Patient selection and techniques for home mechanical ventilation

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Strategies and equipment for the treatment of patients with chronic respiratory insufficiency are developing rapidly. The Eighties have seen the widespread use of long-term oxygen therapy following the results of the two reference trials: Nocturnal Oxygen Therapy Trial (NOTT) and Medical Research Council (MRC) [1, 2]. The Nineties promises to be the decade of long-term mechanical ventilation. New techniques have been developed to reduce pulmonary ventilators to smaller, easy to use devices, requiring little maintenance and permitting home treatment. Most experiences in this field are recent, thus large case series, many yet uncontrolled, have been followed-up for only short periods. Nevertheless, the great interest in this topic and the lack of guidelines for both researchers and clinicians were clearly sensed by the working party of the European Respiratory Society (ERS) "Rehabilitation and Chronic Care Scientific Group" during the drawing up of the "Recommendations for Pulmonary Rehabilitation" [3].

The group decided to make a further contribution by organizing a consensus conference on "Patient Selection and Techniques for Home Mechanical Ventilation", with the intention of producing a document updating the knowledge in this area, giving indications about the different underlying diseases, rationale of treatment and methodological aspects. The Clinica del Lavoro Foundation, Pavia, Italy, supported a two day meeting in Arona, Italy, on February 7-8, 1991, the contributions to which are reported in the European Respiratory Review (ERR) issue published this month.

The increased costs of health and the attempt to improve the patients’ quality of life, especially of the so-called "revolving door" patients, has produced a real stimulus to the organization of home care services in recent years. Chronic respiratory failure can now be treated at home in the large majority of patients in a clinical and psychological steady-state. Overnight correction of blood gases is often sufficient to maintain adequate improvement during the day. Even 24 h ventilator-dependent patients can now live at home, with the assistance of relatives or other non-specialized carers. The option of mechanical ventilation outside hospital results in considerable cost savings and a substantial improvement in quality of life. A comprehensive and individually planned care programme is absolutely essential for the safe transition of a ventilator-dependent person from hospital to home.

Respiratory insufficiency is a pre-terminal event in a number of respiratory disorders, such as disturbances of respiratory control, chest wall diseases, parenchymal disorders. The universal consequence is an impairment of arterial blood gases, which mechanical ventilation attempts to relieve. Treatment strategies must be tailored to the underlying disorder.

Intermittent positive pressure ventilation through tracheostomy is the reference method. Introduced before the days of modern oxygen therapy, it improved by up to 30 yrs the survival of patients with normal lungs, but restricted by thoracic cage distortion or impaired neuromuscular function. However, it is an invasive method, cumbersome, psychologically difficult for the individual and demanding of strict medical supervision.

Negative intermittent pressure ventilation avoided tracheostomy and was widely used for historical reasons (i.e. the poliomyelitis epidemic in the 1950's), but nowadays is used less and less. Its effectiveness is proportional to the amount of the trunk enclosed in the device. Patient restriction is severe, and requires a complete submission to the machine. Upper airway occlusion often occurs at the end of inspiration, especially during sleep, partially hindering the benefits of ventilation or adding further problems and complaints.

Positive pressure assisted ventilation can now be applied non-invasively through a nasal mask. Despite air leaks around the mask or through the open mouth, this method of ventilation is likely to become the method of choice. In some diseases it will only delay tracheostomy, especially in progressive neurological disorders, or will support ventilation for a patient awaiting transplantation, before a donor becomes available. For many restrictive diseases, natural survival curves induce little optimism of benefit, but the method is relatively recent and studies are still in progress. A combination of different methods can sometimes lead to the best results, particularly in totally ventilator-dependent patients.

The common point of these methods is the delivery of a fixed tidal volume, therefore volumetric
ventilators are employed. Pressure support ventilation has recently become available for home treatment; less cumbersome than volumetric ventilation, it allows an easy synchronization of the patient to the device. Its indications are more restricted than the volumetric approach, but it may permit the treatment of disease at an earlier stage.

The problems are often seen differently and the management of patients differs from country to country. New technologies and controversial issues were discussed at the final round table, comparing different experiences and approaches to problems. A collection of directories for future research emerged. A section is in particular, devoted to the problem of training families to be carers and to the examination of the relationship between the respiratory specialist and general practitioner.

In summary, the ERR accompanying the current issue of the ERJ is not targeted simply to specialists involved in this area. Respiratory insufficiency is a problem involving all pulmonologists. The disorder affects both adults and children. We hope to have been able to provide information crucial to the decision-making process of diagnosis, management and care of those subjects who may now survive a little longer, spending a greater part of this time with their family.

References