking at baseline was 1.25 hours per week. Assuming a value of 4.5 for metabolic equivalent of work for brisk walking[17] and an average body weight of 70 kg, energy expenditure on walking was 393.75 kcal/week, similar to the baseline rate in the Harvard alumni study.[16] The intervention group increased walking by an average of 0.73 hours (44 minutes) per week and expended an estimated additional 300 kcal/week. Paffenberger's second category of 500-999 kcal/week[16] showed a relative risk of 0.78 from all cause mortality when compared with the baseline group. It is said that the Harvard alumni data applies to females,[18] therefore there may be a 22% reduction in mortality associated with the increase in walking observed in our study.

## Discussion

Our rigorously conducted randomised controlled trial of an educational intervention in general practice showed an increase in physical activity, frequency of pleasurable activities, and self rated health of elderly patients, important independent predictors of wellbeing.[16 19 20] The public health implications of a sustained increase in physical activity in elderly people could be considerable, reflected by the estimated reduction in mortality of 22%.

No effect on other outcomes was observed. Influenza vaccination rates increased by almost 10% in both groups, and baseline rates were higher than expected. Drug related outcomes for elderly people have been difficult to impact by educational interventions.[21] Functional status and psychological wellbeing were favourably influenced, but did not reach statistical significance.

### Limitations

Generalisability of our findings is not assured although response rates were similar to other studies. Participating general practitioners had been at their current practice site longer and were less likely to bill their patients in bulk than non-participants. Participating patients were more functionally able than non-participants. Reproducibility of this result awaits further study.

**Table 1** Distribution of characteristics of general practitioners and patients randomised to two groups. Values are numbers (percentages) unless stated otherwise

| Characteristic | Intervention group | Control group |
|---|---|---|
| **General practitioners** | **n=21** | **n=21** |
| Men | 19 (90) | 17 (81) |
| Women | 2 (9) | 4 (19) |
| Age (years): | | |
| ⩾30 | 4 (19) | 4 (19) |
| ⩾40 | 8 (38) | 6 (29) |
| ⩾50 | 5 (24) | 8 (38) |
| ⩾60 | 4 (19.0) | 3 (14.3) |
| Years at clinic (mean SE) | 17.6 (2.82) | 15.3 (1.97) |
| Billing style: | | |
| Bulk bill all patients | 16 (76) | 6 (29) |
| Bulk bill card holders | 4 (19) | 8 (38) |
| Discretionary charging | 1 (5) | 7 (33) |
| No of doctors in practice: | | |
| Solo | 8 (38) | 9 (43) |
| 2-4 | 9 (43) | 10 (48) |
| ⩾5 | 4 (19) | 2 (10) |
| Average patients seen per week: | | |
| <150 | 7 (33) | 12 (57) |
| 151-200 | 7 (33) | 7 (33) |
| >201 | 7 (33) | 2 (10) |
| Average patients aged >65 per week: | | |
| <30 | 7 (33) | 4 (19) |
| 31-45 | 4 (19) | 7 (33) |
| >45 | 10 (48) | 10 (48) |
| **Patients at baseline** | **n=135** | **n=132** |
| Men | 60 (44) | 63 (48) |
| Women | 75 (56) | 69 (52) |
| **Patients in trial sample** | **n=121** | **n=112** |
| Men | 55 (46) | 52 (46) |
| Women | 66 (54) | 60 (54) |
| Age (years; mean SE) | 72.9 (0.57) | 74.2 (0.62) |
| Higher education: | | |
| Yes | 38 (31) | 26 (23) |
| No | 80 (66) | 85 (76) |
| Living arrangements: | | |
| Live alone | 38 (31) | 44 (39) |
| With spouse | 61 (50) | 54 (48) |
| With children, relatives, or friends | 22 (18) | 14 (13) |
| Total activity (minutes; mean SE): | | |
| Previous fortnight | 562 (66) | 656 (87) |
| Walking yesterday | 20 (2) | 23 (3) |
| Functional status* (mean SE) | 60 (1.5) | 62 (1.3) |
| Influenza vaccination: | | |
| Yes | 76 (63) | 78 (70) |
| No | 44 (36) | 34 (30) |
| Drug total (mean SE) | 3.2 (0.25) | 3.9 (0.22) |
| Social interaction (mean SE) | 12.1 (0.42) | 11.7 (0.46) |

*Score for human activities profile from <10 (bedbound to >80 (jogging quarter (about 0.4 km) to half (about 0.8 km) a mile non-stop, or equivalent activity).

