A randomized controlled trial of geriatric screening and surveillance in general practice

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SUMMARY. A randomized controlled trial of geriatric screening and surveillance was undertaken on a practice population of 295 patients aged 70 years or more over a two-year period. In the screened group (145 patients) many social problems were found and a total of 380 medical conditions were reported during the study period, 144 (38 per cent) of which were previously undetected. Conditions found most frequently involved the circulatory, musculoskeletal and nervous systems; 67 per cent of the conditions found were manageable, half being improved and the remainder resolved completely.

The screening programme was found to increase the use of social and health services but it did also decrease the expected duration of stay in hospital.

Independent assessment of patients in the study and control groups at the end of the two-year period showed that the screening programme had made no significant impact on the prevalence of socio-economic, functional, and medical disorders affecting health.

We formed the firm impression that the study patients were made more comfortable (by control of pain) and less disabled, although there was no unequivocal objective evidence of this. They were, however, kept independent for longer.

The findings are discussed and a model of geriatric care is suggested combining conventional management on demand with comprehensive screening to identify the high-risk patients on whom care might need to be focussed.

Introduction

NUMEROUS geriatric screening programmes have been reported by doctors working in hospital, public health services, and family practice.[1-25] All but three[14, 15, 25] have reported many unrecognized problems affecting health, but little effort has been made to assess how easily managed these problems are and the effect of such management on current and future health status. Lowther[16] found on follow-up 18 to 30 months after screening that 23 per cent of patients were "helped by early diagnosis" and Williams[26] reported a comparable benefit in 27 per cent. It was felt that it was time to evaluate the benefits of identifying and managing these problems and to assess the effects of screening on the use of other health and social services by means of a randomized controlled trial as already recommended.[27,28]

Aims

The aims of the study were as follows:

1. To screen a controlled sample of patients in the practice aged 70 years or more for socio-economic, functional, and medical problems.
2. To estimate to what extent medical disorders were:
a) previously recognized
b) capable of modification.
3. To study the effects of such a programme on the use of other health and social services.
4. To measure the benefits to the patient of identifying and managing these problems.

Method

A list was obtained of all the patients (360) aged 70 years or more from the practice register held in the Oxford

Community Health Project, a computerized information service designed to aid the development of primary medical care.[29] Twenty-one patients in Part 3 accommodation were excluded and the remainder (339) were randomly allocated to study and control groups. Additional exclusions from this residual list were made for those patients who had died or moved away but whose names had not yet been removed from the practice list. Also, three patients declined to take part. This left a final study population of 295 patients. The study group of 145 patients were then intensively screened while the control group of 150 patients continued with conventional care on demand by the patient. Regular review of disease and disability already known was, of course, maintained (Figure 1).

The total study population consisted of 295 of the 360 patients in the practice aged 70 years or more (Table 1), 4·3 per cent of the practice, half the figure for England and Wales at that time (8·4 per cent).[30] The age/sex analysis did not differ substantially from the contemporary figures for England and Wales.

Patients in the study group were first sent a letter detailing the project and seeking their co-operation. They were also advised that the nurse would be calling in two weeks to discuss the programme, so that they had an opportunity to refuse to take part in the project. At this visit the nurse questioned the patient about socio-economic and functional problems. Two weeks later the patient was sent a second letter enclosing a medical questionnaire and the offer of a physical examination.

