Assessment of treatment for the respiratory cripple

The problems and opportunities

J E Cotes DM FRCP

MRC Pneumoconiosis Unit, Llandough Hospital,
Penarth, Glamorgan, CF6 1XW

Rehabilitation of the chronic respiratory cripple to the extent that he or she can return to previous employment is seldom achieved, but much can be done to ameliorate the symptoms and increase the ability to take exercise. The prospects for treatment have been improved by greater acceptance of the need to avoid breathing polluted air, by new developments, and by the success of rehabilitation programmes in cardiology. The recent developments include: the oxygen concentrator (Stark & Bishop 1973) which provides an economical source of domiciliary oxygen; advances in the mechanics of breathing which provide a scientific basis for breathing exercises; greater acceptance of the probable virtues of exercise training; better estimation of the proportion of body weight which is fat, leading to improved control of weight reduction; development of really convenient walking aids; and legislative support. Other advances include portable oxygen therapy and, for the patient with advanced emphysema, possibly deep X-ray therapy (Axford et al. 1977). Trials are now in progress of some of these remedies.

Evidence on the effectiveness of remedies has been reviewed by Cochrane (1971); the first stage is usually an opinion based on a clinical impression. With luck this will provide the stimulus for an effective trial but in itself it is 'the worst type of operational evidence'. Of greater use is the evidence that, for example, the treatment affects the results of a laboratory test or that patients who receive the treatment are improved compared with a control group. For the result to be valid the indices of improvement should be appropriate and free from bias. An index which meets both the criteria is mortality, but it is possibly not as appropriate as indices of morbidity and quality of life; however, these are seldom unbiased. The problem of finding an appropriate control group was solved by Bradford Hill (1960) when he introduced the randomized control trial. Bias is further reduced by arranging that the treatment is double blind.

Double blind randomized control trials are a powerful tool for the assessment of remedies but still may not yield a credible answer. The failure may be due to not using appropriate indices and this aspect is considered in subsequent papers. It may be due to the number of subjects being too small in relation to the effect of treatment, or it may arise from the more general defect that insufficient information is available on which subjects are most likely to benefit and how the remedy should be applied. In these circumstances a detailed observational study in which differences between the subjects are related to their varied responses to treatment may be more informative than a randomized control trial based on imperfect criteria. However, the two may be combined.

Of the indices of respiratory disability which are of use in assessing the response to treatment, the most valuable is probably the clinical grade of breathlessness of Fletcher (1952). This

1 Symposium held by Section of Measurement in Medicine with the Breathing Club, 21 March 1977.
has recently been expanded to provide more information about disabled subjects (Cotes 1975). However, the grade is not independent of subjective factors. In addition, its relation to the forced expiratory volume is affected by age and by other factors which influence the ventilatory cost of activities. These and other aspects are considered in the papers which follow. Together they provide an overall view of treatment for the respiratory cripple; they also illuminate the general problem of assessing clinical remedies.

References
Fletcher C M (1952) Proceedings of the Royal Society of Medicine 45, 577–584

DISCUSSION
Professor C M Fletcher stressed the very wide range of forced expiratory volumes (FEV₁₀) for each clinical grade of breathlessness which in turn varied with time of day but was usually reproducible between days.

Dr L Capel said that the clinical grade was a better guide to the sickness absence than was the FEV₁₀.

Dr Cotes said that the mean difference in FEV between grades indicated the likely progression of the average patient. In answer to Dr K Saunders he said that the indirect maximal breathing capacity obtained from the FEV₁₀ indicated, with a standard deviation of about 10%, the maximal ventilation available for a patient during activity; this could be related to the average ventilatory cost of the activity in question.

Dr D J Lane said that the discrepancy between functional impairment and symptoms reflected in part the extent of the patient’s adaptation to his disease. Thus airways obstruction might lead to a compensatory increase in lung size, which in turn affected the sensation of dyspnœa. The intensity of this symptom was also related to the rate of onset of the airways obstruction, to the extent to which the resulting hypoxaemia increased the ventilation minute volume, and to the life-style of the patient.

Disability scales
R G A Williams DPhil MA
Department of the Regius Professor of Medicine, Health Services Evaluation Group, 9 Keble Road, Oxford OX1 3QG

One approach to scoring or scaling disablement is based on the premise that, irrespective of the locus of impairment, patients will be subject to social pressure to conform to a definite sequence of behaviour in deterioration or recovery, a sequence which is uniform for patients of a given social category, as recognized by their own social group. This premise led to the examination of Guttman scaling as a way of eliciting this sequential ordered structure. If a Guttman scale is found in a body of data, an order exists in the data which is cumulative and unidimensional.

The cumulative characteristic of the scale can be illustrated by taking three activities which have an obvious cumulative order of recovery for a sick person: (1) getting up; (2) going out of the house; (3) going back to work. The relationship between these three items can be translated into the basic tenet of the Guttman scale: if we know how many of the items were counted as