



Nocturnal Ventilation in the Home

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Home nocturnal intermittent positive-pressure ventilation (NIPPV) via a nasal or face-mask is being increasingly used¹ to treat patients with chronic respiratory failure. The technique was first developed to help patients with neuromuscular disease or chest wall deformity. These patients develop inspiratory pump failure during sleep resulting from a combination of sleep related hypoventilation and the marked hypoventilation during REM sleep. Breathing in REM sleep is largely dependent on the diaphragm as intercostal activity is decreased as part of the generalised hypotonia of postural muscles in REM sleep.² Thus patients with bilateral diaphragmatic paralysis become severely hypoxaemic during REM sleep and patients with diaphragm weakness or mechanical inefficiency may become significantly more hypoxaemic than during wakefulness or non-REM sleep. This REM-related hypoventilation can contribute to the development of cardio-respiratory failure especially in those with co-existing lung disease. Such diaphragmatic weakness may be found in a wide range of neuro-muscular diseases including muscular dystrophies,³ myotonic dystrophy, motor neurone disease,⁴ myasthenia gravis, post-polio and Charcot Marie Tooth disease.⁵ Patients with Duchenne muscular dystrophy often develop marked kyphoscoliosis which may result in inefficient diaphragmatic angle of action and consequences similar to diaphragm palsy.⁶ Treatment of REM sleep related hypoxaemia due to diaphragm malfunction is by nocturnal intermittent positive pressure ventilation using a nasal or face mask. The usual indications for nIPPV are morning headache with documented associated carbon dioxide retention, ventilatory failure or marked daytime sleepiness.

Some patients with COPD find nIPPV acceptable, and it has the theoretical advantage over long-term oxygen therapy of reducing, rather than raising, arterial carbon dioxide tension. In patients who can tolerate nIPPV, improvements in arterial blood gas tensions and sleep may be achieved, but nocturnal oxygenation is improved more with nocturnal oxygen therapy than with nIPPV alone.⁷ Simultaneous nasal nIPPV and nocturnal oxygen therapy produced greater improvements in arterial blood gas tensions

and quality of life than did oxygen therapy alone in randomized controlled trials.^{8,9}

Nocturnal ventilation is usually started in hospital with inspiratory and expiratory pressures adjusted according to patient's comfort and arterial carbon dioxide level. Either nasal or full face masks may be used depending on a balance of comfort and leak.¹⁰ Patient compliance with this therapy is excellent.¹¹

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