
Disabling Chest Disease: Prevention and Care

A REPORT OF THE ROYAL COLLEGE OF PHYSICIANS
BY THE COLLEGE COMMITTEE ON THORACIC MEDICINE

Summary

1. *Prevalence*

Bronchitis, emphysema and other chronic lung diseases are responsible for over half a million periods of sickness absence from work per annum and for 10 per cent of occupancy of medical beds in hospital. The conditions are the stated cause of ill-health in over 60,000 men who receive long-term invalidity benefit; this number has remained constant over the past 15 years. The nature and prevalence of the disability merit fuller description.

2. *Prophylaxis*

Smoking cigarettes has replaced environmental air pollution as the main cause of respiratory disability; having a parent who smoked and individual susceptibility are contributory factors. Other chronic diseases of the lung and occupational exposure are also important. Many of these factors are preventable. In particular there is an overwhelming case for effective governmental measures to discourage smoking.

3. *Acute Episodes of Chest Illness*

Preventive measures against acute episodes of chest illness in these patients are seldom effective and more research is needed. Treatment of the acute episodes is that of the chronic condition (see below) supplemented where appropriate by anti-bacterial chemotherapy, diuretics and other remedies. Subacute conditions of the lung should also be treated early.

4. *Treatment of the Chronic Condition*

In the presence of obstruction to air flow the regimen must include a trial of appropriate bronchodilator chemotherapy. There may be a need for weight reduction and for measures to clear secretions. General exercise training is usually beneficial; methods for training the respiratory muscles should be assessed further. Oxygen from portable apparatus is of use for improving exercise tolerance. Oxygen for 15 hours daily has been shown to modify pulmonary hypertension and to increase life expectancy in some patients. For the development and promulgation of these and other remedies a centre of excellence for respiratory rehabilitation should be set up within the NHS.

5. *Providing Effective Help*

Early identification is the key to management and should be encouraged. To this end general practitioners should look for airflow obstruction in patients presenting with their first episode of bronchitis in middle age. An abnormal result should lead to the patient seeing his local chest physician. Subsequent counselling and selected aspects of domiciliary care should be undertaken by a respiratory health visitor attached to the chest department; a few such appointments should be made on a trial basis.

6. *Employment*

Placement in suitable employment would be facilitated by earlier referral to the Disablement Resettlement Service of the Manpower Services Commission and by training of disablement resettlement officers in the requirements of persons with respiratory disability. The present quota scheme for the employment of registered disabled persons needs reassessing. Registration as a disabled person should carry an entitlement to limited social security payments while in employment. Registration should be on the basis of a specialist medical examination supplemented by physiological tests. The implementation of this proposal should be the subject of a separate enquiry.

7. *Cost of Rehabilitation Procedures*

The present financial provision for rehabilitation should be reviewed and a cost-benefit analysis undertaken. Points to be considered include that NHS resources would be used more economically for purchase of oxygen concentrators than for oxygen cylinders. Portable oxygen sets, other walking aids and other equipment for use under supervision at home should be budgeted for separately from equipment for use in hospital. The criteria for eligibility for mobility allowances should be reviewed.

8. *Aim*

At present chronic respiratory disability has a high prevalence but is associated with a low expectation of improvement. This report aims to transpose the latter two adjectives.

1. Introduction

Excessive breathlessness on exertion is all too common. It may be due to obesity and lack of exercise or to a combination of these factors and chronic lung disease or, less often, chronic heart disease. In chronic lung disease the breathlessness is due mainly to narrowing of the lung airways and is progressive, interfering with work and leading to the abandonment of leisure-time activities. Premature death is a frequent outcome.

The main aetiological factor is air pollution, especially personal pollution by smoking cigarettes; when this is the cause, giving up smoking leads to slowing or reversal of the deterioration. The breathlessness may also be secondary to other lung diseases. In either event, while the deterioration may appear to be irreversible, if the patient is determined and well advised, the prospects for rehabilitation are better than is usually imagined. However, at present too few patients make the effort, the medical advisers are often pessimistic, the appropriate treatment is not always available and the social support is not effective in securing suitable re-employment. This report aims to clarify the present position and to make recommendations for its improvement. It is concerned mainly with men and women who have chronic airflow obstruction and is directed both to members of the healing professions and to informed laymen, including Members of Parliament who alone can implement some of the proposals.

2. Objectives and Content of the Report

The Working Party was set up in response to a widely held view that (a) the person disabled by a chronic respiratory disorder and those at risk of becoming disabled do not always secure optimal benefit from the medical help and social support which are currently available; (b) recent developments in respiratory medicine of potential benefit to the chronic respiratory patient merit critical appraisal as to their scientific value and cost effectiveness, and (c) the needs of the UK are in some respects different from those of other countries in the European Community and the USA.

The report sets out to—

- (1) Estimate the extent of the need for long-term care of patients with chronic respiratory disability (Section 4).
- (2) Consider the role of prophylaxis (Section 5), prevention of acute episodes (Section 6) and treatment (Section 7) including aids to increased activity (Section 8), in improving function and preventing progression.
- (3) Consider how those capable of gaining benefit may be identified and brought under care (paras 9.1 to 9.3).
- (4) Consider what steps should be taken to improve the social circumstances of patients disabled by respiratory disease both using present facilities and statutory provision, and with the aid of new legislation (Section 9).
- (5) Make an estimate of cost effectiveness of any recommendations and/or indicate how this might be obtained (Section 10).

3. Definitions

The Working Party accepted the spirit of the following widely used definitions—

Rehabilitation: the restoration of patients to their fullest physical, mental and social capability[1]. In the case of the patient with respiratory disability the procedure, whilst multidisciplinary, is based on thoracic medicine and does not depend on the services of a specialist in rehabilitation medicine.

Respiratory Impairment: a derangement of function secondary to abnormality of the lung or thoracic cage. The abnormality might be with respect to production and clearance of secretions, airway calibre, gas exchange, respiratory control or musculo-skeletal function.

Respiratory Disablement: a reduction in exercise ability due to breathlessness, persistent cough or other related symptom.

Respiratory Handicap: the social disadvantages which arise from respiratory impairment and/or disability, including social intercourse, recreation and employment.

The patient disabled by a chronic respiratory disorder may have been diagnosed as having: chronic bronchitis, chronic airflow obstruction, emphysema, bronchial asthma, bronchiectasis, fibrosing or extrinsic allergic alveolitis, pneumoconiosis, cystic fibrosis, kyphoscoliosis, neuro-muscular disorders of the thoracic cage, post-tuberculosis fibrosis or other chronic respiratory disorders*. Inevitably, some of these conditions present diagnostic problems and not all patients will be labelled correctly. The conditions may be complicated by disorders of other systems. However, breathlessness which arises primarily from such disorders, particularly heart disease, renal and endocrine disorders, psychiatric and psychological disorders and Da Costa's syndrome are outside the scope of the report. This is directed towards alleviating respiratory disablement in men and women of working age and young people in their teens; it is also likely to be relevant to other age groups.

*The following definitions of the commonest disorders are offered as a guide though they are not intended to be comprehensive or exclusive.

Chronic bronchitis is usefully defined as the occurrence of cough and phlegm on most days for at least three months in the year for two successive years (MRC). The symptoms should not be due to bronchiectasis, tuberculosis or other specific cause. Chronic bronchitis is often complicated by recurrent chest illnesses and may be associated with obstruction to air flow. Emphysema often co-exists[2].

Emphysema may be said to be present where there is enlargement of air spaces beyond the terminal non-respiratory bronchioles, usually with destruction of lung tissue[3]. The diagnosis covers a number of types of abnormality which can only be identified with certainty by pathological examination. The main symptom is breathlessness on exertion and this is associated with changes in lung function which may take a characteristic form. However, where chronic bronchitis co-exists it is seldom possible to separate their respective contributions to respiratory disability.

Asthma is characterised by obstruction to air flow which is variable spontaneously and in response to treatment. Over a period of time, which is usually measured in years, the obstruction may become less reversible.

Long-term Care: a condition is considered to be 'long-term' if it has existed for more than three months and either cure or return to the initial pre-morbid level of ability is unlikely. The care might take the form of medical treatment of the chronic disorder, measures for prophylaxis and protection against aggravating factors, aids to increased activity, social support and aids to employment. The psychological reaction to respiratory impairment might require special treatment. Some conditions will be more responsive than others but the medical remedies will be considered generally.

Benefit: the social security payments to individuals are referred to as benefits. The usage is mostly self-explanatory including unemployment benefit ('the dole'), supplementary benefit, industrial injuries benefit ('compensation') and sickness benefit ('the sick'). A person who has been in receipt of sickness benefit for 26 weeks or more becomes eligible for invalidity benefit.

4. The Extent of the Problem

The information compiled by government departments provides estimates of the amount of respiratory ill-health in terms of sickness absences, GP consultations, hospital admissions, attendance and mobility allowances and persons registered as disabled. These sources give different answers but all probably under-estimate the extent of the problem.

4.1 Sickness Absences and GP Consultations

In 1976/77 the number of person-days lost from work on account of bronchitis, chronic bronchitis and emphysema was recorded as 26 million for men and 2.6 million for women. During the year 0.43 million men and 0.1 million women began new spells of incapacity. These figures constituted respectively approximately 10 per cent of all recorded working days lost on account of sickness absence and 5.8 per cent of all spells of absence from work[4]. The cost of sickness benefit, if expressed at current rates, would have been in excess of £100 million and the total economic cost to the community would have been considerably more. The associated load on the GP services was reflected in the GP consultations of which, in 1971, 21 per cent were on account of respiratory ill health including infections of the upper and lower respiratory tracts[5]. The number of chronic sick is reflected in the figures for invalidity benefit plus those for persons in receipt of non-contributory invalidity pension. In 1977, approximately 68,000 men of working age and 6,000 women received these benefits on account of chronic respiratory disorders. The number with respiratory disability who were in employment cannot be obtained directly. It may be estimated indirectly from the experience of those on the Disabled Persons' Register and from epidemiological and occupational surveys including that reported in 1961 by the Royal College of General Practitioners[6]. In 1978, the Disabled Persons' Register included 57,000 entries on account of respiratory dis-

order. Of these people, 14 per cent were unemployed, an estimated 20 per cent were sick and the remainder were in employment. If it is assumed that the number of chronic sick constitute a similar proportion of the national pool of such persons then the total number of men of working age with respiratory impairment sufficient to make them potential candidates for invalidity benefit is of the order of 0.3 million. This figure is consistent with that for the number of men beginning new spells of incapacity caused by chronic bronchitis and emphysema given above and with the epidemiological evidence on the prevalence of chronic bronchitis, e.g. 25 per cent amongst men aged 50-59 years[7]. However, disablement is of many degrees of severity and the number requiring help with some item of daily living has been estimated at about 20,000. Above working age about twice this number are similarly handicapped[8]. The prevalence of severe handicap is reflected in the figures for attendance and mobility allowances. In the case of the former, at the end of 1978 there were 7,600 persons with chronic respiratory disease on whose behalf an attendance allowance was being paid; 6,000 were cases of bronchitis. On 22nd October 1979 mobility allowances were being paid to 4,209 persons aged 60 years or less who were disabled by chronic lung disease. These figures are inevitably of limited reliability but the biasing factors do not all operate in one direction so, when taken together, the figures confirm that the management and support of the respiratory cripple makes large demands on the National Health and Social Security Services. In human terms it must present a very considerable burden of ill health and misery.

