BTS Home Oxygen Guideline
Evidence Tables: 1 Dec 2014

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
4 - Continuous or nocturnal oxygen therapy in hypoxemic chronic obstructive lung disease: a clinical trial. Nocturnal Oxygen Therapy Trial Group. Annals of Internal Medicine 1980, 93(3):391-8	Randomised controlled trial	1+	203 patients	Patients with hypoxemic chronic obstructive pulmonary disease.Stable hypoxemic patients with COPD PaO2 55mmHg or less , or Pao2 59mmHg or less with signs of right heart failure (oedema or p pulmonale 0 or erythrocytosis (hct greater than or equal to 55). FEV1 30% pred, PaO2 51 mmHg , PaCO2 43 mmHg	Oxygen therapy or 12 hours nocturnal oxygen therapy	Mortality, pulmonary haemodynamics, exercise capacity	at least 12 months (mean 19.3 months)	Pulmonary haemodynamic mortality	Mortality in the nocuturnal oxygen therapy group was 1.94 times that of continuous oxygen therapy group (p=0.01). This trend was more apparent in patients with carbon dioxide retention and also in patients with relatively poor lung function at low nocturnal oxygen saturation, more severe brain dysfunction and prominent disturbances. The benefits to patients with	NIH

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5 - Long term domiciliary oxygen therapy in chronic hypoxic cor pulmonale complicating chronic bronchitis and emphysema. Report of the Medical Research Council Working Party. Lancet 1981;317(8222):681-6	Randomised controlled trial	1+	33 males, 9 females treated with longterm oxygen therapy, 33 male, 12 female controls FEV1 0.75, PaO2 51 mmHg , PaO2 55 mmHg	Men and women under 70 years of age with chronic bronchitis and emphysema, irreversible airways obstruction FEV1<1.2 ltr and PaO2 40-60 mm Hg breathing air at rest with history of admission with recorded episode of heart failure with ankle oedema studied in stable state with arterial blood gas FEV1 and body weight	Oxygen therapy release 15 hours per day by nasal prong. Flow rate ? to a minute or higher flow rate to achieve PO2 >16 mm Hg. Treatment over 2,000 days	Mortality, hospital admissions with exacerbations , red cell mass pulmonary arterial pressure in this subgroup	2000 days	Survival, hospital admissions, red cell mass, pulmonary arterial pressure in this subgroup	19 of 42 oxygen treated patients died in 5 year survival follow up compared with 30 of 45 control. In 66 men survival advantage did not emerge until 500 days had elapsed. Survival for the 12 female controls was poor. A summation of arterial carbon dioxide ? and red cell mass was helpful for predicted survival. Neither time spent at hospital because of exacerbations	MRC

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6 Cooper C.B, Waterhouse J, Howard, P. Twelve year clinical study of patients with hypoxic cor pulmonale given long term domiciliary oxygen therapy. Thorax 1987;42:105-110.	Cohort study	2-	72 (uncontrolled)	COPD patients with hypoxic cor pulmonale (Pa)2 <60mmHg, of which 57 had PaCO2 >6kPa). Exclusion criteria "unlikely to comply"	LTOT $\geq$ 15 hours/day	Compared to MRC study's normal/untreated male (rather than control in own study)	12 yrs (mean 5 yrs)	Pulmonary haemodynamics (in 45/72) including PAP, CO and pulmoanry vascualr resistance. Also measured survival and Spirometry	Significant survival benefit of LTOT immediately on starting treatment. 10 yr survival 26%. No difference in survival if PAP >25 mmHg. 5 yr survival without treatment <42%) comapred to 62% survival	Unknown

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7 Strom K. Survival of patients with chronic obstructive pulmonary disease receiving long-term domiciliary oxygen therapy. Am Rev Respir Dis 1993;147(3):585-591.	Cohort study	2-	403 (201 male)	From Swedish data register for LTOT prescribed for chronic hypoxaemia secondary to COPD	LTOT. Ensured medically optimised and hypoxia was stable with oxygen for Pa)2 >60mmHg) over 3/52 period	Subgroup analysis within register patients (looking at COPd/asthma /alfa-1 antitrypsin deficiency)	2 yrs (at 6/12 intervals)	Survival (and sex-related differences), spirometry and WHO status	Significantly better survival in femals than males if not receiving steroid maintenance. FEV1 best predictor of long-term survival in LTOT	Swedish heart-lung foundation

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8 - Gulbas G, Gunen H, In E, Kilic T. Long-term follow-up of chronic obstructive pulmonary disease patients on long-term oxygen treatment. International Journal of Clinical Practice 2012;66(2):152-7	Cohort study	2-	228 patients	COPD patients hypoxemia, PO2≤55 mm Hg or SCO2≤88 %; PaO2 56-59 mm Hg or SCO2 at 89% at one of the following ? >55, congestive heart failure or pulmonary hypertension	Oxygen therapy 15 h/day, SCO2 over 90%	Patients grouped into non-utilisers, intermittent utilisers (<15 h/day) and true utilisers (15 h/day or longer)	Mean duration of follow up 27.8±18.5 months. .	Effects of ? survival are similar between groups (19.5±5.6, 32.5±4.1 and 30.0±5.7 months respectively, p>0.05). Compared with group 1 survival was poor in group 2 (p<0.05). There was a positive trend for group 3 during the first 3 yr period. However this improvement disappears during further follow up. Analysis of	nil	

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10- Machado ML, Krishnan JA, Buist SA, Bilderback AL, Fazolo GP, Santarosa MG, Queiroga F Jr, Vollmer WM. Sex differences in survival of oxygen-dependent patients with chronic obstructive pulmonary disease. American Journal of Respiratory & Critical Care Medicine 2006;174(5):524-9	Cohort study	2-	435 patients with COPD - 184 women 251 men. COPD patients referred for longterm oxygen therapy to respiratory clinics in Brazil.	COPD patients enrolled in longterm oxygen treatment programme. Patients prescribed longterm oxygen therapy according to GOLD/BTS guidelines, FEV1 pred 31.4±8% PaO2 51.7±5.5 mm Hg. Similar characteristics for males and females except that female younger, less pack years smoking history.	Longterm oxygen therapy 15 hr/day	Mortality, difference between groups	7 yrs of only 15% of the initial studied cohort had a follow up time >48 months	Mortality	After accounting for potential confounders of age, pack years smoked, PaO2, FEV1, BMI females were at significantly higher risk of death (hazard ratio 1.54, 95% CI 1.15-2.07, p=0.004). Other independent predictors of death were lower PaO2 (p<0.001) and lower BMI (p<0.05).	ATS

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11 Zielinski J, MacNee W, Wedzicha J, et al. Causes of death in patients with COPD and chronic respiratory failure. Monaldi Arch Ches Dis 1997; 52:43-47.	Retrospective questionnaire (on cohort)	3	215 (161 males, 54 females)	COPD patients on LTOT with FEV1/FVC<55 % and PaO2 <8 on air	All deaths of LTOT patients at specific centres	Nil	30/12 period	Cause of death	Majority had slow progressive clinical course before death. Lower PaCO2 and less oxygen useage associated with sudden, unexpected death from arrythmia (not statistically sinificant)	Unknown

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
12 - Chailleux E, Laaban J-P, Veale D. Prognostic value of nutritional depletion in patients with COPD treated by long-term oxygen therapy: data from the ANTADIR observatory. Chest 2003;123(5):1460-6	Cohort study	2-	26140 patients receiving LTOT or prolonged mechanical ventilation (noninvasive ? tracheostomy) 1 Jan 1984 and 1 Jan 1993.	Chronic bronchitis 12043; asthma 1755; bronchiectasis 1556; emphysema 551; tuberculosis sequellae 4147; kyphoscoliosis 1574; neuromuscular disease 1097; pneumoconiosis 919; fibrosis 2498	Longterm oxygen therapy or prolonged mechanical ventilation	Longterm oxygen therapy or prolonged mechanical ventilation	9 yrs	Survival	Mean survival for patients with chronic bronchitis 3 yrs, survival is slightly better for patients with bronchiectasis and asthma and worse for those with emphysema. Patients with kyphoscoliosis, neuromuscular disease have longer survival (8 and 6.5 yrs respectively). Patients with chronic respiratory due to tuberculosis sequellae experience the same survival as	unknown

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13 Fleetham JA, Bradley CA, Kryger MH, Anthonisen NR. The effect of low flow oxygen therapy on the chemical control of ventilation in patients with hypoxemic COPD. The American Review of Respiratory Disease 1980;122(6):833-40	Randomised controlled trial	1+	30 patients with hypoxemic chronic obstructive pulmonary disease	Hypoxemic patients with COPD	24 hr continuous oxygen or 12 hr nocturnal oxygen therapy	Ventilatory and p 0.1 responses to CO2 and hypoxia	6 months in 30 patients, 1 year in 13 patients	Ventilatory and p 0.1 responses to CO2 and hypoxia	? hypoxia responses showed no increase after either continuous or nocturnal oxygen therapy but were further reduced after 6 months of 12 hours nocturnal oxygen. The responses to CO2 were depressed after 6 months of 24 hour oxygen therapy and were associated with a significant increase in PCO2. Change in PCO2 after nocturnal	?

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14- Timms, R. M.; Khaja, F. U.; Williams, G. W. Hemodynamic response to oxygen therapy in chronic obstructive pulmonary disease. Annals of Internal Medicine 1985;102(1): 29-36	Non-randomised controlled trial	1+	203 patients in 6 centres	Stable hypoxemic patients with COPD PaO2 55mmHg or less , or Pao2 59mmHgor less with signs of right heart failure or erythrocytosis	Continuous or 12 hour oxygen therapy	Pulmonary haemodynamics	6 months	Pulmonary vascular resistance, pulmonary arterial pressure/volume index at rest and at exercise	Neither oxygen therapy resulted in correction or near correction of baseline haemodynamic abnormalities. Continuous oxygen therapy group showed an improvement in pulmonary vascular resistance, pulmonary arterial pressure and stroke volume index. Improvement in pulmonary vascular resistance is associated with an improved	NIH

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15 W. MacNee, A.D. Morgan Right Ventricular Performance during Exercise in COPD. Respiration 48 206-215	observational		65. 30 Normal 35 COPD	COPD patients	24 Patients investigated for the acute effects of oxygen on right ventricular performance and 10 patients investigated for the effects of LTOT on right ventricular perfomance (1-3 lites) upto 15 hours a day	COPD vs. Normal vs. oxygen (acute) vs oxygen (LTOT)	up to 6 months	right ventricular performance	Mean PAP fell from 32 to 26 (+/-2) mmHg after 6 months of Oxygen but no effect on RVEF	

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17 Okubadejo AA, Paul EA, Jones PW, Wedzicha JA. Does long-term oxygen therapy affect quality of life in patients with chronic obstructive pulmonary disease and severe hypoxaemia? ERJ 1996;9:2335-2339.	Case series (with COPD controls)- evidence sheet as for cohort	2-	41; 18 COPD controls (did not satisfy criteria for LTOT) and 23 patients on LTOT (8m/15f)	Age 47-82 yrs (71 average) from OPD with COPd diagnosis. FEV1 <1.5 L,PaO2 <7.3 kPa, or a PaO2 <8.0 kPa with evidence of cor pulmonale (oedema and ecg changes of right ventricular hypertrophy). Free from acute exacerbations for at least 3 weeks before entry into the study. Blood gas values and spirometry were assessed	no intervention but SGRQ and HAD measured in patients before LTOT and then after LTOT had been introduced at 2weeks, 3 and 6 months. Compared with SGRQ and HAD in control group at same time intervals	Comparison of SGRQ over time and with COPD patients not on LTOT	6 months	SGRQ quality of life score	No statistical difference in SGRQ scores over time on LTOT (but patients on LTOT had worse scores than those not/with less severe hypoxaemia)	Nil

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
18 Heaton RK, Grant I, McSweeny AJ, Adams KM, Petty TL. Psychologic effects of continuous and nocturnal oxygen therapy in hypoxemic chronic obstructive pulmonary disease. Arch Int Med 1983;143:1941-1947.	RCT	1++	150 (72 NOTT, 78 COT, 55 COPD controls, 53 healthy controls)	COPD patients with hypoxaemia and no exacerbations 3/52 PaO2 <60mmHg on air and never had LTOT	Kept randomisation from NOTT trial of NOT (12 hours)versus COT (20 hours)	Before/after 6/12 of NOT/COT measured neuropsych and Quality of life	6/12 and 12/12 post NOTT trial enrollment	Survival, neuropsychological deficit, mood, quality of life	Small sign of imporvement in brain functioning with COT/NOT at 6/12. At 12/12 COT had greater significant improvement than NOT/controls	Division of lung disease NIH, National heart, lung and Blood institutes

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
19 Borak J;Sliwinski P;Tobiasz M;Gorecka D;Zielinski J. Psychological status of COPD patients before and after one year of long-term oxygen therapy. Monaldi archives for chest disease 1996;51:7-11.	Cohort study	2+	124 eligible (90 survived follow up period)	COPD patients meeting criteria for LTOT (using average of 14.9 hours per day)	LTOT	Before/after 12 months	12 months	Cognitive function, psychometric studies and attitudes	Significant improvement in anxiety and mood after 12/12 of LTOT. Significant improvement in verbal memory and speed of work (no change in visual/spatial memory). Less anxiety generally in hypercapnic patients and FEV1 correlated with visual/spatial memory before and after LTOT	Polish state Reaearch committee grant