Variability in the change in activity and width of confidence intervals around positive results suggests caution in interpretation. The walking variables, however, showed a consistent intervention effect on quintiles and tertiles and were observed with impacts on recall of discussions of exercise (however unreliable), self rated health, and frequency of social activities. Additionally, the question on walking yesterday that was previously validated against a pedometer[10] was highly correlated with other self report walking variables and functional status. This lends some validity to the result.

The estimations of reduction in mortality from this trial may be based on incorrect assumptions. The Harvard alumni group comprised men from a different socioeconomic background than our trial group.

**Table 2** Effect of health promotion intervention on change in outcome variable in randomised trial of 267 elderly general practice patients. Intention to treat analysis used assuming baseline status unchanged in 34 participants lost to follow up

| Outcome variable | Mean effect size (95% CI) | P value |
|---|---|---|
| **Change in** | | |
| Walking (mins/day) | 8.4 (–0.31 to 17.6) | 0.059 |
| Walking (mins/day as a 5 point scale of quintiles) | 0.34 (0.1 to 0.58) | 0.005 |
| Walking (minutes in previous fortnight) | 88 (8 to 168) | 0.032 |
| Walking (minutes in previous fortnight as a 3 point scale of tertiles) | 0.27 (0.03 to 0.51) | 0.025 |
| Total activity (minutes in previous fortnight) | 148 (–146 to 442) | 0.342 |
| Total activity (minutes in previous fortnight as a 5 point scale of quintiles) | 0.23 (–0.17 to 0.62) | 0.303 |
| Score for human activities profile (1-92)* | 2.10 (–0.94 to 5.1) | 0.175 |
| Psychosocial score (1-100)† | 1.28 (–0.54 to 3.1) | 0.168 |
| Frequency of interactions with family and friends (6 point scale) | 0.03 (–0.14 to 0.21) | 0.70 |
| Frequency of pleasurable activities (5 point scale) | 0.30 (0.16 to 0.43) | <0.001 |
| Self rated health (5 point scale) | –0.09 (–0.14 to 0.33 ) | 0.44 |
| Self rated health compared with 12 months ago (5 point scale) | 0.28 (0.02 to 0.52) | 0.029 |
| Total No of drugs taken | –0.08 (–0.36 to 0.53) | 0.71 |
| **Drugs taken** | | |
| Non-steroidal anti-inflammatories | –0.01 (–0.08 to 0.07) | 0.82 |
| Psychotropics | 0.63 (–0.25 to 1.51) | 0.16 |
| Analgesics | 0.03 (–0.05 to 0.12) | 0.45 |
| **Influenza vaccination status** | –0.63 (–1.45 to 0.20) | 0.14 |

For continuous outcomes change in outcome was dependent variable and intervention group status independent. For dichotomous outcomes follow up status was regressed on baseline status and intervention group status. All analyses were controlled for general practitioner billing status and effect of cluster design.
*0 (worst) to 92 (highest function).
†Subscale of sickness impact profile: 0 (no disability related to psychosocial health) to 100 (100% disability related to psychosocial health).

**Table 3** Frequency of change in walking, enjoyable activities, and self rated health reported by 233 elderly general practice patients (includes those successfully followed up). Values are numbers (percentages)

| Variable | Intervention group (n=121) | Control group (n=112) |
|---|---|---|
| **Minutes of walking yesterday*** | | |
| Decreased >20 | 11 (10) | 14 (12) |
| Decreased <20 | 20 (18) | 28 (25) |
| No change | 36 (32) | 40 (35) |
| Increased <20 | 26 (23) | 20 (18) |
| Increased >20 | 18 (16) | 12 (11) |
| Regression coefficient 0.35; robust SE 0.174; P<0.001 | | |
| **Doing something enjoyable†** | | |
| Decreased at follow up | 42 (35) | 58 (52) |
| No change | 45 (37) | 34 (30) |
| Increased | 34 (28) | 20 (18) |
| Regression coefficient 0.63; SE 0.17; P<0.0001 | | |
| **General health compared with 12 months ago‡** | | |
| Improvement in perception | 28 (25) | 16 (15) |
| No change since baseline interview | 62 (52) | 60 (54) |
| Deterioration in perception | 29 (25) | 36 (32) |
| Regression coefficient 0.30; robust SE 0.14; P<0.03 | | |

All analyses adjusted for clustering and billing style.

