Regular Review

The medical check-up

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The medical check-up is a procedure of American origin designed ostensibly to maintain health. How effective is it in achieving this objective? And, if effective, what should be the ingredients of the procedure?

To judge by the number of people, many willingly and a few reluctantly at the behest of their employer, who seek this assessment from physicians or commercially operated health centres there is apparent overall satisfaction. But satisfaction is not necessarily synonymous with effectiveness. Are the public too gullible? Surely a thorough medical check-up may uncover some hidden disease or harmful habit which can by virtue of its early discovery be successfully eradicated or controlled.^{1 2} Subtle shades of distinction can be made between the mass screening of populations, routine periodic health examinations of groups, and the check-up of an individual. Though health maintenance is the declared objective, often there are more hidden motives—to use the doctor as a counsellor to discuss personal, family, or business problems; to seek reassurance regarding undeclared symptoms; or simply to find security, however unrealistic this may logically be.

Some medical examinations—of aircraft pilots, heavy goods vehicle drivers, or public transport drivers—are directed in part towards the protection of the public and have political overtones. This type of examination and pre-employment examination often concerning pension rights are not relevant to this review. Nor is it concerned with the important routine examination of infants, children, and pregnant women: for these groups the value of medical supervision is not in doubt.

The medical profession seems less convinced than the consumer of the benefits of a routine check-up. At one end of the range of opinion are those who devote much time to conducting check-ups—and if only from the stance of job satisfaction presumably they believe in what they are doing or advocating. To this the cynic may say that doctors will play the part that society insists on writing for them.² Even that distinguished editor of the *New England Journal of Medicine*, the late Dr Franz Ingelfinger, capitulated when he wrote “screening programs will be used whether or not any evidence is available that they improve the health of the people.”³

At the other end of the range are those who condemn the medical check-up out of hand as a waste of time and medical resources and positively harmful by increasing anxiety.^{4 5} Others are critical on ethical grounds. They contend that when a doctor investigates the possibility of illness in an asymptomatic client he is giving a presumptive undertaking that if any abnormality is present it will be identified and that subsequent treatment or advice will reduce morbidity or mortality.^{6 7} This is seen as an obligation because the client's request for a health examination is based on the belief that the procedure

is valuable.⁷ Here “valuable” goes undefined and unquantified. Doctors do not claim invariable therapeutic omnipotence.

Between these extremes are those who see some benefits to the supposedly well patient, his family, or his firm. Such views may not always be based on data derived from properly controlled scientific trials. It should be possible to show that routine periodic health examinations lead to increased longevity, fewer complications of disease, less disability, and reduced need for admission to hospital.⁸

Present procedures

In screening large populations economic considerations become important, and the time-honoured procedures that have proved helpful in the assessment or diagnosis of sick patients need re-evaluation.^{9 10} Thus in some centres a printed questionnaire or computerised procedure is used to shorten the exchange between doctor and client. I am unaware of studies that compare the outcome of these techniques with a carefully taken history but suspect that the longer the exposure of the client to the doctor the better. The way the client relates his history, the sequence in which he does so, the precise choice of words, the facial expressions, the tone of voice, the accompanying gestures—all have importance to the discerning doctor but are lost to a questionnaire or computer. Furthermore, and equally important, supposedly well patients often prove to have symptoms which may be the hidden reason for their seeking a check-up. Failure to consider these symptoms—and associated fears—in depth will not be helpful, whether they have their roots in a psychosomatic disorder or an organic disease.

The physical examination should be complete, but in restricted screening for only hypertension or breast cancer,¹¹ for example, and even in multiphasic screening,¹² paramedical personnel may be used. Even the usefulness of an abdominal examination has been questioned¹⁰: in one important study this was restricted to determining whether or not the patient had a hernia.¹³

Investigations tend to range within a narrow selection of laboratory or physical tests. The value of each should in theory be validated. Apart from being harmless, the test should be effective (of possible benefit to the individual person to whom it is applied) and efficacious (of benefit to those who comply with the advice offered or the treatment given when the result is known). The medical check-up is not a final diagnostic work-up, but each result, if abnormal, should lead to further investigations that will identify a specific condition, whose early treatment ought to offer some prospect of reducing its morbidity or mortality. The benefits of such tests must take

into consideration their cost, practicability, and feasibility.¹⁴

Provided the well patient truly has no symptoms and no relevant family history, there are in fact only a few hidden successfully treatable diseases that justify screening. These are, first and foremost, hypertension, followed by cancer of the cervix or breast in women, diabetes mellitus (clinical or biochemical), anaemia, probably colorectal polyps or carcinoma, and possibly hyperparathyroidism and hypothyroidism. These mainly meet the criteria laid down in the World Health Organisation report as amenable to screening.¹⁵ Of the 10 principles enumerated, the three most applicable to this review are that the condition should be epidemiologically important (though importance to the individual, his family, or employer is also relevant); that there must be effective treatment; and that there must be a latent or presymptomatic phase.

