

Primary care intervention programme to improve early detection of hearing loss in the elderly

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Abstract

Objective: To improve audiology screening in general practice, using an intervention programme aiming to empower older adults and their general practitioners.

Methods: We conducted a quasi-experimental community study comparing 206 patients and two control groups (the first being 101 people registered with the same general practitioner, and the second 87 people registered with another general practitioner). Outcome measures were: rates of hearing tests in the six months before interview, and screening recommendation by the general practitioner.

Results: Amongst patients, there was a significant increase in numbers undergoing a hearing test, from 19 per cent before the intervention to 49 per cent two years later, while in the two control groups there was little change. Twenty-two per cent of patients and 19 per cent of the first control group reported that their physicians suggested undergoing a hearing test; the second control group subjects (whose general practitioners received no specific educational intervention) showed no change.

Conclusion: The two crucial factors for improving hearing screening uptake in the elderly are general practitioner education and patient empowerment.

Key words: Hearing Loss; Mass Screening; Public Health; Geriatric Health Services

Introduction

Lowering age-dependent disease and disability rates has become a rising health priority in recent years, and as a result there is now increasing willingness to adopt measures to promote prevention and early detection of illnesses.¹

Hearing loss is one of the most common chronic health conditions. One study found that 28 per cent of people aged 53–97 years had mild hearing loss and 24 per cent had moderate to severe hearing loss.² Other studies indicate that hearing loss affects almost 40 per cent of people over the age of 60 years, and 90 per cent of those aged over 80 years.³ Hearing loss is associated with other distressing problems and has important implications for older people's quality of life.⁴ A diminished ability to hear and communicate is frustrating, and is associated with social isolation, depression, functional decline and deterioration in self-care activities.^{5,6} Hearing loss is strongly associated with disability and with difficulty in performing normal activities of daily living, even after adjusting for other chronic diseases.⁷ There is substantial

evidence that hearing loss is under-detected and under-treated.⁸

General practitioners should be able to provide ongoing comprehensive care, as well as promoting the early detection and prevention of illness and functional disability.⁹ However, many general practitioners' performance is lacking in these areas, and they do less than is recommended.¹⁰ Hearing screening is not always a routine part of the examination of older adults. In the USA, a long-term study found that approximately 17.6 per cent of people aged 65–74 years, and only 21.6 per cent of those over 75 years, were screened for hearing loss by their primary care physician.¹¹ Another US study found that family physicians were unaware of patient self-report screening methods and were unlikely to screen for hearing problems unless patients complained.¹² Lack of awareness of the current technologies available and the benefits they offer older adults with hearing loss may also be an issue at the primary care level. Other barriers are work pressure in general practice clinics, lack of awareness of the effectiveness of health promotion in the

elderly, and clinicians' feelings of low self-efficacy regarding their ability to reduce risk factors and change behaviour patterns.^{13,14}

At the same time, there is widespread recognition of the need to involve older adults in their chronic disease care and health behaviour management. When older individuals are pro-actively involved in their own healthcare, this has a significant impact on their state of health.¹⁵

Maccabi Healthcare Services, the second largest health management organisation in Israel, implemented an intervention programme among both independent older adults living in the community and their family physicians. This comprehensive intervention programme related to several screening tests, early detection methods and health behaviours.

The current study aimed to assess changes in the uptake of hearing tests among older adults, and also changes in their family physicians' approach to hearing tests and screening recommendations for their patients.

Methods

Intervention programme

The target population for the programme was all people aged 65 years and over who were independently functioning and able to attend the clinic to see their family physician.¹⁶ Letters of invitation were sent to 1500 people, registered with 18 family physicians, explaining that Maccabi Healthcare Services was about to implement an innovative programme designed to help them improve their health, and providing details about how to register. The study included 206 patients registered for the treatment programme, 101 patients allocated to control group one and 87 allocated to control group two.

