

## Optimising the therapeutic use of oxygen in Australia

Christine F McDonald and Alan J Crockett

*We need a national register of home oxygen therapy*

Oxygen has been used for therapeutic purposes for centuries, but until relatively recently no scientifically rigorous trials had confirmed its true benefits. In the early 1980s, two landmark randomised trials — the Medical Research Council (MRC) trial and the Nocturnal Oxygen Therapy Trial (NOTT) — showed that continuous or semi-continuous oxygen therapy for between 15 and 24 hours a day provided a mortality benefit in patients with chronic obstructive pulmonary disease (COPD) and severe hypoxaemia.<sup>1,2</sup> Survival rates for those prescribed "continuous" oxygen (in reality about 19 hours per day) in the NOTT were around 80% at 2 years, compared with around 60% for the "nocturnal" group using oxygen for only 12 hours per day. In the MRC study, in which patients were randomly allocated to receive oxygen for 15 hours per day versus no oxygen, survival rates at 5 years were 67% versus 45%, respectively.

This evidence-based treatment is now enshrined in guidelines for managing chronic lung disease locally and worldwide. The Thoracic Society of Australia and New Zealand's position statement on home oxygen also suggests it may be beneficial for those whose resting daytime oxygen levels are satisfactory, but who experience oxygen desaturation only at night or only during exertion. However, the statement acknowledges the lack of a strong evidence base for use of home oxygen for either of these indications.<sup>3</sup> Research to bolster the knowledge base for use of oxygen nocturnally or during exertion, and to examine the effects on mortality of continuous oxygen therapy for patients with COPD and only mild hypoxaemia, was identified as a high priority at a recent workshop on oxygen therapy in COPD initiated by the United States National Heart, Lung, and Blood Institute.<sup>4</sup>

The MRC trial and the NOTT included only patients with COPD. The patients studied were predominantly men, aged under 70 years, and with few comorbidities. Today, patients commencing long-term oxygen therapy are often older and sicker, they frequently suffer from several other serious illnesses, and more women are affected than previously. Although COPD is still the most common reason for commencing home oxygen therapy,

many patients have lung diseases other than COPD. In 2004, the users of home oxygen in South Australia were reported to have a mean life expectancy of 2.9 years; this compared unfavourably with the life expectancy of a demographically similar French population of oxygen users (5.2 years),<sup>5</sup> and with the survival data from the original MRC trial and the NOTT. Although ethical issues would preclude conducting further randomised trials to confirm a survival advantage in *current* oxygen users, we should monitor the use of this intervention to maximise benefits as well as to inform future research.

Recent data suggest that nearly one in five Australians over the age of 40 years has COPD<sup>6</sup> and, with these numbers expected to rise as our population ages, the number of Australians requiring oxygen therapy will also increase. To maximise the mortality benefit, patients need to use their oxygen as prescribed — for at least 15 hours or more a day. The few studies of adherence to a home oxygen regimen have found adherence rates of only 40%–50%.<sup>7</sup> Understanding the difference between the use of oxygen to relieve dyspnoea (which may or may not occur), and its use for prolonged periods of the day to lower mortality by relieving hypoxaemia, requires intensive patient education. Accordingly, the distribution of oxygen should not (as, for example, has been the case in Victoria) occur simply as a component of an "aids and equipment program", with eligibility for oxygen therapy being determined in the same way as for wheelchairs and walking aids. Oxygen therapy should be regarded as drug therapy, with regular follow-up and clinical review required after prescription and distribution. An explanation for the higher mortality rates in South Australian oxygen consumers, compared with those in France, could be the home care and review program that French patients receive, which may enhance their survival.<sup>8</sup>

The article by Serginson and colleagues in this issue of the Journal (page 549) is very opportune,<sup>9</sup> coming at a time when the National Health and Hospitals Reform Commission has highlighted the fragmentation of our health system, with its complex divisions of funding responsibilities and performance accountabil-

ties between different levels of government.<sup>10</sup> Serginson and colleagues show that there is considerable variability in prescription rates of oxygen, costs of oxygen therapy, and types of oxygen services provided across different Australian states and jurisdictions. The total direct cost of oxygen therapy in Australia in 2005, to treat a little over 20 000 Australians, was estimated by these authors to be \$31 million. At the time of their audit, state government funding was not provided for portable oxygen therapy in Queensland and, in New South Wales, it was only available in some areas and for some patients. In New South Wales and Queensland, a means test was applied to determine eligibility for all types of oxygen therapy. Prescription rates were found to vary greatly, from 44 per 100 000 population in the Northern Territory to 133 per 100 000 in Tasmania. Explanations for the differences were not apparent from this important but retrospective observational study.