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20 Garcia-Aymerich J, Monsó E, Marrades RM, Escarrabill J, Félez MA, Sunyer J, Antó JM; EFRAM Investigators. Risk factors for hospitalization for a chronic obstructive pulmonary disease exacerbation. EFRAM study. Am J Respir Crit Care Med 2001;164(6):1002-1007.	Case-Control	2++	86 patients (86 controls)	Cases: admission for COPD exacerbation within 1 yr at selected tertiary hospital) Controls: previous admission with COPD but not in comparison time period. Excluded all patients who died or had previously positive bronchodilatory test	Observation	Case comapred to control group	1 year	Spirometry, ABG measures, number of admissions, LTOT use and prescription, smoking habits and quality of life questionnaires. Uptake of pulmonary rehabilitation	Statistically significant increase in admissions (more than 3) related to lower FEV1 and underprescription of LTOT. This was also seen in patietns still smoking	Generalitat de Catalunya Agencia d'Avalvacio

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21 Ringbaek TJ, Viskum K, Lange P. Does long-term oxygen therapy reduce hospitalisation in hypoxaemic chronic obstructive pulmonary disease? ERJ 2002;20:38-42.	Case series (completed evidence sheet as for a cohort)	3	246 COPD patients	Patients divided into 4 groups. 125 patients continuous oxygen therapy (COT <15 hrs /day), who started LTOT at hospitalisation, 37 patients on COT who started LTOT as outpatients, 58 patients on non-continuous oxygen therapy (nCOT) who started LTOT at hospitalisation and 26 patients on	Continuous (.15hrs/day or noncontinuous (<15hrs/day) LTOT	Comparison of days spent in hospital; number of patients with at least 1 hospitalisation (never hospitalised) compared in 2 periods of 10 months before and after inititationof LTOT.	10 months	Admission rates were days spent in hospital and number of patients with at least 1 hospitalisation (never hospitalised)	Overall admission rates, hospital days and never hospitalised were reduced by 23.8%, 43.5%, and 31.2% respectively. COT = 15-24 hrs per day oxygen; nCOT =>15hrs per day. Most of the 162 CO2 patients (77.2%) started oxygen therapy immediately after hospitalisation. In comparison to the pre-oxygen period hospitalisation days spent in	nil

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22 - Bratel, T, Ljungman S, Runold M, Stenvinkel P. Renal function in hypoxaemic chronic obstructive pulmonary disease: effects of long-term oxygen treatment. Respiratory Medicine 2003;97(4):308-16	Before and after/interrupted time series study	3	12	% pred 28.5±17.9, PaO2 7.29±1.07 kpa	Longterm oxygen therapy	Renal function before and after longterm oxygen therapy	6 months	Renal function assessed by clearances of intravenously adminstrered inulian and para-iamino-hippurat and orally supplemented lithium and of circulating sodium	LTOT treatment in 12 patients did not produce any significant changes in renal function for the entire study group	nil

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23 Chambellan A, Chailleux E, Similowski T. Prognostic Value of the Hematocrit in Patients With Severe COPD Receiving Long-term Oxygen Therapy. Chest 2005;128:1201-1208.	Cohort study	2+	2524 (from total 11366 ANTADIR pts with COPD on LTOT). Of this 1799 f/u > 1yr	Hypoxaemic COPD patients between 1980-1999	LTOT	Subgroup analyses of haematocrit ranges	10 years mean	Haematocrit, spirometry, survival and hospital admissions (and duration of admission) all measured	Median survival on LTOT 3 yrs. Increased survival with increased haematocrit. 3 yr survival 24% if HCT <35% and 70% if HCt >55%. Equally fewer and shorter hospital admissions if HCT > 55% compared to <35%.	ANTADIR study

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24 - Elphick H, Mallory GB, Fullmer JJ, Vaughan DJ. Oxygen therapy for cystic fibrosis. Cochrane Database of Systematic Reviews 2005;4:CD003884	Systematic review	2++	9 published studies (149 participants) of which only 1 examined longterm oxygen therapy (28 participants)	Patients with moderate/severe obstructive lung disease and cystic fibrosis. Only 1 study examined the effect of longterm oxygen therapy in patients with CF with an FEF 25-75>25% predicted or arterialised capilliary blood gas measurement with a PaO2<65 mm Hg (8.767 kpa) on 2 occasions 1 week apart	Longterm oxygen therapy in 1 study supplemental. Four studies examined the effects of supplemental oxygen during sleep by polysomnography; of these studies oxygen implementation evaluated during exercise	1 study assessed the effects of longterm oxygen therapy in hypoxemic CF participants. 28 children and adults were enrolled in 3 Canadian centres. Participants were randomised to receive oxygen supplementation to achieve a PaO2 of 70 mm Hg or room air administered from a concentrator. Treatment	36 months	Mortality, measure of pulmonary function and anthropometric measurements, exercise test, and radionucleotide angiography to assess right heart function, cognitive function, memory capacity and participant self esteem.	LTOT had no discernible effect on mortality, lung function, blood gases, measurements of nutrition, mood or cognitive function	Cochrane Collaboration

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26 Calverley PM, Leggett RJ, McElderry L, Flenley DC.Cigarette smoking and secondary polycythemia in hypoxic cor pulmonale. Am Rev Respir Dis. 1982 May;125(5):507-10.	Cohort study	2++	47 total (15 on LTOT of which 7 smoked)	Hypoxic cor pulmonale secondary to bronchitis or emphysema (asterial hypoxaemia mean PaO2 52.5mmHg) FEV1 0.6 +/- 0.2L. Included both non-smokers and smokers (verified by CO)	15 hours of LTOT per day for 12 months (compliance varified by random home visits and checking the reservoir weight)	Smokers v non-smokers. Comparing level of hypoxaemia and polycythaemia	12 months (36 month enrolment period)	Correction of arterial hypoxaemia. Red cell mass and volume	After 12/12 LTOT no change in polycythaemia (red cell mass) in the patients who still smoked. Those who stopped smoking had significant reduction in red cell mass and pulmonary artery pressures	Unknown
28 Roberts CM, Bulger JR et al 1993 Value Of pulse oximetry in screening for lTOT requirements ERJ 6, 559-62	Observational - before & after	3	113	Stable OPD COPD	Pulse Ox & ABG if SpO2≤92%	SpO2 to PaO2	None	Sensitivity and specificity of various levels of Sao2 in the detection of hypoxaemia below 8.0 kPa and below 7.3 kPa		Undeclared

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29 Roberts, C. M. et al 1998 Screening patients in general practice with COPD for long-term domiciliary oxygen requirement using pulse oximetry Respiratory	Case controlled	2+	114	Stable COPD in primary care	Use of pulse oximetry to screen for LTOT	ABG vrs SpO2		No pts who met criteria for LTOT	3/11 pts(27%) with SpO2≤92%	Undeclared
30 Carlin BW, Clausen JL, Ries AL. The use of cutaneous oximetry in the prescription of long term oxygen therapy	Observational cross-sectional study	3	55	Stable patients with chronic lung disease with a resting PaO2 <8.65kPa.	Simultaneous PaO2 and SpO2 measurements on air at rest	PaO2 vs SpO2	Nil	Number of patients eligible for LTOT using ABG criteria vs SpO2 criteria of <85% and <88%	Using SpO2<85% would have led to underprescribing in 80%. Using SpO2<88% would have led to under- and over-prescribing.	Nil declared
31 Guyatt, G. H.; Nonoyama, M.; Lacchetti, C.; Goeree, R.; McKim, D.; Heels-Ansdell, D.; Goldstein, R. 2005 A randomized trial of strategies for assessing eligibility for long-term domiciliary oxygen therapy. American Journal of Respiratory and Critical Care Medicine. 172(5), 573-80	Cluster randomised trial	1+	546	All patients (excluding palliative) referred to O2 assessment centre	Prescription of LTOT on first visit vs at 2 months to allow for clinical stability	Numbers prescribed LTOT, costs, HRQL, mortality	1 year	numbers prescribed LTOT, HRQL, costs, mortality	36% less prescribed LTOT at 2 month, 15% at 1 year	Authors declared no conflict of interest with commercial copanies

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33. Chaney JC, Jones K, Grathwohl K, Olivier KN.Chest. 2002; 122:1661-1667. Implementation of an oxygen therapy clinic to manage users of long-term oxygen therapy.	Non-comparative study	2-	283	oxygen therapy clinic patients: 97 new in-patient prescriptions; 95 follow-ups ; 91 new out-patient referrals	Full review	None	Nil	demographics, oximetry (exercise and overnight as able / required) and ABG's as indicated	50% of those started during hospital admission no longer required LTOT. 31.6% of follow-up patients no-longer met criteria, 56.7% of new referrals required LTOT.	Nil reported

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34 Oba Y et al Reevaluation of contnuous oxygen therpay afetr initial prescription in patients with COPD 2000 Respiratory Care 45(4) 401-6	Observational before-after	3	57	COPD followed up after initiation of LTOT (n=19)	1-3 months	PaO2 compared to guideline criteria for LTOT	single follow up	PaO2 and number of patients eligible for LTOT	58% of patients no longer required LTOT	Undeclared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
35 Eaton, T.; Rudkin, S.; Garrett, J. E 2001 The clinical utility of arterialized earlobe capillary blood in the assessment of patients for long-term oxygen therapy Respiratory Medicine 95 (8) 655-60	Observational	3	160	Referrals for LTOT assessment - mixed disease group	LTOT assessment	Those who met criteria for LTOT and those who did not	2 months	Standard measures for LTOT PaO2<7.3kPa or 8kPa if added problems	47.5% of all acute inpatient referrals required LTOT at 2 months. 30% of those given O2 at discharge did not meet criteria for LTOT at 2 months (include drop outs/deaths on intention to treat 25%)	Undeclared
36 Levi-Valensi P, Weitzenblum E, Pedinielli J-L, Racineux J-L, Duwods H. Three month follow up of arterial blood gas determinations in candidates for Long term oxygen therapy	Observational before-after	3	77	COPD, ex smokers, with PaO2 between 41 and 59mmHg after 1 month clinical stability. None on LTOT	Observation for 3 months	Change in PaO2 at three months	3 months	PaO2 and number of patients eligible for LTOT	30% of patients no longer required LTOT after 3 months observation	Nil declared

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38 Munoz X, Torres F, Sampoi G, Rios J, Marti S, Escrich E. Accuracy and reliability of pulse oximetry at different arterial carbon dioxide pressure levels	Observational cross-sectional study	3	846	Stable patients with chronic lung disease (74.2% COPD) undergoing LTOT assessment	Simultaneous ABG and SpO2 measurements	SpO2 vs SaO2 correlation at differing CO2 levels	Nil	Agreement between SpO2 and SaO2	SpO2 overestimated SaO2 at elevated CO2 levels (ie >6,40kPa). Agreement between SpO2 and SaO2 also poor when PaO2 low (ie <7.20kPa)	Nil declared
40 Zavorsky et al 2007	Metaanalysis	1+	886 overall. 57 in fingertip CBG hypoxic group (ie PaO2<70mm Hg) and 227 in earlobe CBG hypoxic group	Range of patients including healthy controls, healthy controls under hypoxic conditions and patients with lung disease	ABGs, fingertip CBGs and earlobe CBGs	ABGs vs fingertip CBGs. ABGS vs earlobe CBGs	Not applicable	Accuracy of CBGs using ABGs as gold standard	Mean difference and 95% confidence intervals for a) fingertip - arterial: overall 10.4mmHg (8.4-12.4); hypoxia 3.1mmHg (1.8-4.4) b) earlobe - arterial: overall 2.4mmHg (1.9-2.8); hypoxia 0.7mmHg (0.3-1.1)	Nil declared

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41 A D Pitkin, C M Roberts, J A Wedzicha. Arterialised earlobe blood gas analysis: an underused technique. Thorax 1994;49:364-366	Prospective observational cross sectional study	3	40	Patients with chronic lung disease, including COPD (29/40)	Simultaneous radial ABG and arterialized earlobe capillary sample	ABG vs CBG	Single assessment	Correlation between ABG and CBG with respect to PaO2, PaCO2 and pH	CBG vs ABG PaO2 (mean difference -0-17, 95% confidence intervals - 1 09 to + 0 75 kPa)	Nil declared
42 Schafroth Tarok et al. Combined oximetry-cutaneous capnography in patients assessed for long term oxygen therapy	Before-After study	3	20	Chronic lung disease with PaO2<55mH or <59 in presence of pulmonary hypertension	Oxygen at variable flow rates to obtain SaO2>90%	None	Assessment study	Correlation between arterial PaCO2 and transcutaneous CO2 estimation	Minimal bias between PtCO2 and PaCO2	Undeclared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
43 Chiang et al. Respiratory response to carbon dioxide stimulation during low flow supplemental oxygen therapy in Chronic Obstructive Pulmonary Disease	Before-After study	3	26	Stable COPD patients with varying severity of disease	Oxygen supplementation	Change in chemoresponsiveness in COPD patients with normocapnoea vs hypercapnoea	Assessment study	Response to CO2 stimulation	Hypercapnoeic patients demonstrate blunted response to CO2 stimulation	Undeclared
44 Pilling, J.; Cutaia, M Ambulatory oximetry monitoring in patients with severe COPD: a preliminary study 1999 Chest 314-20	Observational	3	27	stable COPD on LTOT	18hr ambulatory SpO2 monitoring	Nil	single test	% time spent saturating <90% whilst ambulatory	On average patients spent 25% of their ambulatory time with Sp02<90%	undeclared

