

Comprehensive Health Screening of Well Elderly Adults: An Analysis of a Community Program¹

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We examined the yield of a health screening program in a free-standing community senior citizen center and identified factors associated with patient compliance with referral recommendations. Of elderly individuals screened, 94% had some positive finding requiring advice or intervention, and 54% were referred to a physician for further evaluation. The most prevalent findings were skin disorders (52%), genitourinary disorders (44%), and eye-ear-nose-throat disorders (33%). Of individuals referred to a physician, 70% complied with the referral. Of those who complied, 38% reported receiving treatment for the referred condition — 15% of the entire group of clients screened. Factors positively associated with compliance with physician referral included the specific type of referred problem, the perceived seriousness of the problem, and absence of financial barriers to medical care. Though controlled trial data are lacking, this and other published studies indicate that many remediable problems can be identified among apparently healthy elderly individuals in community geriatric screening programs.

Key Words: Geriatrics, Health promotion, Preventive medicine

PREVENTIVE health care for elderly adults is an area of active concern and debate in geriatric medicine. Several authorities decry the lack of attention given to this component of health care and advocate that greater emphasis be given to activities that maintain health and prevent disability among elderly people (Anderson, 1978; Kennie, 1984; Stults, 1984; Williamson, 1967). There is little conclusive evidence, however, that routine preventive activities among healthy elderly adults, at least along traditional approaches, has significant impact on the overall health of the individual.

Among the most widely used and advocated preventive activity is comprehensive screening or case-finding programs for elderly people, who often have either unrecognized remediable conditions (the focus of secondary prevention) or established disorders deserving effort to avoid disability or handicap (the focus of tertiary prevention). Sev-

eral community screening studies have documented a high prevalence of previously undetected, remediable medical conditions among community living older adults (Barber & Wallis, 1976; Currie et al., 1981; Currie et al., 1974; Hale et al., 1981; Thomas, 1968; Williams et al., 1972; Williamson et al., 1964). Nevertheless, few studies have attempted to measure how individuals ultimately benefit from such screening programs. For community screening programs to produce favorable outcomes, mechanisms for follow-up evaluation and treatment must exist, and individuals must comply with referrals for follow-up. To date, the published outcome studies on geriatric screening programs have originated almost entirely from the United Kingdom. Only one of these used a randomized study design (Tulloch & Moore, 1979), and none described patient compliance patterns.

This paper addresses the question of compliance among a sample of community-living elderly people who attend a health screening program. We looked at how often clients complied with referrals, what was done during the referred visits, and what factors might predict those individuals most likely to comply with a referral recommendation. We also present data from follow-up of clients who received a screening examination to document the yield of the examinations and put the data into broader

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context through a review of the published literature on geriatric screening programs.

The Santa Monica Senior Health and Peer Counseling Center is a nonprofit community center that provides a wide range of free health screening, counseling, and educational services for community residents 55 years and older. It was established in 1976 as a result of the initiative of four senior citizens who were concerned about the lack of affordable preventive health care services for community elderly people. Although the community's health care needs are supplied by an abundance of physicians, two large community hospitals, and a major university medical center, access to preventive health care is limited by the unwillingness of most third party payers to reimburse for these services.

The Center strives to improve or maintain the health of older adults by screening for unrecognized and untreated disease and by teaching clients self-help measures that could ultimately improve physical and mental well-being. This spectrum of offered services is funded by a combination of governmental and philanthropic sources.

At the Center's screening clinic clients can obtain, on an annual basis, a complete physical examination and certain laboratory tests, including a urinalysis, hematocrit, stool for occult blood, and pap smear. The physical examinations are performed by one of the Center's three part-time nurse practitioners who have special training in geriatric assessment. Each client completes an extensive symptom inquiry and health history questionnaire which includes specific questions about activity levels, use of medication, and sexual dysfunction. Clients are screened for depression using the Geriatric Depression Scale (Yesavage et al., 1983), and inquiry is made about their social situation, and their ability to obtain medical care. The nurse practitioner reviews this information with the client prior to the examination. The physical examination includes measurement of vital signs, abbreviated neurological testing, and examination of the skin, head, eyes, ears, nose, throat, neck, chest, heart, abdomen, genitalia, rectum, and extremities. Special effort is made to identify common geriatric problems such as polypharmacy, falls, incontinence, memory loss, malnutrition, and foot disorders. Laboratory specimens are analyzed by a nearby hospital laboratory. Other screening services are provided at the Center by a community ophthalmologist, who conducts monthly glaucoma testing, and an audiologist, who tests for hearing disorders. A weekly blood pressure clinic provides

follow-up and health education for hypertensive clients and organized outreach hypertension screening programs (Uman & Hazzard, 1982). There are no charges to clients and no restrictions, other than age, on who can use these services. The majority of clients learn of the Center through friends, other senior centers, or the media.