The development of the programme and its ongoing operating and monitoring were conducted by a steering committee. The committee planned the programme's implementation protocol, set times for the performance of its activities, and formulated its content. The latter included separate lectures for patients and family physicians, regular patient meetings with the programme co-ordinator, and the preparation of instructional material for both patients and physicians.

During the programme, patients initiated visits to their family physicians for routine consultations, which were not necessarily for acute medical problems. At these visits, the doctor and patient discussed the patient's condition, and the patient was referred for testing as needed. The programme co-ordinator, who was responsible for ongoing implementation and guidance, also referred the patient for relevant activities and requisite tests. Patients also attended lectures on health promotion given by the clinic medical staff, and participated in small discussion groups led by the co-ordinator which aimed to reinforce their sense of personal responsibility for their health.

Participating family physicians attended lectures on healthy ageing and health promotion for the elderly prior to commencement of the programme, and continued with monthly lectures during the programme itself; they also received written instructional material. Participating physicians were also counselled by the programme co-ordinator, who answered any questions which arose during implementation of the programme.

Study design

In order to evaluate the effect of the programme on participating patients and family physicians, we conducted a community, quasi-experimental, 'before and after' study of programme participants (the experimental group) together with two control groups. Two control groups were used to enable separate examination of the effect of the two different study interventions: that involving patients and that involving family physicians.

Study population

The experimental group was made up of patients taking part in the programme. All were registered with the 18 family physicians participating in the programme. Patients were interviewed twice, once before the start of the programme and again approximately two years later. Approximately 275 patients were selected for the first interview, by simple random sampling, from the 400 programme participants; two years later, 206 (75 per cent) of these patients were again interviewed.

In addition, we undertook an interview with 106 independently functioning people aged 65 years and above who were registered with the same 18 participating family physicians but who did not participate in the programme (this was control group one). One hundred and one (95 per cent) of these individuals were also interviewed two years later.

We also interviewed 117 patients registered with non-participating clinics (this was control group two). Eight-seven (75 per cent) of these individuals were also interviewed two years later.

Several of the patients in these three groups died in the two years between interviews.

Study method

Subjects in all three groups were interviewed twice: once before the start of the programme and again two years later. All interviews were conducted by telephone, using an identical closed, structured questionnaire consisting of three parts, as follows.

The first part assessed demographic and functional characteristics; this part was included only in the first interview.

The second part comprised direct questioning regarding hearing tests in the six months before the interview (i.e. 'Have you had a hearing check-up in the past six months?'). If the response was negative, the patient was asked if he or she planned to have such a test in the near future; if the response was

affirmative, the next question asked whether they had arranged an appointment to do so.

The third part of the questionnaire comprised direct questioning on the involvement of the patient's family physician (i.e. 'In the past six months, has your family physician asked you about having your hearing checked?').

The study outcome measures (i.e. dependent variables) were (1) having had hearing tests in the six months before the interview, and (2) involvement of the family physician prior to such testing. The main independent variable was membership of one of the three study groups (i.e. the experimental group, control group one or control group two); demographic characteristics were also classed as independent variables.

The study aims were explained to the experimental group and control group one patients before the programme began, and all were asked to sign an informed consent form in accordance with the health plan's ethical guidelines. The study aims were explained to the patients in control group two before the first telephone interview; these individuals were included in the study only if they agreed to be interviewed.

Statistical analysis

The data were analysed using the Statistical Package for the Social Sciences version 17 software program. The chi-square test was used to check the inter-relationship of the dependent variables, on ordinal scales, with the main independent variable. A multivariate analysis was then performed using logistic regression, in which the dependent variables were defined dichotomously (i.e. as yes or no) and the independent variable was defined as membership of either the treatment or the control group; this analysis also assessed the effect of several demographic characteristics acting as covariates.