Figure 1. *Patients involved in the study.*

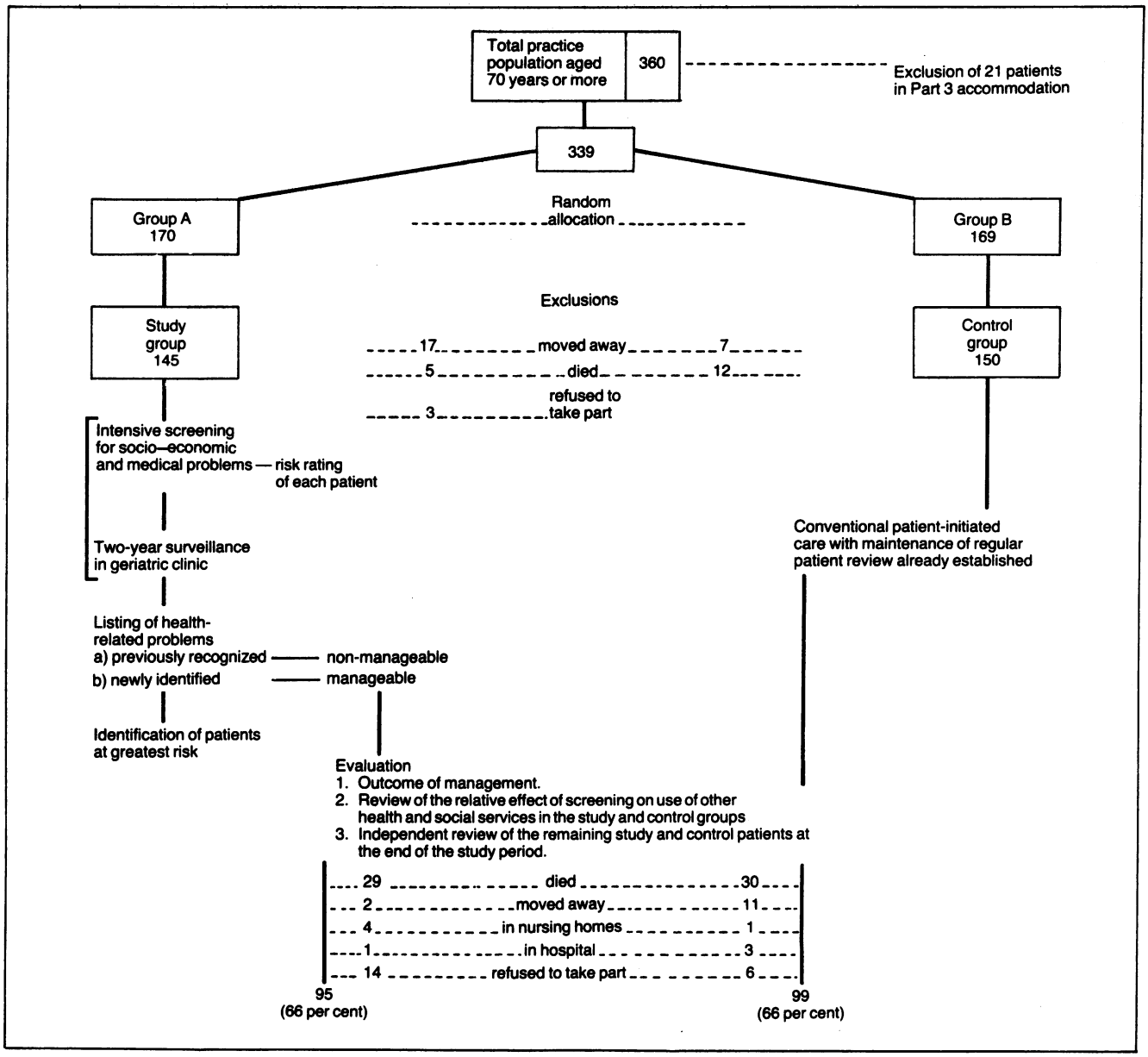

Table 1. Age/sex distribution of study population.

Age	Study group Female	Study group Male	Control group Female	Control group Male	Total
70 to 74	35	29	36	31	131
75 to 79	20	22	17	20	79
80 plus	12	27	15	31	85
	67	78	68	82	295

Table 2. Patients' vulnerability to ill health and stress.

Risk rating	Medical problems and disabilities	Socio-economic problems
1	Nil	Nil
2	Minor and/or	Minor
3	Major and	Nil or minor
4	Nil or minor and	Major
5	Major and	Major
6	Dependent on others for the activities of daily living	

The latter was done at the surgery or (if required) at the patient's home, followed by any investigations thought necessary as a result of the physical findings. Only haemoglobin and serum folate were assayed routinely.

The health problems found were listed and the patients' vulnerability to ill health and stress was estimated, and rated as shown in Table 2. Thereafter the study patients were kept under regular surveillance in a geriatric clinic run by the authors, practice nurses, and health visitors for a period of two years. This phase of initial screening and subsequent follow-up was known as the study period.

The factors under review during the study period were day-to-day and illness support (provided by relatives, friends, neighbours, voluntary and professional workers), suitability of accommodation, amount of social contact, loneliness, and financial status. Functional disability was also assessed, while medical disorders were listed only if they were thought to have a material bearing on health—for example, asymptomatic varicose veins (unless severe) were not included.

