

Screening in Family Medicine: The Current Situation

Walter W. Rosser, MD
Ottawa, Ontario

Unrealistic patient expectations, financial constraints, and lack of medical scientific evidence as to the benefits of screening make it difficult for the family physician to establish appropriate screening procedures in his/her practice. The current status of screening is reviewed and some suggestions are made as to how family physicians might better use what is known about screening.

Screening may be considered a medical investigation that does not arise from a patient's request for advice on specific complaints.¹

In conducting screening procedures as part of their daily office practice family physicians are caught in a three-way conflict between the media and the public, the government and private insurance companies, and the medical scientific community. The media, used by various medical foundations and special interest groups in society, constantly promote the idea that everyone owes him/herself an annual health examination. The government and private insurance agencies, who must foot the bill for these examinations, are seriously questioning the value of annual screening examinations and, in some areas of North America, financial disincentives have been attached to such examinations. The medical-scientific community, using biostatistical analyses, can find no hard evidence that more than eight or ten basic screening procedures result in

early detection of disease in which the natural history of the disease can be altered. Family physicians are caught in the middle of this three-way conflict. Daily they must decide what investigations are appropriate to fulfill the demands of their patients, the financial constraints imposed by the government and insurance agencies, and what biostatisticians indicate are valid screening procedures in asymptomatic people.

In trying to resolve this dilemma, the scientific aspects and the art of medicine must be kept in mind as well as the value, which should be increasingly emphasized, of a continuing trusting relationship between physician and patient.

It will be no surprise to practicing family physicians that there are several studies of North American general family practice that find that periodic health examinations are the single most common type of examination carried out by the average family physician, representing between 10 and 20 percent of all patients encountered.²⁻⁴ Only in the past few years has much been written on how up to 30 percent of family physicians' time is spent and how it could be better spent. There is little evidence that intensive "multiphasic screening" improves one's life expectancy, although after seven years of study by the Kaiser Permanente Foundation, some improvements have been found in a group screened intensively, compared to those not screened.⁵⁻⁸

From the Department of Family Medicine, University of Ottawa, Ottawa, Ontario. Requests for reprints should be addressed to Dr. Walter W. Rosser, Director, Ottawa Civic Hospital, Family Medicine Centre, 210 Melrose Avenue, Ottawa, Ont, K1Y 4K7.

Effective Screening Tests

Infants and Children

Screening tests for family physicians can best be studied by age groups, starting with the prenatal care of the fetus (Table 1). Little discussion about screening for Rh isoimmunization in pregnancy is required. The test consists of determining the mother's Rh type and, if possible or known, the father's Rh type. The use of "RhoGAM" after spontaneous or therapeutic abortions, as well as the monitoring of rhesus negative mothers throughout pregnancy, combined with the treatment postpartum as indicated, has been shown to reduce the incidence of Rh isoimmunization to about ten percent of what it would be without intervention.⁹

In newborns in most parts of the world routine screening for phenylketonuria is common. Early detection and treatment with appropriate diet prevent lifelong debilitation and mental retardation. The high cost of lifetime institutional care justifies the cost of the large number of tests required to detect one abnormal result.¹⁰

In carrying out physical examinations on the newborn, and thereafter for the first three or four months of life, ruling out congenital hip dislocations by a "hip click" test, auscultating for murmurs suggestive of congenital heart defects, and ruling out significant amblyopia will prevent the serious sequelae of these problems.¹⁰

The second age group to be screened is preschool children between six months and five years of age. Screening should be aimed at detecting abnormalities in vision and hearing. Parents should be questioned about hearing and vision defects as they will often suspect problems at a very early age. A physician associate of the author whose child is congenitally deaf states that the child's grandmother was sure of the problem when the baby was three weeks old, yet it took several physicians ten months to be convinced. The earlier hearing aids are used the better the outcome in developing communication skills in deaf children. Visual testing can be effectively carried out using special children's eye charts at relatively early ages of two to four years.¹⁰

Starting as early as eight years of age (Table 2), questioning about smoking habits can be justified. Studies carried out on public and high school chil-

dren have indicated that most preteenage and early teenage smokers have no intention of continuing their smoking for more than three to five years. Suggestions to teenagers about risks involved in smoking may be more effective than is currently believed in preventing the many sequelae of long-term smoking.¹¹