Positive findings (symptoms, signs, laboratory tests) are referred for physician evaluation according to a protocol designed by the nurse practitioners and the medical director (a community geriatrician). Examples of positive findings referred to a physician include heart murmurs and arrhythmias, certain vascular bruits, breast masses, skin lesions, cataracts, symptomatic prostatic enlargement, cystoceles, polyyps, depression, hypertension, anemia, occult stool blood, abnormal pap smears, and genitourinary infections.

For less serious findings that might benefit from counseling but do not require physician referral, the nurse practitioner will instruct the client in self-help techniques (e.g., exercises, low sodium diet) or recommend a life-style modification (e.g., smoking cessation, weight reduction). Health maintenance activities are strongly emphasized, and clients are routinely instructed to perform breast self-examination and are encouraged to obtain immunizations at appropriate intervals. Clients may also be referred to other programs within the Center such as the blood pressure clinic, stress or pain management workshops, a weight-reduction support group, a sexuality group, or for peer counseling.

All positive findings and recommendations are recorded and reviewed with clients before they leave the Center. The entire screening process requires about 2 hours. If clients do not already have a primary physician, the Center refers them to community physicians who accept Medicare fee assignment or to low-cost clinics. All clients who are referred to physicians or clinics are routinely followed-up by telephone to check on their condition and to encourage them to seek medical care if they have not yet done so.

METHODS

Retrospective study (Phase 1). — The first study phase consisted of a retrospective chart review of all patients who received an annual physical examination in the 12-month period between July 1981 and June 1982. Data collected included demographic information, laboratory results, abnormal physical findings, recommendations, past medical

history, and use of Center services. Clients whose resting blood pressures were elevated (recumbent systolic blood pressure greater than 160 mm Hg or diastolic blood pressure greater than 94 mm Hg) when measured on two separate occasions were classified as hypertensive (either isolated systolic or systolic-diastolic). These clients were contacted by telephone 1 year later and were asked a set of follow-up questions which included whether they had subsequently seen a physician for hypertension, what treatment had been prescribed, if they had complied with that treatment, and their most recent blood pressure reading. The intent of this first phase was to better describe the population of elderly people who request screening, to tabulate the prevalence of abnormal findings, and to analyze follow-up data on hypertensive patients.

Prospective study (Phase 2). — We performed a second phase in order to gain better knowledge of the overall outcomes of screening. This phase consisted of a prospective outcome analysis of clients who had abnormalities on their physical examination or laboratory tests and were referred to physicians during the 6-month period between December 1983 and May 1984. At the time of the physical examination, clients who were deemed by the nurse practitioners to have a new positive physical or laboratory finding requiring further evaluation or treatment by a physician were identified. Also identified were active problems previously known but not currently being treated. Abnormalities already being followed or treated by a physician were not included as new or active findings, nor were they followed-up. Positive findings not referred to a physician but for which the nurse practitioner suggested a non-prescription medication, a self-care therapy, or a lifestyle modification were also tabulated from the charts, and prevalence rates were calculated. Demographic data were collected on all clients.

Follow-up and analysis of compliance. — One month after their examinations, individuals referred to physicians were contacted by a research assistant, who administered a follow-up questionnaire over the telephone. For each positive finding that had resulted in referral, clients were asked a series of questions to assess compliance and outcome. Some of these were adapted from the Health Belief Model (Rosenstock, 1974) and have been shown in other populations to predict compliance. These questions included (a) Did you see a physician for the finding? (b) Had you suspected the

finding prior to the screening examination? (c) How serious did you perceive the problem to be after the screening examination (*very serious* to *not serious*)? (d) What was the physician's diagnosis? (e) What treatment was recommended by the physician? In addition, clients were questioned about their source of transportation and whether the cost of medical care was a major barrier to seeking treatment. Clients who could not be reached by telephone were mailed a similar questionnaire.

Data analysis. — Data analysis consisted primarily of tabulating prevalence and follow-up data using descriptive statistics. In analyzing compliance patterns, differences between groups were tested for significance with the chi-square test for independence, using two-tailed rejection regions.