4.2 Trends and Projections

Figures for previous years show that the number of persons in receipt of invalidity and/or sickness benefit for bronchitis has remained relatively stable, whereas the hospital admissions for chronic bronchitis and emphysema have declined steadily (Fig. 1), as has the associated mortality (Fig. 2). Nevertheless, on average throughout the year 10 per cent of all medical beds are occupied by chest cases of whom about half are chronic bronchitis, and this proportion rises steeply during the winter months. The picture is in general similar for men and women but fewer women are affected.

These figures for hospital admissions are in line with both consultant clinical experience and the epidemiological evidence. For example, among a group of initially healthy London Transport and Post Office workers no new cases of chronic bronchitis were detected during an eight-year period of follow-up[7]. We appear to be witnessing a secular trend in disease pattern for this condition with, in addition, a higher proportion of acute episodes now probably being treated by general practitioners without referral to hospital. The favourable trend for chronic bronchitis does not extend to invalidity attributed to chronic lung disease, nor to deaths from cancer of the respiratory tract, of which there is a continuing increase, particularly amongst women (Fig. 3).

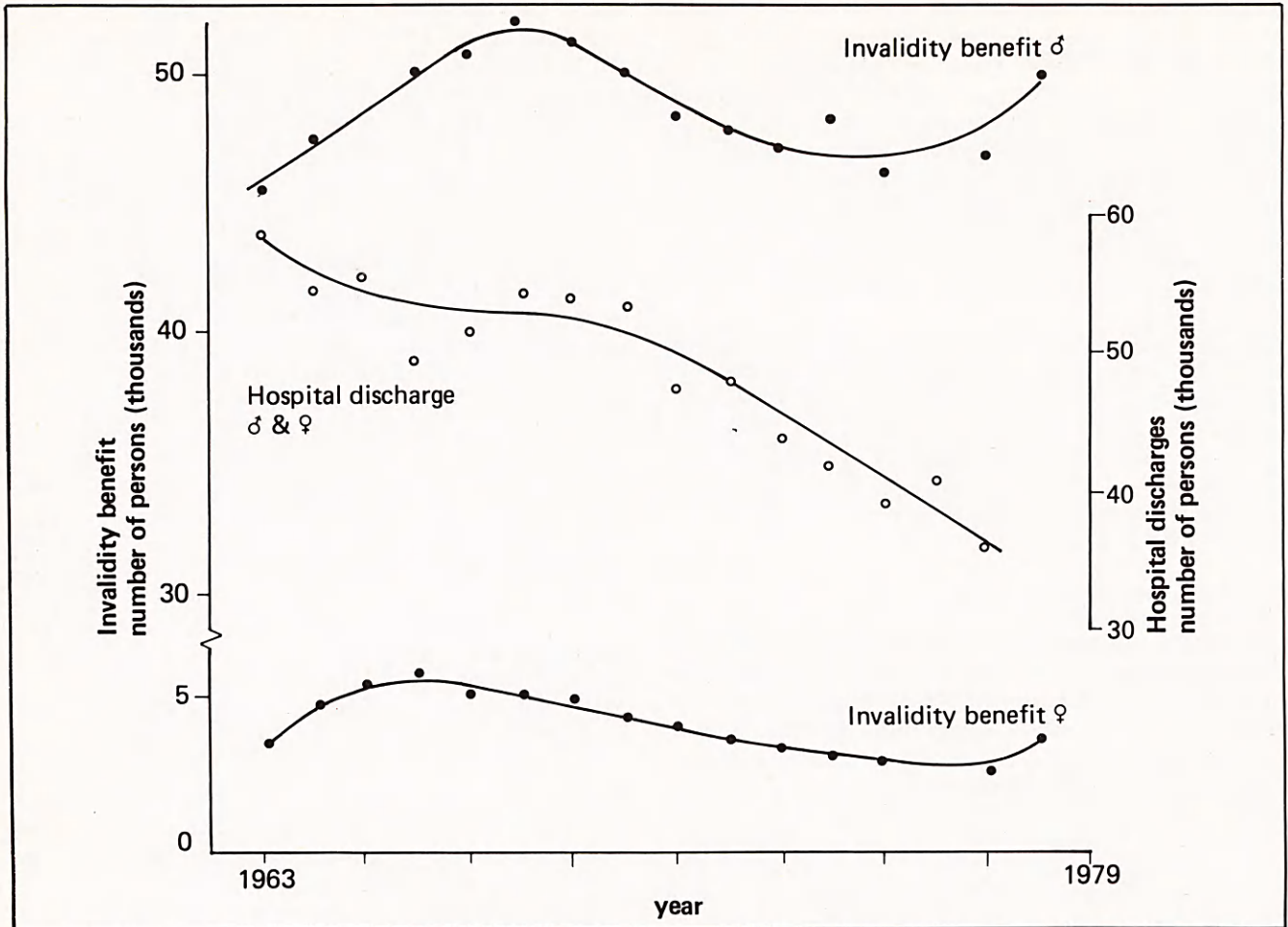


Fig. 1. Trends in long-term invalidity benefit (>6/12) and hospital discharges with diagnosis 'chronic bronchitis'. Great Britain[9, 10].

4.3 Implications and Need for Research

The continuing high social burden from chronic lung disease requires further investigation. It is not explicable in terms of changes in age structure of the population; indeed, our projections show that if present rates of invalidity benefit within age groups are maintained, the numbers will remain at their present level over the next decade. The high rate is not due to recurrent acute illnesses requiring hospital admission and it is not reflected in the mortality statistics for bronchitis and emphysema. It has been suggested to us that it reflects a change in social attitudes and expectations. For example, in some firms the number of days of work lost on account of bronchitis has increased since the time when continued payment of wages and salaries during illness was started. Alternatively, does much of the respiratory disability arise from associated conditions including airways obstruction without bronchitis? Both these hypotheses are probably partly correct. They should be investigated further by study of (a) the nature of the disability in a sample of people in receipt of invalidity benefit for chronic respiratory disorders; (b) the change in prevalence of bronchitis in general practice since the College of

General Practitioners' survey (para. 4.1 above); (c) the number and proportion of out-patient referrals due to chronic respiratory disorders, and (d) the definition of 'chronic bronchitis' as it is used in gathering statistics from in-patients in thoracic and general medical wards.

There is also a need to find practical means for reducing invalidity on account of chronic respiratory diseases both among those of working age and among the elderly. These aspects are considered in the next two sections. The support which the disabled person might receive is reviewed subsequently.

5. Prophylaxis

5.1 Smoking

The role of smoking as the principal cause of chronic lung disease including chronic bronchitis and emphysema is well-known. Its relative contribution is probably greater now than in the past on account of the progressive reductions in environmental and occupational pollution which have followed the Clean Air Act and the Health and Safety at Work Act. There is also good evidence that following abandonment of smoking there is a relative