Adults

In the adult age group, the simple act of determining whether or not patients smoke, and if they do, what number of cigarettes per day, is one of the most important screening tests available. There is overwhelming evidence of the relationship between heavy smoking and an increasing list of debilitating and fatal diseases.¹² It is estimated that 80 percent of the deaths from carcinoma of the lung are caused by smoking.¹³ There is a definite relationship between the amount smoked and the increasing risk of carcinoma of the lung. Anyone smoking more than 40 cigarettes a day has the risk of developing carcinoma of the lung rise exponentially with each further cigarette smoked per day.¹⁴ It has been estimated that if all persons currently smoking could reduce the amount smoked to fewer than 10 cigarettes per day, the mortality rate in the 1980s from carcinoma of the lung could be reduced by 84 percent.¹² New heavily filtered cigarettes may reduce the amount smoked by an equivalent of 30 percent.¹⁵ Cigarette smoking has also been implicated in carcinoma of the oral cavity, esophagus, and pharynx as well as in coronary heart disease, generalized atherosclerosis, chronic bronchitis and emphysema, and an ever-growing list of other tumors and related conditions throughout the body. This adds to the importance of screening for smokers, who, it is estimated in the United States, include 42 percent of the male and 32 percent of the female population over the age of 20.¹⁶

The other major screening procedure that cannot be overemphasized is the simple act of determining blood pressure. Studies in Canada and in the United States suggest that between 12 and 15 percent of the general adult population is hypertensive.¹⁷ The definition of hypertension requiring treatment that is generally accepted is any patient's blood pressure which, on six independent readings taken over a period of two to six weeks, is found to average more than 145/95. In patients over 60 years of age, no such definition should be rigidly

Age	Test	Preventable Problem
Fetus Early in pregnancy	Rh determination mother/father Determination of isoimmunization	Rhesus incompatibility with mother Mortality or mental retardation
5 to 7 days	Blood test for phenylketonuria	Severe mental retardation
5 days, repeated to 9 to 12 months	"Hip click" test	Congenital hip dislocation
1 to 6 months	Heart auscultation	Irreversible effects of congenital heart malformations
1 month to 4 years	Tests for amblyopia: light reflex or patch test	Lack of "fusion" or blindness in one eye
1 month on	"Clap" test	Learning difficulties secondary to deafness

applied. Patients in the geriatric age group with average blood pressures of 165/105 or greater will likely benefit from treatment. The other well-known Veterans Administration Study has demonstrated unquestionably that treating anyone with a diastolic pressure of greater than 115 significantly reduces mortality and morbidity if patients are followed over a 2½ year period.¹⁸ The study of people with diastolic blood pressures between 90 and 114 was less definitive. Further analysis indicates that blood pressure greater than 165 systolic and 105 diastolic justifies treatment. People in this group, followed for five years, had between 2½ to 4 times more cardiovascular disease than those who were treated for the same blood pressure.¹⁹ Fry, who has observed the natural history of disease in his general practice near London, England for more than 20 years, states that rigorous treatment of the elderly hypertensive patient may not be warranted because the side effects of antihypertensive medications appear to outweigh the benefits. The scientific facts must be weighed with the physician's experience and clinical judgment in the management of hypertension.²⁰

The Papanicolaou smear is a test that definitely

reduces the mortality from invasive carcinoma of the cervix,^{21,22} but it has taken 20 to 25 years of careful study to demonstrate that fact. A task force, appointed by the government of Canada, has made recommendations for a Canadian screening program after analyzing the results of screening programs throughout the world.²³ The task force recommends that Papanicolaou smear screening should commence for any woman over the age of 18 who has become sexually active. If the first smear is negative, then a second smear should be obtained in one year. This suggestion is made because of the eight to ten percent false negative rate in well-organized cytology laboratories. Once two negative Papanicolaou smears have been obtained and the woman is not considered a high risk, smears should be taken every three years to the age of 35, every five years from the age of 35 to 60, and are unnecessary after the age of 60. Groups of women at high risk include those who are promiscuous, especially before age 20, those who have any other carcinoma, and those who have had abnormal Papanicolaou smears, and a list of other conditions that predispose to carcinoma. The high-risk group

Table 2. Recommended Screening Procedures of Proven Benefit School Age to Adult		
Age/Sex	Test	Preventable Problem
8 years and throughout adulthood	Determination of smoking habits	Bronchitis Carcinoma of the lung Cardiovascular disease Carcinoma of oral cavity Growth retardation in pregnancy
Any adult	Blood pressure	Cerebrovascular accidents Atherosclerosis Probable coronary heart disease
Sexually active female over 18	Papanicolaou smear	Mortality from cancer of the cervix
Any female over 30	Breast self-examination Physician breast examination Possibly mammography	Mortality from breast carcinoma
Anyone over 20	Alcohol intake	Cirrhosis of liver Carcinoma of the oral cavity, esophagus, and pharynx
Pregnant female	Urine culture	Renal damage Perinatal mortality

should undergo annual Papanicolaou smears. Women who have never been sexually active are excluded from the screening program. In practical terms it may be difficult to convince women, some of whom have had Pap smears every six months for many years, that this is a safe and reasonable program. Fortunately this has not been a problem in my own experience.²³