Evaluation

Evaluation of the programme took place in two ways:

1. During the study period

a) By listing the health problems found in the study group, identifying those previously unrecognized, and reviewing the outcome of their management. Modification achieved was rated as follows:

i) resolved—if normal function had been completely restored even if control rather than cure was the objective (as in diabetes).

ii) ameliorated—marked improvement in the patient's health or prognosis without normal function having been completely restored.

iii) unchanged.

b) By comparing the effects of the programme on the use of other health and social services resources during the two years by both study and control groups.

2. After the end of the study period

By independent review of the prevalence of health problems in the study and control groups. This work was undertaken by a lecturer from the Department of the Regius Professor of Medicine at the University of Oxford and two final-year medical students. They were not told in advance whether patients were in the study or control group but inevitably this emerged subsequently in some cases in conversation with the patients. They repeated the screening by questionnaire and physical examination as before for socio-economic and medical problems, but in addition estimated the accident risk to patients. The extent of subsequent investigation was influenced by these clinical findings. Comparison of the results in the two groups sought to give a measure of the effectiveness of the programme in improving the health status of the study group patients.

Results

1. Results in the study group (145 patients) during the study period.

Socio-economic problems. The profile of these problems followed the general pattern of so many programmes of this type focussing on the usual problems of isolation, immobility, dependency, and loss of identity. The findings are discussed below.

Medical disorders. On screening and surveillance 380 medical conditions were found, 144 of which were previously unrecognized—an average of one per patient (Table 3). Of these, 60 (42 per cent) were found on initial screening and the same number by routine on-demand care, while the remaining 24 (16 per cent) were identified during regular review in the geriatric clinic.

Unrecognized problems were found most often in the following systems:

a) Circulatory system—22 per cent, mainly ischaemic heart disease and heart failure.

b) Musculoskeletal system—18 per cent, mainly osteoarthrosis and rheumatoid arthritis.

c) Nervous system and sense organs—13 per cent, mainly cerebrovascular insufficiency and grossly impaired sight and hearing.

Conventional care initiated by the patient had not identified half of the circulatory conditions, 88 per cent of the musculoskeletal disorders, and 16 per cent of problems of the nervous system and sense organs (including one case of dementia).

Although all the conditions above were thought to have a bearing on health, clearly the importance varied and in a few cases the findings were vital to health and occasionally life expectation, for example, diabetes and several cases of carcinoma (Table 2).

Two other patients had major conditions—carcinoma of the breast and a large undiagnosed abdominal tumour—in which intervention was not thought appropriate, owing to advanced age and the presence of other disease.

Table 3. Classification of medical disorders first identified in the study group during the study period (RCGP Code).

System	Male		Female		Total (percentages in brackets)
Endocrine, nutritional, and metabolic systems	Gout	2	Diabetes	2	
			Obesity	1	
			Myxoedema	1	
			Hyperuricaemia	1	7
Blood and blood-forming organs	Hypochromic anaemia	1	Hypochromic anaemia	5	
	Low serum folate	1	Hypokalaemia	1	8
Mental disorders	Alcoholism	4			
	Depression	1			5
Nervous system and sense organs	Deafness	1		1	
	Grossly impaired vision	2		5	
	Cerebrovascular accident	3		2	
	Glaucoma	2	Dementia	1	
			Epilepsy	1	
			Severe insomnia	1	19 *(13)*
Circulatory system	Congestive heart failure	4		4	
	Ischaemic heart disease	6		5	
	Fibrillation	1	Aortic stenosis	1	
	Hypertension	2	Haemorrhoids	4	
	Thrombophelebitis	1	Severe varicose veins	1	
	Deep vein thrombosis	1			
	Nutritional ulcer	1			31 *(22)*
Respiratory system	Chronic bronchitis	1		1	
	Bronchopneumonia	1		3	
	Emphysema	2	Psittacosis	1	9
Digestive system	Multiple carious teeth	1	Hiatus hernia	1	
	Severe pyorrhoea	1	Duodenal ulcer	1	
	Inguinal hernia	3			
	Severe chronic constipation	1			8
Skin disease	Corns	1		4	
	Multiple seborrhoeic warts	1			
	Rodent ulcer	1			7
Genito-urinary system	Acute retention	2	Incontinence	1	
	Urinary infection	2		2	
	Renal calculus	1			
	Benign enlarged prostate	1			9
Accidental injury	Fracture				
	—clavicle	1	—malleolus	1	
			—radius	2	
			—femur	1	
			—fibula	1	6
Musculoskeletal system	Dupuytren's contracture	1	Hallux valgus	3	
	Osteo-arthrosis				
	—shoulders	2	—cervical spine	3	
	—hands	2		1	
	—knees	1		2	
	Rheumatoid arthritis		—generalized	4	
			—cervical spine	1	
			—hands	3	
	Bone sclerosis	1	Hammer toe	1	
	Shuffling gait	1			26 *(18)*
Neoplasms	Carcinoma			1	
	—prostate	2	—breast	1	
	—pancreas	2	—vulva	1	
	Secondaries from carcinoma (site unknown)	1	Undiagnosed epigastric mass	1	
			Undiagnosed ovarian mass	1	9
Totals		66		78	144

