

## THE EVALUATION OF THE WORTH OF EARLY DISEASE DETECTION

**Dr J. M. G. Wilson, M.B., B.Chir., F.R.C.P.** (*Principal Medical Officer, Ministry of Health*)

I want to speak of the need for a national medical service (particularly one 'free at the point of consumption', as Mr Enoch Powell has put it) to ensure that resources are, as far as possible, economically used for the early detection of conditions only when this has been proved reasonably worthwhile.

Unlike many other countries where a particular item of medical service may or may not be provided according to local ideas and demand, in the United Kingdom the health service is under an obligation to provide medical services universally (as quickly as this may be done) once the need for those services has been established. We have already heard doubts about the evidence on the worth of cervical screening; but the policy decision to provide this service for women at risk had to be taken pragmatically on the strength of the evidence then available. It might have been better if those who now doubt the value of cervical screening had been able to attack the question themselves by their own methods of randomization 15 to 20 years ago, then we would perhaps have this evidence now; as things are we hope we have done the next best thing in helping those people concerned with cervical cytology, to try to evaluate this form of screening here in Cardiff, at the same time as a service is being provided. There are drawbacks to mixing epidemiological research with service case-finding, as we have seen, but in this case it is a matter of making the best of one's resources.

We must also remember that for practical purposes a country's resources for health have a limit, and that the introduction of a new service adds to the cost, possibly at the expense of the development of some other desired service.

For these reasons there is always the need to consider very carefully the worth (in its widest sense) of providing new screening services, and the most economical ways of doing this. Because of this need a not inconsiderable part of the funds available centrally for the support of research have been devoted to helping epidemiological projects of the kind mentioned by Professor Cochrane. There is one further point which is important to this issue of the worth of screening. This is the difference between the doctor's responsibility to the public when he carries out some test on a patient who has approached him for help, and the doctor's responsi-

bility, which is increased, when he offers the public tests which he claims are of benefit to health, as in screening, but which are not demanded clinically on account of symptoms. I mention this here because I believe this difficulty can be minimized when screening is closely related to general practice. I noticed an example of this kind of difficulty occurring in a situation where the general practitioner is remote from the screening operation; in some recent correspondence in the *British Medical Journal* a drug had been advised by the screening doctor for a man with a raised blood cholesterol.

### *Criteria for screening*

With these kinds of consideration in mind, I have drawn up a list of criteria which may be important and should be met before accepting a condition as worth early, perhaps presymptomatic, detection. Naturally, these are not discrete criteria, and they interlock with each other.

1. *There should be an important problem:* For example, iron deficiency anaemia, which on the strength of its prevalence and susceptibility to treatment, would be classed as important, may on evidence be receding in importance as more facts about its natural history are brought to light. In assessing importance, the two factors of prevalence and severity play a part. For example, phenylketonuria has been accepted as worth detecting at the earliest possible moment in postnatal life because of the existence of an effective treatment, and of the tragic results if undetected and untreated, although its prevalence in the population is only of the order of 1 : 20,000 births; while overweight (though admittedly difficult to treat effectively) is a relatively benign condition (at least in the short-term) but highly prevalent in the population. By these criteria, both are worth screening for.

2. *There should be an accepted treatment:* It should go without saying that there is no point in finding conditions at an early stage about which we can do nothing useful. For example, though we know treatment for patients with a much raised blood pressure is effective, we do not know yet the effectiveness of treatment in people with blood pressures only a little high for their age and sex. Until the information is available as the result of controlled trials, it would be premature to recommend screening and treating people with only mild hypertension in the absence of symptoms.