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46 Silwinski et al. The adequacy of oxygenation in COPD patients undergoing long term oxygen therapy assessed by pulse oximetry at home	Observational	3	34	Stable COPD on LTOT	24 hr SaO2 monitoring on LTOT	Nil	single test	% time spent saturating <90%	On average patients spent 6.9hrs with Sa02<90%	Undeclared
47 Abdulla, J.; Godtfredsen, N.; Pisinger, C.; Wennike, P.; Tonnesen, P. Adequacy of oxygenation in a group of Danish patients with COPD on long-term oxygen therapy. Monaldi Archives for Chest Disease. 2000. 54, 4, 279-82	Case series	3	26	COPD on LTOT	24hr pulse oximetry with activity diary		Single measure	Mean saturation	Mean SpO2 over 24hrs on LTOT was acceptable at 94%, with only minimal episodes of desaturation	Undeclared
48 Zhu et al (2005) Continuous oxygen monitoring--a better way to prescribe long-term oxygen therapy. Respiratory Medicine. 1386-1392	Cohort	2-	17	Stable COPD on LTOT	O2 flow adjusted to maintain SpO2 88-92%using 24hr SpO2 monitoring	Initial vrs altered O2 flow	Single test	Time spent outside target SpO2	28% increase in time within target saturation (p=0.001)	Undeclared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
49 Morrison D, Skwarski K Macnee W. resp Med 1997;91;287-291	Observational study	3	20	Stable COPD patients already receiving LTOT at prescribed flow rate	Continuous SpO2 measurement for 24h study period	Correlation between continuous pulse oximetry and single ABG on current oxygen flow rate	Single assessment over 24 hours	Accuracy of oxygen provision comparing single ABG to continuous pulse oximetry	9/20 patients did not achieve adequate oxygenation when assessed with ABG at rest. 7/20 patients achieved >90% SpO2 for <75% of the time during ambulatory assessment. Poor correlation between ABG measurements and ambulatory assessment.	Scottish Home and Health Dept

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
50 Nisbet et al. Overnight prescription of oxygen in long term oxygen therapy: time to reconsider the guidelines?	Observational	3	38	stable COPD on LTOT	Overnight oximetry on usual LTOT flow rate	Nil	single test	No. of patients who desaturating <90% for >30% of the night	16% desaturated significantly	undeclared
51 Plywaczewski, R.; Sliwinski, P.; Nowinski, A.; Kaminski, D.; Zielinski, J. Incidence of nocturnal desaturation while breathing oxygen in COPD patients undergoing long-term oxygen therapy. Chest 2000. 117,3, 679-83	Case control study	2-	82	COPD on LTOT	nocturnal oximetry		single test		47.6% of patients desaturated significantly overnight on LTOT	undeclared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
52 Peckham et al Improvement in patient compliance with long-term oxygen therapy following formal assessment with training 1998 Respiratory medicine 1203-06	Non-randomised controlled trial	2+	86	Patients with chronic respiratory disease prescribed LTOT	Formal assessment using ABGs on two separate occasions + education at time of initiation by Respiratory specialist team	Formal assessment + education by Respiratory specialist vs GP prescription with no education	single	Adherence to prescription - self reported and clock time. Patient understanding. Mortality	82% vrs 44% using LTOT for 15hrs min (p=0.002). 93% understood rationale for treatment vs 41%	Undeclared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
53 Pepin JL, Barjhoux CE, Deschaux C, Brambilla C, Long term oxygen therapy at home: Compliance with medical prescription and effective use of therapy	Observational	2+	930	COPD patients already established on LTOT in France. 10% randomly selected from 14 regions	Physician ques	Concentrator clock readings, weight of liquid cannisters or number and number of cylinders all estimating use over 3 months compared retrospectively with physician prescriptions. Comparison between hours used, severity of disease and lifestyle	3 month	Mean daily use of oxygen therapy (hours)	Only 45% of patients received O2 for ≥15 hrs/day. These were significantly more hypoxic ($p<0.001$),more hypercapnic ($p<0.005$), more obstructive ($p<0.001$). Other factors associated with effective use were prescription >15hrs/day, supplementary education, cessation of smoking, using oxygen during domestic activites and absence of side effects.	Unclear

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
53. Pepin J-L, Barjhoux CE, Deschaux C, Brambilia C, on behalf of the ANTADIR Working Group on Oxygen Therapy. Chest. 1996;109:1144-1150. Long-term Oxygen Therapy at Home Compliance with medical prescription and effective use of therapy.	Non-comparative study	2-	930	10% patients chosen randomly from LTOT registers in 14 ANTADIR regions. COPD. Aged 40-80. Those on NIV & CPAP excluded	patient review at home and questionnaire to prescribing physician	None	Nil	Oxygen uasge	The 37 patients using liquid oxygen had significantly longer daily oxygen usage than those with concentrators (p<0.001). Patients using > 15 hrs/day were more hypoxaemic 54 vs 59mmHg (p<0.001)Supplementary education from nurse / physio increased liklihood of using oxygen > 15 hrs per day	CNMRT special fund contract 90 MR/16
General comments:										

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
54 Eaton, T.; Rudkin, S.; Garrett, J. E 2001 An evaluation of shrt term oxygen therapy: the prescription of oxygen to adults with chronic lung disease hypoxic at discharge form hospital. Respiratory Medicine 95 (8) 655-60	Observational	3	160	Referrals for LTOT assessment - mixed disease group	LTOT assessment	Those who met criteria for LTOT and those who did not	2 months	Standard measures for LTOT PaO2<7.3kPa or 8kPa if added problems	47.5% of all acute inpatient referrals required LTOT at 2 months. 30% of those given O2 at discharge did not meet criteria for LTOT at 2 months (include drop outs/deaths on intention to treat 25%)	Undeclared
55. Cottrell JJ, Openbrier D, Lave JR, Paul C, Garland JL. Chest. 1995;107:358-361. Home Oxygen Therapy a comparison of 2- vs6-Month Patient re-evaluation	Cohort Study	2-	50	patients who met LTOT criteri and had 6 months experience of LTOT. Stable for at least the 6 weeks before enrollment. Able to give informed consent.	2 monthly follow-up	6 monthly follow-up	1 year	Demographics, mortality, ABG's, VAS score, Sickness Impact Profile, oxygen flow-rates, physician visits, Ed visits, admissions to hospital, hospital days, hospital and oxygen costs	Evaluation costs were significantly lower (p<0.001) in 6 monthly follow up group.	VA grant 87-033, NHLBI grant T32 HL07563, and the American lung Association of Pennsylvania

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
56.Granados A, Escarrabill J, Borras JM, Rodrigues-Roisin R. Respiratory Medicine. 1997;91;89-93. The importance of process variables analysis in the assessment of long term oxygen therapy by concentrator.	Non-comparative study	2-	62	Random sample of 111patients who received LTOT via concentrator in Catalonia (Spain) during 1991. Those who had died or were no-longer on LTOT were excluded	patient interviews at home	No comparison	Nil	demographics, make of concentrator and hours of usaage. FiO2 produced, patient sats on air and after 30 mins LTOT	58% patients met LTOT criteria at review. 205 concentrators weren't working properly	Nil reported
57.Godoy I, Tanni ST, Hernandez C, Godoy I. Int Jour COPD. 2012;7:421-425. The importance of knowing the home conditions of patients receiving long-term oxygen therapy.	Non-comparative study	3	97	patients who met LTOT criteria and had used it for 6 months(brazilian criteria i.e. pO2 <55mmHg or SpO2<88%. Or pO2 between 56 and 59mmHg or SpO2 89% with evidence of pulmonary hypertension, peripheral oedema or polycythaemia	Patient interviews at home	No comparison	Nil	demographics, SpO2 on LTOT and after 20 mins on air, compliance with prescription	62% patients required concentrator maintenance, 85 required smoking cessation advice, 5% required tubing replacement or adjustment.	Nil reported

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
58.Rizzi M, Grassi M, Pecis M, Andreoli A, Taurino AE, sergi M, fanfulla F. Arch Phys Med Rehabil. 2009. ;90:395-401.	cohort study	2+	217	consecutive caucasian COPD out-patients who had been on LTOT for at least 1 year, were stable and on optimal therapy at inclusion but had at least 1 exacerbation the preceding year. Enrollment From 1st Jan 20014 to 31st December 2005	Home care: outpatient clinical and functional evaluations every 6 months with domiciliary assessments by specific team of (pneumologist, respiratory nurse and therapist every 2-3 months	Standard care: reviewed in clinic by the team at the Consultant or GP's request	10 years	demographics, charlston Index, exacerbation frequency, intubations and survival.	survival in homecare group was better than standard care p=0.0001. Need for NIV was reduced in the Homecare group p=0.005, need for intubation was 7.3% lower in the homecare group (p=0.08), emergency department visits decreased in homecare compared with standard care p=0.009	Nil reported

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
59. Farrero E, Escarrabill J, Prats E, Maderal M, Manresa F. Chest. 2001;119:364-369. Impact of a hospital based home-care program on the management of COPD patients receiving long-term oxygen therapy.	RCT	1-	122	primary diagnosis of COPD and meeting LTOT criteria, at least 6 months experience on LTOT, able to travel to hospital sites.	Homecare programme: monthly phone call, hospital visits every 3 months and home or hospital visits on demand	Conventional medical care. Reviewed by homecare team at enrollment and after 1 year. Consultant and GP reviews at Drs request	1 year	demographics, CRDQ, hospital resource use, costs of resources	Home care group had signif decreased use of ED compared with controls p=0.0001, significantly less admissions to hospital p=0.001 and and significantly less hospital days p=0.01. costs were reduced by $46,214 in Homecare group	Nil reported
60. Goldbart J, Yohannes AM, Woolrych R, Caton S. Health and Quality of life Outcomes. 2013;11:124-132. 'It is not going to change his life but it has picked him up': a qualitative study of perspectives on long-term oxygen therapy for people with Chronic Obstructive pulmonary disease.	Non-comparative study	3	16 patients, 6 carers and 9 health care professionals	COPD patients on LTOT in single PCT who returned initial questionnaires and consented to take part in focus groups	3 Focus groups	None	Nil	Qualitative info on: Impact of living with COPD and views of LTOT service	Not measured	NHS Wirral

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
61. Restrick LJ, Paul EA, Braid GM, Cullinan P, Moore-Gillon J, Wedzicha JA. Thorax. 1993; 48:708-713 Assessment and Follow-up of patients prescribed long-term oxygen treatment	Non-comparative study	2-	176	All patients who had static concentrators in 3 GP authorities on 1st January 1991	Review at home	None	Nil	demographics, ABG's, problems with LTOT	74% patients used oxygen for > 12 hours. 46% of patients with SpO2. 91% met LTOT criteria	Nil reported
62 A randomized trial of nocturnal oxygen therapy in chronic obstructive pulmonary disease patients. Chaouat, A.; Weitzenblum, E.; Kessler, R.; Charpentier, C.; Enrhart, M.; Schott, R.; Levi-Valensi, P.; Zielinski, J. Eur Respir J 1999; 14(5); 1002-8	RCT	1+	76	COPD with mild daytime hypoxia (PaO2 7.4-9.2kPa) and nocturnal desaturation (>30% night with O2 sats <90%). OSA excluded.	NOT aiming for SaO2>90% - usually 2l.min nasal cannulae	NOT or air	2 yrs	Survival, pulmonary haemodynamics (Rt heart catheter), ABG, time to requiring LTOT,	No significant difference in survival, time to LTOT, pulmonary haemodynamics	Grant from Programme Hospitalier de Recherche Clinique
63 Mckeon J, Murree-Allen K, Saunders N. Thorax 1989:44: 184-8 Supplemental oxygen and quality of sleep in patients with chronic obstructive lung disease.	RCT	1+	23	14/23 male, 4 smokers, mean PaO2 at rest 7.7 (5.5-10.9)	NOT titrated to maintain O2 sats>90% or compressed air nasal cannulae	NOT or air	2 nights	PSG and sleep questionnaire	No difference in sleep quality	grant from NHS and MRC

