Online Supplement

Table 1: Main study and population characteristics (NIV versus usual care): RCTs

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
Bhatt 2013	30 (20/27, 74%)	6 months	FEV_1/FVC <0.70. Based on mean (SD) FEV_1 % predicted NIV 30.3 (7), usual care 29.6 (7.4), likely GOLD stage III or IV for most patients.	No details.	Stable: no exacerbations in 4 weeks prior to study.	Patients described as normocapnic. Inclusion criterion: $PaCO_2$<52mmHg (or <6.93 kPa).	Median (IQR), NIV 70 (66-73), usual care 68 (65-78)	Not stated. Could be active or ex-smokers (providing stable smoking status in last 6 months). Mean (SD) pack years: NIV 59 (29), usual care 61 (30)	NIV 24.8 (2.8), usual care 24.8 (4.8)	Yes. Only patients with a low clinical probability of having obstructive sleep apnoea as assessed using the Berlin Questionnaire were included.
Casanova 2000	52 (43/44, 98%)	12 months	Based on inclusion criteria (FEV_1/FVC < 70%; FEV_1 < 45% predicted), GOLD stage III or IV.	No details.	Stable: no acute exacerbation in previous 3 months.	No details, but stated in the discussion that: *"The number of hypercapnic patients in our series was small"*. Mean (SD) PaCO2 in NIV group 50.7 (7.9) (or 6.76 kPa), usual care group 53.2 (8.6) (or 7.09 kPa).	NIV 64(5), usual care 68 (4)	No active smokers (smoking history of > 20 pack-years was an inclusion criterion).	NIV 25(4), usual care 25 (4)	Yes. To rule out the coexistence of OSA, patients were screened with a nocturnal respiratory polysomnography.
Chen 2016 (1229)	120 (63/120, 53%)	12 months	Described as severe. FEV1(L) (Mean(SD)): NIV: 0.94 (0.15); usual care: 0.95 (0.19). No	Patients were admitted for acute exacerbation and received BiPAP	Post-hospital	Patients are described as having severe COPD with type II respiratory failure. No details on baseline PaCO2 value.	NIV 52.4 (8.3), usual care 51.7 (8.2)	No details	No details	No details

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
			details on FEV1/FVC and FEV1% pred.	treatment before the trial.						
Chen 2014 (8672)	38 (30/38, 79%)	18 months	No details	No details.	Post-hospital	No details	NIV 71 (5), usual care 72 (6)	No details	No details	No details
Cheung 2010	47 (43/47, 91%)	12 months	Mean (SD) FEV_1% pred. NIV 28.1 (8.5), usual care 31.3 (9.3), likely GOLD stage III or IV for most patients.	No details.	Post-hospital: Patients who were admitted with a severe exacerbation with persistent respiratory acidosis despite initial treatment with bronchodilators, corticosteroids and antibiotics, and who required treatment with NIV. Those who survived after treatment with acute NIV were the target study population.	Inclusion criterion: $PaCO_2$ > 6 kPa	NIV 69.5 (7.8), usual care 71 (7.7)	No active smokers Mean (SD) pack years: NIV 48.7 (30.7), usual care 53.1 (29.4)	NIV 19.2 (3.6), usual care 19.2 (3.6)	Yes. Polysomnography was performed in all eligible patients to exclude obstructive sleep apnoea.
Clini 2002	90 (69/86, 80%)	24 months	Severe as defined by American Thoracic Society criteria. FEV_1/FVC ratio < 60%. Mean (SD)	No details.	Stable clinical condition, as assessed by an arterial pH>7.35, and free from exacerbation in	Inclusion criterion: $PaCO_2$ > 6.6 kPa	NIV 64(7), usual care 66(14)	No active smokers Mean (SD) pack years: NIV 29(6), usual care 26(5).	NIV 26(5), usual care 25(6)	Yes. Patients excluded if documented history of obstructive sleep apnoea syndrome as defined by an