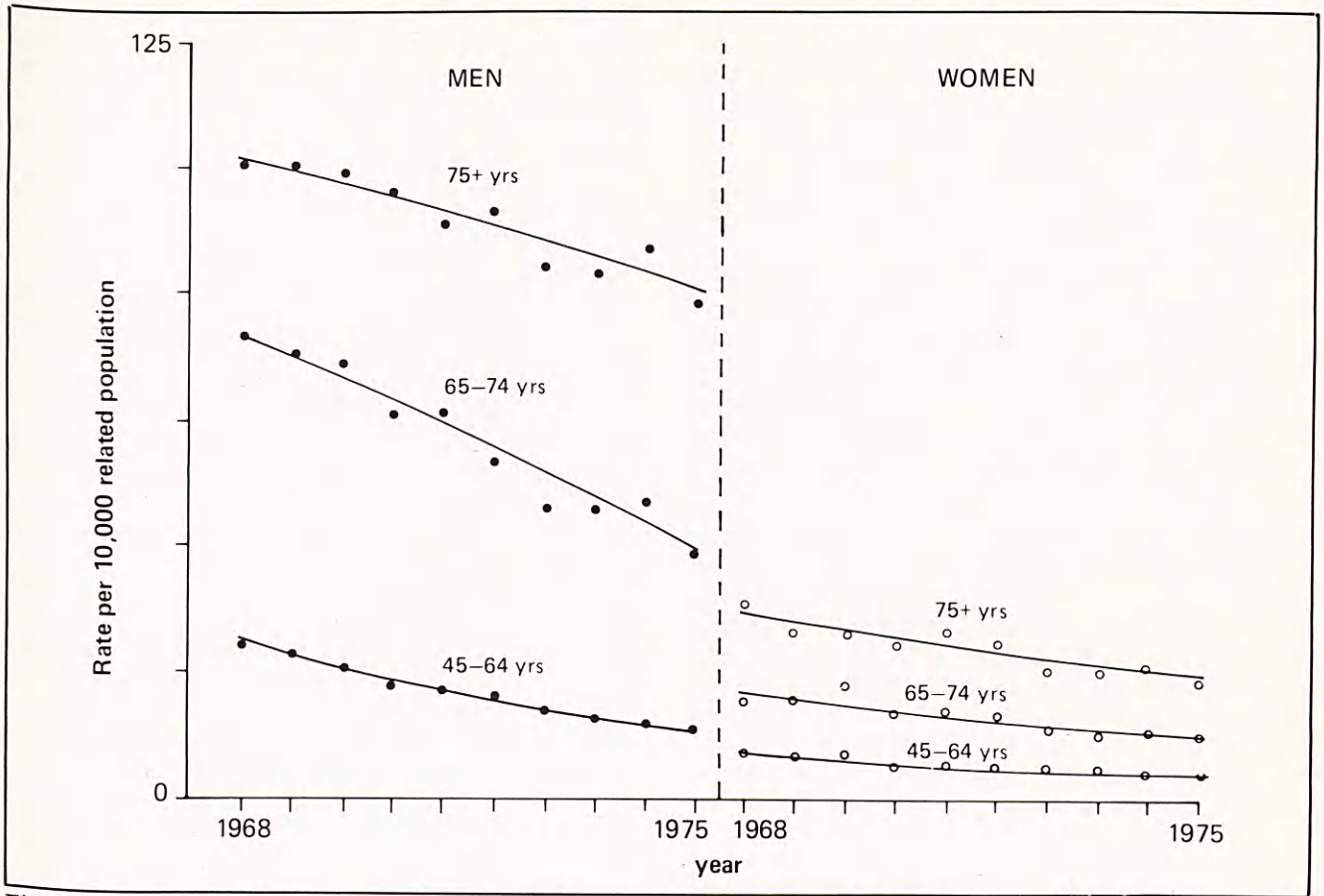
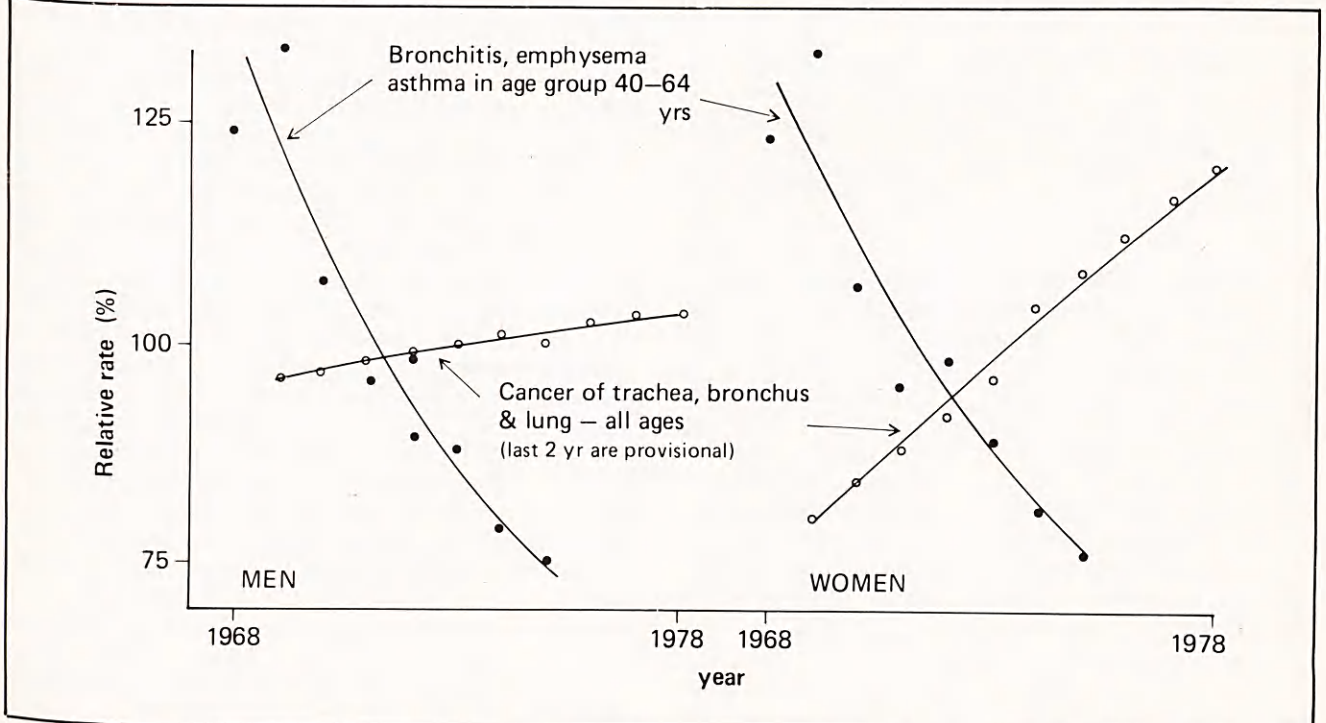


Fig. 2. Hospital admissions on account of chronic bronchitis and emphysema in England and Wales[10].

Fig. 3. Relative death rates in England and Wales (as percentage of mean rate per annum over the relevant period)[10, 11].



improvement in respiratory health. So far, safer smoking materials have proved unsuccessful, and the case for further reduction in cigarette smoking is overwhelming. However, despite the strenuous efforts by the College[12] and by the profession generally[13], there is little evidence that either the bulk of the population or their elected representatives are aware of the amount of tobacco-induced disease and that the remedy lies with themselves.

It is particularly disturbing that the consumption of tobacco, while decreasing among elderly men and those in social classes I and II, is increasing among women who are now tending to start smoking at an increasingly young age[14]. The effect of the latter trend is already apparent in the mortality statistics for cancer of the respiratory tract (see Fig. 3) but not yet in those for chronic bronchitis. The Working Party recognises that the problem is multi-factorial while the possible remedies are mostly non-proven. However, there is some evidence for the efficacy of the following measures.

Health Education. Awareness of the risk has led to striking reductions in tobacco consumption and tobacco-induced disease amongst many professional people, especially doctors[15]. Thus better health education will help. Relevant facts which should be better known are that at least 30 per cent of all smokers die of tobacco-related disease, maternal smoking harms the brain of the unborn child, parental smoking damages the lungs of the young child and example can be effective. For this reason amongst others teachers should not smoke on school premises and smoking on television and in films and plays should be further restricted. As well as in schools, health education should be extended in the NHS, in which the continuing high prevalence of smoking amongst nurses[16] remains a serious cause for concern.

Advertising. A total ban on tobacco advertising appears to have contributed to a reduction in the proportion of Norwegian men indulging in daily smoking from 52 per cent in June 1974 to 44 per cent in December 1977[17]. There is a strong case for a similar ban being applied in the UK for a trial period.

Fiscal Measures. There is good reason to believe that a doubling of the tobacco excise duty from its present relatively low level would materially decrease consumption while increasing the yield to the Exchequer[18]. This measure should be carefully evaluated and we recommend its adoption. At the same time cigarettes should be removed from their present incongruous place in the Cost of Living Index. Whole life insurance policies that fail to allow for the additional risk due to smoking are effectively providing a bonus for smokers at the expense of non-smokers. The College should consider with the industry ways of overcoming the practical difficulties that underlie this unfortunate situation.

Smoking in Industry. As compared to the occupational dusts and vapours, smoking is a major cause of respir-

atory disablement amongst workers in many industries, including foundries and coal mines[19,20]. It is also associated with a greatly enhanced risk of lung cancer in workers with asbestos[21]. The risk would be reduced by industry preferentially recruiting non-smokers and by actively encouraging smokers to desist.

Personal Advice and Treatment. For a patient to abandon smoking usually requires an awareness that tobacco smoke is a poison, an inducement which, in financial terms, should be made self-evident, and a stimulus which is usually a deterioration in health. The decision may be precipitated by advice and help from the general practitioner, occupational physician or consultant chest physician and reinforced by the activities of the respiratory health worker. Their roles are referred to respectively in paras 9.3 (c) and 9.4.

5.2 Environmental Pollution

Since the College report on this subject[22], the further progressive implementation of the Clean Air Act seems to have virtually eliminated air pollution as a cause of contemporary increased morbidity and mortality in London and other major cities[23]. Only once during the past ten years (in December 1975) has there been any cause for concern, but it remains possible that outdoor air concentrations of smoke and sulphur dioxide may occasionally reach levels high enough to exacerbate bronchitis in patients with respiratory impairment. Necessary ingredients are a large metropolitan area where, in the mid-winter months, the onset of anti-cyclonic conditions with almost no wind and clear sky may lead to temperature inversion and the accumulation of pollution at close to ground level. Were this to occur, public warnings should be issued by means of radio and television so that patients may take precautions, but no formal arrangements exist at present. Those who are at high risk should stay indoors where the concentrations of sulphur dioxide are relatively low on account of absorption into walls and furnishings; they should avoid heavy exercise, as this materially increases the ventilation of the lungs.

Local risks may still be important, in particular high concentrations of smoke or sulphur dioxide may occur as a result of faulty flues or down draughts where solid fuel fires or boilers are in use. Individual patients who appear to be affected in this way should be advised about checking the flue, improving the air supply to the fire, or substituting an alternative method of heating. Exposure to SO₂ may also occur when carrying hot ashes away from such fires. One social group who may be at above average risk on this account are coal-miners and their wives who both have a relatively high incidence of bronchitis and consume on average per household six tons of solid fuel p.a., representing 20 per cent of domestic consumption, compared with 2.5 tons for other domestic users[24].

Indoor pollution by cigarette smoke is a confirmed cause of respiratory ill health in young children (para. 5.4) and there is some evidence of its harmful effects in adults[25].

Exposure to tobacco smoke accentuates air flow obstruction in many respiratory cripples and is a factor reducing both social intercourse and the likelihood of remaining at work. With a view to helping these people and also for its protective and educational value, the no-smoking rule which at present applies to the lower deck of double-deck buses should be extended to single-deckers. It should also be applied in governmental and related offices which serve the general public, including Post Offices, Social Security offices and Job Centres. There should be more smoke-free zones in factories, offices, restaurants and places of entertainment.