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
64 Survival in COPD patients with a daytime PaO2 greater than 60mmHg with and without nocturnal oxyhaemoglobin desaturation. Fletcher EC, Donner CF et al. Chest 1992 Mar: 101 (3): 649-55	Cross sectional study	2+	169	COPD, some smokers, PAO2>60mmHg and evidence of nocturnal desaturation in REM sleep for minimum of 5 mins to <85%	varied - 5 centres - no details given	NOT or air	10 year survival study	Survival differences between nocturnal desaturators and non-desaturators, and between those receiving NOT and no NOT	Survival signficinatly better on those without nocturnal desaturation. Trend towards improved survival with NOT	None declared
65 A Double-blind Trial of Nocturnal Supplemental Oxygen for Sleep Desaturation in Patients with Chronic Obstructive Pulmonary Disease and a Daytime PaO2 above 60mmHg Fletcher EC et al Am Rev Respir Dis 1992; 145: 1070-1076	RCT	1+	29	COPD with daytime PaO2>60mmHg (O2 sats >90%), evidence of nocturnal desaturation during REM sleep. Some smokers	nasal O2 at 3 l/min (confirmed that corrected desaturation)	compressed air at 3l/min nasal	3yrs	compliance, pulmonary haemodynamics, polysomnography indices, red cell mass, TLCO	Reduction in PA pressures of -3.7mmHg over 3 yrs. No signficant difference in other parameters	None declared
66 Effects of oxygen therapy on left ventricular function in patients with Cheyne-Stokes respiration and congestive heart failure. Krachman, Samuel L.; Nugent, Thomas; Crocetti, Joseph; D'Alonzo, Gilbert E.; Chatila, Wissam. Journal of Clinical Sleep Medicine 2005; 1 (3): 271- 6	Non randomised controlled trial	1-	10	CHF LVEF < 12%, AHI 57+/-61/hr,	NOT nasal cannulae 2l/min or air	NOT or air	30 days	PSG to measure AHI and sleep quantity and quality, radionucleotide ventriculography	NOT reduced AHI after 1 night and had same effect size at 30 days. NOT showed no change in LVEF, sleep time and sleep architecture.	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
67 Javaheri, S.; Ahmed, M.; Parker, T. J.; Brown, C. R. Sleep 22(8): 1999; 1101- 6. Effects of nasal O2 on sleep-related disordered breathing in ambulatory patients with stable heart failure	Non randomised controlled trial	1-	36	male, HF LVEF <45%, Sleep study AHI >15/hr	NOT nasal cannuale 2-4l/min titrated to give O2 sats>90%	NOT or air	2 nights	PSG to measure AHI, ABG, cardiac radionuclide ventriculography and holter monitor for arrythmias	NOT significantly reduced total AHI in 41% patients (mainly reducing central sleep apnoea index) but did not affect total sleep time	None declared
68 Hanly PJ, Millar TW, Steljes DG, Baert R, Frais MA, Kryger MH. Annals Int Med 1989;111:777-782. The Effect of Oxygen on Respiratory and Sleep in patients with Congestive Heart Failure.	RCT	1+	9	Male, <70yrs, HF NYHA 3/4, LVEF <30%, awake O2 sats >93%,	NOT nasal cannuale 2-3l/min or compressed air via nasal cannuale	NOT or air	2 nights	PSG to measure CSR, sleep quality, AHI, total sleep time	NOT group had increased total sleep time, reduced AHI, reduced duration of CSR	Part funded by Heart and Stroke Foundation of Canada and MRC Canada

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
69 Effect of oxygen on sleep quality, cognitive function and sympathetic activity in patients with chronic heart failure and Cheyne-Stokes respiration. Staniforth, A. D.; Kinnear, W. J.; Starling, R.; Hetmanski, D. J.; Cowley, A. J..European Heart Journal 1998: 19(6): 922-8	RCT	1+	11	Stable heart failure with LVEF <40%. Baseline PaO2 was 10.7KPa	4 week periods of overnight oxygen 2l/min nasal cannulae or air (blinded using sham concentrators)	overnight oxygen and air	4 weeks	compliance, CSA on sleep study, ESS, VAS, cognitive function tests, neuroendocrine tests (noradrenaline, ANP and BNP)	nocturnal HOT group showed reduction in CSAs, no effect on OSAs, no effect on patient symptoms or cognitive function, reduced urinary noradrenaline concentration	not declared
70 Improvement of exercise capacity with treatment of Cheynes Stokes Respiration in patients with Congestive cardiac failure. Andreas S, Clemens C, Sandholzer H, Figulla H and Kreuzer H. J AM Coll Cardiol 1996:27:1486-90	RCT	1+	22	Severe HF, LVEF <30%, evidence of CSR	NOT at 4 l/min or compressed airs both by nasal cannulae	NOT or air	7 nights	PSG, exercise test, baseline echo, spirometry, symptom questionnaires	NOT significantly reduced CSR, total sleep time and quality, peak O2 consumption during exercise test and test for cognitive function but not daytime symptoms	None declared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
71 Sasayama S, Izumi T, Matsuzaki, M.; Matsumori, A.; Asanoi, H.; Momomura, S.; Seino, Y.; Ueshima, K.; Circ J 2009;1255-1262Improvement of quality of life with nocturnal oxygen therapy in heart failure patients with central sleep apnea.	RCT	1-	51	HF (NYHA II-III) and CSA. Baseline PaO2 not given.	overnight oxygen 3 l/min nasal cannulae or usual breathing	overnight oxygen and air	52 weeks	QOL (Specific activity scale), ventricular function (ejection fraction), SDB indicators (PSG), plasma concentration neuropeptides	HOT group showed significant improvement in SDB indicators, SAS, and NYHA class. No signficant improvement in LV function or plasma neuropeptide levels.	Teijin Pharma Ltd, Tokyo
72 Brostrom A, Hubbert L, Jakobssen P, et al J Cardiovascular nursing 2005: 20(6); 385-396. Effects of long etrm nocturnal oxygen treatment in patients with severe heart failure	case series	3	22	HF (NYHA III/IV)	NOT at 2l/min for 10 hrs	pre and post NOT compairng outcomes for AHI> and < 20	3 months	PSG, Echo, 6MW, Sleep questionnaire and ESS, HRQOL	Significant improvement in 6mw in all patients. No change in cardiac function, sleep quality, HRQOL	Swedish Foundation for healthcare science and allergy research grant
73 Suzuki, Jun-ichi; Ishihara, Takashi; Sakurai, Kaoru; Inagaki, Hiroshi; Kawabata, Mihoko; Hachiya, Hitoshi; Hata, Akihiro; Circulation journal 2006; 70 (9): 1142-7. Oxygen therapy prevents ventricular arrhythmias in patients with congestive heart failure and sleep apnea	Non randomised controlled trial	1-	37	HF adult	NOT 3l/min nasal cannulae	NOT or air	2 nights	Holter monitoring, PSG, echo, BNP	Group with lower daytime O2 sats and frequent PVCs had no change in PVCs or heart rate with NOT compared to group with normal daytime sats and fewer PVCs	Japan Cardiovascular research foundation

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
74 Paul B, Joseph M, Pasquale CG. Hert, Lung, Circulation 2008; 17:220-223 Domicilary Oxygen Therapy Improves Sub-maximal Exercise capacity and quality of life in Chronic Heart failure.	case series	3	10	8Male, 2 female, HF LVEF < 40%, OSA excluded by history, baseline PaO2 70+/- 19.55mmHg	NOT 4l/min and 8 hrs/night nasal prongs	NOT	4 weeks	6 min walk, echo, QOL score, Biological marker (NTproBNP),	Signficant improvements in 6 min walk, QOL score but no change in LVEF or biological markers.	Funded by National Heart Foundation Australia
75 Zinman R, Corey M, Coates AL, Canny GJ, Connolly J, Levison H, Beaudry PH. Nocturnal home oxygen in the treatment of hypoxemic cystic fibrosis patients. J Pediatr 1989;114(3):368-377.	RCT	1+	28	CF patients with PaO2 <65mmHg and stable. All with PaCO2 >60mmHg were excluded	Nocturnal oxygen prescribed at 1 litre increasing increments for PaO2 > 70mmHg (not LTOT) compared to room air	LTOT versus room air	3 yr enrollment	Admission frequency. Death. Disease progression (measured by BMI, pulmonary function, exercise capacity and RV ejection response to exercise)	School and work attendance was maintained in not versus air group. No effect on mortality/admission or disease progression measures	Canadian CF foundation

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
76 Spier S, Rivlin et al. The effect of Oxygen on Sleep, Blood Gases and Ventilation in Cystic Fibrosis	randomised controlled trial	1+	10	Adult CF FEV1 < 25% pred, awake SaO2 <92%, 4 had daytime hypercapnia	humidified oxygen or compressed air delivered via nasal prongs, 2 l/min	NOT or air	2 nights	Polysomnography, tidal volumes, transcutaneous CO2,	In NOT group, oxygen saturation improved, TcPCO2 rose but not to clinically significant degree, no change in no of arousals or lther sleep parameters.	None declared
77 Gozal D. Nocturnal ventilatory support in patients with cystic fibrosis: compariosn with supplemental oxygen	randomised controlled trial, non blinded	1-	6	Adult CF FEV1 < 29% pred, 2 had daytime hypercapnia	room air, oxygen titrated (not clear to what level) or BIPAP using nasal mask	Air, NOT, BIPAP and BIPAP +NOT	3 nights	Polysomnography, transcutaneous CO2, lung function	Compared with air NOT improved oxygenation but no changes in sleep quality. 2 patients had sym,ptomatic rises in PTCCO2 which was improved with BIPAP support.	None declared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
78 Milross, M. A.; Piper, A. J.; Norman, M.; Becker, H. F.; Willson, G. N.; Grunstein, R. R.; Sullivan, C. E.; Bye, P. T. P. American Journal of Respiratory and Critical Care Medicine. 2001; 163 (1); 129-134. Low-flow oxygen and bilevel ventilatory support: Effects on ventilation during sleep in cystic fibrosis	RCT	1+	13	Adult CF, FEV1<65% pred, awake PaO2 53-77mmHg	Air with CPAP at 4cmH2O, NOT with CPAP at 4cmH2O titrated to maintain O2 sats>90%, BiPAP and NOT titrated to maintain O2 sats>90% and prevent hypercapnia	Air or NOT or BiPAP with NOT	3 nights	Lung function, ABG, PSG, Ventilation via pneumotach	Vi (minute ventilation) was reduced on Air and NOT nights in REM sleep, but not with BIPAP+NOT, which also prevented rise in TcCO2: a significant CO2 rise and fall in pH was seen with NOT alone. Total sleep time less on BIPAP than NOT or air.	None declared
79 Vazquez J-C, Perez-Padilla R. Effect of oxygen on sleep and breathing in patients with interstitial lung disease at moderate altitude. Respiration 2001: 68: 584-9	Non-randomised controlled trial	1-	33	Adults ILD patients (mixed types of ILD) living at moderately high altitude	nasal prongs	Air or NOT	2 nights	breathing frequency, heart rate, sleep study indices	reduction in heart arte and breathing frequncy with oxygen. No effect on sleep quality	Supported by "CONACYT and INER"
80 Smith PEM,Edwards RHT, Calverley PMA. Oxygen treatment of Sleep Hypoxaemia in Duchenne Muscular Dystrophy	randomised controlled trial,	1+	7	Adult patients with Duchenne muscular dystrophy FVC 1.37L and normal daytime ABG	room air, nasal cannulae oxygen at 2l/min	Air, NOT,	2 nights	Polysomnography, lung function. Blood gases not measured.	Compared with air Not reduced sleephypoxaemia but prolonged episodes of hypoventilaton and apnoeas and had no effect on arousals	Muscular Dystrophy Group

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
82 Bradley et al. The Cochrane Database 2005 Issue 2	Metaanalysis	1+	469	COPD patients with moderate to severe airflow obstruction - including both those who fulfilled criteria for LTOT and those who did not	Single assessment studies studying beneficial effects of oxygen during exercise testing	Oxygen vs cylinder air	Single assessment	Endurance and maximal exercise capacity	Improvements in all outcomes relating to endurance (distance, time and number of steps).	N/a
83 Judy M. Bradley, Toby Lasserson, Stuart Elborn, Joe MacMahon, and Brenda O'Neill, A Systematic Review of Randomized Controlled Trials Examining the Short term Benefit of Ambulatory Oxygen in COPD* (CHEST 2007; 131:278–285).	Systematic Review of RCT's - single assessment studies	**1++**	534	COPD, mean age 47-73, mod-severe obstruction (1 study mild) mean resting pa02 = 6.9 to 11.3. Various dose of oxygen	performance during a single exercise test using ambulatory oxygen	ambulatory oxygen vs placebo air		exrecise capicy (distance or time), dyspnoea scores BORG/VAS, sa02 (pulse oximetry or ABG's)	exercise distance by 18.86 m (95% CI 13.11-24.61 m, n=238) exercise time increased by 2.71 mins (95% CI =1.96 -3.46 min, n=77)	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
84 Nonoyama et al Cochrane database 2007 Issue No. 2	Metaanalysis	1-	63	COPD patients who did not fulfill criteria for LTOT	Supplemental oxygen use during the exercise-training component of a PR programme	Oxygen vs air	Exercise training for ≥3 weeks, including ≥2 sessions per week	Exercise time, Exercise distance, oxygenation status, Borg scores and HRQL	Increased constant power exercise time (2.68 minutes) and improved Borg scores (-1.22 units) but no improvement in 6MWD, shuttle walk distance, HRQL or oxygenation status	n/a
85 Dyer et al. Chronic Respiratory Disease 2012 9:83	Single blinded RCT	1-	51	COPD patients attending PR who had demonstrable desaturation and who had previoulsy been noted to walk further with supplemental oxygen	Supplemental oxygen use during the exercise-training component of a PR programme	Oxygen vs cylinder air	6-7 weeks	Endurance shuttle walk test, quality of life	490m (95% CI 228-750) improvement in ESWT. No signficant change in quality of life	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
88 Rosemary P Moore, David J Berlowitz, Linda Denehy, et al. A randomised trial of domiciliary, ambulatory oxygen in patients with COPD and dyspnoea but without resting hypoxaemia. 2011 Thorax 66: 32-37	RCT double blinded	**1++**	**Amb Air = 75, Amb 02 = 68**	pa02>7.3, no previous oxygen, no rehab,stable,no locomotor disease. 50 were classed as desaturators <88% after 6MWT moderate to severe COPD mean FEV1 = 1.16 (0.51)	Amb air cylinder vs amb oxygen cylinder to use inside and outside during exertional activities	Amb air cylinder vs amb oxygen cylinder to use inside and outside during exertional activities	assess 2 week run in reassessed then randomised, measures repeated at 4 weeks and end of study 12 weeks	ABG'S, PFT's,CRDQ, 6MWD,BDI, AQoL, HADS, activity count (pedometer)	NONE	National Health and Medical Research Council, Northern Clinical Research Centre, Victorian Tuberculosis and Lung Association, Austin Hospital Medical Research Foundation, Institute for Breathing and Sleep, Austin Hospital, Australia Finkel Foundation, Air Liquide, Boehringer Ingelheim.
89 Eaton et al 2002. ERJ 20:306-12	Double blind crossover RCT	1-	41	Dyspnoiec COPD patients who did not fulfill criteria for LTOT	Domicilary ambulatory oxygen	Oxygen vs cylinder air	12 weeks	CRQ, HAD and SF-36	Improvements in all domains of CRQ, in HAD and in some domains of SF-36	n/a

