COPD Evidence Tables

The evidence tables are presented in section order.

The methodological quality of each paper was rated using the Scottish Intercollegiate Guidelines Network (SIGN) system (Scottish Intercollegiate Guidelines Network. SIGN 50 Guideline Developers Handbook, 2001; ID 19457):

++	All or most of the SIGN methodology checklist criteria were fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought very unlikely to alter.
+	Some of the criteria were fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions.
-	Few or no criteria were fulfilled. The conclusions of the study are thought likely or very likely to alter.

Chronic Obstructive Pulmonary Disease: Management of adults with Chronic Obstructive Pulmonary Disease in Primary and Secondary Care

Managing Stable COPD
Non-invasive ventilation
Index

Author	Publication Date	ID
Wijkstra, P. J., Lacasse, Y., Guyatt, G. H., & Goldstein, R. S. 2002, "Nocturnal non-invasive positive pressure ventilation for stable chronic obstructive pulmonary disease. [Review] [30 refs]", *Cochrane Database of Systematic Reviews*.	2002	1482
Clini, E., Sturani, C., Rossi, A., et al. 2002, "The Italian multicentre study on noninvasive ventilation in chronic obstructive pulmonary disease patients", *European Respiratory Journal*, vol. 20, no. 3, pp. 529-538.	2002	1301

Author / Title / Reference / Yr	Wijkstra PJ, Lacasse Y, Guyatt GH, Goldstein RS. Nocturnal non-invasive positive pressure ventilation for stable chronic obstructive pulmonary disease. (Cochrane Review). *The Cochrane Library.Oxford: Update Software* 2003;Issue 3. Ref ID: 1482
N=	N=4 RCTs
Research Design	Cochrane Review
Aim	To determine the effect of nocturnal non-invasive positive pressure ventilation via nasal mask or face mask in patients with COPD
Operational Definition	Patients with COPD according to the guidelines of American Thoracic Society
Population	Stable patients with COPD
Intervention	Nocturnal non-invasive positive pressure ventilation plus standard therapy
Comparison	Standard therapy alone

Outcome	Blood gases, 6 minute walk (6MWD), dyspnoea (during daily activities), health status (health related quality of life measurements), and respiratory muscle function (muscle strength or muscle endurance, including PI max (maximal inspiratory pressure). Lung function (FEV1 and VC) and sleep efficiency (time asleep as a percentage of total time in bed)
Characteristics	Included studies **Strumpf 1991** – Nocturnal positive pressure ventilation via nasal mask in patients with COPD. RCT with crossover comparing nocturnal non invasive Bi-level Positive Airways Pressure (BiPAP) with standard care for a sequential period of 3 months. N = 23 **Gay 1996** – Nocturnal nasal ventilation in stable, severe COPD. RCT comparing nocturnal BiPAP versus sham treatment. N = 35 **Meecham Jones 1995** – Nasal pressure support ventilation plus oxygen compared with oxygen therapy alone in hypercapnic COPD. N = 14 **Casanova 2000** – Nocturnal ventilation by BiPAP plus standard treatment compared with standard treatment. N = 52 Studies were excluded if not published in full, not randomised, duration of BiPAP too short, training of BiPAP too short.
Results	The only outcome for which the 95% confidence interval excluded zero was Pi max. n = 24 BiPAP n = 24 control; mean effect [95%CI] = 6.2cm H2O [0.2;12.2] The 95% confidence interval of the other outcomes included zero. These included FEV1, FVC, PaCO2, sleep efficiency and 6-minute walking distance (6MWD). FEV1 (n = 33 BiPAP n = 33 control) - mean effect (95% CI) = 0.02L (-0.04; 0.09) FVC (n = 33 BiPAP n = 33 control) - mean effect (95% CI) = -0.01L (-0.14; 0.13) Pimax (n = 24 BiPAP n = 24 control) - mean effect (95% CI) = 6.2 cm H2O (0.2; 12.2) PEmax (n = 24 BiPAP n = 24 control) - mean effect (95% CI) = 18.4 cm H2O (-11.8; 48.6) PaO2 (n = 33 BiPAP n = 33 control) - mean effect (95% CI) = 0.0 mmHg (-3.8; 3.9) PaCO2 (n = 33 BiPAP n = 33 control) - mean effect (95% CI) = -1.5 mmHg (-4.5; 1.5) 6MWD (n = 12 BiPAP n = 11 control) - mean effect (95% CI) = 27.5m (-26.8; 81.8) The mean effect on 6MWD was modest at 27.5m, but the 95% CI were wide (-26.8, 81.8m) suggesting that some patients had a big improvement. **Reviewers' conclusions** Nocturnal NIPPV for at least 3 months in hypercapnic patients with stable COPD had no consistent clinically or statistically significant effect on lung function, gas exchange, respiratory muscle strength, sleep efficiency or exercise tolerance; however, the small sample sizes of these studies precludes a definite conclusion regarding the effects of NIPPV in COPD.
SIGN Quality Rating	++
Hierarchy of Evidence Grading	1a
NCC CC ID	Cochrane 1482