RESULTS

Client characteristics. — During Phase 1 389 clients received a physical examination and were studied. During Phase 2 an additional 261 clients were examined and studied. Although the Center population was sampled in two phases, client characteristics in both phases were similar. The majority were female (75%) and white (89%), and 43% were married. Clients ranged in age from 56 years to 94 years, though 76% were age 65 or older. The mean age of clients was 71 years. Although the elderly individuals visiting the Center comprised only 3% of the elderly people in the surrounding Santa Monica community, their demographic characteristics were similar. (The City of Santa Monica's elderly adults are 91% white and 63% female and represent 21% of the total population of 88,000). The number of clients screened during the two phases rose from 32 to 44 patients per month.

Retrospective study (Phase 1). — Information on the medical histories and health habits of the Phase 1 sample was obtained from the health history questionnaire. Clients in this group reported using a mean of 0.8 prescription medications and a mean of 0.7 nonprescription medications. Forty-eight percent of clients were taking vitamins and 20% were taking antihypertensive medications. When asked about alcohol and tobacco use, 9% reported drinking on a daily basis, and 14% smoked. The four most common medical conditions listed by clients on the medical history questionnaire were hypertension (21%), gastrointestinal disorders (19%), heart disease (18%), and arthritis (17%).

The prevalence of measured hypertension (in-

cluding both isolated systolic and systolic-diastolic) in the Phase 1 sample screened was 22.2%, and another 6% of the sample had borderline hypertension (140/90 to 159/94) (Figure 1). An additional 17.8% had previously diagnosed hypertension controlled on medications, leaving only 54.1% of the sample truly normotensive. As also shown in Figure 1, hypertension was a new finding for over a third of those clients with measured hypertension (8% of all clients screened). Follow-up of hypertensive clients was completed for 71% of the group, using both client self-report and report from the hypertension clinic. The majority of these clients (75%) had their blood pressure under control at the time of follow-up. Only 14% still had uncontrolled systolic-diastolic hypertension and 11% had uncontrolled isolated systolic hypertension. Among clients with newly diagnosed hypertension, 89% had their blood pressure under control at the time of follow-up.

Prospective study (Phase 2). — The yield of positive findings detected during the screening examination was calculated among the 261 clients in Phase 2. Of these clients, 54.4% had at least one positive finding which was referred to a physician for further evaluation; 40.2% had positive findings not referred to a physician but for which the nurse practitioner gave some form of advice or referred patients to other programs within the Center (e.g., patients with psychological symptoms were referred to the peer counseling program). Only 5.4% of the clients screened had no positive physical or laboratory finding requiring referral or advice (Figure 2). There was a mean of 3.2 positive findings per client, of which a mean of 1.1 were referred to a physician. The overall prevalence rates of new or active positive findings are listed in Table 1. This table also lists the percentage of all clients referred to a physician for specific findings, the percentage of all clients actually seen by physicians for the findings at the time of the 1-month follow-up, and the percentage of all clients who received treatment from the physician for the findings. The most prevalent findings were skin disorders (found in 52% of clients), genitourinary disorders (44%), and eye/ear-nose-throat disorders (33%). A comparison of first-time Center clients ($n = 162$) with those who had received a physical exam in a prior year ($n = 93$) revealed no significant differences in prevalence of most findings with one major exception: the prevalence of new hypertension was significantly higher among first time clients (14.2% vs. 2.2%, $p < .05$).

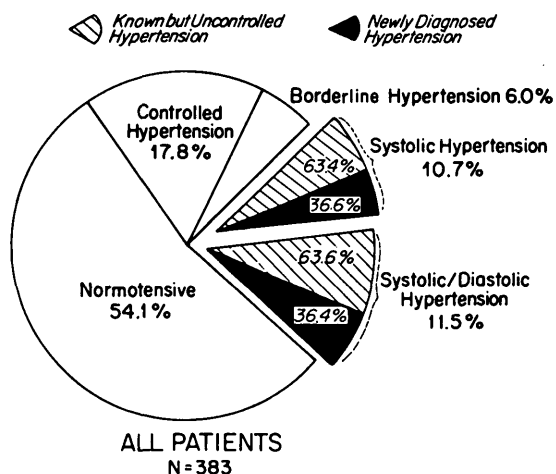


Figure 1. Yield of blood pressure screening (Phase 1 sample).