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
90 Nonoyama et al. AJRCCM 2007 176:343-9	Individual blinded RCT ('n of 1')	3	27	COPD patients who do not fulfill requirements for LTOT	Domiciliary ambulatory oxygen for 2 week periods	Oxygen at 2L/min vs cylinder air	6 weeks	5 minute walk test, CRQ and SGRQ	Significant improvement in 5MWD (427 steps vs 412 steps) but no difference I CRQ or SGRQ	n/a
91 Sandland et al Chest 2008; 134:753-760	Double binded RCT	1-	20	COPD patients who were either hypoxic at rest or who desaturated on exercise	Domicilary oxygen or cylinder air for 8 weeks	Oxygen vs cylinder air	8 weeks	Total domestic activity and HRQOL	No change in domestic activity or HRQL between groups	
91 Ringbaek et al. 2013 Chronic Respiratory Disease 10(2);77-84	Unblinded RCT	1-	45	COPD patients who are normoxic at rest but who desaturate during exercise and	Domiciliary ambulatory oxygen during 20 week PR programme	Oxygen at 2L/min vs control (ie room air)	33 weeks (including 20 weeks PR)	ESWT, SGRQ, exacerbation rate or hospital admission rate	No differences	
93 McDonald, C.F, Blyth,C.M, Lazarus, M.D, Marschner, I, Barter, C.E. Exertional Oxygen Of Limited Benefit in Patients with Chronic Obstructiive Pulmonary Disease and Mild Hypoxemia. 1995. Am J Resp Crit Care Med 152 pp1616-1619.	RCT - crossover. Blinded	**1++**	**26**	stable COPD MOD-SEVERE pa02>60 mmHg	6 weeks of amb cylinders or 6 weeks of amb air cylinders	airs vs oxygen amb cylinders provided for home and outdoor use	12 weeks total	PFT's, 6MWD, step test, diary symptom cards, CRDQ		Sir Edward Dunlop Research Foundation and Medical Gaes, Australia.

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
95 Vergeret et al 1989 ERJ 2:20-25	Unblinded RCT	1-	159	COPD patients who met criteria for LTOT	LTOT via concentrator alone or via concentrator + AOT or liquid oxygen	LTOT via concentrator alone or via concentrator + AOT or liquid oxygen	12 months	Daily use of oxygen.	Patients with a concentrator and AOT or liquid oxygen accumulated greater daily use (17 hours/day vs 14 hours day)	n/a
95 Vergeret, J.; Brambilla, C.; Mounier, L.: Portable oxygen therapy: use and benefit in hypoxaemic COPD patients on long-term oxygen therapy: 1989 The European respiratory journal : 20 - 25	RCT	+	122 tl1e number of medical check-ups and home questionnaires was 158 at 3 months, 136 at 6 months, 128 at 9 months and 122 at 12 months (58 with fixed oxygen, 64 with portable oxygen).	Stablse 40 - 75 year old severe COPD patients with a PaO2 < 8kPa but > 5.3kPa and PaCO2 < 8.2 kPa already receiving LTOT snd able to walk 200m on 12 min walk test	12 centre study with no analysis of separate centre data although don't think this would make a difference. Might have been useful to look at the concentrator patients when loaned portable systems to see if compliance did improve	Liquid oxygen compared with ambulatory cylinder/concentrator	12 months	Cost and QOL (daily duration of use and daily activity)	Care, held December 13-16, 2008, in Anaheim, California. Thesymposium was made possible by an unrestricted educational grant from Boehringer Ingelheim.	Care, held December 13-16, 2008, in Anaheim, California. The

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
96 Lacasse et al 2005; 25:1032-8	Randomised crossover trial	1-	24	COPD patients who met criteria for LTOT	LTOT via concentrator alone or via concentrator + AOT vs cylinder air	LTOT via concentrator alone or via concentrator + AOT vs cylinder air	12 months	6MWD, CRQ and daily use of oxygen	No signficant benefit from AOT - study stopped prematurely after interim analysis	Quebec universal medical insurance plan
97 Casaburi et al 2012 COPD 9(1):3-11	Unblinded RCT	3	22	COPD patients who met criteria for LTOT	Standard' cylinder (weighing 22lb) carried via cart vs 'lightweight' (weighing 3.6lb) cylinder	Standard' cylinder (weighing 22lb) carried via cart vs 'lightweight' (weighing 3.6lb) cylinder	6 months	Physical activity (as measured by accelerometer)	No difference between groups in activity levels	n/a

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
97 Casaburi, Richard; Porszasz, Janos; Hecht, Ariel; Tiep, Brian; Albert, Richard K.; Anthonisen, Nicholas R.; Bailey, William C.; Connett, John E.; Cooper, J. Allen, Jr.; Criner, Gerard J.; Curtis, Jeffrey; Dransfield, Mark; Lazarus, Stephen C.; Make, Barry; Martinez, Fernando J.; McEvoy, Charlene; Niewoehner, Dennis E.; Reilly, John J.; Scanlon, Paul; Scharf, Steven M.; Sciurba, Frank C.; Woodruff, Prescott; Copd Clinical Research Network. Influence of lightweight ambulatory oxygen on oxygen use and activity patterns of COPD patients receiving long-term oxygen therapy. Journal of Chronic Obstructive Pulmonary Disease. 2012. Pages 3 -11	RCT	+	22 randomised 17 completed	Male/femal >= 40 stable COPD (FEV1 <= 60%) patients established on lTOT who had no ambulatory source or just an E cylinder	Does a lightweight cylinder improve oxygen use in LTOT patients	Comparing a lightweight portable cylinder with standard ambulatory cylinder plus compliance over a period of time (this included a static concentrator)	Baseline activity and oxygen use were recorded for 2 weeks during which subjects utilised and E cylinder. Then patient randomised. Activity was monitored for 3 weeks before and 3 and 6 months at centre visists. 42 days of home recording with static concentrator	Used a conserving regulator capable of measuring O2 use for ambulation. Stationary O2 used a "breath tracker" a piezoelectric sensor to record pressure fluctuation , attached to a standard concentrator. How often/how many hours theambulatory device was used. Recorded by electronic device	Activity and oxygen utilisation was analysed. Static and ambulatory data were merged. Stationary and ambulatory use was calculated 24 hours per day and the average calculated. Satn measured on patients with ambulatory and statie giving SpO2 =>92%. Patients only averaged 2.5 hours per day using E cylinder and activity level was very low. Not improved by using a light weight cylinder. Questionnaire used for patients to estimate compliance.	COPD clinical research networkby a cooperative agreement from the National Heart, Lung and Blood institute. No commercial sources were utilised.

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
106 Philip J Gold M Milner A Di Iulio J Miller B Spryut O Journal of pain and symptom management 2006 32;6	Randomized double blind cross over trial	2+	51	Stable patients over the age 18 with diagnosis of cancer who complained of dyspnoea with a dyspnoea intensity score of at least 30mm on a 0-100mm VAS, which was deemed clinically related to cancer.	Patients randomized to receive eith air or oxygen at 4 litres / min via nasal cannula for 15 minutes with each therapy.	Comparison of impact of oxygen versus air on dyspnoea rating.	one hour	Completion of VAS for dyspnoea, QLQ-C30 dyspnoea measurement, Dyspnoea assessment questionnaire results and pulse oximetry, pre and post blinded administration of oxygen and air at 4 litres. The preferred as was then nominated.	No significant difference identified in VAS or QLQ-C30 for 2 gas types, oxygen saturations showed improvement in oxygen arm of study however there was no evidence of a significant correlation between VAS score and oxygen saturation. No significant gas preference for oxygen over air, 41% expressing a preference for oxygen, 29% a preference for air and 29% no prefererence.	Australian New Zealand Society of palliative care
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Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
107 Abernathy A McDonald C Frith P Clark K Herndon J Marcello J Young I Bull J Wilcock A Booth S Wheeler J Tulsky J Crockett A Currow D 2010 lancet 376:sept 4	Randomized double blind cross over trial	1+	239	Patients over age of 18 with life limiting illness who did not meet criteria for LTOT (PaO2 more than 7.3kPa) who are on optimum medication but experience refractory breathlessness (MRC 3 or greater)	Administration of oxygn or air at 2 litres continuously via concentrator for relief of breathlessness in patients ineligible for LTOT	Breathlessness rating recorded twice daily, daily diary recording of average dyspnoea expeieinced in previous 24 hours following administration of oxygen or air via concentrator 15 hours /day, and side effects reported by use of likert 5 point scale.	7 days	Numerical rating scale recording breathlessness right now twice daily, Numerical rating scale recorded in diaries for previous 24 hour period. Daily QoL questionnaire, Modified MRC and 5 point likert scale for side effects.	No difference in breathlessness noted in either group. 52% patients on oxygen and 40% patients on air responded to intervention with morning dyspnoea and 42% of patients in both groups responded to intervention for evening dyspnoea. No difference in change in QoL noted between each group. No clinically relevent difference in side effects noted.	US National institute of Health, Australian National health and Medical research council, Duke Institute.
108 Uronis HE, Currow DC, McCrory DC, Samsa GP and Abernethy AP. British J of Cancer (2008) 98, 294-299	Systematic review of RCTs	1+	134	Adult cancer patients with refractory breathlessness not qualifying for home LTOT.	effect of oxygen and medical air on dyspnoea. Oxygen was delivered by nasal canula in 3 studies,	comparing oxygen and medical air		Assessment of breathlessness using VAS, NRS or Modified Borg	Oxygen failed to improve dyspnoea in mildly or non-hypoxaemic cancer patients (SpO2 > 88%)	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
109 Clemens K Quednau I Klaschik E 2009 Support Care Cancer 17;367-377	prospective non randomised study	2+	46	adult inpatients on palliative care unit with advanced cancer or other terminal incurable disease and had dyspnoea at rest. Patients with Hb <10 were excluded	Nasal Oxygen 4 L/min applied at rest for 60 min. Additionally Opioids were given as per the intensity of dyspnoea.	Data obtained from continous recordings of patients on room air, 60 minutes after oxygen delivery compared with data obtained at regular intervals following opioid application.	Baseline data of dyspnoea, SaO2, tcpaCO2, pulse rate and resp rtae for 15 min breathing room air at admission, 60 min during nasal O2 and 30, 90 and 120 min after the first opioid application and without O2.	The effects of Oxygen and opioid on ventilation and relief of dyspnoea in hypoxic and non-hypoxic palliative care patients either opioid naive or pre treated with strong opioids.	Opioids worked significantly better than oxygen in reducing the intensity of dyspnoea even in hypoxix patients. there was no correlation between intensity of dyspnoea and oxygen saturation in Hypoxic and non hypoxoc patients.	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
110 Currow D Agar M Smith J Abernathy A 2009 Palliative med 23;309	Cohort study	2-	5862	Adult patients with cancer and other life limiting illness prescribed oxygen. Patient rated symptom assessment scale for each clinical contact in the community but could not include pulse oximetry.	Oxygen therapy via concentrator for relief of symptomatic breathlessness following referral to palliative care.	Symptom assessment scale as 2 weeks pre initiation of oxygen and 2 weeks post oxygen therapy.	One month	symptom assessment scale for breathlessness at baseline and 1 or two weeks post oxygen therapy.	No clinically significant improvement on breathlessness demonstrated despite introduction of oxygen. One third patients who were prescribed oxygen earlier in disease trajectory did have clinically significant improvement in breathlessness which may be related to exertional dyspnoea.	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
111 Short burst oxygen therapy after activities of daily living in the home in chronic obstructive pulmonary disease. Quantrill, S. J.; White, R.; Crawford, A.; Barry, J. S.; Batra, S.; Whyte, P.; Roberts, C. M. Thorax 2007;62:702-705.	double blind RCT crossover study	1+	22	14M/8F, age 72(7.3)56-86, FEV1 0.87(0.38)0.40-1.69. FEV1%pred 38.0(16.1)17-74. SaO2 % resting RA 93.1(3.8) 82-98%. Desaturation with activity 7.5(-2.5 to 0.5)%. Patients were currently using O2 for activities	Cylinder O2 via nasal prongs 2l/min for 18 patients and 4l/min for 4 patients and Cylinder Compressed air via nasal cannulae post activity following 2 different activities.	Cylinder O2 via nasal prongs at 2l/min or 4l/min post activity versus compressed cylinder air post activity	1 day	subjective(pts percieved recovery) and objective (SaO2 returned to within 2% and HR to within 5 bpm of pre activity values). Recovery post activity. Breathlessness was measured with VAS.	Median (mean)of activities1 and 2 objective O2 75(97)s, RA 110 (135)s, p=0.08. Subjective O2 186(186)s, RA 240(219)s p=0.06.	Chest clinic amenity fund