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
			FEV_1% pred. NIV 27(8), usual care 31(11), likely GOLD stage III or IV for most patients.		the 4 weeks preceding recruitment.					apnoea/hypopnoea index > 10 episodes h-1 during polysomnography
Duiverman 2008	72 (35/66, 53% first study period, 33/56, 59% second study period)	3 months	GOLD stage III or IV.	No details.	Stable clinical condition (no exacerbation in the 4 weeks prior to study participation together with a pH of >7.35)	Inclusion criterion: $PaCO_2$ > 6.0 kPa.	NIV 63 (10), usual care 61 (7)	No details. Median (IQR) pack years 42 (31-57) NIV, 43 (24-58) usual care	NIV 27.1 (6.4), usual care 27.5 (6.3)	Yes. Apnoea/ hypopnoea index ≥ 10/hour was an exclusion criterion.
Duiverman 2011		24 months					NIV 63 (10), usual care 61 (8)	NIV: 5/24 (21%). Median (IQR) pack years 42 (31-57). Usual care: 11/32 (34%). Median (IQR) pack years 43 (24-58)	NIV 27.2 (5.1), usual care 27.0 (5.8)	
Fan 2011 (259)	47 (37/47, 79%)	24 months	"All patients are severe as defined by the guidelines for the diagnosis and treatment of COPD developed by the Respiratory Branch of the Chinese Medical Association."	No details.	Unclear	No details	NIV 61.5 (12.0), usual care 60.2 (11.0)	No details	No details	No details

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
Gao 2011 (1867)	32 (26/32, 81%)	24 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	All included patients with hypercapnic respiratory failure	NIV 72(4), control 75(5)	No details	No details	No details
Garrod 2000	45 (28/45, 62%)	3 months	No details on FEV_1/FVC, FEV_1 < 50% predicted indicative of GOLD stage III or IV.	No details.	Stable severe COPD. Patients had no reported exacerbations in the past 4 weeks.	Patients described as normocapnic. NIV group mean $PaCO_2$ 44.2 (6.68) (or 5.89 kPa) Usual care 46.1 (9.07) (or 6.15 kPa).	NIV 63 (range 38-84), 67 (range 55-79	No details.	No details.	No details. (Polysomnography was performed during on 6/45 patients for purposes of assessing sleep quality).
Gay 1996	13 (10/13, 77%)	3 months	No details on FEV_1/FVC, FEV_1 < 40% predicted indicative of GOLD stage III or IV.	No details.	Clinically stable, severe COPD. No major changes in FEV1, PaCO2, hospitalisation or change in medications over a six week period.	Inclusion criterion: $PaCO_2$ >45mm Hg (or 6.0 kPa)	NIV 71 (4.5), usual care 66.5 (9.1)	No details.	NIV 23 (4.5), usual care 26.5 (2.2)	Yes. Sleep-related breathing disorders were an exclusion criterion. Polysomnography performed to assess sleep quality, but no patient was later found to have obstructive or central apnoeas (no patient had more than 6 episodes of hypopnoea per hour)
Kaminski 1999	19 (16/19, 84%)	NIV mean 16 (10)	Advanced, stable, hypercapnic COPD. No details	No details.	Stable: exacerbation of COPD during last	Inclusion criterion: $PaCO_2$>50mmHg (or 6.6 kPa)	All 60 (8)	No details.	No details.	Yes. Sleep apnoea excluded using polysomnography.

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
		months, usual care mean 23 (13) months	on FEV_1/FVC, FEV_1 < 50% predicted indicative of GOLD stage III or IV.		3 months was an exclusion criterion.					
Köhnlein 2014	195 (121/195, 62%)	12 months	Severe stable COPD, GOLD stage IV.	No details.	Stable: no exacerbations in 4 weeks prior to study.	Yes ($PaCO_2$) of ≥7 kPa (51·9 mmHg))	NIV 62.2 (8.6), usual care 64.4 (8.0)	No details.	NIV 24.8 (5.8), usual care 24.5 (5.8)	No details (not listed in exclusion criteria).
Li 2016 (2090)	96 (57/96, 59%)	12 months	Likely GOLD III or IV based on guidelines for the diagnosis and treatment of COPD developed by the Respiratory Branch of the Chinese Medical Association	All admitted for acute exacerbation; no details on history	Post-hospital	Inclusion criteria: $PaCO_2$>50mmHg; PaO_2 < 60 mmHg	NIV 69.21 (5.59), usual care 70.36 (6.12)	No details	No details	No details
Li 2012 (98)	45 (18/45, 40%)	2-3 years	MRC dyspnoea scale: NIV 4.02 (0.12); usual 3.95 (0.11)	18/45	Post-hospital	All included patients with hypercapnic respiratory failure (mean $PaCO_2$ ≥ 55mmHg)	NIV 65.1 (9.0), usual care 65.2 (11.0)	No details	No details	No details
Li 2009 (2035)	30 (23/30, 77%)	24 months	Inclusion criteria: (FEV1/FVC < 70%; FEV1 <	No details.	Likely post-hospital.	Inclusion criteria: $PaCO_2$>55mmHg	NIV 62 (4), usual care 64 (5)	No details	No details	No details.