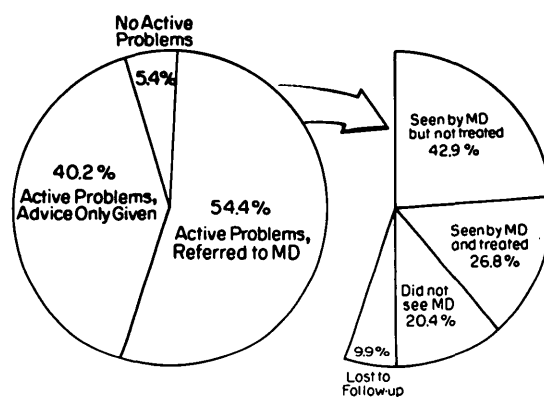


Figure 2. Overall prevalence of active problems and follow-up patterns (Phase 2 sample Cohort, $n = 261$).

The positive findings most frequently leading to physician referral were abnormal urinalyses (18% of clients were referred), cardiovascular abnormalities other than hypertension (16%), and genitourinary problems (14%). As can be seen, some findings were much more likely than others to result in a physician referral (e.g., all new hypertension cases were referred, whereas only 17% of skin abnormalities were referred). Of the clients referred to physicians, 58% felt that at least one of their findings was "serious" in response to that question from our questionnaire.

Of the 142 clients referred to a physician, 70% reported actually following through with this recommendation (Figure 2). The three most common findings seen by physician referral were abnormalities of the genitourinary system (including abnor-

Table 1. Prevalence of Positive Findings and Follow-up for All Clients Screened (Phase 2, $n = 261$)

Type of positive findings ^a	Prevalence of finding		Percentage of all clients referred to physician for finding		Percentage of all clients seen by physician for finding ^b		Percentage of all clients treated by physician for finding ^b	
	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>
Skin	52.1	(136)	8.8	(23)	4.3	(11)	2.7	(5)
Genitourinary	44.4	(116)	13.8	(36)	7.4	(19)	2.7	(7)
Eye/ear-nose-throat	33.3	(87)	6.1	(16)	3.9	(10)	1.5	(4)
Cardiac	30.7	(80)	16.5	(43)	10.9	(28)	2.3	(6)
Musculoskeletal	30.7	(80)	2.7	(7)	1.2	(3)	0.4	(1)
Gastrointestinal	29.1	(76)	6.9	(18)	4.2	(11)	0.8	(2)
Psychological	27.6	(72)	1.5	(4)	0.8	(2)	0.4	(1)
Breast	21.8	(57)	8.4	(22)	6.2	(16)	0	
Urinalysis	17.6	(46)	17.6	(46)	11.7	(30)	4.3	(11)
New hypertension	9.6	(25)	9.6	(25)	5.1	(13)	1.6	(4)
Respiratory	9.2	(24)	3.5	(9)	2.7	(7)	1.2	(3)
Other	4.2	(11)	3.8	(10)	1.5	(4)	0.8	(2)
Anemia	3.8	(10)	3.8	(10)	3.1	(8)	1.2	(3)
Neurological	2.3	(6)	2.3	(6)	0.8	(2)	0	
Occult GI Blood	0.8	(2)	0.8	(2)	0.4	(1)	0	
Any positive finding	94.6	(247)	54.4	(142)	40.1	(99)	15.4	(38)

^aPositive findings include newly detected problems as well as active problems previously known about but not currently under treatment.

^bExcludes patients lost to follow-up.

mal urinalyses), the cardiovascular system, and the breast (Table 1). Among those clients who saw a physician for a specific referred problem ($n = 99$), 38% actually received some kind of treatment for that problem. Although there was no difference in rates of referral to physicians between clients screened for the first time and clients previously screened, or in their compliance with the referrals, clients screened for the first time were significantly more likely to receive treatment from their physicians. Of those first time clients who saw a physician, 50.8% received treatment, as compared with only 20.0% of those previously screened ($p < .005$).

The major new conditions treated included urinary tract infection (10), vaginal infection (5), new hypertension (4), dermatitis (4), cardiac arrhythmia, (3) polyps (2), anemia (2), other infections (2), heart failure (1), lung cancer (1). Certain problems for which the patient was referred were more likely to be treated than others. These included skin disorders (45% of skin disorders seen by a physician were treated), respiratory disorders (43%), eye/ear-nose-throat disorders (40%), anemia (38%) and positive urinalyses (37%). Prevalent problems seen by physicians least likely to be treated were breast abnormalities (none received treatment though 75% of those seen were evaluated by mam-

mography), neurological disorders (none received treatment), and gastrointestinal disorders (18% received treatment). Of all clients who underwent the screening examination, 15% received subsequent treatment from a physician for a problem detected by the nurse practitioner (19% of first visit clients, 8% of return visit clients).