Table 4. Study group: outcome of management of newly identified problems.

	Resolved	(Percentage)	Ameliorated	(Percentage)	Unchanged	(Percentage)	Total	(Percentage)
Male	25	*(36.8)*	21	*(35.3)*	19	*(27.9)*	65	*(100)*
Female	25	*(28.9)*	30	*(39.5)*	24	*(31.6)*	79	*(100)*
Total	50	*(32.6)*	51	*(37.5)*	43	*(29.9)*	144	*(100)*

Table 5. Effect of geriatric screening on use of other health and social services, May 1972 to May 1974 (the study period).

	Study group — 145 patients		Control group — 150 patients	
	Numbers	Rate per 100 patients	Numbers	Rate per 100 patients
Outpatient referrals	56	37	33	21
Patients involved	45	30	27	17
Hospital admissions				
Routine	37	25	29	19
To allow relative a holiday	6	4	0	0
Total	43	29	29	19
Patients involved	34	22	26	17
Total bed days	418	288	611	407
Referral to other agencies				
Health visitor	6		0	
Physiotherapist	7		2	
Chiropodist	8		0	
Social services Support	8		4	
Admissions to Part 3 accommodation	0		2	
Total	29		8	

Adaptation. The above profile of social, functional, and medical problems found after intensive review of the study did not always reflect accurately the health status of individual patients unless account was taken of the patients' adaptability. In fact, 88 per cent of patients were held to be well adapted, as they had come to terms with their problems to the point where the effect on the quality of life was minimal.

2. Outcome of management of newly identified problems in the study group

One third of the 144 medical problems were resolved and a similar number were ameliorated, while the remaining third were unchanged (Table 4).

3. Use of health and social services in the two groups during the study period

There were 56 outpatient referrals, involving 45 (31 per cent) patients, at a rate of 37 referrals per 100 patients in the study group. The control group, however, had 33 outpatient referrals, involving 27 (18 per cent) patients at a rate of 21 referrals per 100 patients (Table 5).

The hospital admission rate in screened patients was also higher. Thirty-four (23 per cent) patients accounted for 43 admissions at a rate of 29 admissions per 100 patients in this group. In the control group 26 (17 per cent) patients were responsible for 29 admissions at a rate of 19 admissions per 100 patients. Neither difference in the proportion of patients referred to hospital or admitted to hospital was statistically significant.

In contrast to the above findings, the time spent in hospital by patients from the study group was less than from the control group—418 bed days, a rate of 288 per 100 patients compared with 611 bed days, a rate of 407 per 100 patients in the other group. Eighty per cent of study group patients were discharged in two weeks and 96 per cent in three weeks. The comparable figures for the control group were 42 per cent and 73 per cent. The greater proportion of patients discharged within two weeks in the study group and the greater proportion remaining in hospital more than three weeks in the control group were found to be significant ($\chi^2 = 12 \cdot 11$, d.f. $= 2$, $p < 0 \cdot 01$). The median length of hospital stay for study patients was 12 days compared with 16 days for control group patients.

The rate of referral to other agencies was much higher in the screened group, 29 (20 per cent) patients being referred to the health visitor and other workers compared with eight (five per cent) patients in the control group. The difference was found to be statistically significant ($\chi^2 = 13.15$, d.f. $= 1$, $p < 0.01$).

4. Independent assessment of prevalence of health problems in the two groups at the end of the study period

When account was taken of the patients who had either died or moved away by the end of the study period, there were found to be 109 survivors in the study group and 105 in the control group. However, 20 patients refused to be screened, thus reducing the number of patients remaining for review to 95 in the study group and 99 in the control group, in each case 66 per cent of the original study and control groups.

a) Socio-economic and functional problems. There was no evidence to suggest that the programme had reduced the prevalence of socio-economic problems or physical disabilities appreciably, although in general fewer of them were found in the study group. The differences were not statistically significant and indeed were generally marginal (Tables 6 and 7).