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
112 study 1. Oxygen supplementation before or after submaximal exercise in patients with chronic obstructive pulmonary disease. Nandi, K.; Smith, A. A.; Crawford, A.; MacRae, K. D.; Garrod, R.; Seed, W. A.; Roberts, C. M. Thorax 2003;58:670-673.	RCT	1+	34	Stable COPD, age 68(5.98), FEV% pred 34(13.1), PaO2 kPa RA 7.7(13.1)(5.14-10.50), SaO2 RA resting 91.9(5.2)(76-97). Walk distance RA (m) 283(117.8)(70-490).	O24l/min via 28% mask versus cylinder air for 10 minutes pre exercise	O24l/min via 28% mask versus cylinder air for 10 minutes pre exercise		Change in distance walked(6MWT), oxygen saturations(SaO2), breathleasness(VAS), and recovery time-subjective(SRT) and objective(ORT).	6MWT O2 288(20.8), Air 283(20.3) mean diference 5. Fall in SaO2-O2 11.0(1.1), air 9.4(1.1) mean dif(1.6)(p=0.01). Change in VAS from baseline O2 58(4.3)mm, air 54(3.8)mm. SRT(s) 111(19.6), air 142(16.5) mean dif 13. ORTO2 177(20.6), air 184(31.7)mean dif 7. SBOT for 5 minutes pre exercise did not improve breathlessness, exercise capacity or reduce recovery time.	non declared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
112 study 2. Oxygen supplementation before or after submaximal exercise in patients with chronic obstructive pulmonary disease. Nandi, K.; Smith, A. A.; Crawford, A.; MacRae, K. D.; Garrod, R.; Seed, W. A.; Roberts, C. M. Thorax 2003;58:670-673.	RCT	1+	18	Stable COPD patients age 68(6.87), FEV1%pred 29(6.1)(19-40). PaO2 kPa RA 7.68(1.37). SaO2 resting RA 90.5(5.8). 6MWT 233(88.6).	Cylinder oxygen 4l/min via 28% mask or cylinder air for 5 minutes immediately after 6MWT	Cylinder oxygen 4l/min via 28% mask or cylinder air for 5 minutes immediately after6MWT		Saturations% (SaO2) at 5 mins. VAS(mm) at 5 mins, subjective recovery time SRT, Objective recovery time ORT.	SaO2 at 5 min O2 92.7(1.1), air 89.9(1.2) mean dif 2.7, p<0.0001. VAS 5 mins O2 14(3.6), air 19(5.7) mean dif 5. SRT O2 182(33.1) air 151(17.7) mean dif 31. ORT O2 215(38.4) air 164(17.9) mean dif 51. SBOT for 5 minutes post exercise does not significantly	non declared
113 Short burst oxygen immediately before and after exercise is ineffective in nonhypoxic COPD patients. Lewis, C. A.; Eaton, T. E.; Young, P.; Kolbe, J. Eur Respir J 2003	RCT	1+	22	stable COPD, age 68.7±10.1(47-82). FEV%pred 34.0±12.0(19-59). Resting SaO2% 94.4±1.6(92-98)	oxygen(O2) 2L/min versus cylinder air 2L/min	O2 2 Lmin nasal cannulae versus cylinder air 2L min pre and post exercise	2 visits	The effect of SBOT on performance when administered before and after exercise.	before exercise 6 MWT Visit 1- air 373.5±18.3, O2-383.6±17.7. V2 air-388.2±20.5, O2 390.3±18.7. After execise finaL Borg 4.8±0.4, O2 5.1±0.4, V2- air 5.1±0.5, O2 4.9±0.4 0. recovery after exercise seconds-V1 air 166.5+12.0, O2 168.6±12.2, V2 air 160.0±15.7, O2 141.7±12.6	non declared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
114 B Ronan O'Driscoll, Jane Neill, Siddiq Pulakal and Peter M Turkington. A crossover study of short burst oxygen therapy (SBOT) for the relief ofexercise induced breathlessness in severe COPD. BMC Pulm Med. 2011;11:23	RCT	1++	34	Stable pts with COPD who are SOB on minimal exertion. Age >50yrs, with at least 20pack year smoking history. Resting SaO2 95(92-98)%, FEV1%pred31.4 (21-39)%, resting borg1.5(0-4), post ex Borg 5.1(2-9).	O2, room air, compressed air and fan.	O24L/min from face mask(OM) versus room air from face mask(RA), compressed air(AM) and air from electric fan(EF)	1 day	reduction of dyspnoea post exercise. Difference in dyspnoea and time to recover between O2 room air, compressed air and air from fan.	Mean exercise- RA 93.7(42.1), EF 92.9(43.2), AM94.1(40.5), OM93.0(46.1), pulse end of exercise- RA 99.3(18.6), EF 103.6(16.6), AM 107.0(19.7), OM 102.1(16.2). SpO2- RA 91.3(4.0), EF 91.1(3.7), AM 91.3(4.3), OM 91.5(3.5). End exercise Borg- 5.1(1.7), EF 5.1(1.7), AM 5.3(1.6), OM 5.1(1.7). Subjective recovery(SR) mins- RA 3.2(1.1), EF 3.6(1.8), AM 3.3(1.1), OM 3.1(1.2), objective recovery(OR)- RA 2.8(2.0), EF 2.3(1.1) AM 2.9(2.5) OM 1.9(1.0). 14 pts who desaturated SR- RA 3.2(1.1), EF 3.4(1.1), AM 3.5(0.9), OM	Salford Respiratory Fund

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
115 Short burst oxygen therapy for relief of breathlessness in chronic obstructive airways disease. Evans, T. W.; Waterhouse, J. C.; Carter, A.; Nicholl, J. F.; Howard, P. Thorax 1986;41:611-615	RCT	1+	19	19pts with severe COPD with shortness of breath as principle complaint, 16M/3F, mean age 65 (55-74), mean FEV/FVC 0.97/2.42 (SD0.50/1.09), PaO2 8.05(1.52), PaCO 25.36(0.88), HR96(22), RR21(5.74), VAB6.11(7.72).	administration of O2 via f acemask versus placebo via facemask versus room air.	Time in recovery following exercise as measured by change in VAS, RR, HR.	12 months	recovery time following exercise as measured by VAS, RR, HR. Reproducibility of measurements over time	Recovery time for HR- Placebo-3.76(SD3.02), RA 3.42(1.16), O2 3.31(1.78)(p>0.05). RR-placebo 4.21(2.79), RA 4.39(2.51), O2 3.66(2.01), (p>0.05). VAS 3.63(1.33), RA 3.55(0.94), 3.03(1.11). Plasebo v RA p=1.0, placebo v O2 p=0.046, RA v O2p= 0.046.	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
116 N J Stevenson, PMA CalverleyEffect of oxygen on recovery from maximal exercise in patients with chronic obstructive pulmonary disease. Thorax 2004;59:668-672	RCT	2++	18	12M, 6F. Age 61.2(4.4), FEV1 1.08(0.42).FEV1 (%pred) 40.28(15.93), IC 2.17(0.64), IC%pred86.88(25.27) MIP(cmH2O) 70.18(16.47), MEP 105.28(21.98) SaO295.9(1.66), resting BORG 0.84(0.87), resting Borg leg score 1.0(1.12).	cylinder oxygen versus cylinder air	The effect of cylinder air and cylinder oxygen(0.4) 10Lmin via venturi mask post exercise.	2 visits one week apart	Resting Borg breathlessnes(BB) and leg score (BL), exercise duration, maximal exercise Borg breathlessness, maximal Borg leg score, Maximal workload(W), VO2 max(l/min), VCO2 max(l/min)	BB- air with mouthpiece(AM), 0.97(0.28), O2 mouthpiece(O2M) 0.75(0.25), air mask 1.03(0.26), O2 mask 0.74(0.21). BL-(AM) 1.06(0.31), (O2M) 1.03(0.25), air mask 0.94(0.27), O2 mask 0.97(0.26). Exercise time(min)-(AM)8.16((0.96), (O2M) 7.07(0.87), air mask 8.18(0.95), O2 mask 8.65(0.98). Max ex Borg-AM 5.36(0.55), O2M 5.17(0.51), air mask 5.26(0.49), O2 mask 5.41(0.51). Max ex Borg leg- AM 5.56(0.47), O2M 5.19(0.39), air mask 5.00(0.50), O2 mask 5.44(0.52). W - AM 37.22(5.53), O2M 32.78(5.47), air mask 38.23(5.30), O2	none declared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
117 Short burst oxygen therapy for COPD patients; a 6 month randomised controlled study. Eaton, T.; Fergusson, W.; Kolbe, J.; Lewis, C. A.; West, T. European Respiratory Journal April 1st, 2006 vol 27 no. 4697-704.	RCT	1++	78, 25 cylinder O2(O2), 26 cylinder air(A), 27 usual care(27).	COPD, acute admission to hospital,PaO2 <8kPa, normocapnic, Ex smokers,age 77. Male 36(46%) F42.	cylinder oxygen versus cylinder air versus usual care.	cylinder O2 2L/min via nasal cannulae PRN, versus cylinder air 2l/min PRN, versus usual care.	6 months	change in health related quality of life, acute healthcare utilisation measured with CRQ, SF-36 HAD over 6 months study period.	CRQ total O2 82.9±21.8, A-77.0±16.3, UC-73.3±14.3. SF36 mental O2-30.4±8.9, A-27.2±7.2, UC-28.73±7.3, physical - O2-47.2±13.9, 45.1±13.9, A-45.1±13.2, UC-43.8±12.5. HAD anxiety O2-5.3±4.0, A-5.6±3.2, UC-7.3+4.2. Depression O2-4.2±4.1, A-5.1±4.0, UC-4.7±3.0. Unscheduled visits- O2- 2(8%), A- 4(15%), UC-5(19%),. Hospital readmission- O2-18(72%), A-4(15%), UC-12(44%) p=0.050. Deaths- O2-10(40%), A-4(15%), UC-9(33%).	Aukland Medical Research Foundation, Green Lane Hospital Research and Educational Fund.

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
118 Cohen, A. S.; Burns, B.; Goadsby, P.J. High-flow oxygen for treatment of cluster headache: a randomized trial. JAMA: the journal of the American Medical Association, 2009. Vol. 302, 22 2451-7	DB, R, PC crossover trial	1++	109	Adults (aged 18-70 yrs) with cluster headache as defied by the international Headache society	Patients treated 4 episodes of headache with high flow Oxygen 12L/ min for 15 min through face mask.	High flow oxygen Vs placebo	Up to 5 years.	primary aim was to be pain free in 15 min. Secondary aims were pain free at 30 min, reduction in pain scales at 15, 30, 45 and 60 min, need for rescue medications from 15 min after intervention, overall response to the treatment and overall functional disability and effect on associated symptoms.	57 patients with episodic 19 with chronic cluster headache were available for analysis. The difference between Oxygen, 78% for 150 attacks and air 20% for 148 attacks was significant. There was no important adverse effects.	Univ College of London and BOC Ltd who supplied the cylinders and masks.