Analysis of compliance. — Because only 70% of clients referred to a physician actually reported seeing a physician, we attempted to identify factors associated with a client's compliance with the referral. Among those referred clients whom we were able to follow-up ($n = 128$), certain types of medical problems were associated with increased likelihood of compliance. These were breast abnormalities (89% of clients referred for a positive breast finding and subsequently followed-up saw a physician for that finding), anemia (80%), respiratory or cardiac abnormalities (78% and 74%, respectively), and positive urinalysis (73%). Findings associated with poorest compliance were neurological disorders (40%), musculoskeletal and psychological disorders (50% each), and skin disorders (52%).

Association of additional client factors with referral compliance are listed in Table 2. Clients who felt that their positive finding was "serious" were

Table 2. Clients Referred to Physicians: Association of Client Factors with Referral Compliance

Client factors	Client response (n = 128) ^a	Percentage of clients who saw physician	χ^2
Perceived finding to be serious	Yes (n = 66)	87.9	12.09**
	No (n = 47)	59.6	
Hindered or prevented in seeing a physician because of cost	Yes (n = 66)	69.7	5.29*
	No (n = 49)	87.8	
Suspected the finding prior to screening	Yes (n = 79)	77.2	0.06
	No (n = 43)	79.1	
More than one finding referred to a physician	Yes (n = 79)	77.2	0.09
	No (n = 49)	79.6	
Dependent on others for transportation	Yes (n = 59)	81.4	1.09
	No (n = 60)	73.3	

^aTotals vary slightly between factors listed because of non-responses.

* $p < .05$. ** $p < .001$.

more likely to see a physician than those who did not think the finding was serious (88% vs 60%, $p < .001$). In addition, financial factors seemed to deter further evaluation. Of those clients who indicated that medical costs frequently prevented them from seeing a physician, only 70% complied with the recommendation to see a physician versus 88% of clients who reported that costs did not prevent them from seeking medical care ($p < .05$). On the other hand, suspicion of the problem prior to screening was not significantly associated with compliance nor were the presence of more than one positive finding or the type of transportation that the client depended upon.

DISCUSSION

Present study. — The high prevalence of new and active findings found in this survey of community-living elderly adults who underwent a screening examination is similar to that reported in previous studies and confirms the common expectation that a screening program for elderly people can detect a substantial number of positive findings (both asymptomatic and symptomatic) not currently under treatment (Barber & Wallis, 1976; Currie et al., 1981; Currie et al., 1974; Thomas, 1968; Williams et al., 1972; Williamson et al., 1964).

Among clients screened over half had findings referred to physicians, and 15% of the screened population reported receiving treatment from physicians within approximately 1 month after their screening examination. Among newly diagnosed hypertensive clients identified in Phase 1, the majority were normotensive at follow-up. In Phase 2

of our study, there were significantly fewer cases of new untreated hypertension among clients who had been screened in a previous year than among clients screened for the first time. These excellent results require some explanation, especially in view of the fact that in both of these surveys the majority of hypertensive clients were not treated with medication. Although not being prescribed medications, the majority of clients were referred to the Center's blood pressure clinic (which monitors blood pressure and provides health education and nonpharmacologic blood pressure therapy), and it is likely that this clinic did contribute to the notable reduction in blood pressure. In an earlier study of the Center's hypertension program, 50% of clients who had been identified as hypertensive ($n = 33$) had controlled blood pressure after participating in a hypertension education program (Uman & Hazzard, 1982). Additionally, some apparent normalization of hypertension may have occurred merely as a result of repeated testing. Because only two blood pressure measurements were used to classify patients initially as hypertensive, instead of the three recommended by some experts (Gifford, 1982), we may have somewhat overestimated the prevalence of systolic hypertension.

Additional benefits from screening may have included such things as receiving reassurance that a particular disease was not present, learning self-help measures that could help control existing conditions, or receiving psychological support and limited case management to help deal with health and personal problems. Most of the information on these benefits, however, is anecdotal, and more research is needed to verify these outcomes. In a separate survey of Center clients ($n = 64$), 73%

said that they anticipated making a lifestyle change due to their clinic visit, and all of the clients surveyed felt that they had received important health education information. This is similar to a survey from the Dunedin screening program, in which 99.6% of the patients felt that their initial visit had been worthwhile, and 65% felt that their health knowledge had improved due to their visit (Hale et al., 1981).

