Screening During Routine Health Assessment

C. Richard Kirkwood, MD

Jack Froom, MD

Rochester, New York

Medical charts of 189 patients receiving routine health examination were reviewed. Of the 15 evaluative procedures included, two (the physical examination and stool for occult blood) were performed by physicians; the remaining 13 were delegated to paramedical personnel and/or outside facilities. A total of 330 of 1,497 (22 percent) were found to be abnormal. Of abnormalities only 144 (44 percent) received follow-up as determined by chart audit. Physician-performed tests yielded 62 of 330 abnormal results. The rate of follow-up for physician-detected abnormalities was 58.1 percent compared to 40 percent for abnormalities found by other providers. To improve follow-up rate it is suggested that only those procedures be performed in which early detection significantly alters morbidity and/or mortality and that a structured definition of follow-up role be established for paramedical personnel.

Adult health maintenance is not only expensive but requires extensive utilization of health manpower.[1] The practice of periodic physical examination (usually annual) has been founded upon the assumption that health benefit will accrue from detection of any disease in its presymptomatic state by frequent, complete physical evaluation and a battery of diagnostic tests. Recently, the value of indiscriminate screening has been questioned and an alternative procedure proposed: screening for select disorders which satisfy certain specific criteria.[2,3] As elaborated by Frame and Carlson,[2] these disorders must:

1. significantly affect quality or duration of life,
2. be amenable to therapy,
3. have an asymptomatic phase when treatment significantly reduces morbidity and/or mortality,
4. be most responsive to therapy in the presymptomatic phase,
5. be detectable by reasonably priced tests performed at the asymptomatic level, and
6. have sufficient incidence to warrant routine screening.

Among these diagnostic procedures suggested for select screening are: blood pressure,[4] cervical cytology,[5] palpation for tumor,[6] stool for occult blood,[7] venereal disease serology,[2] serum cholesterol,[2] and intradermal tuberculosis testing.[8]

In an attempt to more economically maintain comprehensive annual multiphasic health screening, large prepaid health-care organizations have instituted programs of multiphasic screening with little or no physician participation.

Although the yield and quality of such screening is apparently satisfactory, there are a number of questionable factors. Follow-up of abnormal results by the personal physician is often poor.[9] Omission of the physical examination eliminates the most effective single technique for screening for breast carcinoma.[6] Those who potentially benefit most from screening, patients in the lower socioeconomic groups, are the least likely to obtain needed services.[10] Finally, estimates of abnormal findings may be elevated because such populations often underrepresent young patients.[11]

Published reports of results of screening within the private practice setting indicate a significant yield of abnormal findings but lack information about either the type or extent of follow-up of abnormal results.[12,13] In addition, these studies reported results from a select population, ie, those who accepted an invitation to participate in the program.

This report summarizes information results obtained from a retrospective study of routine health assessment examinations in a family medicine ambulatory care setting.

Methods

The Practice

The practice is four years old and consists of three clinics in an urban setting and serves middle to low socioeconomic neighborhoods with mixed ethnic and racial populations. All care is provided by health-care teams, composed of doctors, a physician associate, a nurse, a health assistant, and a secretary-receptionist. The medical staff consists of seven Board-certified or Board-eligible family practitioners, two general practitioners, and three pediatricians with family medicine experience, all salaried. On entering the practice, each family is assigned to one physician who is responsible for providing con-

Table 1. Definition of Abnormality of Separate Items Evaluated During Routine Health Examination	
Procedure	**Definition of Abnormal Finding**
By Physician:	
Physical Examination	One or more items checked as abnormal by the provider
Stool for occult blood	1+ or greater using a guaiac or hemoccult test
By Paramedical Personnel:	
Past medical history	Presence of a significant illness which required further evaluation or follow-up
Social history	Presence of a situation amenable to intervention
Family history	Presence of a significant history of disease within the family requiring further evaluation and/or therapy
Blood pressure	>160/90
Weight	>10% above ideal weight
Visual examination	Visual acuity <20/30 in either eye
Urinalysis	1+ or greater for the presence of blood, sugar, or protein
Hematocrit	Females: <than 36% Males: <than 40%
Electrocardiogram	Presence of left ventricular hypertrophy, right ventricular hypertrophy, conduction disturbances, or arrythmias
Tuberculin skin test	Reaction >5 mm in diameter
By Outside Facility:	
Chemical blood screen	A result deviating from the laboratory-established normal range
Vaginal cytology	Rates as atypical, inflammation, or carcinoma
Chest x-ray	An abnormality noted by the radiologist requiring further diagnostic evaluation and/or therapy

tinuing and acute care. Care is provided without regard to payment source. Some physicians urge patients to undergo a health assessment on entering the practice or soon thereafter. Physicians perform all initial physical examinations included in this report. Nurses and health assistants measure vital signs, obtain past medical, social, and family histories and perform such tests as urinalysis, hematocrit, and electrocardiogram. Outside laboratories are used for serologies, chemistries, and cytologic examinations. Radiologic examinations are performed at a nearby community hospital.