Results

The mean patient age at the start of the program was 74 years; 55 per cent of patients were aged 65–74 years

TABLE I PATIENTS' INITIAL DEMOGRAPHIC AND HEALTH CHARACTERISTICS*			
Characteristic	Treatment	Ctrl 1	Ctrl 2
Males (%) [†]	29	31	43
Age (%)			
– 65–69 y	23	25	30
– 70–74 y	29	31	31
– 75–79 y	26	24	21
– 80–85 y	22	20	18
Education [‡] (%)	26	19	16
Has visual impairment (%)	26	19	23
Has hearing impairment (%)	21	15	22
Can walk 400 m unaided (%)	95	94	95
Has had a fall in past 3 mth (%)	16	18	14

*Prior to study commencement. [†] $p < 0.05$, treatment group vs control group 2. [‡]Less than 8 years of education. Ctrl = control group; y = years; mth = months

and the remainder were aged 75 years or more. One-third of patients were men and two-thirds women. No differences were found among the three groups with regard to demographic and functional characteristics, except for gender and education (Table I).

Over the course of the study, the treatment group (i.e. programme participants) showed a statistically significant increase in the proportion undergoing a hearing

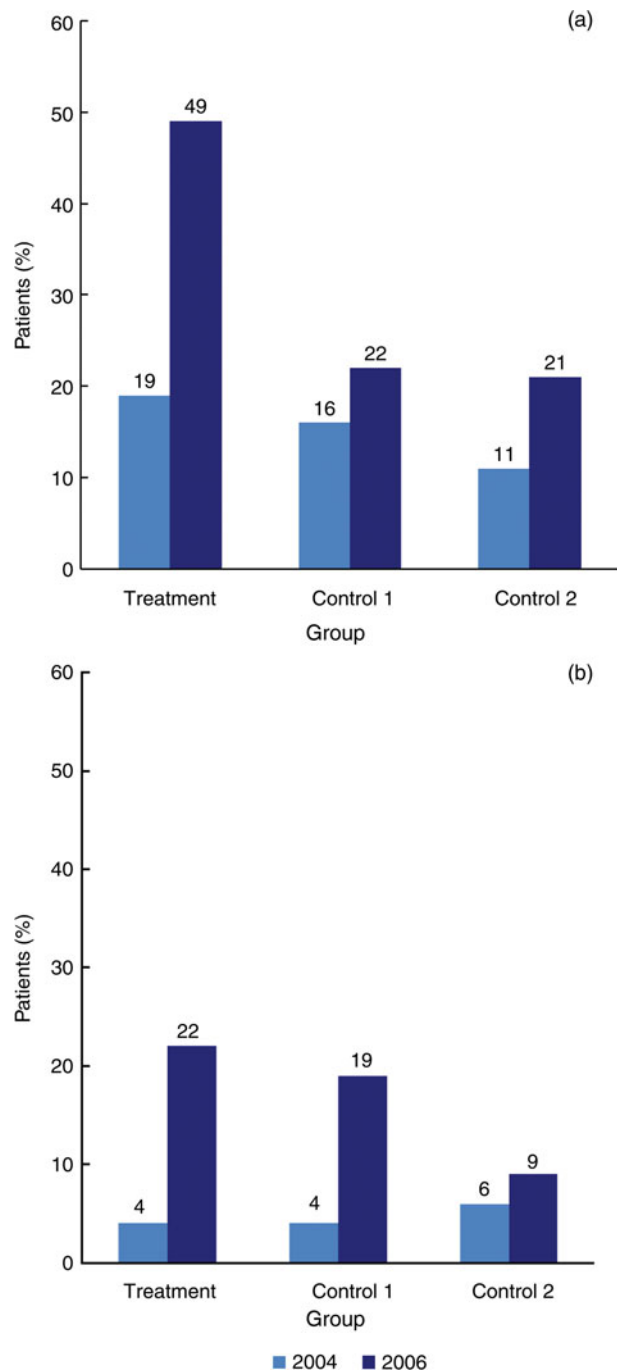


FIG. 1

(a) Subjects giving a positive response to the question 'Have you had a hearing check-up in the past six months?', before programme commencement (2004) and at programme completion (2006). (b) Subjects giving a positive response to the question 'In the past six months, has your family physician asked you about having your hearing checked?', at the same time points.

test in the six months prior to interview, from 19 per cent before programme commencement to 49 per cent two years later; in comparison, the two control groups showed little change (Figure 1a).