3. *Facilities must exist for diagnosis and treatment:* Clearly, this is a most important consideration when introducing screening for some condition at a national level, otherwise, chaos could result. For example, were mass screening by tonometry introduced for

chronic glaucoma in all persons over the age of 40, the number of people needing a full ophthalmological examination to exclude or confirm the presence of the disease would quite swamp our available eye services, about 4,500 per ophthalmologist. Thus, if it is important to detect some condition in whole populations the services for further diagnosis and treatment may have to be enlarged. This is a very important consideration in the economics of screening. For cervical cytology we know there has been an added load on gynaecological services which should be offset in the long run by a reduction in the number of women needing definite treatment for clinical cancer of the cervix. Again, looking to the future, should a successful treatment for early ischaemic heart disease be found, an immediate and heavy load would fall on the medical services in the diagnosis and management of this condition.

4. *There should be a recognizable latent or early symptom stage:* For practical purposes we need this and it is the field of research workers to give us a full picture of the development of a condition. At present, for example, there is no easily recognizable presymptom stage of multiple sclerosis; and we need to know more about indices for the early detection of arteriosclerosis and rheumatoid arthritis. On the other hand, the gastroscop and gastric camera may have given us a view of a precancerous, more treatable, stage of gastric cancer which was not earlier available.

5. *A suitable test or examination must exist:* Discovering this forms part of the study of the natural history of the disease. For example, neither ECG nor tonometry have proved really valid tests to indicate the presence or absence of early disease in the individual.

6. *The test must be acceptable to the population:* We know, for example, that proctosigmoidoscopy will lead to the discovery of rectosigmoid polypi in which (according to type) the incidence of malignancy is appreciable. Yet routine proctosigmoidoscopy as a screening technique other than in gastro-enterological outpatient departments, leads to a severe falling off in attendance. Cervical cytology is another good case in point. We are in danger of failing to obtain the attendance for cytological screening of those women at high risk, as a result of which the overall results could be disappointing. Koch in Copenhagen, and Davis in Baltimore both report success rates of high order for the vaginal irrigation pipette, and this technique may prove a valuable addition to routine screening by means of the Ayre spatula.

7. *The natural history must be understood:* Epidemiological surveys are fundamental to the practice of screening.

8. *Agreed policy on treatment:* Screening will often detect both a group of people clearly in need of treatment who for one reason

or another have not previously come under medical care (the 'ice-berg' of Last); and also a group, perhaps much larger (as in diabetes mellitus and chronic glaucoma), who may be developing clinical disease but in whom the natural history, and particularly the response to treatment, needs further study. From the point of view of the health services, in arriving at a policy about case finding, it is important to have a clear-cut, if arbitrary decision on whom to treat and whom to reassure. It would be a pity, however, to discard all information of borderline character and, when entering in a patient's clinical record, this data may prove useful in diagnosis at a future time.

9. *Cost must be related to other medical care expenditure:* I have already mentioned this briefly. While the actual cost of screening may not be high (though this itself can be considerable) the cost of resources of the diagnostic follow-up of all persons with positive tests, but who prove not to have the condition looked for, will be high. The cost of discovering and bringing to treatment each patient screened and found to have the disease sought is therefore a relatively complicated calculation. We are at present ignorant of the cost of screening calculated in this way and studies need to be made. Another factor in the cost equation is the cost of recording the findings and recalling those screened for re-examination at intervals. In a national screening undertaking like cervical cytology this is certainly a major task.

10. *Continuing process:* I have already implied that this is important. It would be of little use to screen a population once only, thereby attacking the disease already prevalent, without trying to discover newly incident disease thereafter. In addition, it is probably only feasible to screen a relatively small proportion of the persons at risk at any one time and, in order to achieve anything like completeness of response, screening facilities will need to be available either continuously, or else at repeated intervals.

I have said enough, perhaps too much, about these kind of criteria. Table 1 attempts to compare and contrast two conditions to which this set of criteria has been applied (table). The conclusions are that cervical cytology passes this test reasonably well (I am aware there are grounds for argument over point 7) while chronic glaucoma does not do so well.

### *The picture in general practice*

In the time left I should like to consider the application of screening to the scene of general practice, and here I shall cover some of the ground already dealt with by Dr Harvard Davis.