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
			50% predicted), Gold stage III or IV.							
Liang 2017 (5431)	81 (54/81, 67%)	No details	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	All included patients have hypercapnic respiratory failure	NIV 65.3 (2.2), usual care 65.3 (2.2)	No details	Weight (kg). NIV 63.3 (1.3), usual care 63.9 (1.4)	No details
Lin 2015 (178)	78(46/78, 59%)	12 months	Mean (SD) FEV1% pred. NIV 43.30 (3.27), usual care 43.21. (3.25), likely GOLD stage III or IV for most patients.	No details.	Likely stable.	No details	Only report age for all patients: 64.2(8.3)	No details	No details	No details
Liu 2014 (1433)	140 (82/140, 59%)	No details	No details	No details.	Post-hospital	Inclusion criteria: $PaCO_2$>50mmHg and PaO_2< 60 mmHg	NIV 64 (4), usual care 66 (3)	No details	No details	No details
Liu 2012 (8671)	48 (21/48, 44%)	12 months	No details. Only refers to Chinese guidelines.	No details.	Likely stable	No details	Total 71(9), not reported for groups separately	No details	No details	No details
Luyang 2019 (2229)	95 (56/95, 59%)	12 months	No details	No details	Stable	No cut-off points were given. Based on mean (SD) PaCO2 at baseline: NIV 8.1 (2.4) kPa; control group: 7.9 (2.8) kPa, likely patients had	NIV 54.34 (5.39), usual care 54.12 (5.67)	No details	No details	No details

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
						hypercapnia.				
Ma 2019 (CA)	180 (no details on % male)	12 months	COPD with chronic respiratory failure (no further details).	No details.	No details	No details	No details	No details	No details	No details
Mao 2015 (2651)	80 (61/80, 76%)	12 months	No details. Only refer to Chinese guidelines.	No details.	Likely post-hospital.	No details	NIV 73.01(10.14, usual care 71.8 (9.33)	No details	No details	No details
Márquez-Martin 2014	45 (41/43, 95%)	3 months	GOLD stage IV (FEV1<50%; no details on FEV_1/FVC).	No details.	Stable for at least three months.	Hypercapnia as an inclusion criterion: $PaCO_2$ >45mmHg (6.0 kPa)	All median 69 (64-73).	Inclusion criterion: history of smoking of at least 20 pack years	No details.	Exclusion criterion: presence of obstructive sleep apnoea requiring NIV
McEvoy 2009	144 (94/144, 65%)	12 months	GOLD stage III or IV based on FEV_1/FVC <60%, FEV_1 < 50% predicted.	No details.	Stable hypercapnic COPD.	All described as hypercapnic. $PaCO_2$ >46 mm Hg (or 6.13 kPa) at least twice in the previous six months during periods of clinical stability.	NIV 67.2 (65.3 to 69.1), usual care 68.8 (67.1 to 70.5)	No active smokers (inclusion criterion). No details on pack years.	NIV 25.5 (24.3 to 26.7), usual care 25.4 (24.0 to 26.8)	Yes. Polysomnographic evidence of sleep apnoea (>20 apnoeas plus hypopnoeas per hour of sleep).
Meecham Jones 1995	18 (15/18, 83%)	3 months (crossover RCT)	No details on FEV_1/FVC, FEV_1 < 50% predicted indicative of GOLD stage III or IV.	No details	Stable clinical state for at least 1 month prior to entry into the study, with no recent deterioration in clinical state, spirometric	Inclusion criterion: $PaCO_2$ >45 mmHg (or 6.0 kPa)	Median 69 (43-74) (all)	No details.	25.3 (4.1) (all)	Yes. Obstructive sleep apnoea an exclusion criterion (Sleepmaster computerized polysomnography System; patients with more than five apnoeic episodes