Records and Chart Audit

Standard medical record forms are used for each patient. These forms are identical to the problem-oriented data collection system developed by Froom and coworkers.[14] The Royal College of General Practitioners Classification of Diseases (RCGP), as modified for Problem-Oriented Records,[15] is used to classify and code health problems. Data from encounter forms are keypunched and printouts of practice characteristics are generated.

Patients' charts were selected for this study from a list of the diagnostic title 511a (Adults-Routine Physical Examination [All Purposes]). Every tenth patient chart was selected for a total of 63 charts from each clinic center. "Adult" was defined as age 15 or older; 189 charts were reviewed for health assessments performed during a one-year period.

Definition of Terms

The extent of the health assessment was rated by the presence or absence of several procedures. Table 1 lists the procedures under consideration and defines abnormality for each. The following tests were rated as complete if they had been performed and recorded at any time prior to and including the

Table 2. Demographic Characteristics of Study Population (percent)

A. Age-Sex Distribution

	Male	Female	Total
15-24	16.9	27.8	44.7
25-44	17.5	21.7	39.2
45-64	6.1	7.9	14.0
65 +	1.0	1.1	2.1
Total	41.5	58.5	100.0

B. Ethnic Background

Caucasian	57.4
Black	37.3
Caucasian Spanish-speaking	5.3

C. Socioeconomic Status

Class I (highest 10%)	0.0
Class II (upper 20%)	1.7
Class III (middle 40%)	35.6
Class IV (lower 20%)	50.9
Class V (lowest 10%)	11.6

date of the examination: past medical history, social history, family history, electrocardiogram, tuberculin skin test, hematocrit, visual examination, stool for occult blood, urinalysis, multiphasic chemical blood screening, and chest x-ray. These tests might have been performed at any time during the four-year period since the center's establishment, but most were performed no earlier than a year prior to the end of the study period. Vaginal cytology was not counted as complete unless it had been performed within 12 months of the assessment. Only blood pressure and weight determinations performed on the date of the health assessment were accepted for this audit. The physical examination

was rated as complete if 21 of 26 items describing the physical examination were checked.

Follow-up was defined as a record of any action by the health-care provider that indicated that he/she was aware of an abnormality. Whether the action taken in the further care of the abnormality was appropriate was not evaluated. Evidence of the follow-up of abnormalities was considered present if one of the following criteria was fulfilled within six months following completion of the total health assessment:
1. a record of treatment for the specific abnormality,
2. evidence of further diagnostic evaluation,

3. the problem was recorded on the problem list, or
4. the abnormality was recorded as not significant, eg, "functional murmur."

Results

Demographic characteristics of the study population are given in Table 2. Comparison indicated that the sample studied was representative of the adult practice population. The frequency of performance of individual procedures as part of the complete health assessment is given in Table 3. Almost three

Procedure	No.	% of Patients Receiving Procedures
By Physicians:		
Physical examination	137	72.5
Stool for occult blood	8	4.2
Subtotal	145	
By Paramedical Personnel:		
Past medical history	165	87.3
Social history	94	49.7
Family history	104	55.0
Blood pressure	156	82.5
Weight	133	70.4
Visual examination	43	22.7
Urinalysis	131	69.3
Hematocrit	145	76.7
Electrocardiogram	63	33.3
Tuberculin skin test	64	33.9
Subtotal	1,098	
By Outside Facility:		
Chemical blood screen	129	68.3
Vaginal cytology (females)	88	79.0
Chest x-ray	37	19.6
Subtotal	254	
Total	1,497	52.9