5.3 Occupational Air Pollution

Dusts and fumes in the working environment are a cause of chronic air flow obstruction[20], but the size of the effect is difficult to quantify as it seldom occurs in isolation from other predisposing factors. It is usually only apparent in large-scale studies and may be additive with that due to smoking, or exhibit either positive or negative interaction. The nature of this relationship is at present a topic for research. Those who are exposed to known hazards may be protected by abandonment of smoking and by proper control of the working environment (para. 9.5 (2)). In addition, there is need for vigilance against the emergence of new hazards. Particular attention should be paid to air flow obstruction specifically related to the work place since so-called occupational asthma is usually greatly ameliorated by simple measures of industrial hygiene.

5.4 Predisposing Factors in Childhood

The chain of events linking chronic respiratory disease in adult life with childhood experience is not yet complete. However, there is now good evidence of an association between childhood respiratory infections and place of residence, social class, family size and parental smoking in the first years of life. There is also an association between such infections and respiratory symptoms in early adult life[26]. Thus, improving the child's home circumstances and parental abstinence from smoking are likely to have a beneficial effect on respiratory health throughout life. Effective treatment of childhood respiratory illnesses should also be of value. The illness most closely linked with the subsequent development of respiratory disability is acute viral bronchiolitis, which is often caused by respiratory syncytial virus[27]. This should be amenable to prophylactic immunisation of mother and child but there is as yet no satisfactory antigen. In addition, acquired immunity from natural infection appears to vary widely from one child to another, both absolutely and with respect to the age at which the production of antibodies becomes effective. Research into this topic is urgently needed.

5.5 Individual Susceptibility

At the present time only a few adverse gene combinations have been identified but, with increasing vigilance and

improved techniques, their number will increase. The defects may be fairly major as in the case of cystic fibrosis, deficiency of alpha-1-antitrypsin and atopy. It is reasonable to speculate that more subtle defects may also occur, for example enhanced release of elastase from alveolar macrophages, as occurs in smokers[28], or enhanced susceptibility to released proteolytic enzymes; in this context it is relevant that cigarette smoke inhibits the activity of anti-proteolytic plasma protein fractions[29]. There may also be differences in the production and binding of antibodies and other components of immunological defence. Study of these processes should be promoted with a view to improved management of those at risk.

6. Prevention of Acute Episodes in Patients with Chronic Bronchitis

This is an appropriate objective in view of the associated morbidity and mortality, but there is no convincing evidence that acute episodes aggravate the long-term progression of air-flow obstruction[7,30]. In addition, obvious bacterial or viral infection is present in less than 50 per cent of exacerbations, but the only active measures that can be proposed are those directed against such organisms.

6.1 Active Protection by Immunisation against Bacteria

This is theoretically attractive but results so far are disappointing. Vaccines against *Haemophilus influenzae* and *Staphylococcus aureus* are not yet satisfactory. An improved vaccine against many strains of pneumococcus is available and now undergoing clinical trial[31].

6.2 Immunisation against Viruses

Immunisation against common cold viruses is of no practical value, but that against influenza using killed virus is widely practised. Trials of its efficiency in patients with chronic bronchitis have mostly been negative[32]. However, in the only double-blind study that has been reported benefit was observed[33]. There is need for a full trial since (a) the level of acceptance of the vaccine and the incidence of complications in these patients is not known, and (b) the effectiveness is unproven and often in doubt. Most exacerbations of chronic bronchitis are not due to influenza except when there is an epidemic; the killed vaccine is then at a disadvantage as it is directed mainly at viruses that have caused previous epidemics and not the current one. Partly for these reasons, user experience in the USA and by industry has not been uniformly favourable[34]. At the present time, for patients who have material respiratory disability, there is a limited case for annual immunisation using killed vaccine, but a better alternative is needed.

Live attenuated vaccine given by nasal installation[35] is flexible in that a vaccine against a new virus strain can be produced within a few months. However, in patients with chronic bronchitis a dose which provides immunity frequently causes clinical infection and may impair res-

piratory function for several weeks after inoculation[36,37]. It cannot be recommended at present for these patients.

6.3 *Mycoplasma infections*

For infections with these organisms killed parenteral and live attenuated vaccines have been tried out but so far without success[38].

6.4 *Prophylactic chemotherapy*

Bacterial infection. The need for long-term continuous prophylactic chemotherapy is questionable. Amongst patients with respiratory disability the majority do well with courses of antibiotics taken at the onset of an exacerbation. This is consistent with an early finding that long-term chemotherapy shortens the duration of exacerbations but does not reduce their number[39]. Long-term therapy should only be used for bronchiectasis and for failures of reserve course policy (para. 7.3).

Virus infection. There is no specific chemoprophylaxis. The case for low dose antibacterial chemotherapy to reduce subsequent bacterial infection after a common cold[40] should be looked at further.

7. Treatment for the Patient with Chronic Chest Disease

Chronic respiratory disability develops insidiously and patients often do not receive treatment that could benefit them. Both patients and physicians have low expectations of what may be achieved and there is an urgent need to raise these if rehabilitation is to be effective. The procedures that should be considered are discussed below. In addition, the patient should abandon smoking (paras 5.1, 9.3 (c) and 9.4).

7.1 *Prevention or Reversal of Bronchoconstriction*

The reversibility of bronchoconstriction should be assessed in every patient using a selective β -adrenergic stimulant drug. An improvement after 10-60 min or after one or two weeks in the peak expiratory flow rate, forced expiratory volume, forced vital capacity or exercise tolerance is an indication for continued therapy. Slow release theophylline preparations are often a useful adjunct. An inadequate response should lead to a similar trial of corticosteroid drugs administered initially by mouth, and, if the trial is successful, also by inhalation. Subsequent dosage should be adjusted to secure clinical benefit without complications.

An atropine analogue drug which is locally active by inhalation is often of value for patients with chronic obstructive bronchitis either in preference or in addition to a β stimulant. Sodium cromoglycate may be of use for subjects with variable airways obstruction, including exercise-induced asthma.

The drugs will normally be administered as aerosol or

small particles from a suitable dispenser and adequate instruction should be given on its use. For a few very disabled patients a nebuliser driven 'by compressed air[41] or coupled to a positive pressure ventilator (wet nebulisation) may be of value. There is need for further assessment of the usefulness of these procedures.

7.2 *Weight reduction*

An excess of body fat is a common contributory cause of breathlessness and has the advantage of being correctable without medication. Dietetic advice is essential and progress should be monitored. Slimming may be assisted by joining 'Weight Watchers' or a similar organisation.

7.3 *Chemotherapy*

It is common practice to prescribe antibiotic drugs for any acute exacerbation characterised by mucopurulent sputum production not due to eosinophilia. However, the clinical benefit is often marginal. Chemotherapy is usually of value for infections which give rise to fever or leucocytosis, or in which there is radiographic consolidation.

Patients who respond but are subject to frequent acute episodes should be supplied with a reserve course of antibiotics to take at the onset of infection before they have made contact with their general practitioner.

7.4 *Physical Clearance of Secretions*

Among patients with chronic bronchitis help with clearance of secretions should be given to those who produce much sputum or who have difficulty with expectoration; patients experiencing an acute episode and those without material airways obstruction probably benefit little, but experience varies between centres and further research into methods is desirable. Patients with cystic fibrosis clearly benefit, as do most patients with bronchiectasis.

Though instruction is usually given by physiotherapists, surveillance could be one of the duties of the respiratory health worker (para. 9.4).

Favoured techniques are—

- (a) forced exhalation technique comprising deep inhalation, controlled coughs (huffs) combined with chest compression and interspersed relaxed breathing[42];
- (b) posture for draining relevant segments of the lung with or without inhalation of a bronchodilator aerosol[43];
- (c) intermittent positive pressure breathing, especially for patients who are unable to perform the manoeuvre of controlled coughing. Research is needed into the mechanisms with a view to identifying the patients most likely to benefit[44].

7.5 *Diuretics*

Oedema associated with chronic chest disease is usually a complication of cor pulmonale. Frusemide or thiazide diuretics are useful and oxygen may have a synergistic effect in severe hypoxia. Spironolactone given along with a thiazide diuretic may be helpful in resistant cases.

Between acute episodes the oedema may be controlled by low dose maintenance therapy.

7.6 *Mucolytic Drugs*

Sputum viscosity is reduced and the volume increased by use of active mucolytic drugs which might be expected to assist the clearance of secretions. In practice, any long-term benefit has still to be established and there is a need for controlled trials of this form of treatment.

7.7 *Antitussive Agents*

Excessive unproductive cough is debilitating, disturbs sleep and is a cause of syncope. If not relieved by the remedies described above, it may be treated with centrally acting antitussive drugs. However, these are narcotics and have notable adverse effects.

7.8 *Oxygen Therapy during Acute Exacerbations*

In an acute exacerbation of chronic bronchitis the increased hypoxaemia is often accompanied by acute-on-chronic CO₂ retention. The patient should be treated in hospital where the hypoxaemia should be relieved preferably by controlled oxygen therapy; e.g. 2 litres/min by nasal prongs or Edinburgh mask or with a 24 per cent or 28 per cent Ventimask. Subsequent therapy is best controlled by repeated blood gas analysis[45]. If severe respiratory acidosis develops (e.g. arterial pH below 7.25, or [H⁺] above 56 nmols/litre), it should be treated with respiratory stimulant drugs (e.g. doxapram), or intermittent positive pressure ventilation (para. 7.9) to supplement the primary treatment, which is inevitably somewhat hazardous in patients with severe CO₂ retention. Cough mixtures containing antihistamines, analgesics and tranquillisers are dangerous, as they may depress respiration.

7.9 *Intermittent Positive Pressure Breathing (IPPB)*

For acute hypoventilation and during an acute exacerbation of chronic bronchitis, when conservative measures are seen to be failing, intermittent positive pressure ventilation (IPPV) through an endotracheal tube may be life-saving[46]. By contrast, for patients with chronic air-flow obstruction who are breathing spontaneously, intermittent positive pressure breathing (IPPB patient-triggered) is of debatable value. No studies exist in which different devices have been compared and in only a few has the assisted ventilation aspect been separated from its use as an adjunct to bronchodilation. During treatment the arterial blood gases are 'improved' but the effect is transient[47]. There is no objective evidence that IPPB affects the duration of acute exacerbations[48], though there is anecdotal evidence of improved clearance of bronchial secretions by controlled coughing in a few very disabled patients (para. 7.4). Research into mechanisms would be worth while.