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
					values, or resting blood gases.					per hour were excluded).
Meng 2009 (676)	64 (49/64, 77%)	24 months	No details	"Patients admitted with severe exacerbation of respiratory failure at least 1 to 2 times within the past two years."	Post-hospital	All included patients have chronic respiratory failure. (No details on $PaCO_2$ cut-offs.)	NIV 62.4± 11.8, usual care 61.9 ± 12.2	Smoking history: NIV: 20 ± 4.2; Control arm: 19 ± 6.9	No details	No details
Murphy 2011	36 (no details)	3 months (interim)	No details on FEV_1/FVC. Mean (SD) $FEV_{1\,\%}$ predicted NIV 31(7), usual care 22 (12) indicative of GOLD stage III and IV.	No details.	Post-hospital: patients admitted for acute hypercapnic respiratory failure due to an exacerbation of COPD with persistent hypercapnia ($PaCO_2$ >7 kPa) 2-4 weeks following resolution of the acute episode.	$PaCO_2$ >7 kPa	NIV 70 (10), usual care 68 (9)	No details	NIV 21 (3), usual care 26 (6)	No details.
Murphy 2017	116 (47%)	12 months	FEV_1 <50% predicted;	All patients	Post-hospital: patients admitted	Inclusion criterion: persistent	NIV 66.4 (10.2),	NIV mean pack years 42	NIV 21.5 (18.8-	Patients without clinically

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
			FEV_1/FVC ratio < 60%.	included after an exacerbation; 53% had ≥3 COPD-related readmissions within past year	for acute hypercapnic respiratory failure due to an exacerbation of COPD with persistent hypercapnia ($PaCO_2$ >7 kPa) 2-4 weeks following resolution of the acute episode.	hypercapnia ($PaCO_2$ >53 mm Hg)	usual care 67.1 (9.0)	(30.5-60.0), usual care 45 (31.0-55.0)	24.5), usual care 22.2 (17.9-26.9)	significant obstructive sleep apnoea syndrome (based on clinical history or baseline oximetry; investigated with attended limited respiratory polygraphy)
Perez-Bautista 2016 (CA)	50 (no details on % male)	12 months	Described as very severe. FEV_1<30%.	Two or more exacerbations in last year as an inclusion criterion.	Stable.	Normocapnic.	No details.	No details.	No details.	No details.
Shang 2009 (8675)	67 (35/67, 52%)	12 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	Inclusion criterion: $PaCO_2$ ≥55 mm Hg	NIV 68.3 (9.3), usual care 69.5 (8.3)	No details.	No details.	No details.
Sin 2007	23 (10/21, 48%)	3 months	FEV_1/FVC ratio < 70%. Inclusion criterion specified at least GOLD II; mean FEV_1 % predicted values imply	No details.	Advanced stable COPD (no further details).	Based on mean $PaCO_2$, NIV 43.1(4.9) mmHg (or 5.7 kPa), usual care 45.2 (13.5) mmHg (or 6.0), a proportion of patients with hypercapnia.	NIV 64.1 (10.6), usual care66.6 (9.7)	No details. Inclusion criterion: ≥ 10-pack-year history of cigarette smoking	NIV 28.2 (7.2), 26.2 (6.4)	Yes. Apnea-hypopnea index ≥ 20 on a home-based sleep apnea test (Embletta PDS; Medcare; Reyjkavik, Iceland).

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
			patients more likely to be stage III, IV.							
Struik 2014	201 (83/201, 41%)	12 months	Patients with prolonged hypercapnia after ventilatory support, GOLD stage III and IV.	No details	Post-hospital: Patients included after episode of acute respiratory failure	Yes ($PaCO_2$ >6.0 kPa).	NIV 63.9 (8.6), usual care 63.5 (7.9)	No details	NIV 24.6 (5.4), usual care 24.7 (5.5).	Obstructive sleep apnoea an exclusion criterion (Apnoea Hypopnoea Index: AHI>15/hr)
Strumpf 1991	19 (19/23, 83%)	3 months (crossover RCT)	FEV_1/FVC ratio of <0.75	No details.	Severe, stable COPD. No exacerbation of airway disease within the previous month.	Mean $PaCO_2$ 49 (2) mmHg, range 35-67. (Range 4.7 to 8.9 kPa). Likely to include a proportion of patients with hypercapnia.	66 (SE 1) (57-76)	No details	No details	Yes. Obstructive sleep apnoea ruled out through polysomnography.
Su 2016 (8674)	40 (25/40, 63%)	24 months	FEV1/FVC < 70%; FEV1 < 30% predicted, refer to Chinese guidelines	No details.	Post-hospital	Inclusion criterion: $PaCO_2$ ≥55 mm Hg	NIV 70 (7), usual care 69 (5)	No details.	No details.	No details.
Sun 2010 (3316)	68 (46/68, 68%)	12 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	No details	Reported for total group only 61(12)	No details	No details	No details