Multivariate logistic regression analysis indicated that, upon study completion, patients belonging to the treatment group, rather than to one of the control groups, had a 2.6 times greater probability of undergoing a hearing test in the past six months, controlling for age, education and undergoing the test two years previously (Table II).

In the second interview, 30 per cent of treatment group patients reported that they planned to undergo a hearing test in the near future, but only 8 per cent had made an appointment. In comparison, only 16 and 21 per cent of control group one and two patients, respectively, reported intending to undergo the test, and only a few had actually booked an appointment (Table III).

There was a statistically significant increase in the percentage of treatment group patients who reported that their family physicians had spoken to them about hearing tests and recommended undergoing a test, from 4 per cent before the programme to 22 per cent two years later. In control group one, there was also a statistically significant increase in the percentage reporting that their family physicians had discussed this matter with them, from 4 per cent before the programme to 19 per cent two years later. However, in control group two there was very little change (Figure 1b).

Multivariate logistic regression analysis indicated that, on completion of the programme, the probability of a patient's family physician recommending hearing tests was 2.9 times greater in the treatment group than in the control groups, after controlling for the following variables: age, education and the physician recommending hearing tests two or more years previously.

More importantly, multivariate logistic regression analysis also indicated that, on completion of the programme, the probability of the patient's family physician recommending hearing tests was 2.6 times greater in a group comprising the treatment group and control group one combined, compared with control

group two, after controlling for the same covariates (Table IV). Higher education (i.e. more than nine years of education versus less than eight years) was also significantly and independently related to the probability of the patient's physician recommending hearing tests.

Discussion

Main findings

This study examined our intervention programme's contribution to increasing hearing test prevalence among older adults, and to improving family physicians' performance in this regard.

A significant increase in screening for hearing loss was only seen among older adults who both (1) attended lectures or discussion groups and (2) were encouraged to undertake screening by their physicians.

We found that family physician education led to an improvement in their hearing loss counselling given to older adult patients, both those who participated in the programme and those who did not.

Despite this change in physician behaviour, non-participant older adult patients of participating physicians (i.e. control group one, who were not invited to lectures or discussion groups) showed no change in their behaviour as regards hearing loss screening.

Strengths and limitations

The study design made it possible to examine both (1) family physicians' behaviour irrespective of their older adult patients' knowledge of hearing screening, and (2) older adult patients' behaviour irrespective of their physician's knowledge of the same.

Some limitations of the current study should be kept in mind.

The older adult participants' reports of their physicians' behaviour may have been misleading, and may have been subject to recall memory bias. However, all our older adult participants were functioning independently, and therefore we would expect that they correctly remembered their meetings with their family physicians a few months previously.

In addition, we did not interview our participating physicians; doing so may have contributed to our understanding.

TABLE II
HEARING TEST IN LAST 6 MTH: ANALYSIS BY VARIABLE*

Background variable	B	OR	95% CI
Treatment vs ctrl 1 + ctrl 2	0.947 [†]	2.579	1.197–5.556
Treatment + ctrl 1 vs ctrl 2	0.530	1.700	0.847–3.402
HT in prev 6 mth vs not	1.182 [†]	3.260	1.180–9.001
Age: 65–74 y vs ≥75 y	0.344	1.411	0.835–3.385
Education: ≥9 y vs ≤8 y	0.201	1.222	0.670–2.229

*Logistic regression. [†] $p < 0.05$. Mth = months; B = ??; OR = odds ratio; CI = confidence interval; treatment = treatment group; ctrl = control group; HT = hearing test; prev = previous; y = years

TABLE III
PATIENTS' INTENTIONS RE HEARING TESTING

Parameter	Treatment	Ctrl 1	Ctrl 2
No HT in prev 6 mth*	51	78	79
HT planned*	30	16	19
HT appt made [†]	7	8	0