Adaptation to the problems of old age was also virtually identical in the two groups.

b) Medical disorders. Many more patients in the control group were free from medical disorders or suffered from one condition only and this difference was found to be significant ($\chi^2 = 7{\cdot}74$, d.f. = 1, $p < 0{\cdot}01$). Conversely, the number of patients with two disorders was greater in the study group and this pattern was repeated for those patients with three or more conditions although the difference was significant in none of these groups (Table 8).

Also, a greater proportion of the problems in the control group had gone unrecognized than in the study group and this difference was found to be highly significant ($\chi^2 = 19{\cdot}79$, d.f. = 1, $p < 0{\cdot}001$). This applied to both sexes and the general pattern suggested that the more conditions the patient had, the greater the likelihood of at least one going unrecognized.

Classification of the conditions found in both groups showed that the difference between the groups lay in previously unrecognized problems in the musculoskeletal system ($\chi^2 = 5{\cdot}38$, d.f. = 1, $p < 0{\cdot}025$) and the nervous system and sense organs ($\chi^2 = 8{\cdot}40$, d.f. = 1, $p < 0{\cdot}005$).

Risk rating

The findings in the two groups differed only marginally. There was no evidence to suggest that identification of problems in the study group materially affected their health status as reflected by their risk rating.

Discussion

Social findings in the study group followed the same general pattern as those described in the other screening programmes mentioned above. Thirty people (21 per cent) lived alone, 25 of them being women. Illness support had to be mobilized in 56 (39 per cent) patients. It was easily available for up to three or four days but family commitments created problems after that. There was no evidence that families were less supportive in general than in the past, thus confirming other reports.[7,12,31,32] Patients were largely self-sufficient, only 49 (34 per cent) needing support with shopping and 29 (20 per cent) with cooking. Loneliness and financial stress were periodic problems reported respectively in 36 (25 per cent) and 43 (30 per cent) patients. Yet some of these were not even drawing their entitlements owing to ignorance of their rights or scorn for 'welfare handouts'. Finally, 39 (27 per cent) felt that society had little or no interest in them.

The rate of medical disorders in the study group was 2·6 per patient, but only one of these conditions on average was previously unrecognized, a rate of 39 per cent compared with 50 per cent reported by Williamson and colleagues.[4] Following the trend of previous reports[21,23], newly identified disorders of the circulatory, musculoskeletal, and nervous systems, and sense organs predominated, and manageable malignant disease reached three per cent. More than two thirds of these medical disorders proved amenable to treatment.

Independent assessment showed only a marginal difference between the social problems found in the two

Table 6. Domestic care rating.

Category	Study group (99 patients) Male	Female	Total	Control group (95 patients) Male	Female	Total	Percentage
1. Fully independent	40	43	83	29	40	69	*73*
2. Minor disability	0	3	3	5	5	10	*10*
3. Partial independence	3	9	12	8	8	16	*17*
4. Dependence on others for support	0	1	1	0	0	0	*0*
Totals	43	56	99	42	53	95	*100*

Table 7. Risk index.

Category	Socio-economic problems	Disabilities	Study group (99 patients) Male	Female	Total	Control group (95 patients) Male	Female	Total	Percentage
1.	Nil	Nil	24	22	46	24	23	47	*50*
2.	Minor and/or	Minor	15	26	41	15	23	38	*40*
3.	Major	Nil or minor	1	2	3	0	0	0	*0*
4.	Nil or minor	Major	2	3	5	2	5	7	*7*
5.	Major	Major	0	2	2	0	2	2	*2*
6.	Totally dependent		0	1	1	0	0	0	*0*
			42	56	98	41	53	94	99

One male study group patient and one male control group patient were uncoded.

groups although 30 per cent more control group patients were dependent on others for help. There were however 15 per cent more medical conditions found in the study group than in the control group. The rate of unrecognized problems in the latter group was significantly greater than in the former, and these previously unrecognized conditions were most often found in the nervous and locomotor systems, thus confirming the reports of a review of geriatric care in general practice in 1973.[33] The finding that more study group patients had no problems or one problem was unexpected. This was thought to stem from the fact that the authors recorded more conditions as affecting health than the independent examiners, who omitted some of these presumably as they were relatively minor and were thought, by them, unlikely to affect health status. Also study group patients, having been made more health conscious, were more likely to draw the attention of the independent workers to medical disorders, especially those previously diagnosed.