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
Tang 2010 (1733)	25 (17/25, 68%)	6 months	FEV1/FVC < 70%. Based on mean (SD) FEV1 % predicted in NIV: 45.5 (11.5), usual care: 46.2 (9.8), likely GOLD stage III for most patients.	No details.	Post-hospital	Inclusion criteria: $PaCO_2$>=55mmHg	NIV 67.2 (6.7), usual care 68.3 (7.4)	No details	No details	No details
Wang 2014 (8673)	45 (30/45, 67%)	12 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	No details	NIV 62 (5), usual care 61 (6)	No details	No details	No details
Wang 2013 (1985)	44 (35/44, 80%)	6 months	Gold stage IV	No details.	Likely stable	Inclusion criteria: patients had type II respiratory failure. No details on cut-off points.	Reported for total group only: 66 (6.5)	No details	No details	No details
Wang 2010 (218)	36 (19/36, 53%)	12 months	Mean (SD) FEV1% pred. NIV 41 (5), LTOT 42 (7), FEV1/FVC. NIV 40 (5), LTOT 40 (7), likely GOLD stage III or IV for most patients.	No details.	Stable: no exacerbations in 4 weeks prior to study.	All included patients have hypercapnic respiratory failure	NIV: 64.60 (SD not stated), control: 62.44 (SD not stated)	No details	No details	No details
Xiang 2007	40 (31/40,	24 months	FEV_1/FVC<70%, FEV_1 %	All patients	Post-hospital: After discharge	Inclusion criterion: $PaCO_2$ ≥55 mmHg	NIV 71 (9), usual	No details	No details	No details (not listed as an

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
	77%)		predicted <30% or <50%, consistent with GOLD III or IV	had previous exacerbations (other than the one immediately preceding the study)	from hospital. All admitted with acute exacerbation and type II respiratory failure. Discharged once stable.	(or 7.33 kPa)	care 69 (10)			exclusion criterion)
Xu 2016 (2784)	178 (101/178, 57%)	12 months	No details. Only refers to Chinese guidelines.	No details.	Likely stable	No details	NIV 65.27 (8.94), usual care 64.79 (10.87)	No details	No details	No details
Zeng 2019 (3137)	80 (55/80, 69%)	6 months	No details. Only refer to Chinese guidelines.	No details.	Likely post-hospital	No details	NIV 60.58 (7.02), usual care 60.62 (6.85)	No details	No details	No details
Zhang 2014 (1647)/ Zhang 2013 (1763)	50 (41/50, 82%)	24 months	Inclusion criteria according to Chinese Medical Association guidelines. FEV1 (L) NIV: 0.56 (0.1) vs usual care: 0.55 (0.1); FVC (L) NIV: 1.27 (0.1) vs	No details.	Likely stable	Inclusion criteria: $PaCO_2$> 45 mmHg	NIV 60.3 (4.8), usual care 58.6 (5.1)	No details	No details	No details

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
			usual care: 1.25 (0.14).							
Zhang 2012 (2373)	20 (16/20, 80%)	3 months	Only stated: all patients met the diagnostic criteria for COPD and respiratory failure.	No details	Likely stable.	No cut-off points were given. Based on mean (SD) $PaCO_2$ at baseline: NIV 8.1 (2.4) kPa; control group: 7.9 (2.8) kPa, likely patients had hypercapnia.	NIV 62.4 (8), usual care 61.9 (9)	No details	No details	No details
Zhang 2009 (988)	43 (33/43, 77%)	12 months	FEV1/FVC < 70%. Based on mean (SD) FEV1 % predicted NIV 47.55 (0.87), usual care 47.66 (0.66), likely GOLD stage III for most patients.	No details.	Likely post-hospital	No cut-off points were given. Based on mean (SD) $PaCO_2$ at baseline: NIV 77.1 (7.4) mmHg; usual care 79.3 (10.8) mmHg, likely patients had hypercapnia.	NIV 65.1 (1.3), usual care 65.3 (1.2)	No details	No details	No details
Zheng 2012 (2760)	42 (34/42, 81%)	24 months	No details. Only refers to Chinese guidelines. FEV1% < 30% predicted	No details.	Likely stable	No details	Total 71(9), not reported by group	No details	No details	No details
Zhou 2013 (2532)	66 (29/66, 44%)	12 months	No details. Only refers to Chinese guidelines.	No details.	Likely stable	No details	NIV 65.6(7.5), usual care 67.4 (8.3)	No details	No details	No details
Zhou 2008	36 (29/36, 81%)	12 months	No description of severity. No details on FEV_1/FVC or	No details	Stable. No exacerbations within the last month.	Baseline $PaCO_2$ NIV 57.42 (7.64) (or 7.6 kPa), usual care 56.89 (8.26)	NIV 72.81(4.16), usual	No details	No details	No details (not listed as an exclusion criterion)