Much work still needs to be done to determine who benefits from oxygen therapy and whether those Australians currently using oxygen — and the community, as a whole — are getting the best value they can from this treatment. Serginson and colleagues call for a national register of domiciliary oxygen therapy.<sup>9</sup> Similar recommendations were made by the Australian Lung Foundation in their funding submission to Treasury in 2006.<sup>11</sup> We endorse these recommendations wholeheartedly. A scheme to monitor variability in applying guidelines; the use of and adherence to oxygen therapy; and the costs and clinical outcomes of oxygen treatment — both mortality and morbidity — is overdue. Are the disappointingly poor survival data reported from South Australia reflective of survival data in other states? Scrutiny of costs and benefits in health care is currently on the agenda, and taxpayers have the right to expect that outcomes will be reviewed in a systematic way to ensure best practice. It will be important to involve consumers in such a process; we have very little qualitative data about how Australians using home oxygen feel about their treatment. The available qualitative research suggests patients may consider oxygen therapy a burden and adhere poorly to recommendations regarding its use.<sup>7</sup> While we await the results of further studies examining the questions still to be answered about oxygen therapy, we should ensure that data about patients requiring oxygen in Australia are kept in a national home oxygen therapy registry, and that information regarding usage, adverse effects and outcomes is collected. This will enable prioritisation of resources and encourage high-quality research to inform future oxygen use.

- 2 Medical Research Council Working Party. Long term domiciliary oxygen therapy in chronic hypoxic cor pulmonale complicating chronic bronchitis and emphysema. *Lancet* 1981; 1: 681-686.
- 3 McDonald CF, Crockett A, Young I. Adult domiciliary oxygen therapy. Position statement of the Thoracic Society of Australia and New Zealand. *Med J Aust* 2005; 182: 621-626.
- 4 Croxton TL, Bailey WC. Long-term oxygen treatment in chronic obstructive pulmonary disease: recommendations for future research: an NHLBI research workshop report. *Am J Respir Crit Care Med* 2006; 174: 373-378.
- 5 Cranston JM, Nguyen AM, Crockett AJ. The relative survival of chronic obstructive pulmonary disease patients on long term oxygen therapy in Australia: a comparative study. *Respirology* 2004; 9: 233-242.
- 6 Buist AS, McBurnie MA, Vollmer WM, et al. International variation in the prevalence of COPD (the BOLD Study): a population-based prevalence study. *Lancet* 2007; 370: 741-750.
- 7 Ernest MA. Explaining adherence to supplemental oxygen therapy: the patient's perspective. *J Gen Intern Med* 2002; 17: 749-755.
- 8 Ludot A, d'Orbcastel OR. Home respiratory care. *Therapie* 2001; 56: 143-149.
- 9 Serginson JG, Yang IA, Armstrong JG, et al. Variability in the rate of prescription and cost of domiciliary oxygen therapy in Australia. *Med J Aust* 2009; 191: 549-553.
- 10 National Health and Hospitals Reform Commission. A healthier future for all Australians: final report June 2009. <http://www.nhhrc.org.au/internet/nhhrc/publishing.nsf/Content/nhhrc-report> (accessed Sep 2009).
- 11 The Australian Lung Foundation. Chronic obstructive pulmonary disease. Knocking the wind out of over one million Australians. A national approach to COPD. Funding submission, 2006. [http://www.lungfoundation.com.au/images/stories/docs/2006\\_n\\_budget\\_sub\\_final\\_alf.pdf](http://www.lungfoundation.com.au/images/stories/docs/2006_n_budget_sub_final_alf.pdf) (accessed Sep 2009). □

## Author details

Christine F McDonald, MB BS(Hons), FRACP, PhD, Director<sup>1</sup>

Alan J Crockett, PSM, MPH, Director<sup>2</sup>

<sup>1</sup> Department of Respiratory and Sleep Medicine, Austin Hospital, Melbourne, VIC.

<sup>2</sup> Primary Care Respiratory Research Unit, University of Adelaide, Adelaide, SA.

Correspondence: [Christine.McDonald@austin.org.au](mailto:Christine.McDonald@austin.org.au)

## References

- 1 Nocturnal Oxygen Therapy Trial Group. Continuous or nocturnal oxygen therapy in hypoxemic chronic obstructive lung disease: a clinical trial. *Ann Intern Med* 1980; 93: 391-398.