Further estimates of the proportion of clients who benefitted from the screening procedures is limited by our use of client self-report and a short follow-up period. Although we had intended to obtain information on treatment and outcomes directly from the clients' physicians, many clients did not wish the Center to contact their physicians (an interesting phenomenon worthy of further study). By extending our follow-up period, the percentage of clients receiving a measurable benefit from screening might have increased — many outcomes associated with early detection and treatment (e.g., increased survival, improved functional status, decreased health care services utilization) may not be realized for several years after the screening examination.

Referral compliance is essential to any screening program's success. In our study there was a relatively high rate of client compliance with referrals to physicians. Clients were more likely to comply with referrals for conditions that are commonly known to provide a serious threat to health (breast, cardiac, respiratory findings, and anemia), whereas they were less likely to follow-up on neurological, psychological, musculoskeletal, and skin findings, all of which might be considered by clients to be less serious or even inevitable consequences of aging. Although the true "seriousness" of the specific conditions were not determined, this behavior

is consistent with the finding that clients' perception of the seriousness of a condition was positively related to the decision to see a physician.

Although these findings provide some indication of factors influencing compliance, limitations in our study design (retrospective assessment of health belief factors, absence of direct information from clients' physicians, questions of generalizability of this self-selected group) make it difficult to assess the predictive capability of these factors accurately. Perhaps the most important information that has emerged from the compliance analysis is that basically healthy elderly adults are quite likely to comply with a nurse practitioner's recommendation to seek follow-up from a physician. Given that clients' perception of the seriousness of a finding and the cost of medical care can influence compliance, it is apparent that special attention should be given to informing clients about the importance of follow-up care and linking them with low-cost community health care services.

Previous geriatric screening studies. A review of the available published studies on geriatric screening programs from the United Kingdom and North America (Table 3) reveals that an expected mean of two to three active problems per patient will be detected and that over half of the screened population will have at least one active problem. The clinical significance of these findings, however, will depend on the characteristics of the population being screened. The yield of new and active medical problems reported in published studies of screening programs is higher among more aged and frail patients than among younger and healthier patients. For example, in a British population of "at-risk" elderly people (defined as being recently hospitalized, widowed, or living alone), it was

Table 3. Summary of Published Studies on Geriatric Screening Programs

Author and location	Study design	Population	Screening method	Problems detected	Benefit at follow-up
Anderson & Cowan (1955), Scotland	Descriptive	Elderly patients referred by general practitioners ($n = 500$)	Physical and medico-social assessments by a physician at a consultative health center	70% of patients screened had some degree of disability.	Not stated
Williamson et al. (1964), Scotland	Descriptive	Random sample of patients 65 years and older in three general practices ($n = 200$)	Physical exam by a geriatrician; psychiatric screen by a psychiatrist; home assessment by a social worker; performed at the physician's office	Men had a mean of 3.26 disabilities, of which 1.87 were unknown to their physician; women had a mean of 3.42 disabilities; 2.03 were unknown.	Not stated
Thomas (1968), England	Descriptive	"Apparently healthy" elderly 65 years and older ($n = 312$)	Physical exam by a physician at one of two screening clinics	80% of patients screened had multiple disabilities; 4% had a major new finding.	Not stated

Table 3. Summary of Published Studies on Geriatric Screening Programs (continued)