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
119 Kudrow Lee. Headache 21:1-4, 1981	two separate studies published in one paper. First one cohort study. 2nd Cross over trial	2	52 in first study, 50 in 2nd study	Adult patients with active episodic or chronic cluster headaches.	In First study, 100% oxygen through face mask at a rate of 7L/min for 15 minutes.In 2nd study, crossover trial with sublingual ergotamine and oxygen.	in 2nd study Oxygen vs Sublingual Ergotamine	Each patient treated for 10 attacks	reduction of pain in 7 of 10 attacks within 15 minutes	Significant relief of pain in 75% of patients in first trial.In second trial, 82% of oxygen user showed response compared to 70% in ergotamine users	Not stated
120 Fogan L. Arch Neurol 1985, 42 (4): 362-363	Double blind cross over study	2	19	men aged 20-50 years	Oxygen vs air inhalation at 6 L/min via nonrebreathing face mask for 15 minutes for up to six headaches.	oxygen vs air	patients treated for upto 6 episodes of headaches	patient self reporting of pain relief as none, slight, substantial or complete.	the average relief score for Oxygen treated patients was 1.93 and for air 0.77 out of a possible score of 3	
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121 Rozen TD. Neurology 63(3), August 2004, 593	case reports	3	3	2 Adult smokers with chronic cluster headache. 1 adult non smoker with episodic cluster headache.	Higher flow rate oxygen at 14-15 L/min	standard oxygen therapy at rate of 7 to 10 L/min compared with high flow rate of 15L/min	one episode of headache	headache relief	all 3 patients responded to high flow oxygen when standard flow oxygen had failed.	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
122 Backx, A. P. M.; Haane, D. Y. P.; De Ceuster, L.; Koehler, P. J. Cluster headache and oxygen: is it possible to predict which patients will be relieved? A retrospective cross-sectional correlation study. Journal of Neurology, 2010. Vol 257, 9 1533-42	observational study	2+	115	patients from headache clinic or those who responded to website call for study. Patients with cluster headache who had used Oxygen <10 yrs pre study, duration of headache upto 24 hrs	oxygen therapy	none	retrospective questionnaire study	objective of the study was to provide a clinical predictive model for oxygen response in cluster headache.	patients who smoked in the past, had shorter attacks and were pain free interictally respond better to Oxygen inhalation.	not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
124 Johns DP;Rochford PD;Streeton JA; Evaluation of six oxygen concentrators 1985 Thorax 806 - 10 Oxygen concentrators 1993 Health devices 485-97	Equipment comparison	2+	N/A	6 devices	None	6 oxygen concentrators	Single test	Examples of six oxygen concentrators (DeVO2, Dom 10, Econo 2, Hudson, Permox, and Roomate) were evaluated over a 9-28 day period to determine (1) the oxygen yield (%O2) over the flow range 1-4 l min-1; (2) 90% oxygen rise time (90% RT) from a cold start when they were operated at 2 l min-1; (3) accuracy and readability of the flow device; (4) static outlet pressure; (5) major components comprising the product gas (Hudson only); and (6) general characteristics. At an outlet flow of 2 l min-1 the mean % O2 generated by all models, except the Permox (which was lower, mean (SD) 90.5% (3.1%)), were between 94% and	At an outlet flow of 2 l min-1 the mean % O2 generated by all models, except the Permox (which was lower, mean (SD) 90.5% (3.1%)), were between 94% and 95% with a range of less than plus-or-minus sign 0.5%. The Dom 10, Econo 2, and Hudson consistently generated higher oxygen concentrations than the other models at flow rates greater than 2 l min-1. The 90% RT was	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
125 Hall LW;Kellagher REB;Fleet KJ; A portable oxygen generator 1986 Anaesthesia 516 - 8	Technical report	3	N/A	N/A	N/A	N/A	Single test	The use of a portable generator which liberates oxygen from hydrogen peroxide solutions has been investigated in veterinary anaesthesia to assess its potential as an alternative to conventional oxygen supplies both in emergency situations and in the event of failure of cylinder systems. The reliability of the supply appears to be good and the operation of the generator simple, making it suitable for a	N/A	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
126 Gould GA;Scott W;Hayhurst MD;Flenley DC; Technical and clinical assessment of oxygen concentrators 1985 Thorax 811 - 6	Equipment comparison	2+	20	12M:8F, 47-93 years, Type 2 Respiratory Failure on HOS. 4 Devices compared	O2 concentrator vs Air	O2 concentrator vs Air	Single case	One membrane oxygen enricher (Oxygen Enrichment Company OE-4E) and four molecular sieve (MS) concentrators (Mountain Medical Econo2, De Vilbiss MINI DeVO2, Cryogenic Roomate III, and Mountain Medical Mini O2) have been studied to assess technical and clinical performance. During four weeks of continuous operation at a flow rate of 2 l min-1 (6 l min-	SpO2 increased on average from 83% to 93%	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
128 Burioka N;Takano K;Hoshino E;Suyama H;Saito S;Sasaki T; Clinical utility of a newly developed pressure swing adsorption-type oxygen concentrator with a membrane humidifier 1997 Respiration 268 -72	Equipment comparisn	3	13	Receiving LTOT	Air vs oxygen	Concentrators with differenr technologies	Single case	The clinical utility of the newly developed pressure swing adsorption (PSA)-type oxygen concentrator with a membrane humidifier that does not require added water for humidification was evaluated in 13 patients with chronic pulmonary disease who were receiving long-term oxygen therapy. PaO2 and the relative humidity were measured when the patient breathed air and oxygen	A significant difference was observed between the relative humidity of room air (44.7 +/- 18.6%) and that of the oxygen flow (72.7 +/- 14.8%) from the new device. None of the patients experienced dry nasal passages, dry throat, or any other adverse effects. Since this new PSA-type oxygen concentrator with a membrane humidifier supplies well-	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
129 Burioka N;Takano K;Suyama H;Chikumi H;Hoshino E;Sasaki T; Efficacy of newly developed pressure swing adsorption type oxygen concentrator with membrane humidifier: comparison with conventional oxygen concentrator with bubble water humidifier 1997 Internal medicine (Tokyo Japan). 861 -4	Equipment comparisn	3	10	COPD	Air vs oxygen	concentrator with membrane hunmidifier and one without	Single case	To examine the clinical efficacy of a newly developed pressure swing adsorption (PSA) type oxygen concentrator with a membrane humidifier without added water for humidification, the new machine was compared with the conventional PSA type oxygen concentrator with bubble water humidifier in 10 patients with chronic pulmonary disease. Relative	All patients answered that there was no difference on subjective impression between breathing oxygen from the new machine and from the conventional oxygen concentrator. Sufficient relative humidity (above 50%) of oxygen flow was obtained by using membrane humidifier. Since this machine saves the	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
130 Pesce LI;Bassi GN;Santovito A; Clinical usefulness of a new portable oxygen concentrator Clinical usefulness of a new portable oxygen concentrator 1994 Monaldi archives for chest disease = Archivio Monaldi per le malattie del torace / Fondazione clinica del lavoro IRCCS (and) Istituto di clinica tisiologica e malattie apparato respiratorio Universita di Napoli Secondo ateneo Monaldi archives for chest disease = Archivio Monaldi per le malattie del torace / Fondazione clinica del lavoro IRCCS (and) Istituto di clinica tisiologica e malattie apparato respiratorio Universita di Napoli Secondo ateneo 444 -446	RCT	2++	30	Hypoxaemic	Air vs oxygen	Air vs O2 concentrator vs o2 concentrator with demand valve	Single case	Thirty chronic, hypoxaemic patients with a mean arterial oxygen tension (PaO2) of 6.81 kPa (SD 0.56) in air were tested using the Travelair. The study was performed at rest, allowing the patients to breathe in the following conditions: a) compressed air; b) continuous oxygen flow from the concentrator; c) oxygen from the concentrator in demand-valve mode (DV) with an activation time (AT) of 375 ms; d) DV with	No difference	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
131 Shiner RJ;Zaretsky U;Mirali M;Benzaray S;Elad D; Evaluation of domiciliary long-term oxygen therapy with oxygen concentrators 1997 Israel journal of medical sciences 23 - 9	Equipment evaluation	3	2414 machines	Patient on oxygen	Oxygen concentrators	N/A	Single case	In France, 12,000 patients receive long-term oxygen therapy at home supplied by oxygen concentrators (OCs) which are provided by a non- profit organization, the National Home Treatment for Respiratory Insufficiency Association (ANTADIR--31 regional associations). OCs are regularly checked at home by technicians from the associations. Technical data, oxygen fraction (Fo2) supplied at working flow-	N/A	N/A

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
132 Jackson M;Shneerson J; An evaluation of the use of concentrators for domiciliary oxygen supply for less than 8 h day-1 1998 Respiratory medicine 250 -5	RCT	2++	26	On home oxygen	Oxygen concentrators	Concentrator to cylinders	3months	Since their introduction in 1985, oxygen concentrators have only been recommended when domiciliary oxygen is used for over 8 h day-1. Subsequent changes in the prices of oxygen merit a reappraisal of the prescribing of concentrators and cylinders when oxygen is used for less than 8 h day-1. Twenty-six patients in two health districts who used oxygen for less than 8 h day-1 completed a crossover study in which	N/A	N/A

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
133 Cuvelier, A.; Nuir, J. F.; Chakroun, N.; Aboab, J.; Onea, G.; Benhamou, D.: Refillable oxygen cylinders may be an alternative for ambulatory oxygen therapy in COPD: Chest 2002 :451-6	RCT	-	10	Stable COPD patients already established on O2 who could undertake a wlk test	Randomised cross-over trial single blind looking at whether Self-fill system (portable cylinder filled from a concentrator) are equivalent to standard ambulatory cylinders on a 6 minute walking tests.	Self-fill portable system compared with standard ambulatory	N/A	Outcome of 6 minute walk test SaO2 and cardiac frequency plus Borg dyspnoea score	No significant difference between the 2 despite the Self-fill having a lower fill pressure and subsequently slightly lower FiO2	N/A

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
134 Strickland, S. L.; Hogan, T. M.; Hogan, R. G.; Sohal, H. S.; McKenzie, W. N.; Petroski, G. F.: 2009	Controlled	+	39 (44% could notcomplete walking test)	Stable COPD patients (grade IV GOLD very severe obstruction) resting sPO2 on air < 90%. All prescribed LTOT + ambulatory with cylinder, shoulder bag and nasal cannulae.	Paper comparing 4 different methods of supplying oxygen (liquid, Self-fill cylinder, portable concentrator, ambulatory cylinder):	liquid, Self-fill cylinder, portable concentrator, ambulatory cylinder): All were pulsed flow	N/A	Patients undertook a 6 minute walk test on each piece of equipment, sPO2 , walk time and distance was recorded after each test and the patients opinion of the equipment used	There was no difference between the sPO2, distance and time between the 4 methods. Cylinder was the least favourable of the patients in the survey and Helios liquid oxygen was the most favoured system	Sponsored by Puritan Bennett Home Care

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
135 Lock, S. H.; Blower, G.; Prynne, M.; Wedzicha, J. A.: Comparison of liquid and gaseous oxygen for domiciliary portable use: 1992 Thorax; 98-100	RCT	+	15	13 COPD 1ILD 1Kypho all requiring ambulatory O2	Using liquid O2 on ambulation compared with cylinder O2 to see if increase in walking distance and improved quality of life. Walking tests at the start of the study then after 8 weeks of home use on one modality then 8 weeks of home use on the other modality	Liquid O2 compared with cylinder O2 for ambulation	16 weeks	Outcome measures were distance walked, VAS dyspnoea score, The chronic respiratory disease index questionnaire. They also kept a diary card at home throughout the study,recording the number of hours they spenteach day (a) using the portable systems, (b) out of doors, and (c) using their oxygen concentratorsI mpovement in distance walked and quality of life (VAS score). shows that liquid O2 is	There was no significant change in walking distance after eight weeks of gaseous oxygen. There were no significant changes in spirometric values or arterial blood gas tensions at any time during the study. Information from diary cards was available for only 13 patients. The patients used the liquid oxygen for significantly longer (median 23 5 hours a week) than the gas cylinder (10 hours a week, 95% CI 4-2 to 23 3 hourssee	Puritan-Bennett and Air Products Ltd for supplying the equipment and liquid

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
136 Nasilowski, J.; Przybylowski, T.; Zielinski, J.; Chazan, R. 2008 Resp Med	RCT	++	13 completed	Severe COPD patient on LTOT	5 x 6 minute walking testt to see if different modalities gave differnet results. 2 practice walks on air carrying a 3.5 kgm weight then the following in random order,	Comparing Liquid O2 with continuous flow and portable concentrator with pulsed flow for ambulation	N/A	saburi	higher oxygen purity (mean¡SD % oxygen concentration) at 1 L?min-1 than at 5 L?min-1 (94.4¡0.5 versus 85.8¡0.8, p=0.03). Comparatively, wall oxygen had a consistently high concentration (99.6¡0.5 at 1	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
137 Andersson, A.; Strom, K.; Brodin, H.; Alton, M.; Boman, G.; Jakobsson, P.; Lindberg, A.; Uddenfeldt, M.; Walter, H.; Levin, L. A.: Long-term oxygen therapy using portable oxygen devices: pulsed oxygen-delivery via demand system at rest and during exercise: 1998: European Respiratory Journal. 1284-1289	RCT	+	51 (QOL based on 47 patients)	Chronic hypoxaemic patients (all but 4 were COPD) with pulmonary disease that could use and were willing to use portable equipment outside the home	Health-related quality of life was measured by the Sickness Impact Profile (SIP) and the EuroQol, instruments at the start and after 6 months.	Liquid O2 compared with cylinder and concentrator	6 months	Cost analysis and QOL. Patient diary of health professional contacts (to estimate cost)	Mr Dunne presented a version of this paper at the symposium COPD: Empowering Respiratory Therapists to Make a Difference, at the 54th International Respiratory Congress of the American Association for Respiratory	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
138 Katsenos, S.; Charisis, A.; Daskalopoulos, G.; Constantopoulos, S. H.; Vassiliou, M. P. Long-term oxygen therapy in chronic obstructive pulmonary disease: the use of concentrators and liquid oxygen in North Western Greececoncentrators	Observational study	+	104	Stable COPD patients on home oxygen (> 3months)	Looking at if different modalites of oxygen delivery improved compliance and quality of life of LTOT patient. Not cross over study	Concentrator compared with liquid oxygen during daily living	6 month trial	Questionnaire looking at compliance and opinion about equipment.	23 5 hours a week) than the gas cylinder(10 hours a week, 95% CI 4-2 to 23 3 hourssee fig 1). When using gaseous oxygen patients went out of the house on average 15-5 hours a week, whereas with liquid oxygen they went out 19-5 hours a week (fig 2), a small but When they had a gas cylinder patients spent a median of 114 hours a week using their oxygen concentrator, whereas with liquid oxygen they	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
139 Czajkowska-Malinowska, M. P., B.:Ciesielska, A.:Kruza, K.:Jesionka, P. Comparison of the results of long term oxygen therapy in patients treated sequentially using stationary or a portable source of oxygen:Porownanie wynikow domowego leczenia tlenem u chorych leczonych sekwencyjnie za pomoca{ogonek} stacjonarnego i przenosnego zrodla tlenu. 2012. Pneumonologia i Alergologia Polska.308-316	Prospective study	+	30	Patients on LTOT with chronic respiratory insufficiency		Liquid oxygen with static concentrator	? 6 months	6 min walk, MRC score, QOL score, activity scores (Borg, Katz, Lawton, BTS). Spirometry, Blood gases.		N/A