For the alleviation of disablement due to chronic airflow obstruction, the long-term use of IPPB appears to

be of very limited usefulness[49,50]. However, some patients find that it helps their dyspnoea and become dependent to the extent that they bring their ventilator with them into hospital. There is a need for further research to establish a consensus of opinion on this potentially very expensive form of therapy (para. 7.1).

IPPB may be used with more confidence in patients with neuromuscular disorders affecting the thoracic cage and with kyphoscoliosis of skeletal origin, in which it often has a beneficial effect[51,52].

7.10 *Long-term Oxygen Therapy*

As well as for acute hypoxia (para. 7.8), controlled oxygen therapy is effective for chronic hypoxia in patients with lung disease complicated by cor pulmonale. For these patients a dose of 2 litres/min by nasal prongs for 15 hours per 24-hour day has been shown in a controlled study to lower red cell mass, arrest deterioration of the pulmonary artery pressure and, in the long term, to prolong survival[53]. In another study of patients with similar disease, continuous oxygen therapy had a better effect than 12 hour nocturnal oxygen on pulmonary vascular resistance, mortality, and frequency and duration of hospital admissions[54]. However, not all patients benefit, and treatment should be managed by a consultant physician. The high cost of cylinder oxygen is a material constraint which may be greatly reduced by the alternative use of an oxygen concentrator (para. 9.8 (b)).

The theoretical hazards of CO₂ retention, pulmonary oxygen toxicity, fires, explosions and other accidents have not been a problem and the treatment may now be recommended for these patients.

In some bronchitic patients, particularly those who are cyanosed and oedematous, pulmonary hypertension is aggravated by nocturnal sleep hypoxaemia[55]. The hypoxaemia may be corrected by controlled oxygen therapy (para. 7.8); additional studies are needed to find out if the treatment can prevent a further rise in pulmonary vascular resistance.

7.11 *Management of Secondary Polycythaemia*

Secondary polycythaemia is evidence of chronic hypoxaemia due to ventilation perfusion inequality or hypoventilation, including that due to nocturnal obstruction of the upper airway. The primary treatment is of the cause. Supportive treatment is directed to reducing the red cell mass by one of several modes, especially oxygen therapy (para. 7.10). Phlebotomy may reduce the risk of vascular thrombosis but the case for its use is not proven.

7.12 *Treatment of Depression*

Depression and anxiety are common complications of chronic lung disease and, when present, aggravate the handicap[56]. The severity is often related to that of the underlying pulmonary disease, but it may respond dramatically to appropriate treatment.

8. Aids to Increased Activity

The basis for rehabilitation is effective clinical treatment by remedies described in earlier sections of this report. Measures to increase activity may also be applied.

8.1 Breathing Control

Patients with chronic air flow obstruction have several interrelated abnormalities that may interact to their disadvantage. Intrinsic airway narrowing may be alleviated to some extent by an increase in lung size, yet the increased resting lung volume increases the respiratory work. A raised intrapleural pressure during expiration due to airway obstruction contributes to dynamic compression of unduly compressible airways. An attempt to maintain curvature of the diaphragm by abdominal wall contraction can interfere with the normal and economical outward relaxation of the anterior abdominal wall during inspiration. If one feature predominates it may respond favourably to an appropriate alteration in the pattern of breathing; the following approaches should be tried—

(a) Relaxation of the accessory muscles with attention directed to expanding the lower costal margin and not to elevating the upper rib cage; the anterior abdominal wall is allowed to protrude forwards synchronously with inspiration.

(b) Adoption of a slow frequency of breathing.

(c) Raising the resting respiratory level by aiming to terminate each expiration a little prematurely.

Procedure (a) is common to most schools of physiotherapy and many patients find it helpful. Procedure (b) is widely used and has been shown in several studies to result in improved blood gas tension; however, opinion is not unanimous and patients do not necessarily find it comfortable. Procedure (c) is directed mainly to patients with emphysema and is experimental. Objective assessments of these techniques have produced few results that would encourage their continued use[57]. However, the criteria of benefit have usually been in terms of indices of respiratory function. There is also need to look at exercise performance.

8.2 Exercise Training

General Exercises. In patients with chronic respiratory disability there is now abundant evidence of a favourable response to exercise training[58-60]. The subject feels better, the maximal distance which he or she can walk in 12 minutes is increased and the stride is lengthened. There is no material change in lung function. The training can take any of a number of forms, including walking, jogging, cycling or stepping, or more organised activity such as swimming or gymnastics. Sport and creative activities including gardening do not appear to have been investigated. The duration should be at least six weeks and the exercises should initially be supervised by a physiotherapist or physical educationalist. Maintenance of the improvement is conditional on the exercise being continued, and the furtherance of this should be

one of the roles of the respiratory health worker (para. 9.4). The optimal response may be expected in a well-motivated individual whose ventilatory capacity (FEV) is 30-50 per cent of the reference value and who, during the performance of test exercise, exhibits cardiac and respiratory frequencies which are high relative to the physical dimensions and the rate of energy expenditure. Very breathless patients often secure similar benefit by performing the exercise while breathing oxygen.

Training the Respiratory Muscles. Recent work suggests that endurance training of the respiratory muscles against an external inspiratory resistance or by volume loading with hyperventilation increases the maximal sustained ventilatory capacity; this then raises the capacity for exercise by increasing the maximal exercise ventilation[61,62]. However, controlled studies are needed to confirm the observation and to exclude possible harmful effects.

8.3 Walking Aids

Local experience suggests that use of a walking trolley fitted with large wheels, arm troughs and oxygen cylinder (Fig. 4) may materially increase the walking distance[63]. Favourable factors include a subject who is determined and otherwise healthy, a reasonably smooth terrain and a sympathetic local community, including the children. At the present time trollies are modified from existing equipment on a one-off basis, as demand is considered insufficient to justify manufacture. However, the potential usage could be many thousands and further trials are necessary.

8.4 Oxygen during Exercise

Portable oxygen has been shown to improve the exercise tolerance of patients with severe respiratory insufficiency (FEV<1 litre)[64] but the equipment is not readily available on the NHS. This has led many chest physicians giving evidence to the Working Party to recommend that more resources be devoted to this treatment. The procurement of oxygen concentrators, which may form the basis for a domiciliary piped oxygen supply, is considered below (para. 9.7 (c)). Portable oxygen may be provided from small cylinders (e.g. BOC Portogen) or from liquid oxygen dispensers (Linde oxygen walker or liberator stroller system). The former are relatively cheap but re-charging is expensive. The latter are more expensive and require a home delivery system for liquid oxygen, which, in the UK, only exists on an experimental basis.

In addition, the improvement in exercise tolerance is offset by the energy cost of carrying the equipment unless a trolley is used. In smokers the improvement is also offset by the reduced blood oxygen capacity resulting from the presence of carboxyhaemoglobin[65]. Thus there is need for further study of the effects of oxygen on breathlessness, including the efficiency and safety of oxygen systems themselves. Meanwhile, individual patients should only be prescribed portable oxygen systems after objective assessment has shown that benefit occurs when breathing

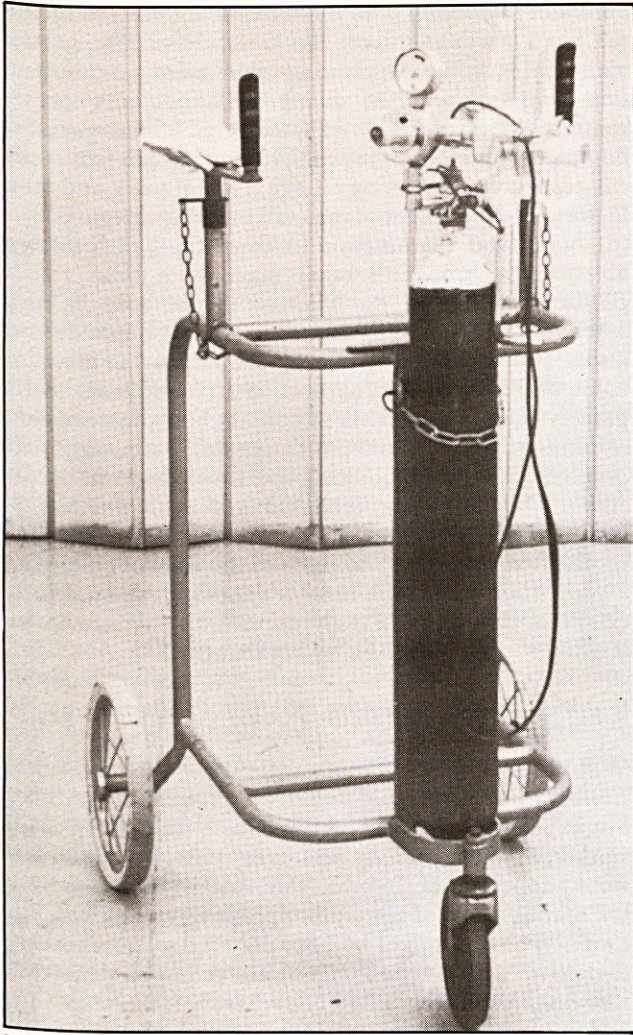


Fig. 4. Walking trolley with oxygen cylinder.

air and oxygen. Portable oxygen is unlikely to be of benefit to habitual cigarette smokers.

9. Providing Effective Help for Those in Need

9.1 Objectives

At all stages in the course of chronic lung disease effective help is needed. In the earliest stage of chronic cough and sputum production or of minimal airflow obstruction when the affected person considers himself healthy (Stage 1) the help should ideally take the form of identifying him [66] and securing a change in life-style, with a special emphasis on smoking and the other factors considered in Section 5. At an intermediate stage, when there is evidence of above average decline in ventilatory capacity, some breathlessness on exertion [67] and loss of time from work (Stage 2), the need is to reinforce the earlier advice and, where appropriate, apply measures to prevent acute episodes of chest illness (Section 6). At a more advanced stage the breathlessness is severe enough to interfere with normal daily activity and work capacity (Stage 3). The

change to a sustainable job may be made successfully or the patient may have to become unemployed. He may be subject to repeated chest infections. Now the earlier advice and prophylactic remedies must be supplemented by active treatment (Section 7) and by help with employment. Finally, the symptoms become too severe to permit work requiring physical activity and normal daily activity becomes very difficult or impossible (Stage 4). At this stage the patient is likely to have experienced one or more episodes of acute respiratory or congestive cardiac failure. The need now is to enhance the quality of life with active medical treatment, to reduce hospital admissions with long-term oxygen and other measures and to increase exercise capacity using some of the techniques listed in Section 8. In addition, throughout this progression, there is a need to identify those who are deteriorating rapidly with a view to their receiving special attention.