There are four harmful habits: excessive eating, drinking too much alcohol, smoking, and obsessional behaviour. In many instances, regrettably, the doctor may be unsuccessful in influencing their consequences or in reducing their prevalence. Health education with the widespread use of propaganda machinery of all types may one day prove superior. Often it seems that we have a significant influence on patients' bad habits only when one essential ingredient is present—the patient is ill²—and then it may be too late.

Documented results

Few properly controlled multiphasic screening trials have been reported in recent years. In the South-east London study¹³ started in 1967-8 some 2500 adults aged 40-64 years were screened on one or two occasions with a health questionnaire, a somewhat restricted physical examination on the first occasion, chest x-ray film, lung function tests, electrocardiograph, haemoglobin, packed cell volume, biochemical tests (for concentrations of cholesterol, protein-bound iodine, urea, random blood sugar, serum urate), cervical smear, and an occult blood stool test on the first occasion. In each person screened 2-3 diseases were identified, of which, though 53% were unknown to the patient's general practitioner, 95% were of a "minor nature." Of the serious diseases discovered, however, only 56% were already known. Treatment was mainly directed at the control or correction of hypertension and anaemia. Over the nine years that the trial lasted there was no statistical difference between the screened and control groups (drawn from the same general practices) in mortality, certified absence from work through illness, admission to hospital, or in visits to their general practitioner.

The larger and more comprehensive Kaiser-Permanente study in California was designed to determine if people encouraged to take an annual multiphasic health check-up experienced postponement or prevention of morbidity, disability, or death.¹² The trial was started in 1964 with some 5000 persons aged 35-54 in each of the screened and control groups. The results were reported after 11 years of follow-up. The screening procedure was intended to include a medical questionnaire, a physical examination by a physician or paramedical worker, tonometry, electrocardiograph, spirometry, chest x-ray film, haematological and biochemical tests, sigmoidoscopy for all over the age of 40, and mammography for women aged 48 and over, but no occult blood stool test. The study group were urged to have an annual check-up but only 60% did, whereas 20% of the control group elected to do so. Over the 11 years on average each member of the study group had 5.2 check-ups as compared with 2.0 check-ups for

each of the controls. In the study group sigmoidoscopy was performed in 8% and in the control group in 5% of patient-years of observation.

Over the 11 years there was no difference between the two groups in the use of outpatient facilities, of admission to hospital, in self-reported disability, or in total mortality. Nevertheless, especially in the older persons aged 45-54, the mortality was significantly less ($p < 0.05$) from such potentially postponable conditions as complications of hypertension (hypertensive cardiovascular disease and haemorrhagic strokes) and colorectal carcinoma. Of the colorectal carcinomas found at check-ups, six were detected by sigmoidoscopy, two through the investigation of anaemia, and one on rectal examination. In men aged 45-54 there was less admission to hospital and less disability from hypertension and its complications, ischaemic heart disease, and, inexplicably, from back problems. On the other hand, the study group had a significantly higher mortality from suicide and from lymphohaemopoietic malignancy (without evidence of increased exposure to medical irradiation). In the two groups as a whole there was no difference in the mortality from breast cancer, but three-quarters of the women were under the age of 50 at the start of the trial, and current evidence suggests that breast screening reaps its maximum reward in women aged 50-60.

In the face of these discouraging results one wonders if, and how, they could have been improved. Was enough attention given to the history taking and the physical examination? Were the right tests done? Can anything be learnt from programmes restricted to screening for specific diseases?

Hypertension—There is unassailable evidence that treatment of asymptomatic hypertension reduces morbidity and postpones death. It may be less clear at what blood pressure level, taken in conjunction with age, treatment should be started. Here we await the results of the Medical Research Council trial of treatment in mild to moderate hypertension, but the case for hypertension screening is surely accepted.

Lung cancer—Regrettably, as a helpful screening procedure a routine chest x-ray film can be discarded. Even six monthly radiographs do not improve the five-year survival rate,¹⁶ nor does early detection with a combination of radiology and sputum cytology reduce the mortality.¹⁴ The main thrust to reduce death from this cause must be prevention—non-smoking or safe cigarettes.