Screening for breast cancer has been shown to reduce mortality in women between the ages of 50 and 59.²⁴ The screening carried out consisted of annual manual breast examination, and a mammography every two years. Mammography is controversial and is not definitely recommended, but self-examination of the breasts every two to three months, and annual examination by a physician is considered beneficial. Although all the questions surrounding the benefits of such a program have yet to be answered, breast self-examination and biannual physician examination should commence in all women aged 30 or older.²⁵ This might increase to physician examination annually after age

50. Frame and Carlson, in their critical review of the status of mammography, recommend it only in women over 50 with fatty breasts.²⁶

The benefits of reducing heavy alcohol intake for the lowering of morbidity and mortality from cirrhosis of the liver, carcinoma of the oral cavity, larynx, and esophagus need little comment. It is estimated that two thirds of all deaths from cirrhosis are directly related to alcohol.¹²

A screening test for urinary bacteriuria in pregnant women has been shown to be beneficial in detecting asymptomatic infection and, with early treatment, in preventing renal disease in pregnant women.²⁷

Questionable Screening Procedures

The list of individual screening procedures that definitely have been shown to detect disease that can be prevented by active intervention is quite short (Tables 1 and 2). Obvious exclusions include

tests to determine serum cholesterol and lipids, blood glucose, the urinalysis, and many other tests that physicians may be doing in their offices on a regular basis. There is no definite study showing that lowering cholesterol will prevent atherosclerosis or coronary heart disease. The Framingham study found that men aged 30 to 59, who had a diastolic blood pressure below 90, who did not smoke, and who had a cholesterol below 250 mg/100 ml had a ten-year mortality rate of 20/1,000. The cohort group of the same age with the three risk factors above the stated levels had a mortality rate of 171/1,000.²⁸ There is, as yet, no evidence that reducing cholesterol levels actually reduces the risk of atherosclerotic heart disease.

A discussion about screening should include methods of reducing motor vehicle accidents. National and local governments in North America, by legislating the wearing of seat belts and by lowering speed limits, have reduced morbidity and mortality from motor vehicle accidents by as much as 22 percent annually, as reported by the Ontario Government Ministry of Transport.

Over the past 20 years tonometry has frequently been suggested as a screening procedure for adults over the age of 40. Only between zero to ten percent of those with raised intraocular pressure ever develop visual field defects.²⁹ This finding has made the cost effectiveness of screening adults over age 40 for raised intraocular pressure questionable. One recommendation is that tonometry and ophthalmoscopy might be justifiable every four years from age 40.²⁶

Other procedures such as chest x-rays,³⁰ rectal, proctoscopic, and sigmoidoscopic examination,³¹ electrocardiograms,² gastroscopy, urine cytology, sputum cytology, and various biochemical and hematological tests await definite evidence that by detecting abnormalities using these tests one can alter the outcome of whatever condition is detected. Screening for anemia in menstruating females and nutritionally deprived groups may be justified because of the simplicity of the test, but there is no evidence that asymptomatic anemia has serious outcomes.²⁶

Discussion

Although there is relatively thin scientific support for many screening procedures that are cur-

rently available, the public's expectation that screening is very effective in early detection and cure of dreaded disease persists. Because of widespread anxiety about illness, reassurance may be the most important thing done for patients during the "health examinations." If physicians perform appropriate screening procedures and detect abnormalities, can they convince patients to modify their life-styles to follow appropriate therapeutic regimens? One approach used in the Family Medicine Centre at the University of Ottawa is a simple Coronary Risk Assessment sheet (Figure 1), which patients complete in the waiting room prior to their screening examination. This Risk Assessment sheet attaches an arbitrary score to each of seven risk factors so that the patient can see how much he may reduce his risks by life-style modification.