9.2 Difficulties

Ideally, the affected person should recognise his symptoms at an early stage, but he often fails to do so. The reasons include—

- (a) The insidious onset and a low level of health expectations due to the high prevalence of respiratory symptoms in some sections of the community.
- (b) Ignorance that anything can be done, or reluctance to accept the self-discipline and willingness to change that are essential ingredients of self-help, particularly in abandoning smoking.
- (c) Low expectation of a satisfactory outcome by both patients and members of the health care professions, sometimes partly due to unfamiliarity with modern treatments, and sometimes reflecting the outcome of previous unsuccessful attempts to help individual patients both directly and through the social and employment services.

These difficulties arise in part from the nature of chronic lung disease, especially chronic bronchitis. It affects mainly those in social classes IV and V and gives rise to a conspicuous cough which is socially distasteful, while the accompanying breathlessness, which should stimulate supportive action, is unrecognised because it occurs mainly on exercise. The condition is known to be often partially self-induced by smoking. Those who are affected do not help themselves either individually or corporately. There is no strong social pressure group acting on their behalf, except in the cases of the occupational lung diseases and cystic fibrosis which between them only contribute a small proportion to the total morbidity. In addition, the chronicity of the disease, its largely unpredictable variability, the often poor qualifications for suitable employment of those who are affected, and the present depressed state of the employment market all militate against effective help by those who are in a position to give it. Many of the services available are not used effectively by this group of patients. This is partly a consequence of services being intended primarily for other needs.

Against this background the first need is to identify the potential respiratory patient at a time when both the

illness may still be reversible and the affected person will wish to co-operate in treatment. The advice and help which are given should then yield an optimal return in personal and economic terms. In addition, the opportunity should be taken to find out to what extent the natural history of the disease can be altered.

9.3 Identifying the Potential Respiratory Patient

Identification may be by the person's voluntary action, through epidemiological or industrial surveys, by works' medical officers conducting pre-employment, periodic or post-sick-leave examinations and through the medical services, including general practitioners and hospital physicians. A few may be identified from their health records at school or during higher education, while others might be spotted by the social services of the Department of Employment's medical and rehabilitation services. However, despite these opportunities, many candidates go undetected or, if they are identified, they may decline to accept help. The following points clarify and indicate how the position might be improved.

(a) The low level of voluntary action is part of the apathy to which reference has been made above. Its reversal requires both a change of attitudes and appropriate resources. There is need for more postgraduate medical education, including some directed specifically to the prescribers of obsolescent remedies, health education, including some linked to the campaign to mitigate the harmful effects of smoking, and more publicity through voluntary organisations and through places of work. The DHSS and appropriate charities should be asked to collaborate with others in the production and distribution of appropriate educational material. This might be directed in part to those who are affected, their families and acquaintances.

(b) The conduct of an epidemiological or occupational survey and other medical examinations related to employment carry an obligation to give guidance to individuals via their general practitioners on aspects of health revealed by the investigation. It is desirable that this responsibility is accepted in the case of subjects with airflow obstruction as well as for those in whom the condition is already widely recognised as carrying an immediate hazard (e.g. high blood pressure).

(c) Periodic medical examinations in employment, which include measurement of lung function, despite being recommended by the International Labour Organisation, are usually applied only where there is a special indication, as with members of mine rescue brigades and certain categories of the staff of British Rail. Thus such examinations cannot yet make much impact on the problem. Periodic examinations by general practitioners could be more rewarding since it is estimated that, on average, a doctor sees every patient on his or her list at least once every two years. We recommend that attendance at surgery by adult male patients be used for a brief check on respiratory health, including advice on smoking[68,69]. In addition, just as general practitioners now aim to measure the blood pressure of male patients over the age of 40 years, they should measure the peak

expiratory flow rate (PEFR) or forced expiratory volume (FEV_{1.0}). To this end the DHSS should supply each GP with one peak flow measuring instrument, and instruction in its use should be arranged. Patients in whom the result is significantly below the expected level should then be examined and appropriate action taken; this is discussed below. Depending on age, type of work and other factors, 10-30 per cent of men fall into this category[7].

(d) A medical examination in connection with sickness absence for bronchitis takes place at a time and in circumstances when the affected person may be most amenable to advice. For this reason the first episode after a specified age, say 40 years[7], should lead to measurement of PEFR or FEV_{1.0} and, if it is reduced, to the patient being referred via the local chest physician to a respiratory health worker with special responsibility for prophylaxis and rehabilitation. His or her role is discussed below. Similar remedial action should also be taken for all who are admitted to hospital with bronchitis for the first time. In some parts of the country, including a proportion where the need is greatest, the implementation of this proposal may require an increase in the staffing of thoracic medicine departments.

9.4 The Respiratory Health Worker

With the marked decline of tuberculosis, the tuberculosis health visitor has usually been transferred to other duties, but in a few centres she continues as a respiratory health worker, or a new post has been created to that end. There would appear to be an important role for such persons in the management of respiratory prophylaxis and rehabilitation. The post might be filled by a nurse, occupational therapist, lung function technician, or health visitor who was a non-smoker and had both experience of chest work and an appropriate personality. The post should be in the Department of Thoracic Medicine of the District General Hospital and have access to secretarial assistance. The work would be broadly based and include collaborating with general practitioners, health visitors, district nurses, physiotherapists, occupational therapists, dieticians, social workers and specialists in rehabilitation. Specific duties might include (a) keeping a case register of persons with chronic respiratory disorders, (b) promoting respiratory health education and practices among these people and their close family, especially with regard to smoking, (c) providing continuity of support in employment and during re-training, including contributing to the assessment of respiratory disability (para. 9.5(5c)), (d) assisting in domiciliary care of established respiratory patients, including the provision of accommodation without stairs, the ergonomics of living and the treatment listed in Section 7 above, (e) supporting corporate self-help by those with a respiratory handicap, including physical training (para. 8.2) and home industry, and (f) providing guidance through the bewildering network of health, social and re-employment services. Some of these duties should be performed at specialised clinics run by the respiratory health worker who would refer back to the consultant on aspects not so delegated; there are precedents for this in the management of tuberculosis

and patients with colostomies and ileostomies. Initially such appointments should be made on a trial basis and their success monitored by comparison with a control group. They should be a cost-effective means of both reducing the social burden from 'the English disease' and improving the quality of life of those who are affected.

9.5 Employment

(1) The onset of disabling disease affects employment, particularly if the job is physically demanding, if there is exposure to fumes or if it involves climbing many stairs or much travelling by public transport. Initially the onset may be concealed, as other workers may protect disabled colleagues from the more arduous tasks. Subsequently, when the condition is recognised, disabled employees in large firms may be accommodated in suitable work. Small firms may be unable to afford such re-deployment and, as a result, their disabled employee has to search for more suitable work and, if unsuccessful, draw unemployment benefit or sickness benefit. He may try job after job, frequently taking unsuitable work in an attempt to continue as the breadwinner of his family. Sooner or later he may settle for long-term invalidity benefit. The contrast between the diminishing number of hospital admissions for chronic bronchitis and the persistently large numbers receiving invalidity benefit (para. 4.1) suggests that many disabled people adopt this last course; the supposition is consistent with clinical experience, but needs to be explored further (para. 4.3).

(2) The Employment Medical Advisory Service (EMAS), as the medical branch of the Health and Safety Executive of the Department of Employment, is concerned with preventing ill health caused by work. EMAS also advises people with health problems about the type of work which might suit them and what they should avoid on health grounds. A staff of some 140 occupational health doctors and nurses conducts or supervises medical examinations on persons employed in potentially hazardous occupations and contributes to the work of the Employment Rehabilitation Centres (para. 9.5(3b)). Many organisations have their own occupational health service staffed by physicians and nurses who, because of their detailed local knowledge, are well placed to promote prophylaxis, assess and advise individuals, and influence conditions of work with a view to continued employment.

(3) The Manpower Services Commission (MSC) is responsible for helping those who whilst disabled are yet capable of some form of gainful employment.

(a) *Job centres* are successors to the Employment Exchange. They are usually attractively laid out and staffed, and endeavour to match the requirements of employers with those of persons seeking a change of employment or who are unemployed. However, it has been suggested to us that sufficient attention is not always given to the quality of the placements that are achieved.

(b) *The MSC* runs a network of 27 Employment Rehabilitation Centres (ERCs) which provide help for people who have been ill or are handicapped to return to working

fitness. ERC courses are run by a multi-disciplinary team with medical, technical and other staff and normally last six to eight weeks (range 3 to 26 weeks); they aim to improve physical capacity, restore confidence, and produce a considered and practical recommendation about the type of work likely to lead to permanent resettlement.

In the 6 months to September 1978, 371 (5.2 per cent) of the 7,037 persons who attended at the centres had a respiratory disability. Of these 27 per cent (i.e. 100 persons) were back at work or on a course of vocational training within three months, compared with 29 per cent for all participants. The drop-out rate, which was mainly on account of prolonged sickness absence or of being unlikely to benefit, was 16 per cent. This high figure appears to have been mainly due to referral being too late in the course of the disease. Lack of skill is frequently a contributory factor. More information is needed on the other factors.

Access to ERCs is through one of the MSC's 500 Disablement Resettlement Officers (DROs) or the Employment Medical Adviser at the ERC. Referrals from all sources are welcomed. About 70 per cent of applicants take up a place. The DROs have a responsibility for finding employment, but at present they are not always well informed about what jobs are suitable for patients with disabling chest disease nor effective in locating such jobs. They are not members of a professional organisation. The position may improve following the establishment of a DRO Training Centre at Leeds, but DROs should be given additional specialist training in the management of people with chronic lung disease. There is also a need for more specialist leaflets to supplement the one which has been prepared on cystic fibrosis.