Breast cancer—The shorter the delay between the appearance of symptoms and the initiation of treatment the better the survival.¹⁷ There is a case for breast screening, if only because the 85% five-year survival rate in women with localised disease drops to 53% when the disease has extended to the lymph nodes or beyond.¹⁸ Self-palpation should be more widely practised in all women aged 20 or over, and any intercurrent illness should be used by the primary-care physician as a case-finding opportunity to examine the breasts.¹⁹ The place of mammography, particularly in breasts that are normal to palpation, used to be more controversial because of the radiation hazard. In women aged 50 or over (but not in those aged 40-49) screened by physical examination and mammography the mortality in a group of 31 000 screened by an initial and three additional annual examinations was reduced by one-third compared with controls.²⁰ In another trial in asymptomatic women aged 50 or over mammography proved a more effective diagnostic procedure than clinical examination.¹¹ This is a developing subject, in which new techniques and methods of application are being applied.^{21 22}

Cervical carcinoma of the uterus—Though present evidence may not be wholly conclusive, it strongly suggests that early

detection of cervical cancer or carcinoma-in-situ by a Papanicolaou smear, followed by treatment, prevents further invasion.²³ In Scotland, for example, in women over the age of 30 the incidence rate of invasive cervical carcinoma was 55 in screened as compared with 310 per 100 000 in unscreened women.²⁴

Cancer of the colon and rectum—Four screening procedures are used for the detection of colorectal carcinoma—rectal examination, proctosigmoidoscopy, testing of the stool for occult blood, and the investigation of anaemia. Rectal examination presents few problems but is limited in its scope. To avoid false-positive and false-negative results the criteria recommended by the American Cancer Society for carrying out the stool guaiac test are stringent (a meat-free diet for 48 hours, the collection of two separate stools on each of three consecutive days, and a uniform technique for carrying out the test and recording the result).¹⁴ No doubt sigmoidoscopy will detect a few colorectal cancers and polyps, some of which left unremoved may become malignant.²⁵ The lower mortality from colorectal cancer (1.0 per 1000 in the screened as compared with 3.3 per 1000 in the control group) reported in the Kaiser-Permanente trial¹² was achieved by a combination of rectal examination and investigation of anaemia or sigmoidoscopy, but without occult blood stool tests. Others, such as the Consensus Report of the United States National Cancer Institute,²⁶ are less convinced of the value of the occult blood stool test or sigmoidoscopy or both. Without more evidence to change the public's and the profession's attitude it seems unlikely that the recommendations of the American Cancer Society¹⁴ of an annual occult blood test from age 50 onwards with sigmoidoscopy at 50 and repeated every three to five years will find widespread acceptance.

Laboratory tests—Haematological and biochemical screening tests have—surprisingly—not paid the dividends expected. Such procedures led to a new or “significant” additional diagnosis in 8% of hospital admissions²⁷ and in 17% of patients attending their general practitioners.²⁸ The poor yields in the Kaiser-Permanente and London trials^{12 13} are at variance with clinical experience. A raised mean corpuscular volume or an abnormal aminotransferase activity can be the first clue to excess alcohol intake, though admittedly such knowledge may not influence the patient's habits. Most patients with hypercalcaemia due to hyperparathyroidism are diagnosed by serendipity. In the 188 cases per 100 000 women aged 60 detected by screening at the Mayo Clinic²⁹ many declared themselves asymptomatic, but in fact 20% had bone disease, 20% had emotional disorders, and others had renal calculi or hypertension—a not uncommon and sometimes reversible accompaniment of hyperparathyroidism.³⁰ Whether or not treatment should be offered to patients with asymptomatic hyperparathyroidism may be debatable and is economically threatening, but in those with mental changes, particularly the elderly, personal experience and that reported from Birmingham³¹ show that surgical treatment may effect a striking improvement to the benefit of the patient and the relief of the family.

If laboratory tests are used they must be reproducible and subject to stringent quality control. Despite lack of specificity for any particular disease, the test must be shown to be usefully informative in the screening process and not included simply because the automated analyser is capable of making the estimation. Thus estimation of the serum iron concentration has been retired from most repertoires, and the usefulness in this context of the gamma-glutamyltranspeptidase estimation needs validation. The problems surrounding screening for

hyperuricaemia have been reviewed by Scott.³² The blood sample must be collected in a manner not to falsify the result or make it uninterpretable. For example, blood for calcium must be taken without venostasis, and the result of a triglyceride determination in a non-fasted patient is meaningless.

