Oxygen concentrators in the home

Wrongly prescribed without expert advice

Respiratory failure is a common cause of death in chronic obstructive airways disease. The fall of arterial oxygen tension becomes important at values below 8 kPa (60 mm Hg); many patients develop hypercapnia, but it is oedema (when the combination is called cor pulmonale) that marks the turning point in the prognosis. If, however, the inspired air can be enriched with oxygen sufficiently to raise the arterial oxygen tension beyond 8 kPa survival is improved.

The Medical Research Council study carefully selected bronchitic patients with a forced expiratory volume of less than 1.5 litres in one second and an arterial oxygen tension less than 8 kPa who had had oedema with or without hypercapnia. They were then randomised into two groups. The first group was given oxygen through nasal cannulas at flow rates of about 2 l/minute for at least 15 hours a day, including during the night. The second group of patients were given merely the usual supportive treatment. After three years roughly half as many patients again in the first group had survived compared with those in the second. A second, American, study of patients given 12 hours of oxygen, largely at night, or 24 hours' treatment was stopped after just under two years because of the greatly enhanced survival in the latter group. Combining the results of the two studies showed clearly that oxygen had to be given for at least 15 hours a day to improve survival.

After these studies the health services of many Western countries were faced with implementing their implications. Several questions had to be asked about long term domiciliary oxygen treatment. How should it be given? How should patients be selected? And who was responsible for prescribing the oxygen, a consultant or a general practitioner?

The two national studies indicated that the oxygen concentrator, which separates oxygen from the ambient air, would be the cheapest and easiest means of supplying low flow oxygen for long periods during the day. Patients with bronchitis with an arterial oxygen tension of less than 7.3 kPa (55 mm Hg), hypercapnia, and oedema were the ideal candidates for treatment but there was less knowledge about its value in other patients—for example, those with respiratory failure from other causes such as fibrosis of the lung. Three categories were defined in the Drug Tariff; patients with obstructive airways disease, chronic respiratory failure, hypercapnia, and oedema (category 1); patients with obstructive airways disease and hypoxia but no oedema or hypercapnia (category 2); and patients with respiratory failure from other causes (category 3). All patients must be in a stable phase of their disease with persistent respiratory failure for at least three to four weeks.

In other countries the use of oxygen varies widely, from roughly 10,000 per 50 million of the population in France to as high as 50,000 per 50 million people in the United States. Nevertheless, all patients receive genuine long term oxygen treatment. In Britain we have no idea how many patients are likely to benefit, but in Sheffield a random survey of people over 45 showed that roughly three in 1000 had a forced expiratory volume of less than 1.5 litres in one second and an arterial oxygen tension of less than 7.3 kPa (55 mm Hg). If such a proportion is general throughout England and Wales then as many as 60,000 oxygen concentrators might be needed.

As long term oxygen treatment is a specialised treatment it was recommended that consultant chest physicians should assess patients for suitability. Nevertheless, as treatment was based entirely in the home general practitioners had an important role and the decision was taken that they would prescribe the concentrator, though they were urged to seek a consultant's opinion before doing so.

The service started in 1985, and several studies have now examined the outcome. Several weeks ago in the BMJ Walshaw and his colleagues reviewed 61 patients prescribed

Reduction of the risk seems to depend on even more complex care of the heart anaesthetic technology and technique, perhaps with the addition of positive protection to limit the damaging effect of any unpreventable cerebral ischaemia.

C M C ALLEN

Consultant Neurologist,
Addenbrooke's Hospital,
Cambridge CB2 2QQ

long term oxygen treatment in the Liverpool area. Some 34 of the concentrators had been installed on the recommendation of a consultant respiratory physician, 17 on that of the general practitioner without advice from a chest physician, and 10 on the advice of a general physician without respiratory experience. The prescription of oxygen by general practitioners without expert advice was inadequate: only three of the 17 patients had been told to use the oxygen for over 15 hours a day. Patients selected by respiratory physicians initially had arterial tensions of blood gases in the prescribed range, and all patients had advanced obstructive airways disease; in the other two groups few patients were sufficiently hypoxaemic. Finally, 12 of the 54 smokers continued to smoke despite advice not to do so. Thus overall only 18 out of the 61 patients fulfilled all the criteria for selection, use, and stopping smoking.

Similar results from three studies from other parts of Britain were presented to the Thoracic Society this summer. All confirmed the excellent service for the 5000 or so patients currently served by the three contracting companies providing, installing, and maintaining the equipment. Remarkably few patients criticised the arrangements.

Inevitably in introducing any new specialised treatment several difficulties arise. Logistically the service seems to have functioned remarkably well, but in our view the prescription of oxygen concentrators by general practitioners without advice should be stopped in favour of mandatory assessment by a chest clinic. A wise move would be to set up a monitoring body of general practitioners and chest physicians to oversee the service and provide information and education. Closar supervision in the home is needed and the commercial companies might be asked to help. Finally, given that Britain is not alone in facing these problems, there is much to be learnt from comparing the results of the different types of home based care and monitoring elsewhere in Europe—particularly since detailed national registers have been set up in Belgium and Sweden.

P BARDSLY
Lecturer in Medicine
P HOWARD
Reader in Medicine
University Department of Medicine, Royal Hallamshire Hospital, Sheffield S10 2JF

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