Author and location	Study design	Population	Screening method	Problems detected	Benefit at follow-up
Lowther et al. (1970), Scotland	Descriptive, time-series	Community elderly 65 years and older identified as being "high risk" (recently hospitalized, widowed, or living alone) ($n = 300$)	Home assessment by a health visitor; physical exam by a physician at a screening clinic	65% of patients screened had a major condition detected, and patients had a mean of 2.3 diagnoses detected.	23% of patients screened showed improvement in a condition at follow-up 18–30 months after the exam.
Williams et al. (1972), England	Descriptive	Patients of a general practice, 75 years and older ($n = 297$)	Medical history and social assessment by a health visitor; physical exam by the patient's general practitioner	75% of patients screened had some unknown moderate or severe disability that required treatment. Patients had a mean of 1.5 unreported conditions.	Not stated
Currie et al. (1974), Scotland	Descriptive	Patients 70–72 years enrolled in an urban general practice ($n = 259$)	Medical history and psychosocial assessment by a health visitor; abbreviated physical exam by a physician	Patients had a mean of 3.2 conditions; 20.5% of these conditions were unknown to the physician.	Not stated
Barber & Wallis (1976), Scotland	Descriptive	Elderly patients of a general practice center ($n = 100$)	Screening questionnaire administered by a health visitor at the patient's home	Patients had a mean of 7.8 symptoms; 39% of these were previously unknown to the physician or needed treatment.	Not stated
Pike (1976), England	Descriptive, time-series	Patients of a general practice, 65 years and older, who were not currently receiving care ($n = 138$)	Patients completed a screening questionnaire and received a physical exam by a physician	First screening: 43% had a new problem detected which affected "quality of life." Second screening: 30% had a new problem detected.	55% of patients followed-up showed improvement in an important problem found at screening.
Brocklehurst et al. (1978), England	Descriptive	Frail elderly awaiting admission to a residential care facility ($n = 100$)	Physical exam by a physician at an outpatient geriatric clinic	80% of patients had a new finding or needed a change in treatment.	More suitable placement was arranged for 32% of the patients.
Tulloch et al. (1979), England	Randomized controlled study, 2-year follow-up	Patients 70 years and older of a general practice (145 cases, 150 controls)	Cases received a physical exam by a physician and were followed for 2 years in an outpatient geriatric clinic.	Patients had a mean of 2.6 conditions; 38% of these were previously unrecognized.	33% of the new problems were resolved at 2-year follow-up. Cases had fewer hospital days and maintained independence longer.
Currie et al. (1981), North Carolina	Descriptive	Elderly patients living at home, referred by a physician or social service agency ($n = 50$)	Physical exam by a geriatrician in patient's home	Patients had a mean of 3.8 problems (1.5 "significant diagnoses").	Not stated
Hale et al. (1981), Florida	Descriptive, time-series	Self-referred community elderly, 65 years and older ($n = 4,247$)	Blood pressure readings obtained as part of a geriatric screening program	39% of patients had some form of hypertension; 15.6% were untreated.	At 1-year follow-up, only 7.6% of the patients had untreated hypertension.
Furukawa (1982), Colorado	Descriptive, time-series	Self-referred community elderly 65 years and older ($n = 1200$)	Blood pressure, urinalyses and hematocrit screening by nurses at community outreach programs.	78% of patients had an abnormal blood pressure; 9% abnormal urinalyses; 9% abnormal hematocrits.	The number of abnormal blood pressures decreased over the five years, as did the percentage of patients referred to physicians.
Barber (1984), Scotland	Descriptive, time-series	Patients 75 years and older ($n = 100$)	Health and psychosocial assessment by a health visitor	Patients had a mean of 1 physical symptom per patient and 6.4 medicosocial problems.	71% of medical problems found showed improvement.
Rubenstein et al. (present data), California	Descriptive, time-series	Self-referred, community elderly 55 years and older ($n = 261$)	Physical exam by a nurse practitioner at a screening clinic	54.4% of patients had a new or active finding that was referred to a physician. Patients had a mean of 3.2 findings, of which 1.1 were referred.	15% of patients screened were treated for a problem found by the nurse practitioner.

reported that two-thirds of patients screened had a major condition that required treatment or intervention (Lowther et al., 1970). In contrast, a survey of "apparently healthy" British elderly adults, most of whom were between the ages of 65 and 70, found that 80% had multiple disabilities but that screening detected a new "major" disorder in only 4% (Thomas, 1968). Likewise, Currie et al. (1974) concluded that most of the unreported morbidity detected in their survey of 70 to 72 year olds was "trivial." Our data seems to lie between these two extremes; about half of our clients had findings warranting further evaluation by a physician.

This diversity among published reports on the yield of screening programs makes it clear that one cannot objectively assess the effectiveness of screening solely on the number of positive findings noted in a specific population of elderly adults. The use of this type of evaluation criteria alone will probably overestimate the short-term medical value of screening. On the other hand, using only the prevalence of serious life-threatening conditions detected will surely underestimate many true benefits. Similarly, even the World Health Organization criteria for judging the value of screening tests (i.e., the condition should be an important health problem with an asymptomatic early phase detectable on a screening test, an accepted treatment should be available, and the natural history of the disease should be understood; Wilson & Jungner, 1968) underestimate the value of screening programs in elderly people because they only apply to secondary prevention (i.e., screening for asymptomatic disease). Among older populations, even seemingly minor conditions (e.g., decreased hearing and vision, foot problems, arthritis) can have serious effects on the individual's well-being and ability to live independently. The identification and treatment of these problems (tertiary prevention) can help reduce the risk of further disability. Conversely, it is possible that screening might promote unnecessary worry or morbidity in some asymptomatic individuals by identifying new diagnoses (labeling effect, Sackett, 1975). Consequently, it is important to determine how detection of these conditions impacts on the health of the elderly individual who is given this information.