Future policy

The individual check-up differs from mass screening in that the act of seeking medical assessment may be a “symptom” in itself. Many self-declared well patients in fact have symptoms, unhealthy habits, or hidden fears. Most are less concerned with dying than with being ill to the detriment of their livelihood, their family, or their business. Despite the tendency of doctors to overestimate their ability to deal effectively with detected disease and to overvalue the benefit of their care to patients,³³ the exchange is in many instances patently helpful to the patient. The consultation often develops into case finding and psychotherapeutic counselling; the margin between screening and case finding becomes blurred and moves towards personal clinical medicine and away from the routine check-up.¹ To advocate discontinuance of check-ups on the basis of lack of evidence of their benefit must not be premature because of the very real risk of declaring that there is no effect when indeed there is an effect.³³ There is tangible evidence that detection of hypertension and possibly colorectal cancer has beneficial results,¹² but the allaying of ill-founded fears has never been quantified.

A prescription for the check-up

In the face of the existing evidence there is little prospect of achieving uniformity between conflicting recommendations.^{10 14 34} The procedure must be tailored to the individual according to the sex, age, previous and family history, environment, risk factors, and life style. What is done will also depend on whether he or she is being seen for an initial or subsequent check-up. At the first and subsequent encounters, the well patient must be allowed to talk freely before specific questions are asked about cough, breathlessness, tiredness, weight change, indigestion, bowel function, micturition, menstruation, sexual function, and sleep pattern.

The immunisation state should be reviewed at the first check-up. Immunity to rubella (in young women), tetanus, and poliomyelitis is likely to be the most relevant. For those who have not had mumps or measles in youth either may be highly inconvenient, and effective vaccination may be offered on an individual basis.

The physical examination must be complete and include a rectal examination. The urine needs to be examined for protein, glucose, and blood. A baseline electrocardiogram should be recorded and kept on file. For example, the discovery of innocent right bundle-branch block in early adult life may save a lot of life assurance hassle later. Pulmonary function tests in the asymptomatic are of little value except if abnormal in helping to persuade the patient to stop smoking.

Until evidence is stronger, an occult blood stool test and sigmoidoscopy should be confined to those with bowel symptoms, and often a barium enema will then be necessary.

In sexually active women contraceptive technique should be reviewed and breast palpation, a cervical smear, and pelvic examination done every third year up to the age of 40. A case can be made for an annual smear in those most at risk (first

intercourse before 18, a variety of sexual partners, and low socioeconomic state),¹⁴ but a cervical smear is unnecessary in those who do not have sexual intercourse. A baseline reference mammogram is recommended between the ages of 35 and 40. After the age of 40 breast examination and pelvic examination should be done annually, and after the age of 50 there is a case for annual mammography.

The doctor may feel better equipped if some laboratory tests are done, and certainly the patient will expect them. Measuring an erythrocyte sedimentation rate, haemoglobin, absolute indices, serum calcium with accompanying albumin level, alkaline phosphatase, blood urea (or blood urea nitrogen), blood glucose, and aspartate aminotransferase will meet most needs. Additional tests may be added at the first examination depending on risk factors—for example, a lipid profile when there is a family history of early coronary thrombosis, or an antibody profile if vitiligo is found. The recommendation of the Canadian task force¹⁰ to screen for hypothyroidism every two years in those aged 45-64 is interesting, and, given the number of missed cases of thyroid deficiency, would certainly pay dividends. The blood-spot technique for measuring thyrotrophin in the screening of neonates offers an inexpensive method that could be applied to adults.

Frequency of check-ups—In women gynaecological and mammary considerations set the pace—every three years up to the age of 40 and annually thereafter. For men there is less evidence. Provided no problems are identified a working compromise would be every five years to age of 40, every two to three years from 41 to 55, and thereafter annually.

All physicians know that a careful examination occasionally discloses an asymptomatic treatable important condition.³⁴ Nor should we forget, as is well known in hospital practice, that to many people a complete physical examination is often a potent and effective therapeutic act.

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Corrections

Haemolytic disease of the newborn due to antibodies other than rhesus anti-D

We regret that an error appeared in the second paragraph of our leading article on "Haemolytic disease of the newborn due to antibodies other than rhesus anti-D" (22 August, p 514). Line 4 on page 515 should have read "of these, 70 (6%) were due to anti-c. By 1974 prophylactic. . ."

Sunscreens, photocarcinogenesis, melanogenesis, and psoralens

We regret that an error appeared in the fourth paragraph of our leading article on "Sunscreens, photocarcinogenesis, melanogenesis, and psoralens" (1 August, p 335). Line 7 should have read "of both 8-methoxypsoralen and 5-methoxypsoralen in *E coli*. . ."