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Update on Nocturnal NPPV

by Deborah Haider, RPFT, CRTT

Over the last year, nocturnal noninvasive positive pressure ventilation (or NPPV) has come under increasing scrutiny for coverage by Medicare, in spite of its many documented benefits in patients with respiratory failure. This update will provide an overview of the use and benefits of NPPV in chronic care, along with a look at the proposed clinical guidelines for the use of NPPV.

NPPV in chronic care

NPPV is therapeutic ventilation utilized primarily at night. It is indicated for select patients experiencing chronic respiratory insufficiency or chronic hypercapnic respiratory failure.¹ These patients may have a variety of disease processes, including chronic obstructive pulmonary disease (COPD), restrictive thoracic dis-

orders (such as muscular dystrophy, amyotrophic lateral sclerosis, post-polio syndrome, kyphoscoliosis, or chest-wall deformities), obesity hypoventilation syndrome, and nocturnal hypoventilation.^{1,2}

The types of patients who are most appropriate for NPPV are those on long-term oxygen therapy who also have a chronically elevated PaCO₂ (arterial carbon dioxide tension) (equal to or greater than 45 mm Hg in restrictive thoracic disorders and equal to or greater than 50–55 mm Hg in COPD). These patients may also be the ones seen increasingly more often in the physician's office as well as in the emergency department, and are experiencing more frequent hospitalizations. Clinical findings may include dyspnea at rest requiring increased oxygen use, increased

use of accessory muscles to breathe, frequent nocturnal awakenings, morning headaches, and excessive daytime sleepiness or fatigue. They are often maximized on their medical and oxygen therapy without many other options for treatment.² This is when NPPV can be especially beneficial for the patient and gives the physician and respiratory therapist another tool to use in the medical management of these patients.

Using NPPV provided by a noninvasive positive pressure ventilator or bi-level device allows patients to overcome work of breathing and rest their accessory muscles of ventilation, therefore improving nocturnal gas exchange and quality of sleep.³ This effect on gas exchange and ventilation can last into the daytime hours, allowing

the patient to be more independent with activities of daily living and improving their quality of life.²

Data reported by Hill in *American Review of Respiratory Disease* shows that in patients with chronic respiratory failure, mean daytime PaCO₂ levels drawn at least four hours after NPPV was discontinued for the day, decreased from 8 to 24 mm Hg.⁴ Another benefit noted in *Chest* in 1994 by Dr. Leger shows that in 125 patients ventilated noninvasively, annual days of hospitalization decreased an average of 19.6 days. In the COPD patient population, the patients had 49 hospital days in their baseline year before beginning therapy with NPPV, with hospital days dropping to 17 days in the first year after initiation of NPPV.⁵

An Australian study reviewed 29 patients who were receiving NPPV over a 12-month period. These patients had a range of dis-

orders, inability to protect the airway or handle secretions, facial burns, and bullous lung disease.³

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orders contributing to respiratory failure, including neuromuscular disease, chest wall dysfunction, obesity hypoventilation syndrome, and COPD. In all patients and across all groups, significant improvement in arterial blood gases were noted, with mean PaCO₂ falling from 64 to

50 mm Hg and PaO₂ (arterial oxygen tension) improving from 55 to 68 mm Hg over a mean ventilation time of just 10 days. Patients presenting acutely or chronically with respiratory failure all responded similarly to treatment.⁶

NPPV has also been shown to be beneficial in muscular dystrophy when chronic respiratory failure is present. In these patients, advantages in survival and pulmonary function may be seen, along with the benefit of avoiding or prolonging the time before a tracheotomy must be performed.²

Contraindications to the use of NPPV therapy include uncooperative patient, swallowing

The RT and patient selection

Also of importance in selecting the appropriate patient for NPPV is the patient's motivation to comply with the therapy — to “give it a chance.” These would be the patients who may be starting to experience a pulmonary-function-related decline in their health and ability to participate in their usual activities but can still remember what it was like to enjoy a game of golf or a productive day of work.

Acceptance of therapy and compliance depend greatly on relieving or improving a patient's symptoms while minimizing side effects.⁶ It is essential that a respiratory therapist with extensive experience in selecting appropriate interfaces, initiating and managing positive pressure therapy, and conducting patient education with therapeutic respiratory devices be involved from the start of therapy. During the first few hours or days of therapy, adjusting the fit of the interface, optimizing positive pressure settings, and coaching the patient may be labor intensive. The role of the experienced respiratory therapist as caregiver, patient champion, educator, and clinical



specialist cannot be underestimated.^{1,7}

Home NPPV regulations

NPPV in the home is currently reimbursed by Medicare and is classified in the payment policy category, "items requiring frequent and substantial servicing." Equipment and accessories included in this category are currently provided to the beneficiary on a monthly rental basis until medical necessity ends. The requirements for coverage are that the patient is being treated with NPPV for a condition other than obstructive sleep apnea and that other therapy has failed to stop the progression of the patient's disorder.⁸ However, there may soon be changes to this policy.

In February 1998, a consensus conference was held in Washington, DC, to define the clinical criteria for use of NPPV in the home. In July 1998, a draft version of a policy including guidelines for the use of NPPV was released by the Durable Medical Equipment Regional Carriers (DMERCs). This draft has yet to be made formal, but many clinicians are instituting at least some of the proposed guidelines for patient selection proactively.

NPPV guidelines

Suggested patient selection criteria include the following:

For patients with restrictive thoracic disorders:^{9,10}

- PaCO₂ equal to or greater than 45 mm Hg; or
- Nocturnal oxygen desaturation equal to or less than 88 percent for five consecutive minutes on room air; or

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8. Respironics, Incorporated. (1997, January). *Helpful hints for filing/reimbursement*. PSB 983580. Pittsburgh, PA.
9. DMERC Draft Policy. (1998, July 27). *Respiratory assist devices*. Durable Medical Equipment Regional Carriers, Washington, DC.
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- Maximal inspiratory force (MIP) greater than -50 cm H₂O; or
- Forced vital capacity (FVC) equal to or less than 50 percent of predicted.

For patients with COPD:^{9,10}

- PaCO₂ equal to or greater than 55 mm Hg; or
- PaCO₂ equal to or greater than 50 mm Hg, plus nocturnal oxygen desaturation equal to or less than 88 percent for five consecutive minutes on O₂ at 2 L/min.; or
- PaCO₂ equal to or greater than 50 mm Hg, with more than two hospitalizations per year due to respiratory failure with hypercapnia.

*For patients with nocturnal hypoventilation:*¹⁰

- Patient has failed continuous positive airway pressure (CPAP) or CPAP not effective; or
- Patient has significant hypoventilation unlikely to respond to CPAP alone; or
- Patient has central sleep apnea requiring positive pressure ventilation with a back-up rate.

These are only the suggested clinical indicators. Respiratory therapists must review the policy in full to understand all of the details of the criteria and to understand the coding, coverage, and payment rules as soon as they are released.



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In conclusion, it's especially important to remember the primary goal of NPPV therapy noted by Piper and Willson from Royal Prince Alfred Hospital in New South Wales: "In these patients, the primary aim of nocturnal ventilatory support is to improve day-time symptoms and overall quality of life, rather than simply prolonging survival."⁶ This is our mission as clinical advocates for our patients and professionals in the practice of respiratory care. 🧠

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