fourths of the sample population received a complete physical examination as defined in the *Methods* section. In 7.6 percent of the charts there was incomplete or equivocal documentation of the extent of physical examination; these cases were considered to be without a complete physical. The frequency of abnormal results of procedures and the percent follow-up for each are shown in Table 4. The mean number of abnormal results was 22.0 percent. Procedures with exceptionally high yield were family history, 60.6 percent positive; past medical history, 29.7 percent positive; and complete physical examination, 44.5 percent positive. A rate of 1.6 percent

for abnormal tuberculin skin tests may be misleading because a large proportion of results were not recorded either due to clerical error or, more often, because patients failed to return the card describing the extent of reaction. The nonrecorded results were less than 1.0 percent for all other procedures. Approximately 44 percent of all abnormal findings received follow-up. Abnormal physical findings, blood pressure determinations, vision, weight, and vaginal cytology received additional diagnostic or therapeutic attention in over 50 percent of cases. However, no specific abnormality received more than 59 percent follow-up. Abnormal hematocrit, social

history, and tuberculin test results received attention in less than 20 percent of cases.

Discussion

Completeness of Assessment

There is no universal agreement on which procedures should be performed at the time of routine health assessment and recent literature questions the cost benefit of several widely used screening tests. Nevertheless, there is good evidence that blood pressure assessment,[4] cervical cytology (particularly in low socioeconomic

Table 4. Abnormal Results During 189 Routine Health Examinations

Procedure	Total Abnormal		Followed Up	
	No.	(%)	No.	(%)
By Physicians:				
Physical examination	61	(44.5)	36	
Stool for occult blood	1	(12.5)	-0-	
Subtotal	62	(42.8)	36	(58.1)
By Paramedical Personnel:				
Past medical history	49	(29.7)	20	
Social history	11	(11.7)	2	
Family history	63	(60.6)	26	
Blood pressure	31	(19.9)	16	
Weight	30	(22.3)	16	
Visual examination	6	(14.0)	4	
Urinalysis	4	(3.0)	1	
Hematocrit	21	(14.4)	4	
Electrocardiogram	17	(27.0)	4	
Tuberculin skin test	1	(1.6)	1	
Subtotal	233	(21.2)	94	(40.3)
By Outside Facility:				
Chemical blood screen	24	(18.6)	9	
Vaginal cytology (females)	7	(8.0)	4	
Chest x-ray	4	(10.8)	1	
Subtotal	35	(13.8)	14	(40.0)

groups),[5] and some of the other procedures evaluated in this study were useful. Despite evidence of its utility, 17.5 percent of patients examined received no blood pressure determination. There are several possible explanations for the discrepancies between "optimal health-care standards" and actual performance in health-care delivery to a population with a high percentage of minority and low socioeconomic groups. Focus of patient care in such a setting is primarily directed toward rectification of hither-

to neglected illnesses. The adverse consequences of omitting certain screening procedures on an individual patient are not immediately apparent to either patient or provider. In contrast, treatment of manifest disease or symptoms results in immediate benefit obvious to both. Since approximately 73 percent and 17 percent of procedures are assigned to paramedical personnel and outside facilities respectively, responsibility for follow-up of most abnormal findings may be poorly defined.

Several screening tests may be poorly accepted by patients and the provider may be reluctant to subject the asymptomatic patient to such procedures. Rectal and vaginal examination and venipuncture are among these. The low incidence of stool examination for occult blood may be attributed in part to this factor. It is also possible that a few physicians chose to omit certain procedures because they felt that adequate evidence of clinical and cost benefit was lacking.

Abnormal Findings

Individual frequency of abnormal findings is comparable with those reported by others.[3] A 20 percent rate of elevated blood pressure determinations for single measurements in this type of population may be expected. The rate of abnormal cytology is high compared to data from specialty-oriented hospital clinics.[16] However, this study included patients with dysplasia and inflammation. Of seven abnormal results, one revealed carcinoma, three dysplasia, and the remaining abnormalities were inflammatory. Thus the frequency of carcinoma alone was 1.3 percent and is comparable to that reported by others for low socioeconomic groups.[5]

Follow-Up

Since the patient population under study is select and not representative of the total population, no suggestion is made that the frequency of abnormality reported here represents overall incidence figures. The rate of follow-up however should, ideally, be independent of population demographics and it is the primary subject of this report. Bates[17] has shown that abnormalities identified during multiphasic examinations in a screening clinic and subsequently referred to a private physician are poorly followed up by that physician. In the present study, abnormalities detected in many of the procedures performed by nurses and outside laboratories had a very low follow-up rate compared with those found by physicians (primarily physical examination) [$p < 0.025$ — chi square analysis]. That the rate of follow-up for abnormal findings is directly proportional to the personal involvement and responsibility of the health-care provider is apparent. Improved communication between team members and unequivocal definition of follow-up role is essential to adequate determination of the etiology of abnormal findings.