This simple tool, along with many other variations and approaches, may assist in screening and life-style modification, but a basic question still remains unanswered: once abnormalities are detected in screening, how does the physician convince the patient to reduce these risks? Although sociologists, psychologists, health educators, statisticians, and epidemiologists have attempted to develop strategies to improve compliance, as yet no consistently effective formula to improve the known poor compliance rates has been found.³²

The first step in improving the health of patients is to develop a trusting physician-patient relationship. By exploiting the physician's knowledge of the patient, his/her personality, family relationships, and life-style, the physician is able to suggest risk-reducing activity that will be acceptable to the individual. As recently calculated in several practices, each physician sees the average patient between 2.5 and 4 times per year.³³ Over several years physicians should develop a trusting relationship which, in compliance studies, has been found to be the only factor that significantly improves compliance to therapeutic regimens.³⁴

The practical problems of spending time trying to modify life-styles cannot be ignored. Pressure should be applied to health insurance agencies to assure their understanding of the problems inherent in gaining patient compliance to therapeutic regimens that follow screening procedures.

The three-way conflict between the media and the public-at-large, the health insuring agencies and their anxiety over cost, and the medical scien-

Age	1 10 to 20 years	2 21 to 30 years	3 31 to 40 years	4 41 to 50 years	6 51 to 60 years	7 61 to 70 years and over
Heredity	1 No known history of heart disease	2 1 relative with cardiovascular disease over 60	3 2 relatives with cardiovascular disease over 60	4 1 relative with cardiovascular disease under 60	6 2 relatives with cardiovascular disease under 60	7 3 relatives with cardiovascular disease under 60
Weight	0 More than 5 lbs below standard weight	1 -5 to +5 lbs standard weight	2 6 to 20 lbs overweight	3 21 to 35 lbs overweight	5 36 to 50 lbs overweight	7 51 to 65 lbs overweight
Tobacco Smoking	0 Non-user	1 Cigar and/or pipe	2 10 cigarettes or less a day	4 20 cigarettes a day	6 30 cigarettes a day	8 40 cigarettes or more a day
Exercise	1 Intensive occupational and recreational exertion	2 Moderate occupational and recreational exertion	3 Sedentary work and intense recreational exertion	5 Sedentary occupational and moderate recreational exertion	6 Sedentary work and light recreational exertion	8 Complete lack of all exercise
Cholesterol or fat % in diet	1 Cholesterol below 180 mg/100ml Diet contains no animal or solid fats	2 Cholesterol 181-205 mg/100ml Diet contains 10% animal or solid fats	3 Cholesterol 206-230 mg/100ml Diet contains 20% animal or solid fats	4 Cholesterol 231-255 mg/100ml Diet contains 30% animal or solid fats	5 Cholesterol 256-280 mg/100ml Diet contains 40% animal or solid fats	7 Cholesterol 281-300mg/100ml Diet contains 50% animal or solid fats
Blood pressure	1 100 upper reading	2 120 upper reading	3 140 upper reading	4 160 upper reading	6 180 upper reading	8 200 or over upper reading
Sex	1 Female under 40	2 Female 40 to 50	3 Female over 50	5 Male	6 Stocky male	7 Bald stocky male

Name: _____ Date: _____ Date: _____ Date: _____

Figure 1. Coronary Risk Assessment Sheet*

*A complete Risk Assessment Sheet may be obtained from the Family Medical Centre, 210 Melrose Avenue, Ottawa, Ontario K1Y 4K7.

tific evidence of the benefits of screening is likely to persist into the 1980s as family physicians in the middle of this conflict will have to try to educate patients to the actual known benefits of screening and try to use all their skills and knowledge to maximize the benefits, to each individual patient, of current screening.

Ivan Illich, in his book *Limits to Medicine* cannot be refuted in his statements that in spite of spiraling health-care costs no major changes in mortality have occurred in the past 25 years. He argues that medicine is trying to take the individual's responsibility for his/her own health care away from him, making him dependent on expensive but questionably beneficial technology.³⁵

It would seem reasonable that physicians reorient their efforts somewhat away from technology and concentrate more energy on understanding and exploiting the physician-patient relationship for the patient's benefit. If family medicine concentrates on this reorientation, the family physician can be in the forefront of both screening for preventable disease and convincing patients to modify their life-styles; this he will be able to do more effectively than many of the currently advocated approaches to preventive medicine. The challenge then for the family physician is to use his/her continuing relationships with patients to influence them to follow risk-reducing life-styles while further developments in understanding the field of screening healthy populations are awaited.