Mass population screening is costly because of the low prevalence

TABLE 1

REQUIREMENTS FOR POPULATION CASE-FINDING AS SATISFIED BY CANCER OF THE CERVIX AND CHRONIC SIMPLE GLAUCOMA

| <i>Requirements for case-finding</i>              | <i>Cervical cytology</i>   | <i>Chronic simple glaucoma</i>   |
|---|--|--|
| 1. Important problem                              | Yes. Cancer  | Yes. Prevalence 1 per cent accounts for 14 per cent reg. blind.                  |
| 2. Accepted treatment                             | Yes. Radical treatment   | Yes, with reservation.   |
| 3. Facilities for diagnosis of treatment          | Yes. Through local health authorities, general practitioners and hospitals | Hardly; 8-10 per cent false positives would provide intolerable diagnostic load. |
| 4. Recognizable latent or early symptom stage     | Yes. Carcinoma <i>in situ</i>  | Yes, at stage of visual field loss.  |
| 5. Suitable test or examination                   | Yes. Cervical smear  | Not entirely. Tonometry too non-specific and sensitive.                          |
| 6. Test acceptable to population                  | Yes, but irrigation smear may be more acceptable                           | Yes, but care needed not to injure cornea.                                       |
| 7. Natural history adequately understood          | Yes, with reservations   | Not as yet.  |
| 8. Agreed policy on treatment                     | Yes, find and remove all pre-invasive lesions                              | No.  |
| 9. Cost related to other medical care expenditure | Yes, with reservations   | No, if mass tonometry.   |
| 10. Continuing process                            | Yes  | Yes, would need to be.   |

of the conditions sought and expensive efforts needed to bring the public along. But there are, of course, high risk vulnerable groups in the population and some of these groups, for example, prenatal women, infants and young children, almost automatically become available for examination by either their own doctors or the medical staff of the medical officer of health. With general practice in the process of developing towards larger groups working from their own purpose-built practice control premises or from health centres, the opportunity is growing for an extension of the screening type of examination, and particularly for improving the cover given for conditions we all tend to take for granted. For example, a short while ago when the question of screening a population for chronic disease was being discussed, it turned out that the pregnant women in the population in question were not being routinely and completely examined for rhesus incompatibility and it seemed important that

this should be arranged for first. Again, it is fairly generally agreed that it is worth examining high-risk groups for diabetes mellitus. But I think there must be doubt whether all antenatal women are being effectively examined for this condition. The changing organization of general practice should do much to put right this kind of omission, particularly when family doctors work in close collaboration with local health authorities. With our shortage (far from unique to this country) of doctors, we need to discover what duties can best devolve on non-medically qualified helpers. Under any new type of practice organization the question of the patient's medical record and the preservation of the confidentiality of that record, can prove a stumbling block. The Royal College is, I know, taking a deep interest in records and it is important for the future that a satisfactory answer be found. A particularly fruitful field for case-finding is among the elderly and a number of projects are in progress, ascertaining, with the help of health visitors, the medical (as well as social) needs of the elderly. As Williamson of Edinburgh, among others, has shown, a high proportion of declared and remediable conditions can be found when looked for, particularly visual, hearing and locomotor disabilities.

Finally, I should like to mention very briefly two projects in which we have an interest at the Ministry. The first one is a form of short questionnaire for use by general practitioners which has been devised and is still in the process of testing by Dr Edward Bennett of the department of social medicine at St Thomas's Hospital. This aims at bringing out salient features, by system of the body, needing further investigation, and includes questions about mental health. This questionnaire may, we hope, prove a useful addition to the family doctor's equipment.

The other project I have in mind is a trial of screening in general practice, based on a group practice, to be conducted by Dr Walter Holland, director of the same department. From this trial, which will use randomized controls, we hope to learn more about the effectiveness of screening a middle-aged population in general practice; and more about the economics of doing this, as well as of the social attitudes of those taking part.