Data represent subject percentages. * $p < 0.05$, treatment group vs both control groups. [†]Significance testing not possible due to low numbers. Treatment = treatment group; ctrl = control group; HT = hearing test; prev 6 mth = previous 6 months; appt = appointment

TABLE IV
PHYSICIAN HEARING TEST RECOMMENDATION IN
LAST 6 MTH: ANALYSIS BY VARIABLE*

Background variable	B	OR	95% CI
Treatment vs ctrl 1 + ctrl 2	1.087 [†]	2.966	1.639–5.688
Treatment + ctrl 1 vs ctrl 2	0.966 [†]	2.627	1.472–4.688
HT recom 2 y ago vs none	0.682 [‡]	1.978	1.123–3.483
Age: 65–74 y vs ≥75 y	0.462	1.531	0.998–2.371
Education: ≥9 y vs ≤8 y	0.572 [‡]	1.771	1.068–2.936

*Logistic regression. [†] $p < 0.01$; [‡] $p < 0.05$. Mth = months; B = The intercept; OR = odds ratio; CI = confidence interval; treatment = treatment group; ctrl = control group; HT recom = hearing test recommendation; y = years

A further limitation relates to our study population. We invited all the older adult patients enrolled with our 18 participating physicians to take part in the programme, but only one-quarter agreed to do so. For practical reasons, we could not randomly allocate patients into the treatment and control groups. This may have caused bias, since the treatment group consisted of those who had decided to participate in the programme, while control group one consisted of patients of the same physicians who had decided not to participate despite our invitation. Therefore, the ability to generalise our findings should be further evaluated.

In addition, it was impossible to avoid information transfer between older adult patients during the programme. This problem is inherent in community programme evaluation. Although it may make the results susceptible to mutual influence bias, it is impossible to isolate intervention group participants within their own community.

Assessment of changes in patients' quality of life was beyond the scope of this study.

Comparison with existing literature

Many older adults do not act on their physicians' recommendations. The reasons are multifactorial, and include the negative attitudes of some older adults towards hearing aids, lack of motivation for seeking help, inability to identify rehabilitation goals, and problems with device management. Patients' reasons may be related to the fact that many do not believe their hearing problem can be improved.¹⁷ Success in hearing aid fitting involves the same dynamics affecting other assistive technologies, and is dependent on a match between the characteristics of the prospective user, the technology itself and its intended use.^{18,19}

In the context of audiology screening rehabilitation, the health belief model holds that people (1) must feel handicapped by their condition, (2) must believe that there will be psychosocial and communicative benefits associated with audiological evaluation and hearing aid purchase, and (3) must feel competent in hearing aid use.²⁰

According to Prochaska and colleagues' model, individuals go through a sequence of stages (i.e. pre-

contemplation, contemplation, preparation, action and maintenance) when changing their health-related behaviours.²¹ They must move through all these stages sequentially. In the pre-contemplation stage, the individual cannot see the problem and thus does not intend to change their behaviour. This is the 'denial' stage, and a large number of older adults with mild hearing loss are likely to fit into this category. They can benefit from information provided by the medical staff, which may move them on to the next stage of change: contemplation. At that stage, the individual is open to counselling about options. In our study, a higher percentage of older adults in the treatment group reported that they planned to undergo a hearing test in the near future, compared with the two control groups. The Prochaska model may partially explain why our older adults were more likely to undergo hearing tests if they were also empowered with information, in addition to their family physician's referral.

Conclusions

An intervention programme that includes screening for hearing loss increases uptake. In the current study, separate empowerment of both older adults and their family physicians were crucial factors in determining whether those older adults underwent screening.

- **General practitioners often fail to screen older patients for hearing problems**
- **Hearing loss screening can be improved by intervention programmes**
- **Patient empowerment and physician education are vital to improve screening uptake**

However, we should bear in mind that, even after completion of the programme, only half of the empowered older adults underwent hearing tests, and only a third of the empowered physicians recommended such testing to their patients. These results are higher than reported in other studies but are still too low. Therefore, new approaches to improve hearing loss screening in older adults should be examined.

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