(c) *Quota System.* The statutory requirement that firms with 20 or more workers must employ 3 per cent of registered disabled persons arose at the end of the Second World War when it was expected there would be many physically disabled ex-service men and women seeking employment. Fortunately these did not materialise in the numbers expected but the scheme has helped other disabled people. On 1st June 1979, about one-third of employers subject to the quota system achieved the 3 per cent. The proportion might be expected to rise to about two-thirds if all persons registered as disabled were taken on. This disparity reflects the present number of registrations as well as geographical differences in demand for and availability of suitable jobs, differences that make it inevitable that no national quota will meet local needs. In addition, some disabled persons, including a number known to the DROs, choose not to register, often for good reasons.

The scheme is clearly unsatisfactory, but has proved educational value and should not be scrapped until a better substitute is found. Other possibilities now being considered by the MSC include a voluntary policy, disclosure of companies' performance, and a financial pool which receives from employers who do not take up their quota and pays to those who exceed it. On balance there seems to be a need for retaining the present statutory responsibility, but with a variable quota to suit the number of disabled persons, additional inducements for

employers, and a procedure by which aggrieved persons may seek redress. An equal opportunities provision for disabled persons seems desirable. The Employment Protection Act in its original form discouraged employers from engaging disabled people; the recent increase in the qualifying period for security of tenure from six months to one year should reduce but not eliminate this disadvantage.

Designated employments supplement the quota scheme but only two employments have been reserved—car park attendant, which is unsuitable for those suffering from respiratory disability, and passenger electric lift attendant, for which there are very few vacancies.

(d) *The MSC* is currently publicising the employment potential of disabled people by means of the 'Fit for Work' campaign which stresses that disability does not necessarily mean inability.

(e) *Pensions and the Disabled*. The Occupational Pensions Board has received few reports of discrimination against disabled people who in general appear to be making pensions arrangements comparable to those of other workers.

(f) *Sheltered Employment*. The MSC provides financial support for sheltered workshops run by local authorities and voluntary bodies. Grants are made towards the cost involved in employing severely disabled people in these workshops—90 per cent in the case of voluntary bodies and 75 per cent in the case of local authorities, subject to a ceiling (provisionally £1,500 per severely disabled worker in 1979/80) which is adjusted annually. Grants of up to 75 per cent are also made towards items of capital expenditure. Remploy Limited, the major agent for providing sheltered employment, is wholly subsidised by the MSC. A further form of sheltered employment organised by the MSC is the Sheltered Industrial Groups (SIGs); these are small groups of severely disabled people working within ordinary industry or commerce but under special supervision.

(g) *Other Special Facilities*. The MSC will lend special tools to enable registered disabled persons to work alongside able-bodied people, it will make grants towards adaptations to premises or equipment, and will assist with excess fares to work for those who, because of disability, cannot use public transport for all or part of the journey. The MSC may also provide money to help registered disabled persons set up in business on their own account and they have a Job Introduction scheme which operates when a registered disabled person is qualified for a job but there is reasonable doubt about his or her ability to do it. The MSC will then pay the potential employer a sum of (at present) £40 a week for six weeks to engage the disabled person for that period on a trial basis. Since 1977, 3,300 people have been engaged in this way, of whom over 60 per cent have retained employment for six months after the end of the introductory period; it is not known what proportion had respiratory difficulties.

(h) *The Training Service Division of the MSC* provides financial support during participation in full-time residential training at a Skill Centre, College of Further Education, or Residential Training College for the Dis-

abled. The scheme has achieved remarkable success for disabled people generally. It has not yet made the important contribution which it could do to the management of the disabled patient suffering from a chronic respiratory disorder.

(4) The local authority Careers Service is responsible for providing vocational advice and guidance to young people, including those who are handicapped. The careers offices receive health reports from school medical officers but not all offices have the services of a Specialist Careers Officer, who deals exclusively with handicapped young people, and it has been suggested to us that the system only works well in some areas. However, the number of Specialist Careers Officers has increased in the last ten years. There may sometimes be a need for closer liaison with the local Disablement Resettlement Officer (see below).

(5) The Manpower Services Commission's flexible and comprehensive approach to employment is impressive and should be more widely known. However, it appears not to be particularly effective for patients with respiratory disability; the effect might be assessed by controlled trial. The difficulties are multiple. In addition to those mentioned above they include the following—

(a) Respiratory cripples are in general referred late in the course of their disease and often do not have the basic educational equipment required for most sedentary jobs. They often do not regard themselves as disabled, so may be unhappy working alongside others with a conspicuous handicap and unwilling to accept the drop in pay which this entails. Unpredictable attendance at work is also a problem.

(b) Many disabled persons, particularly any who are psychiatrically disturbed, have a compulsive urge to smoke and on this account are unsuitable companions for those with respiratory disability.

(c) Not all jobs subject to quota are at present suitable for people with respiratory disability. It is an advantage if the building is easy of access, within easy travelling distance of home, and has a clean atmosphere and if work can be performed by the employee at his own pace. Night-shift work is usually well tolerated, as are jobs which entail light activity. Such jobs often have the additional advantage of better long-term prospects than employment that is entirely sedentary. However, there is need for research into what jobs are actually preferred. Some turn out to have unexpected disadvantages, for example clock repairing, in which the fumes from paraffin used for cleaning the mechanism may irritate the chest.

The prospects for employment would be greater if the employee was free to exercise initiative, and if all employees were approachable on the same terms.

These objectives might be achieved if the employment subsidy was paid not to the sponsor but to the disabled man directly, subject to his having certified respiratory disability of a defined extent (see below) and being in employment.

The scheme should provide some financial incentive to the candidate who might reasonably expect to take home more money than when in receipt of social security

Trandate

labetalol hydrochloride

PRODUCT INFORMATION

PRESENTATION AND BASIC NHS COST

Trandate Tablets 100mg, 200mg and 400mg each contain labetalol hydrochloride, 100mg, 200mg and 400mg, respectively. In packs of 50 and 250. Basic NHS cost of 50 tablets, £4.54, £7.32 and £11.64, respectively. PL 0045/0106, PL 0045/0107 and PL 0045/0109. Trandate Injection: 20ml ampoules each containing 100mg (5mg/ml) labetalol hydrochloride. In boxes of 5 ampoules. Basic NHS cost £14.70. PLO045/0104.

INDICATIONS

Trandate Tablets are indicated for the oral treatment of all grades of hypertension, mild, moderate and severe. Trandate Injection is indicated when rapid control of blood pressure is essential.

DOSAGE AND ADMINISTRATION

Trandate Tablets:

Adults: The initial dosage should not usually exceed 100mg 3 times daily. Adjustment of dosage should be gradual. Most cases are controlled with 600mg per day or less, but severe cases may require up to 2,400mg daily. Administration should be after a main meal.

Trandate Injection:

Adults: When rapid reduction of blood pressure is essential a dose of 50mg of Trandate should be given by intravenous injection over at least one minute. This may be repeated, if necessary, at 5-minute intervals but the total daily dose should not exceed 200mg. Alternatively it may be given by intravenous infusion. For this 2 ampoules of Trandate Injection are diluted to 200ml with sodium chloride and dextrose injection BP. This is infused at a rate of 2ml/minute until a satisfactory response is obtained when the infusion should be stopped. For most patients the effective dose is from 50 to 200mg but in phaeochromocytoma up to 300mg may be necessary.

Patients should be in the supine position when Trandate Injection is given and they should not stand or sit up within 3 hours of administration. Once controlled, blood pressure reduction can be maintained with Trandate Tablets at a starting dose of 200mg 3 times daily.

Children: Not applicable.

For information on the use of Trandate with other drugs or for transfer to Trandate from other antihypertensive agents, see respective Data Sheets.

CONTRA-INDICATIONS, WARNINGS, ETC.

Trandate should not be given to patients with uncontrolled or digitalis-resistant heart failure, or with atrioventricular block. Caution is necessary in asthmatic patients or others prone to bronchospasm. Patients with severe liver damage will probably require lower doses of Trandate than usual. Unnecessary administration of drugs during the first trimester of pregnancy is undesirable.

Trandate Injection may cause excessive postural hypotension if patients are allowed to assume the upright position within 3 hours of administration.

Trandate Tablets may cause symptoms of postural hypotension if initial dosage is too high or increased too rapidly, but they are uncommon, except at very high doses, if used as recommended. Mild and usually transient side effects include: headache, tiredness, dizziness, depressed mood, lethargy, difficulty in micturition, epigastric pain and nausea and vomiting. Tingling in the scalp has occasionally occurred but is usually transient. Rarely, a lichenoid rash has been reported which disappears on drug withdrawal. Other skin rashes, blurring of vision, eye irritation and cramps have been reported but have been difficult to relate directly to Trandate treatment.

Warning: There have been reports of skin rashes and/or dry eyes associated with the use of beta-adrenoceptor blocking drugs. The reported incidence is small and in most cases the symptoms have cleared when the drug was withdrawn. Discontinuance of the drug should be considered if any such reaction is not otherwise explicable. Cessation of therapy with a beta-adrenoceptor blocking drug should be gradual.

Full prescribing information is available on request.



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benefit, be moderately attractive to the employer who would otherwise not go to the trouble and expense of engaging a disabled person, and economical to the State, as the subsidy would be less than the current rate of benefit. The interests of able-bodied persons would not be affected, as the scheme would only apply to those with objective evidence of disability. This would be confirmed by a consultant physician on the basis of a clinical consultation supplemented by periodic physiological measurements. The tests would be supervised by the respiratory health worker; their nature should be decided by a review body on the basis of research now in progress or contemplated.

This procedure would be simple and direct; it would have the further advantage of selecting for employment those who were highly motivated, and therefore most likely to correct the at present poor image of the respiratory cripple in the eyes of some employers, so preparing a way which others could follow. The implications of the proposal for persons disabled from other causes and the financial details should be the subject of separate enquiries.