Study	n= (n, % male)	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age (mean (SD)	Proportion smokers	BMI (mean (SD))	Overlap syndrome ruled out?
			FEV_1 % predicted			(or 7.6 kPa). Likely to include proportion of patients with hypercapnia.	care 69.76(6.83)			
Zhou 2017	115 (79/115, 62%)	3 months	GOLD III or IV	No details.	Stable. No exacerbations within the last 4 weeks.	Patients with chronic hypercapnia. Baseline $PaCO_2$ NIV 57.78 (2.88) (or 7.7 kPa), usual care 58.07 (3.5) (or 7.7 kPa).	NIV 66.91 (7.10), usual care 68.47 (6.57)	No details.	NIV 19.43 (3.10), usual care 20.56 (3.36)	Patients with overlap syndrome excluded.
Guan 2018 CA Update of Zhou 2017	165 (no details on % male)	6 months	No details.	No details.	No details.	No details.	No details.	No details.	No details.	No details.

*Differences in population characteristics are due to the fact that different numbers of drop-outs were excluded (greater number in the follow-up study)
+ Abstract reporting interim data from the HOT-HMV trial for 20/36 patients (see section **Error! Reference source not found.** for ongoing trials)

Main study and population characteristics (NIV versus usual care): non-randomised studies

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
Budweiser 2007	140 (91/140, 65%)	Prospective controlled	NIV mean (SD) 19.8 (12.9) months, usual care 12.9 (9.9) months	GOLD IV. FEV_1/FVC <70% and FEV1 <50%.	No details	Both stable and post-hospital patients: Patients with immediately preceding exacerbation eligible for inclusion (proportion of patients not stated).	Inclusion criterion: $PaCO_2$ ≥50mmHg (or 6.6 kPa)	NIV 64.2 (8.4), usual care 66.6 (8.6)	NIV 17/99 (17%), mean pack years (SD) 24.8 (27.5); usual care 11/41 (27%), mean pack years (SD) 31.5 (29.2)	NIV 25.4 (6.6), 23.5 (6.5)	No details
Chen 2011 (1084)	30 (18/30, 60%)	Prospective controlled	12 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	All included patients have hypercapnic respiratory failure	NIV 68 (7), LTOT 71 (2), usual 65 (6)	No details	No details	No details
Chen 2010 (3141)	52 (36/52, 69%)	Prospective controlled	6 months	Mean (SD) FEV1 % pred. NIV: 67.18 (4.54); control: 67.71 (4.15). Most likely GOLD stage II for most patients	No details	Likely stable	All patients have Type II respiratory failure	NIV: 74.13 (7.59); control: 74.52 (7.48)	No details	No details	No details
Clini 1998	49 (36/49, 73%)	Prospective controlled	Mean (SD) 35 (7) months	Severe as defined by American Thoracic Society criteria. Based on mean FEV_1/FVC AND FEV_1 %	At least one ICU admission due to severe exacerbation in the two years preceding the study.	Stable clinical state i.e. stability in blood gas values and pH (>7.35), and lack of exacerbation in the preceding four weeks.	Inclusion criterion: PaCO2 >6 kPa	NIV 66 (6), usual care 66 (8)	No active smokers. States that previous smoking habit did not differ between the groups.	NIV 23 (4), usual care 23 (1)	Yes. Patients excluded on suspicion of sleep apnoea as assessed by nocturnal monitoring of arterial oxygen saturation.