Conclusion

The results of this study indicate that routine health assessment in an ambulatory care setting can identify a significant number of abnormal findings. Many of these abnormalities are detected by screening procedures that meet the rather rigid criteria set forward by Frame and Carlson.[2] It is disconcerting, however, that a high proportion of abnormalities do not provoke any overt action on the part of the provider. This inactivity was particularly true of abnormalities detected by procedures performed by paramedical persons or outside laboratories. Two possible procedural failings may contribute to this disparity and deserve further study. First, the results of tests performed by nonphysicians may escape the primary provider's notice since they are generally inserted into the chart at some later date following the actual patient visit. Secondly, and far more difficult to assess, the physician may be unconsciously biased in favor of the physical examination as the ultimate determinant of patient well-being. In addition, the effect of such performance on eventual outcome within this patient population may be overestimated. Fessel[18] has shown that in one hospital setting audit of chart content for the quality and extent of patient evaluation may not correlate with outcome. Moreover, in a setting where there is a high continuity of care, a study extending over longer periods of time might demonstrate that abnormalities which are neglected at the time of the study may be acted on at future visits. It is difficult, however, to escape the moral and perhaps legal imperatives for health-care providers to at least react to an abnormal finding. Response to this imperative may be facilitated by performance of only those screening procedures whose practical value in affecting ultimate outcome has been fully demonstrated. In addition, it is possible that the delegation of more clearly defined authority to paramedical professionals for follow-up of abnormalities might result in improved health care.

References

1. Garfield SR: Multiphasic health testing and medical care as a right. N Engl J Med 283:1087, 1970
2. Frame PS, Carlson SJ: A critical review of periodic health screening using specific screening criteria. Parts 1 and 2. J Fam Pract 2:29, 123, 1975
3. Whitby LG, Holt KS, Colley JRT, et al: Screening for disease (A nine-part series). Lancet 2:819, 1057, 1125, 1189, 1245, 1303, 1364, 1434, 1494, 1974
4. Veterans Administration Cooperative Study Group on Antihypertensive Agents: Effects of treatment on morbidity in hypertension. JAMA 202:1028, 1967
5. Anderson WAD, Gunn SA: Cancer of the cervix: Time interval in repeating a cytology smear. CA 17:150, 1967
6. Venet L, Strax P, Venet W, et al: Adequacies and inadequacies of breast examinations by physicians in mass screening. Cancer 28:1546, 1971
7. Gregor DH: Occult blood testing for detection of asymptomatic colon cancer. Cancer 28:131, 1971
8. Preventive treatment of tuberculosis; Joint Statement of the American Thoracic Society, National Tuberculosis and Respiratory Disease Association, and the Center for Disease Control. Am Rev Respir Dis 104:460, 1971
9. Sackett DL, Holland WW: Controversy in detection of disease. Lancet 2:1380, 1974
10. Wakefield J, Baric L: Public and professional attitudes to a screening programme for the prevention of cancer of the uterine cervix. A preliminary study. Br J Prev Soc Med 19:151, 1965
11. Adams AI: What is worth screening for what? Med J Aust 2:860, 1968
12. Scott R, Robertson PD: Multiple screening in general practice. Br Med J 2:643, 1968
13. Pike LA: Screening middle-aged men in a general practice. Practitioner 209:690, 1972
14. Farley ES Jr, Treat DF, Baker CF, et al: An integrated system for the recording and retrieval of medical data in a primary care setting: Parts 1 through 8: J Fam Pract 1(1):44, 47, 1(2):45, 49, 1(3/4):43, 49, 1974; 2:37, 1975
15. Coded Classification of Diseases: A Problem-Oriented Adaptation of the Royal College of General Practitioners Classification. Rochester, New York, University of Rochester and Highland Hospital Family Medicine Program, 1972
16. Franco S: Early detection of disease by periodic examination. Ind Med Surg 25:251, 1956
17. Bates B, Parker RC Jr, Reifler CB: Chemical evaluation of multiphasic screening — conversion of yields. Ann Intern Med 75:929, 1971
18. Fessel WJ, Van Brunt EE: Assessing quality of care from the medical record. N Engl J Med 286:134, 1972