References

1. Commission on Chronic Illness: Chronic Illness in the United States. Cambridge, Mass, Harvard University Press, 1957, vol 1
2. Rosser WW: Periodic health examination. *Can Fam Phys* 20:84, 1974
3. Newell JP, Bass MJ, Dickie GL: An information system for family practice: Part 4: Encounter data and their uses. *J Fam Pract* 3:639, 1976
4. Marsland D, Wood M, Mayo F: A data bank for patient care, curriculum, and research in family practice: 526, 196 patient problems. *J Fam Pract* 3:25, 1976
5. Thorner RM: Whither multiphasic screening. *N Engl J Med* 281:30, 1969
6. Robert NJ, Ipson J: Mortality among males in periodic health examination programs. *N Engl J Med* 281:20, 1969
7. Schor SS, Clark TW, Parkhurst LW, et al: An evaluation of the periodic health examination. *Ann Intern Med* 61:997, 1964
8. Knox EG: Screening for disease: Multiphasic screening. *Lancet* 2:1434, 1974
9. Eklund S, Nevanlinna R: Rh Prevention: A report and analysis of a national program. *J Med Genet* 10:1, 1973
10. Baily EN, Klehz PS: Screening in pediatric practice. *Pediatr Clin North Am* 21:123, 1974
11. Wake FR: Anti-smoking: Where do we go? *Can J Public Health* 64:493, 1973
12. Louria DB, Kidwell AP, Lavenhar MA: Primary and secondary prevention among adults. *Prevent Med* 5:549, 1976
13. Cancer Statistics 1975. *Ca* 25:8, 1975
14. Doll R, Hill J: Mortality in relation to smoking: Ten years of observation of British doctors. *Br Med J* 1:1399, 1964
15. Wunder EL, Joffman D: Less harmful ways to smoke. *J Natl Cancer Inst* 48:1749, 1972
16. US Department of Health, Education, and Welfare, Program Research Branch, National Clearinghouse for Smoking and Health: Adult Use of Tobacco, 1970. DHEW Publication (HSM) 73-8727. Center for Disease Control, Atlanta, Georgia, 1973
17. Wilbur JA, Barrow JG: Hypertension: A community problem. *Am J Med* 52:653, 1972
18. Veterans Administration Cooperative Study Group on Antihypertensive Agents: Effects of treatment on morbidity in hypertension. *JAMA* 202:1028, 1967
19. Veterans Administration Cooperative Study Group on Antihypertensive Agents: Effects of treatment on morbidity in hypertension. *JAMA* 213:1143, 1970
20. Fry J: James Mackenzie lecture: Common sense and uncommon sensibility. *Practitioner* 218:106, 1977
21. Kinlen LJ, Doll R: Trends in mortality from cancer of the cervix in Canada, England, and Wales. *Br J Prev Soc Med* 27:146, 1972
22. Task Force on Cervical Cancer Screening Programs Appointed by the Department of National Health and Welfare, Canada. Epidemiology and natural history of carcinoma of the cervix. *Can Med Assoc J* 114:1003, 1976
23. Task Force on cervical cancer screening programs appointed by the Department of National Health and Welfare, Canada: Conclusions and recommendations. *Can Med Assoc J* 114:1033, 1976
24. Shapiro S, Strax P: Periodic breast cancer screen for reducing mortality from breast cancer. *JAMA* 215:1777, 1971
25. Shapiro S, Goldberg SD, Hutchinson GB: Leadtime in breast cancer detection and implication for periodicity of screening. *Am J Epidemiol* 100:357, 1974
26. Frame PS, Carlson SJ: A critical review of periodic health screening using specific screening criteria (4 parts). *J Fam Pract* 2:29, 123, 189, 283, 1975
27. Brumfit W: Bacteruria in relation to renal disease in adults with special reference to women of child bearing age. *Milbank Mem Fund Q* 47:22, 1969
28. Stamler J, Epstein FH: Coronary heart disease: Risk factors as guides to preventive action. *Prev Med* 1:27, 1972
29. Wilinsky JT, Ponos JM: Prognostic parameters in ocular hypertension. *Arch Ophthalmol* 91:200, 1974
30. Brett GS: Lung cancer detection by six monthly chest radiographs. *Thorax* 23:414, 1968
31. Shorlock P, Winawer SJ: Modern approaches to early identification of large bowel cancer. *Am J Dig Dis* 19:959, 1974
32. Haynes RB: Symposium on Compliance: A Critical Review of the Determinants of Compliance. Hamilton, Ontario, Department of Clinical Epidemiology and Biostatistics, McMaster University, 1974
33. Rockhold F: Family practice in Virginia: A comparative analysis of two years data. Presented at the meeting of NAPCRG, Williamsburg, Virginia, March 1977
34. Barofsky I: Behavioural conditioning. Presented at Workshop on Compliance with Therapeutic Regimes, McMaster University Medical Centre, Hamilton, Ontario, May 1974
35. Illich I: *Limits to Medicine*. Toronto, Ontario, McLelland and Stewart, 1976