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
				predicted, likely to be GOLD III and IV.							
Clini 1996	34 (21/34, 62%)	Prospective controlled	18 months	Severe as defined by American Thoracic Society criteria. Based on mean FEV1/FVC AND FEV1 % predicted, likely to be GOLD III and IV.	At least one hospital admission due to severe exacerbation in the preceding 18 months.	Stable: Noninvasive mechanical ventilation was initiated during a preliminary hospital trial when patients were in a stable state.	Inclusion criterion: $PaCO_2$ >6.7 kPa	NIV 62 (5), usual care 67 (7)	No details	No details	Yes. Patients excluded on suspicion of sleep apnoea as assessed by arterial saturation monitoring.
Coquart 2017	193 (129, 67%)	Retrospective analysis of data (controlled).	5 years	Moderate to very severe airflow limitation. (FEV1/FVC< 0.70).	No details.	No details.	No details.	NIV only: 64.9 (8.8) LTOT only: 64.8 (11.8)	No details	NIV only: 29.4 (9.0) LTOT only: 24.9 (6.5)	No details
Frazier 2019 (CA)	37,014 (410 with NIV, no details on % male)	Retrospective analysis of data (controlled).	No details	All with chronic respiratory failure. No further details.	No details	Unclear	No details	No details	No details	No details	No details
Fu 2014 (6422)	40 (26/40,	Prospective controlle	12 months	Mean (SD) FEV1% pred.	No acute exacerbations	Stable	All patients have	NIV: 65 (6);	No details	No details	Exclusion criteria: patients