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
140 Okubadejo AA;Paul EA;Wedzicha JA; Domiciliary oxygen cylinders: indications, prescription and usage 1994 Respiratory medicine 777 - 85	Review of service	3	56	COPD	Home oxygen	N/A	Single case	Oxygen therapy for use in the home can be prescribed in two forms: oxygen concentrators are used to provide long term domiciliary oxygen therapy (LTOT), and oxygen cylinders are used to provide oxygen intermittently for relief of symptoms. In this study prescription and usage of oxygen cylinders in the home were assessed. All patients using oxygen cylinders at home in the London Borough of Tower Hamlets in October 1992 were studied. A questionnaire was sent to each patient; further information was obtained from a questionnaire to the general practitioner and from hospital notes where available. Patients with a	N/A	N/A

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
14 Paul, J.; Otvos, T.: 2006. Comparison of nasal cannulas and the OxyArm in patients requiring chronic domiciliary oxygen therapy: Canadian respiratory journal : journal of the The European respiratory journal : 778-81	RCT	+	25	Adults already receiving home oxygen for severe COPD (stable)	comparing the oxy-arm with nasal cannulae on walkingtests and 4 week home trial	comparing the oxy-arm with nasal cannulae	N/A	Static tests were performed first with the patient breathing oxygen at flows of 2, 3, 4, 5, 6, 7 l/min after 10 mins 5 satn were measured 10secs apart and the mean calculated. 2 walk tests were then performed on the 2 devices and distance walked and satn (as previously measured) was measured at the end of tests. 4 week home trail on each device and patients kept diary of use and how they liked the device. Investigators showed that at rest and ambulatory the oxy-arm did not give any significant difference in Satn when compared with nasal cans. At the time of tests the oxy-arm was preferred by patients (significant) but	The Oxy-arm (OA) proved to be similar to Nasal cannulae (NC's) in delivering oxygen and maintaining saturation in patients on LTOT. After the 4 week trial only 44% wanted to keep the oxyarm (mainly because of the device moving out of place	Grant from Southmedic inc. Canada

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
143 Domingo C;Roig J;Coll R;Klamburg J;Izquierdo J;Ruiz MJ;Morera J;Domingo E; Evaluation of the use of three different devices for nocturnal oxygen therapy in COPD patients 1996 Respiration 230 - 5	RCT	3	14	Hypoxaemic	Oxygen via na	Nasal cannulae or oxymizer	Single case	OBJECTIVE: To determine whether transtracheal catheter and reservoir nasal cannula contribute to maintaining adequate oxygen saturation during sleep, and to calculate the oxygen saving they allow compared to nasal prongs. DESIGN: A prospective study in which patients were randomly	N/A	Not stated

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
142 Moore GJC;George RJ;Geddes DM; An oxygen conserving nasal cannula 1985 Thorax 817 - 9	RCT	2++	12	Hypoxaemic	Air vs nasal ca	Standard nasal cannulae and resvoir cannulae	Single case	Oxygen administration via a nasal cannula incorporating a small collapsible reservoir (Oxymizer, Chad Therapeutics Inc, California) was compared with delivery via a standard nasal cannula. Twelve patients with chronic, stable hypoxaemia (arterial oxygen tension less than 60 mm Hg (8.0 kPa)) were studied. Transcutaneous oxygen and carbon dioxide tensions were recorded by	8/12 patients improved. Oxygen	

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
145 Roberts, C. M.; Bell, J.; Wedzicha, J. A. Comparison of the efficacy of a demand oxygen delivery system with continuous low flow oxygen in subjects with stable COPD and severe oxygen desaturation on walking 1996 Thorax 51 831-4	RCT	++	15	COPD patients with severe desaturation on exercise	Electronic conserver versus continuous flow at 2L/min (equiv) on ambulation.	electronic conserver versus continuous flow oxygen at a standard flow	N/A	**respiratory rate, visual analogue breathlessness score and SaO2. walking distance, subjective time to recovery, objective time to recovery, lowest recorded satn, time spent with satn < 90%**	**If patients are going to use O2 outside of the home and need greater mobile oxygen use patients should be tested on a conserver before prescribing. Using a conserver with cylinder oxygen was poor for correcting desaturation on exercise compared with continuous oxygen in COPD patients with severe desaturation. Patients need to be assessed on the conserver if this is to be prescribed**	Life Support (Europe) for the loan of the oxymatic devices used during the study Oxymatic devices used in the study.

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
146 SR Braun, G Spratt, GC Scott and M Ellersieck. Comparison of six oxygen delivery systems for COPD patients at rest and during exercise. 1992: Chest; 694 - 698	RCT	1+	10	Patients with severe COPD as per the NOTT study	To see if oxuygen conserving devices gave adequate oxygenation at rest and during exercise compared with continuous flow	5 different conserving devices (with different modes of delivery) were compared with each other and with continuous flow at rest and on exercise. Flow on exercise set to physician prescribed O2.	N/A	Areterial blods gases at rest. Patients undertook a 12 min walk test and pulse rate and Sao2 recorded from pulse oximeter and breathlessness assessed using Borg scale. Distance walked measured using a	All patients showed a significant desaturation on exercise whatever device was used including continuous flow. The conservers providing a bolus of oxygen at the start of inspiration gave less time desaturated than the other devices	N/A
147 Marti s, Pajares V, Morante F, Ramon M-A, Lara J, Ferrer J, Gwell M-R. Are oxygen conserving devices	Open cross sectional cross-over study	2+	59	COPD and ILD with exercise desaturation	exercise test to see if conservers are acceptable	DOD, oxygen pendant to standard continuous flow	N/A	6 minute walk (desat, Borg, HR, BF)	N/A	N/A

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
148 Chatburn, R. L.; Lewarski, J. S.; McCoy, R. W.: Nocturnal oxygenation using a pulsed-dose oxygen-conserving device compared to continuous flow: Respiratory Care: 2006	RCT	-	10	Patients had either emphysema or pumonary fibrosis with a history of prolonged oxygen use	All patients had base line sleep study to rule out sleep apnoea and to get base line values on their own continuous O2 (liquid O2 or concentrator). Randomsed to inogen one pulsed device; set to sensitive (7 patients) or to default setting (3	Continuous O2 compared with pulsed using Inogen with 2 different settings sesitive and normal.	N/A	Overnight saturation comparison on the different modalities.Showed a significant statistical difference in O2 level but authors felt this was not a clinical difference. One patient did have a clinically significant	hypoxemic patients with COPD (46 percent) were adequately oxygenated during sleep while using the RNC	N/A

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
149 Andres, D. Randomized double-blind trial of the effects of humidified compared with nonhumidified low flow oxygen therapy on the symptoms of patients: 1997: Canadian Respiratory Journal; 76-80	RCT	++	157 medical and 87 surgical patients	patients admitted to hospital requiring oxygen.	humidified low flow oxygen (4L/min or less) compared with oxygen without humidification, nasal cans and masks both used	Humidified low flow O2 with non-humidified low flow. Symptoms and problem score	followed for a maximum of 6 days	symptom questionnaire. The primary symptom of interest was dryness secondary nosebleeds. They showed there was no difference in symptoms on questionnaire in patient on humidified low flow O2 (< 4L/min) compared with non-humidified. Did show whichever arm the patient was on that they improved with time.		Alberta lung association ans foothills hospital research and development committee

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
152 Pendleton N, Cheesbrough JS, Walshaw MJ, Hind CRK Bacterial colonisation of humidifier attachments on oxygen concentrators prescribed for long term oxygen therapy: a district review. Thorax. 46, 257-258	Observational	3	8	Patients with severe chronic airflow obstructionusing bubble through humidification with their home oxygen concentrator	Home visit with samples taken from the humidifiers after water change, taken from their water tap and from patients nose and throat. Samples sent for culture	Cultured organisms compared from each patient, their humidifier and water supply	Single visit	Number (colony forming units/ml) and range of organisms cultured from humidifiers	n/a	Undisclosed

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
153 Leggett, R. J.; Flenley, D. C.: Portable oxygen and exercise tolerance in patients with chronic hypoxic cor pulmonale 1977: BRITISH MEDICAL JOURNAL: 84-6	RCT	+	19	19 chronic hypoxic cor pulmonale patient with pulmoonary hypertension as a result of COPD	The effects of the way portable oxygen is transported on ambulation (also physiology in this paper)	Walking test on air and O2 plus carrying a ambulatory cylinder compared with a trolley. NB Three subgroups were studied, some patients being common to each group: group 1 included eight patients who walked when breathing air or 2 1 of oxygen/min with and without the oxygen walker. Group 2 comprised	N/A	Minute ventilation, O2 uptake, CO2 output, pH, PaO2, PaCO2 and distance walked but also a lot of physiology in this paper	system, the Union Carbide Oxygen Walker, althoug1o convenient and practicable, does carry the disadvantage that the extra weight of the equipment hinders the patient's performance. We suggest that wheeling the oxygen walker on a simple, cheap,, lightweight trolley will allow these breathless patients to derive benefit from oxygen during exercise, in addition to the undoubted benefit that they already obtain from having a	RJELeggett was supported by the MRC

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
154 Crisafulli, E.; Costi, S.; De, Blasio F.; Biscione, G.; Americi, F.; Penza, S.; Eutropio, E.; Pasqua, F.; Fabbri, L. M.; Clini, E. M. 2007: Effects of a walking aid in COPD patients receiving oxygen therapy: Chest: 1068-74	RCT	+	60	Patients established on LTOT (COPD as per GOLD guidelines)	The effects of the way portable oxygen is transported on ambulation	Wheeled cart and portable cylinder compared with back pack and cylinder	N/A	Walking speed, leg fatigue and peak dysponoea were th primary e outcome measures with sPo2 and HR being the secondary measures	A simple change in the way ambulatory O2 is carried may make a significant change on QOL. Moreover, cardiorespiratory parameters recorded during the walking activity (secondary outcomes) were significantly better with the cart as was the walking speed. The same improvements in both primary and secondary outcomes due to the cart were even more striking in the subgroup of patients who had a walking distance < 300 m, whereas no significant differences were observed in the subgroup of patients who walked > 300 m	NK

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
155 Fatal fires associated with smoking during long-term oxygen therapy--Maine, Massachusetts, New Hampshire, and Oklahoma, 2000-2007. MMWR morbidity and mortality weekly report2008; Vol57/No31: 852-854	case study	3	38	38 cases, age 9-87 24(63%) female 37 lived in private residence, I lived in nursing home		Fatalities associated with home oxygen use	7 yrs	fatalities caused by smoking andhome oxygen use	38 cases, 34(89%) on LTOT and smoking, 3(8%) household members of LTOT smokers, 1(3%) non smoker on LTOT ignited by smoker who lived in house. 22(58%) died on day of fire, 7(18%) died next day 9(24%) survived med 15 (3-41)dys	none declared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
156 Home oxygen therapy;Adjunct or risk factor. Robb, Bruce W.; Hungness, Eric S.; Hershko, Dan D.; Warden, Glenn D.; Kagan, Richard J. Journal of Burn Care and Rehabliation. 2003;24:403-406	case study	3	27	27 patients with burns attributed to oxygen. 14M/13F,age 68(40-82). 25(93%) had COPD. 3 lived in nursing home and 1 was an inpt in acute care	oxygen related burns	burns attributed to home oxygen use	10yrs	injuries and hospitalisation caused by smoking and use of home O2	24(89%) were smoking whilst using oxygen, two were lighting pilot lights, one was lighting his wifes cigarette. 4(15%) sustained burns>10% 17(63%) had partial thickness burns. 13(48%) required admission to hospital average LOS 4.4dys).There were 4 (15%) deaths.	none declared

Bibliographic citation	Study type	Evidence level	No patients	Patient characteristics	Intervention	Comparison	Length of f/u	Outcome measures	Effect size	Funding
157 A Hazard of Home Oxygen Therapy. Chang, T. T.; Lipinski, C. A.; Sherman, H. F. J Burn Care Rehabil 2001;22:71-74	case study	3	23	23 patients admitted to burns unit with oxygen related burns. Age 70(50-84). 20 (87%) had COPD.	admission to burns unit	admission to burns unit with oxygen related burns	12yrs	admission to burns unit with oxygen related burn injuries.	16(70%) had burns associated with smoking, 6(26%)cooking, 1(4%) filling LOX. Average burn 3.9% total body surface.13(57%)pts had inhalation injury, 5(22%) required intubation, 2(8.7%) died. There were 11 incidents recorded in the first 10yrs and 12 recorded in the last 2yrs of study	none declared
158 Brother, have you got a light? Assessing the need for intubation in patients sustaining burn injury secondary to home oxygen therapy Amani H, Lozano D, Blome-Eberwein S. J Burn Care Res 2012;33e280-e285	case study	3	86	Mean age 64(39-90), 56M(65%), 30F(35%). COPD 91%. 75(87%) lighting cigarette, 4((5%) lighting stove. 2(2%)candle, 1(1%)open flame, 4(5%) electrical spark.	bronchoscopy to confirm correct decision to intubate	treatment characteristics of patients with flash burns while on HOT(home oxygen therapy)	11yrs	decision to intubate	32 non- intubated %TBSA1.5(0.25-9), LOS1(1-20), ICU stay 6(1-35). Intubated %TBSA 2(0-15), LOS 7.5(1-41)<.0001. Ventilated 4.5(1-29), ICU stay 6(1-35). <.0001	non declared