Respiratory Medicine (2014) 108, 229–243

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/rmed

REVIEW

Systematic review of non-invasive positive pressure ventilation for chronic respiratory failure

Liam M. Hannan [a,b,c,*], Giulio S. Dominelli [c], Yi-Wen Chen [d], W. Darlene Reid [d], Jeremy Road [c]

[a] Institute for Breathing and Sleep, Austin Hospital, Heidelberg, Victoria, Australia
[b] University of Melbourne, Medicine, Dentistry and Health Sciences, Melbourne, Victoria, Australia
[c] University of British Columbia, Respiratory Division and Department of Medicine, Vancouver, British Columbia, Canada
[d] University of British Columbia, Department of Physical Therapy, Vancouver, British Columbia, Canada

Received 30 August 2013; accepted 12 November 2013
Available online 20 November 2013

KEYWORDS
Non-invasive ventilation;
Ventilation;
Chronic respiratory failure;
Quality of life

Summary
Background: This systematic review examined the effect of non-invasive positive pressure ventilation (NIPPV) on patient reported outcomes (PROs) and survival for individuals with or at risk of chronic respiratory failure (CRF).
Methods: Randomised controlled trials (RCTs) and prospective non-randomised studies in those treated with NIPPV for CRF were identified from electronic databases, reference lists and grey literature. Diagnostic groups included in the review were amyotrophic lateral sclerosis/motor neuron disease (ALS/MND), Duchenne muscular dystrophy (DMD), restrictive thoracic disease (RTD) and obesity hypoventilation syndrome (OHS).
Results: Eighteen studies were included and overall study quality was weak. Those with ALS/MND had improved somnolence and fatigue as well as prolonged survival with NIPPV. For OHS, improvements in somnolence and fatigue, dyspnoea and sleep quality were demonstrated, while for RTD, measures of dyspnoea, sleep quality, physical function and health, mental and emotional health and social function improved. There was insufficient evidence to form conclusions regarding the effect of NIPPV for those with DMD.

* Corresponding author. C/o Institute for Breathing and Sleep, Austin Hospital, PO Box 5555, Heidelberg, Victoria 3084, Australia.
E-mail addresses: liamhannan1@yahoo.com.au (L.M. Hannan), dominell@alumni.ubc.ca (G.S. Dominelli), yiwenchen@alumni.ubc.ca (Y.-W. Chen), wdreid@mail.ubc.ca (W. Darlene Reid), Jeremy.Road@vch.ca (J. Road).

0954-6111/$ - see front matter
http://dx.doi.org/10.1016/j.rmed.2013.11.010

Conclusions: This review has demonstrated that NIPPV influences PROs differently depending on the underlying cause of CRF. These findings may provide assistance to patients and clinicians to determine the relative costs and benefits of NIPPV therapy and also highlight areas in need of further research.

Contents

Introduction

Non-invasive positive pressure ventilation (NIPPV) is an established, effective long-term treatment for individuals with or at risk of chronic hypercapnic respiratory failure due to a number of heterogeneous conditions. Most commonly, these conditions include obesity hypoventilation syndrome (OHS), restrictive thoracic diseases (RTD), chronic obstructive pulmonary disease (COPD) as well as amyotrophic lateral sclerosis/motor neuron disease (ALS/MND) and other neuromuscular diseases [1,2] Rapid expansion in the use of domiciliary NIPPV has been described in a number of countries [3,4], and it is a preferred method of providing long-term ventilatory support (in comparison to negative pressure methods or invasive mechanical ventilation) due to a variety of factors including cost and patient preference as well as a possible reduction in ventilator associated complications [5—7].

Increasingly, investigators who have evaluated domiciliary NIPPV therapy have recognised and emphasised the reporting of patient reported outcomes (PROs). These outcome measures generally evaluate the presence or severity of symptoms and/or determine health-related quality of life (HRQoL). In general, instruments that evaluate HRQoL attempt to measure those aspects of overall quality of life that can clearly be shown to affect health — either physical or mental [8]. PROs are considered to be useful outcome measures in studies involving NIPPV — particularly where a mortality benefit is unlikely to be identified. This focus on PROs contrasts earlier studies that more frequently evaluated physiologic outcome measures, such as daytime carbon dioxide tension ($PaCO_2$), pulmonary