9.6 Rehabilitation Centres

The NHS runs 18 medical rehabilitation centres in England; these mainly have a special interest in rheumatology, neurology or orthopaedics. There are six Miners' Rehabilitation Centres in England and one in Wales where priority is given to miners with orthopaedic problems or arthritis. The Miners' Rehabilitation Centre at Talygarn also takes patients with chronic lung disease, in collaboration with the MRC Pneumoconiosis Unit. Some of the centres, together with a few hospital departments, are designated as Demonstration Centres, which are centres of excellence for the teaching and practice of rehabilitation. None of these centres specialises in respiratory rehabilitation. This is surprising, since persons with a respiratory handicap originally constituted 40 per cent of those attending courses at Employment Rehabilitation Centres. That proportion has now fallen considerably but there is still an overwhelming need to establish one or more centres of excellence in respiratory rehabilitation within the specialty of thoracic medicine. The centres should preferably be sited in areas of high prevalence of chronic lung disease and be linked at the senior lecturer level with a local university. Such centres might initiate and appraise the scheme proposed in para. 9.5(5c) above, including the evaluation of jobs suitable for the respiratory patient and the development of certification procedures.

9.7 Financial Aspects of Disablement

Disablement is expensive on account of the time lost from work and the financial demands made on the National Health and Social Security Services. The local authorities also contribute towards sheltered employment, housing, travel and domiciliary care. Disablement causes poverty

to the individual, mostly through loss of wages and increased costs. The latter are subvented in part by the DHSS through grants to hospitals for purchase of equipment and through mobility and attendance allowances. It is desirable that policy in these respects be reconsidered.

(a) *Mobility Allowance*. The present regulations require that the applicant should be unable or virtually unable to walk. If interpreted literally this excludes all but people with bilateral leg amputations. Possible alternative criteria based on impaired function should be explored.

(b) *Aids to Mobility*. Portable oxygen equipment and walking aids fitted with arm rests and oxygen cylinders are available to departments of thoracic medicine as permanent equipment that can be issued on loan to patients. Both items have been shown to increase materially the mobility of selected respiratory patients but up to now they have not been used effectively. One deterrent has been lack of supervision; its provision should be one of the duties of the respiratory health worker. In addition, the equipment has been in short supply due to hospitals spending their equipment allowance on aids to diagnosis and management of the acute sick. A separate allocation should be made for the chronic sick. A third constraint has been that placed on general practitioners to be very economical in their prescription of oxygen. This constraint should be lifted in the case of oxygen for use with equipment discussed in this paragraph but not for the equipment itself which should continue to be supplied through departments of thoracic medicine. The list of items that may be prescribed for use in the home should also be reviewed.

(c) *Long-term Domiciliary Oxygen*. Two studies (para. 7.10) have shown beneficial effects in chronic obstructive lung disease (a) in hypoxaemic patients with cor pulmonale and (b) in hypoxaemic patients without significant hypercapnia. This treatment should now be made available to those who are likely to benefit. The oxygen is best administered from an oxygen concentrator which fractionates room air into its component gases. The equipment has a useful life of at least 10 years, but the cost is only that of six months' supply of cylinder oxygen delivered to the house. However, the money is spent on the purchase of equipment; this has the disadvantage that under present Treasury regulations the money comes from a closed budget whereas that for cylinder oxygen, which is prescribable through the NHS Oxy-tariff, comes from an open budget. With a view to providing an important clinical service in the most economical way these regulations should be changed.

9.8 Economic Cost of Long-term Care and Rehabilitation

The total economic cost is difficult to calculate with acceptable accuracy and any such calculation is probably of limited usefulness. However, the cost of alternative measures, including the proposals made in this report, are calculable and could be related to the financial savings procured[70]. This procedure might be used for

establishing priorities. The remedies would include all those listed in earlier sections. The health benefit associated with each of them might be measured in terms of improved exercise tolerance, relief of bronchitis and breathlessness, and life expectancy.

The economic implications of each treatment and its outcome has two components—

(a) Changes in real resources including (i) services provided by the NHS and local authorities (e.g. hospital primary care, social services, housing, etc.); (ii) costs falling on patients and helpers, and (iii) output of goods or services by the disabled person.

(b) Changes in taxes and transfer of resources, including taxes and National Insurance contributions, social security benefits, and other transfers such as charitable contributions, insurance policies, etc.

In the case of the proposed service by respiratory health workers (para. 9.4), the costs would include the direct costs of visits for which there would be an optimal strategy in terms of the number of follow-ups, and so on, and the yield in terms of reduction in smoking, prolongation of employment and improvement in health with consequent reduction in future NHS and local authority costs. The task of analysis is difficult but should be tackled. Initially it is proposed to conduct a cost-benefit analysis of long-term oxygen therapy using the material now available from the MRC's long-term trial of treatment of patients with cor pulmonale[53]. If this exercise is successful it is recommended that other aspects be examined, possibly in conjunction with the Department of Economics at the University of York.

Recommendations

1. Respiratory Invalidity

To understand why respiratory invalidity remains at a high level while respiratory illness is declining there is need to investigate (para. 4.3)—

(a) The nature of the disability in a sample of patients in receipt of invalidity benefit for chronic respiratory disorders.

(b) The trends in prevalence of chronic lung disease in the community and among out-patient referrals.

(c) Factors that influence the hospital diagnosis of patients with chronic respiratory disorders.

2. Tobacco-induced Disease

There is an urgent need to increase public awareness of the amount and personal and economic costs of tobacco-induced disease. Educational, financial and other measures which should be used to achieve this are described (para. 5.1).

3. Indoor Air Pollution

Health hazard from indoor air pollution by fumes from solid fuel fires and boilers should be investigated further (para. 5.2).

4. *Research into other Causes*

Research should continue into the contributions to subsequent respiratory disability of individual susceptibility, childhood illnesses and occupational air pollution (paras 5.3 to 5.5).

5. *Early Detection of Airflow Obstruction*

As a major contribution to early detection of airflow obstruction the DHSS should arrange for each general practitioner to receive one peak flow measuring device and instruction in its use (para. 9.3 (c)).

6. *Acute Episodes of Chest Illness*

Acute episodes of chest illness in patients with chronic bronchitis are proving difficult to prevent and more research is needed (paras 6.1 to 6.4).

7. *Medical Treatment and Rehabilitation*

(a) The general standard of treatment should be improved by postgraduate medical education and more research, including use of wet nebulisers, intermittent positive pressure breathing and nocturnal sleep hypoxaemia (paras 7.1 to 7.12).

(b) Equipment issued by hospital departments of thoracic medicine for use in the home should be budgeted for separately from that for use in hospital. Treasury regulations should be amended to permit the use of oxygen concentrators (para. 9.7 (b) and (c)).

(c) More research is needed into ways of increasing exercise performance in these patients, including training the respiratory muscles and the use of portable oxygen equipment (paras 8.2 to 8.4).

(d) With a view to appraising and promoting these and other developments, one or more medical rehabilitation centres with a special interest in thoracic medicine should be set up within the NHS (para. 9.6).

(e) A trial of the usefulness of appointing respiratory health workers with defined duties to departments of thoracic medicine should be undertaken (para. 9.4). The cost-effectiveness of this approach to therapy should be assessed (para. 9.8).

8. *Re-employment*

(a) Disablement Resettlement Officers should receive specialist training in the management of people with chronic lung disease (para. 9.5 (3b)).

(b) The present quota system for employment of registered disabled persons should be improved. An equal opportunities provision for disabled persons should be established (para. 9.5 (3c)).

(c) The practicability of changing the basis for payment of the employment subsidy for disabled persons from sponsors such as a local authority to the disabled person himself should be examined in detail, including developing a procedure for certification of patients with respiratory disability which might serve as a model for

patients disabled from other causes, and examining the financial implications (para. 9.5 (5c)).

9. *Cost-effectiveness*

The cost-effectiveness of these proposals should be assessed, starting with long-term oxygen therapy for patients with hypoxic cor pulmonale (paras 9.8 and 7.10).

Membership of the Committee on Thoracic Medicine and the Working Party

Committee on Thoracic Medicine

Sir Douglas Black, MD, FRCP (President), J. C. Batten, MD, FRCP (Chairman), T. J. H. Clark, MD, FRCP, K. M. Citron, MD, FRCP, S. W. Clarke, MD, FRCP, P. C. Elmes, FRCP, C. F. Hawkins, MD, FRCP, H. P. Lambert, MD, FRCP, D. H. Lane, A. D. Milner, MD, FRCP, J. E. Stark, MD, FRCP, G. M. Sterling, MD, FRCP, Margaret Turner-Warwick, DM, FRCP, S. Nariman, FRCPEd, J. F. Costello, MRCP(UK), G. K. Knowles, MRCP(UK) and T. K. Sweeney, MFCM (Observer, Department of Health and Social Security).

Working Party

J. E. Cotes, DM, FRCP (Chairman)

J. M. Bishop, MD, FRCP

*L. H. Capel, MD, FRCP

M. Caplin, FRCP

†D. C. Flenley, FRCP

P. Howard, FRCP

†D. J. Lane, DM, FRCP

*G. J. R. McHardy, FRCP

S. G. Spiro, MRCP(UK)

*in consultation with the British Thoracic Association

†in consultation with the Thoracic Society

Acknowledgements

The report was drafted by the Working Party, assisted by 85 individuals and organisations who kindly contributed evidence or commented on a draft of the report. They included Dr A. M. Adelstein, Professor C. Aitken, the British Thoracic Association, Mr A. J. Curtis, the Department of Health and Social Security, Dr J. Dick, Dr F. C. Edwards, Dr P. C. Elmes, the Faculty of Occupational Medicine of the Royal College of Physicians, Professor C. M. Fletcher, Dr M. Gimenez, Dr I. Gregg, Professor A. Guz, the Health and Safety Executive, Professor W. W. Holland, Dr J. Kay, Dr W. McIntosh, the Manpower Services Commission, Professor A. D. Milner, Dr K. N. Nichol, Dr P. D. Oldham, Dr N. B. Pride, Professor C. W. Potter, Dr M. A. H. Russell, Dr A. Seaton, the Society of Occupational Medicine, Professor Sir Charles Stuart-Harris, Dr T. K. Sweeney, the Thoracic Society, Dr R. E. Waller, Professor A. Williams and Mr D. Wishart. A full list of names and addresses is available from the College Secretary. Mrs P. E. J. Harding kindly provided secretarial assistance.

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