As Table 3 shows, to date there have been only a few studies that have attempted to measure the effectiveness of health screening, and only one used a randomized design. Among the descriptive studies published, benefit is typically described as measurable improvement at follow-up in a condition detected during screening. Using this defini-

tion, the percentage of patients reported to have benefitted from screening ranges from 23% (Lowther et al., 1970) to 53% (Pike, 1976) of patients followed-up. Although several of these studies imply that these outcomes are a result of the screening examination, no information is given on the percentage of problems that improved due to treatment versus those that may have improved without any intervention.

The most definitive outcome data on a geriatric screening program was published by Tulloch & Moore (1979). In this randomized trial involving 295 British patients, many medical problems were found among the patients screened (2.6 per patient). Of these, 38% were newly diagnosed, and 67% were treatable. Their data revealed that the screened patients used significantly fewer hospital bed days during the 2-year follow-up period than controls. In addition, screened patients maintained independence longer than controls.

A few other randomized trials have looked at the benefits of comprehensive screening, but these included only nonelderly populations. In one such randomized trial, conducted by the Northern California Kaiser-Permanente medical care program, there was significant reduction in mortality from "potentially postponable" causes of death (i.e., those related to hypertension and specific malignancies that can benefit from early detection) (Dales et al., 1973). Furthermore, the middle-aged men who received the screening tests had lower disability rates and lower health care costs than controls over the 7-year follow-up period (Collen et al., 1973). It is reasonable to believe that the yields and the ultimate benefits from a comprehensive screening program would be even greater for an elderly population, given the higher prevalence of disease and disability among elderly adults.

Recommendations. — We believe that our data, and those of others, support the value of a periodic screening examination for elderly adults. Although we are unable to provide much additional insight on the usefulness of specific laboratory and diagnostic tests, due to the small number of positive findings detected by these tests in our study, several published reports (American Cancer Society, 1980; American College of Preventive Medicine, 1976; Breslow & Somers, 1977; Canadian Task Force, 1979; Stults, 1984) have provided both rationale and data to support the routine use of certain screening tests. Those screening tests most frequently cited as being useful in geriatric screening programs include hypertension screening, stool

guaiac, cervical cytology, mammogram, and tests of hearing and vision. Many other tests (e.g., chest x-rays, electrocardiograms, blood chemistry panels, tonometry) have not been found to be particularly useful in routine screening among geriatric populations due to the low prevalence of treatable conditions among asymptomatic individuals, the low sensitivity and specificity of these tests, and/or their high costs.

Although a urinalysis is not often recommended as an important screening test, the yield of positive findings found in our study suggests that this test is worth further study, given the high prevalence of asymptomatic urinary tract infections among elderly adults and the fact that many authorities recommend treatment for this condition. Likewise, given that the prevalence of depression among elderly people has been estimated at between 11% and 45% (U'Ren, 1984) and that over a quarter of "healthy" elderly clients screened in this study were identified as having psychiatric symptoms, the usefulness of routine screening for depression may well be warranted and should be studied.

The accumulated results from this and other studies document the high prevalence of identifiable and potentially remediable problems among elderly adults, and in themselves provide reasonably strong support for geriatric disease detection and health promotion strategies. The general consensus among proponents of health screening for elderly people is that screening is important and that it should be repeated at systematic intervals, possibly annually, in view of the high incidence of newly developing problems and disabilities. The specific components of screening programs are not universally agreed upon and will depend upon the population screened (i.e., frail vs. healthy), the goals of the program (i.e., secondary vs. tertiary prevention), and the ability of the program to provide treatment.

Though the true benefit of prevention programs can only be measured by performing larger controlled studies with long-term follow-up, we do not feel it is premature to take an advocacy position. A periodic screening examination can certainly identify individuals particularly at risk for disease or loss of function and, in conjunction with a referral system for treatment and other services, can probably contribute to improved health care outcomes and quality of life for elderly people.

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