Similar reductions in mortality, however, have been associated with similar levels of walking in groups more closely resembling a primary care group.[22]

### General practice intervention

To the authors' knowledge this trial is unique in that general practitioners and elderly patients were randomly selected, the general practitioner was randomised to receive an educational programme, and outcomes were evaluated at the patient level. One trial reported favourable changes in biochemical variables but not exercise behaviour[23] and others have not used primary care as the setting.[24 25]

**Key messages**

- Few educational interventions for doctors have shown benefit to the health of patients
- Elderly people were identified in the UK health initiatives as in need of additional attention, and levels of health protective behaviours were low in community surveys
- A multifaceted educational intervention for general practitioners was effective in improving walking behaviour, self rated health status, and the frequency of social contacts in elderly patients
- General practitioners are effective in improving health and health behaviours in their elderly patients

In our study, walking but not other activities increased. Success of activity interventions was more likely if exercise was enjoyable, of moderate intensity, and not related to attending a facility.[26] This programme may have been less expensive or complex than other interventions tested in all ages.[27 28] Strategies to aid dissemination need to improve doctors' participation rate.

### Conclusion

Education and clinical practice audit for general practitioners improved health outcomes in elderly patients. Although modest, the improvements in physical activity had public health significance and resulted from a comparatively inexpensive intervention.

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# Five year follow up of patients at high cardiovascular risk who took part in randomised controlled trial of health promotion

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Health promotion programmes for patients with coronary heart disease are valuable,[1 2] but there is little evidence on their lasting effect.[3] A randomised controlled trial in which patients who received personalised health promotion for two years showed significant benefits in lifestyle and quality of life.[2 4] We investigated whether the differences in lifestyle, quality of life, and risk factors persisted between the two groups five years after enrolment.

## Participants, methods, and results

Patients aged under 75 who had had angina (all grades included) for at least six months and no other concurrent serious illness were identified by 18 general practices in Belfast. Their diagnosis was confirmed at interview, and they were randomly allocated to receive either usual NHS care and personal health promotion from a trained nurse every four months for two years or usual NHS care alone. Sealed envelopes opened at interview showed group allocations. Both groups were reviewed after two years. Full details, including sample size calculations, have been reported previously.[2 4]

Patients who completed the study were invited by letter to a five year follow up interview at their general practice surgery or their home. The nurse, blind to the trial group allocation, administered a questionnaire; measured height, weight, blood pressure, and breath carbon monoxide concentration; and took a blood sample for measurement of serum cholesterol concentration. Patients completed a Nottingham health profile questionnaire.

Distributions of age (mean 63 (SD 7)), sex (59% (408/688) male), and social class (I and II, 11% (72/688); III, 47% (325/688); IV and V, 42% (291/688) were similar in both groups. After five years 250 of the 342 (73%) in the intervention group (45 defaulted, 47 had died) and 237 of the 346 (68%) in the non-intervention group (44 defaulted, 65 had died) were reviewed.

There were no significant differences between the groups in respect of blood pressure, serum cholesterol concentration, body mass index, reported frequency of angina, or restriction of activities at five years (table).

Differences between the groups both in mean reported exercise frequency and change of frequency were significant at two years ($P<0.001$). The difference in change of frequency was significant at five years ($P<0.05$). The non-intervention group reported a progressive decrease in exercise frequency over five years. The intervention group's mean exercise frequency had increased at two years but decreased subsequently.

At two years the intervention group's reported diet was better than and had improved significantly compared with that of the non-intervention group, but there were no significant differences between groups at five years. Differences between groups in mean quality of life scores at various times were not significant. The intervention group's score for social isolation showed improvement at two years but not at five years.

Initially there was no significant difference between groups in the proportion of patients who took drugs (glyceryl trinitrate, nifedipine) to prevent an angina episode; a greater proportion of the intervention group did so at both two and five years (131/250 (52%) *v* 94/237 (40%); $P<0.001$) and five years (119/250 (48%) *v* 91/237 (38%); $P<0.05$). Smoking cessation (self report validated by measurement of breath carbon monoxide concentration) was not significantly different between groups at five years (7/41 (17%) in the intervention group; 13/51 (25%) in the non-intervention group).

We also analysed the data on an intention to treat basis, with baseline or adjusted values being substituted for missing data, but this did not alter the conclusions.

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