Studies Included	Strumpf 1991, Gay 1996, Meecham Jones 1995, Casanova 2000

Author / Title / Reference / Yr	Clini, E., Sturani, C., Rossi, A., Viaggi, S., Corrado, A., Donner, C. F., Ambrosino, N., Murgia, A., DeMurtas, R., Polverino, M., Grisolia, M. A., Marcolongo, A., Confalonieri, M., Gorini, M., Villella, G., Garuti, G., Clini, E., Vitacca, M., Scarduelli, C., Amaducci, S., Iuliano, A., Sergi, M., Rizzi, M., Nava, S., Squillante, F., Cassandro, R., Bevilacqua, M., Marchese, S., LoCoco, A., Cerveri, I., Pasi, A., Dottorini, M., Baglioni, S., Ferranti, P., Tazza, R., Palla, A., Desideri, M., Muir, J. F., Damato, S., Marino, P., Peratoner, A., & Zaccaria, S. 2002, "The Italian multicentre study on noninvasive ventilation in chronic obstructive pulmonary disease patients", *European Respiratory Journal*, vol. 20, no. 3, pp. 529-538. Ref ID: 1301
N=	N= 90 Location=Italy
Research Design	Prospective randomised controlled trial
Aim	To assess the effect of Non-invasive positive pressure ventilation (NPPV) + Long Term Oxygen Therapy (LTOT) on: 1) severity of hypercapnia; 2) use of healthcare resources, and 3) health related quality of life in comparison with LTOT alone
Operational Definition	Diagnosis of chronic ventilatory failure based on values of PaCO2 > 6.6 kPa (50mmHg) during room air spontaneous breathing. All patients were in stable clinical condition, as assessed by arterial pH >7.35 and were free from exacerbation in the 4 weeks preceding treatment.
Population	Stable hypercapnic COPD patients on long term oxygen therapy for ≥6 months
Intervention	NPPV + LTOT (n=43)
Comparison	LTOT alone (N = 47)
Outcome	Arterial blood gases / hospital and intensive care unit (ICU) admissions / total hospital and ICU length of stay / HRQL / survival and drop-out rates / symptoms (dyspnoea and sleep quality) / exercise tolerance
Characteristics	Age ≤ 75 years Males 69: females 17 LTOT for at least 6 months Dyspnoea score as assessed by MRC score ≥2 FEV1 <1.5L FEV1 to FVC ratio < 60% total lung capacity ≥ 90% predicted **PaCO2 > 6.6kPa (50mmHg)** Arterial oxygen tension < 7.8kPa (60 mmHg) At baseline all characteristics were similar
Results	Treatment compliance NPPV + LTOT - mean daily LTOT use = 19 ± 1 h

	LTOT alone - mean daily LTOT use = 20 ± 2 h Physiological variables No significant differences in lung function, inspiratory muscle function, exercise tolerance and sleep quality score Arterial Blood Gases No significant differences between groups was found in ABG during room air breathing. PaCO2 Over two years of treatment PaCO2 on usual oxygen averaged 7.23 and 7.89 kPa (55 and 60 mmHg) in NPPV + LTOT and LTOT respectively. PaCO2 exhibited a tendency to increase in LTOT patients, whereas it consistently decreased in NPPV + LTOT patients Month 12 treatment effect 2.997, 95% confidence interval 0.94-5.05 (p = 0.005) Month 24 treatment effect 4.270, 95% confidence interval 1.58-9.96 (p = 0.002) Dyspnoea Resting dyspnoea significantly improved over time in the NPPV + LTOT group and at month 24 was significantly better than in the LTOT alone group. Month 12 treatment effect 0.4, 95% confidence interval 0.02 – 0.78 (p = 0.048) Month 24 treatment effect 0.6, 95% confidence interval 0.15 - 1.05 (p = 0.013) Health Related Quality of Life After 2 years SGRQ total score showed a trend to improve in both groups (-5 and –4% in NPPV + LTOT and LTOT alone groups respectively) (p=0.554) The MRF-28 total score significantly improved in the NPPV + LTOT group compared to the LTOT group Treatment effect 7.1, 95% confidence interval 0.13-4.07 (p=0.041) Hospitalisations Hospital admissions were not significantly different between groups during follow-up. NPPV + LTOT - mean hospital admissions per patient per year = 0.9 ± 1.2 LTOT alone - mean hospital admissions per patient per year = 1.4 ± 2.3 ICU admissions were not significantly different between groups during follow-up. NPPV + LTOT - mean hospital admissions per patient per year = 0.2 ± 0.4 LTOT alone - mean hospital admissions per patient per year = 0.4 ± 0.8 Compared with the 3 year period before the start of the study, ICU stay decreased over time by 75% and 20% in the NPPV and LTOT and LTOT groups, respectively; however differences between groups were not significant Conclusion The addition of non-invasive positive pressure ventilation to long-term oxygen therapy in stable COPD patients with chronic ventilatory failure is able to 1) improve daytime carbon dioxide in arterial blood during oxygen breathing; 2) improve dyspnoea and health-related quality of life.
SIGN Quality Rating	+

Hierarchy of Evidence Grading	1b
NCC CC ID	1301