Patients were well adapted in most cases to their problems so that the quality of life of these old people was relatively unimpaired. Only 10 per cent were poorly adjusted to their problems compared with almost 40 per cent reported by Leeming and Ross[7] in a northern industrial area.

The use of health and social services was appreciably greater by the study group patients, since previously unrecognized conditions, often needing management, were being identified. The rates of referral of study group patients to outpatient departments and of admission to hospital were respectively 76 per cent and 53 per cent higher than in the control group. These figures do not support the contention that screening is likely to keep the burden on outpatient departments to a minimum.[34] The mean duration of stay in hospital per patient was, by contrast, 43 per cent higher in the control group. Also, older patients are admitted to hospital for a variety of reasons such as investigation of illness, management of disease, frailness of supporting relative, and holiday relief. Analysis of the reasons for admission in the two groups showed, however, that they were broadly comparable except that the study group included six holiday admissions which were therefore listed separately.

The use of physiotherapy, nursing, and chiropody services (Table 5) was significantly increased.

The results of this study suggest that screening and surveillance made little impact on health status or vulnerability to stress (represented by risk rating) as might have been expected since management of old people is primarily concerned with care rather than cure. However, we feel that we did not pay enough attention to educating patients about entitlements, benefits, and services available, although there are no figures on the uptake of benefits by study group patients. There were also deficiencies of some services, for example, lack of domiciliary physiotherapy. It must also be acknowledged that intensive review of these patients and management of their problems increase their expectations and, as the results confirmed, lead to an increased use of services available. Conversely, there was some evidence to suggest that they were kept independent for longer and when admitted to hospital, their duration of stay was significantly shorter than control group patients. Painful and disabling conditions were identified and treated with a presumptive improvement in the quality of life. Also the geriatric clinic provides a setting in which health education and advice on services and benefits available can be more easily given. Finally, we formed the firm impression during the study, although there is no objective evidence to support this view, that patient morale and self-esteem were improved simply as a result of receiving special attention which several of them contrasted with the indifference society normally shows them.

Generalizations drawn from these findings must be made with great care as the practice involved is atypical in a number of respects. The mean list size was 2,107 in 1972 compared with the average for England and Wales at that time of 2,421.[35] Also the practice has just over half the expected number of patients aged 70 years or more and enjoys exceptional facilities—a modern well equipped health centre with generous nursing and administrative support plus close liaison with social services. Doctors enjoying such advantages certainly ought to be more familiar with the health problems of their patients than in less privileged practices.

Also randomization resulted in the study group being younger, containing a smaller proportion of women and fewer people dependent on others. Statistical opinion held, however, that this did not alter the significance of the results.

Table 8. Medical disorders found on independent assessment.

	Study group					Control group				
Systems	Male	Female	Total	Previously unknown	Percentage	Male	Female	Total	Previously unknown	Percentage
Musculoskeletal system	30	46	76	5	*6.3*	14	24	38	9	*23.7*
Nervous system and sense organs	23	29	52	1	*1.9*	13	20	33	8	*24.2*
All other systems	76	125	201	16	*8.0*	97	84	181	19	*10.5*

Conclusion

This study confirms reports of similar programmes, that demand-based care of older people is inadequate and must be supplemented by more intensive review. Blanket population screening has been largely discredited[36, 37] because it is time consuming, has a high cost-benefit ratio and yields health problems many of which cannot be modified. Medical care of the elderly requires a basic screening programme to identify social, economic, functional, and medical problems likely to affect their health and quality of life. High-risk patients needing special care can be identified. Subsequent surveillance in a geriatric clinic should be maintained at intervals conditioned by the nature of the medical disorders and the patients' risk rating.

All members of the primary health care team and social workers should be providing carefully planned and integrated care.[38, 39] Each worker must be clear about his defined role. The extra work for all those involved should be partly offset by some reduction in visiting time. Clinic surveillance must, however, supplement rather than replace home visits which yield information that cannot be elicited elsewhere. The real pathology of old age is pain, disablement, frustration, boredom, lack of purpose, and loss of identity and self-respect, all of which lead to dissatisfaction with the quality of life. Optimum geriatric care implies anticipation and management of social and medical conditions likely to precipitate these problems and encouragement of health maintenance, care being taken to ensure that support is not intrusive.

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