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
	65%)	d		NIV: 43.05 (3.23); control: 43.77 (3.21)	within 1 month of study start		hypercapnia. (Meet the diagnostic criteria in the COPD and respiratory failure diagnosis and treatment guidelines)	control: 66 (5)			with diseases that affect lung function aside from COPD are excluded. No further information
Gao 2011 (4078)	40 (31/40, 78%)	Prospective controlled	12 months	Mean (SD) FEV1% pred. NPPV: 38.4 (5.2), control: 38.6 (5.4). Likely GOLD stage III	No acute exacerbations within 2 weeks of discharge from hospital	Post-hospital	All patients had severe COPD and hypercapnia ($PaCO_2$ ≥55 mm Hg)	NPPV: 68.8 (5.2), control: 67.4 (5.6)	No details	No details	No details
Gu 2019 (3064)	40 (27/40, 68%)	Prospective controlled	6 months	Mean (SD) FV1 (L). NIV: 1.22 (0.68); control: 1.24 (0.59) Mean (SD) FVC (L). NIV: 2.18 (0.37); control: 2.20 (0.41)	No details	Post-hospital	All patients have chronic respiratory failure (hypercapnia) $PaCO_2$ > 45 mmHg	NIV: 69.57 (5.79), range 58-86; control: 68.49 (6.75), range 55-86	No details	No details	No details
Han 2006 (4178)	47 (29/47, 62%)	Prospective controlled	12 months	All patients had severe late stage COPD. Refer to Chinese guidelines	No details	Post-hospital	All patients had hypercapnia	Mean age of total 47 patients in study: 66.7 (No details SD)	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
He 2008 (1623)	64 (42/64, 66%)	Prospective controlled	12 months	All patients are GOLD stage III	No details.	Stable	Inclusion criterion: $PaCO_2$ ≥55 mm Hg	NIV 66 (8), control 67 (9)	No details	NIV 21 (5), control 21 (4)	No details
Heinemann 2011	82 (59/82, 72%)	Retrospective analysis of data (controlled).	12 months	Based on mean FEV_1 % predicted (NIV 32.3(10.1), usual care 43.4 (13.2) and FEV/FVC % (NIV 53.1(15.1), usual care 63.5 (21.4)), patients likely to be GOLD stage III/IV. All required prolonged weaning.	No details	Post-hospital: Patients with severe COPD who required prolonged weaning from invasive mechanical ventilation due to acute exacerbation, pneumonia or postoperative respiratory failure.	Inclusion criterion: $PaCO_2$ >52.5 mmHg (or 6.9 kPa) for those receiving NIV	NIV 64.6 (10.8), usual care 72.8 (8.6)	No details	NIV 26 (5.9), usual care 23.7 (5.5) (based on 64/82)	No details
Huang 2011 (427)	50 (27/50, 54%)	Prospective controlled	12 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	No details	Total 54.2(7.3)	No details	No details	No details
Jiang 2008 (3764)	33 (20/33, 61%)	Prospective controlled	12 months	Mean (SD) FEV1% pred. NIV: 38.13 (6.33); usual care: 42.23 (5.67).	No details	Post-hospital	All patients have type II respiratory failure (hypercapnia)	NIV: 70.47 (4.02); control: 71.38 (3.45)	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
				Likely GOLD stage III for most patients (severe)							
Kang 2016 (522)	32 (26/32, 81%)	Prospective controlled	36 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	No details	NIV range: 68-76, control range: 70-80	No details	No details	No details
Laier-Groeneveld 1995	100 (no details on % male)	Retrospective analysis of data (controlled).	Up to 4 years	No details.	No details.	No details.	Hypercapnia a pre-requisite for treatment with NIV (no cut-off stated)	No details	No details	No details	Unclear. Mixed population including those with obstructive sleep apnoea; results for COPD patients presented separately.
Lee 2016 (CA)	2895 (no details on % male)	Retrospective analysis of data (controlled)	Patients included over 7 year period; mean length of follow-up not detailed.	Patients with chronic type 2 respiratory failure. No further details.	No details.	Unclear.	NIV mean $PaCO_2$ 49.2 (7.9) No details for standard care group.	NIV 65.5 (10.8) No details for standard care group.	No details	NIV 38.3 (9.3) No details for standard care group.	No details.
Li 2016 (2409)	56 (33/5	Prospecti ve	12 months	No details.	No details.	Post-hospital	No details	NIV 62.4 (3.5),	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
	6, 59%)	controlled						control 62.1 (3.2)			
Li 2013 (6487)	62 (49/62, 79%)	Prospective controlled	24 months	Mean (SD) FEV1% pred. NIV 51.23 (2.41); usual care 50.76 (2.86), likely GOLD stage II or III for most patients.	No details	Post-hospital	All patients have severe COPD with hypercapnia ($PaCO_2$ > 45 mmHg)	NIV: 69.6, min-max (57-81); control: 68.6, min-max (58-79)	No significant difference in terms of proportion of both groups who are smokers; no further detail	No details	No details
Li 2011 (503)	80 (50/80, 63%)	Prospective controlled	24 months	FEV1 (L): NIV 0.54 (0.17); usual 0.55 (0.10)	No details.	Likely stable.	All included patients have COPD with hypercapnic respiratory failure	NIV 66.5 (range: 55-86), usual 64.5 (range 50-88)	No details	No details	No details
Li 2010 (2513)	40 (24/40, 60%)	Prospective controlled	24 months	FEV1/FVC %: NIV 54.38 (4.18), control 56.92 (3.18)	24 months	Post-hospital	No details	NIV 65.3 (9.6), control 69.9 (7.1)	All have ceased smoking for >1 year	No details	No details
Li 2009 (1401)	18 (9/18, 50%)	Prospective controlled	12 months	FEV1 %: NIV 41.35 (5.88), control 41.45	No details.	Likely stable	All included patients have COPD with hypercapnic respiratory	NIV 66.15 (range 62-79), control 65.22	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
				(7.19)			failure	(range 61-78)			
Liu 2015 (5930)	46 (34/46, 74%)	Prospective controlled	24 months	Mean (SD) FEV1 (L). NIV: 0.62 (0.15); control: 0.62 (0.13). Mean (SD) FVC (L). NIV: 1.39 (0.15); control: 1.37 (0.14)	No details	Stable.	All patients have severe COPD and hypercapnia	NIV: 67.6 (8.2), range (60-81). Control: 65.8 (11.6), range: (56-86)	No details	No details	No details
Liu 2012 (1023)	70 (37/70, 53%)	Prospective controlled	12 months	FEV1 %: NIV 74.3(4.7), control 72.1(5.1)	No details.	Post-hospital	All included patients have COPD with hypercapnic respiratory failure	NIV 65(9.6), control 64(9.9)	No details	No details	No details
Lu 2012	44 (31/44, 70%)	Retrospective analysis of data (controlled)	6 months	FEV_1/FVC <70%, FEV1 predicted <50%, consistent with GOLD III and IV	No details	Post-hospital: patients who were discharged once they were stable following hospitalisation.	Inclusion criterion: $PaCO_2 \geq 55$ mmHg (or 7.33 kPa)	NIV 72(10), usual care 70(9)	No details	No details	No details (not listed as an exclusion criterion)
Melloni 2018	1435 (sub-group with	Retrospective analysis of data	Up to 10 years.	No details	No details	No details	No details	No details	No details	No details	Proportion with OHS and/or OSA.

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
	obstructive disease drawn from larger registry; no details on % m)	(controlled)									
Milane 1985	66 (62/66, 94%)	Retrospective analysis of data (controlled)	Up to 10 years	Described as severe; no further details	No details	Post-hospital: Patients hospitalised during 1973-1983 due to an exacerbation.	"Blood gas measurements determined eligibility for NIV". Mean (SD) $PaCO_2$ NIV group 56.1 (5.3) mmHg (or 7.45 kPa), usual care group 48 (6.6) mmHg (or 6.4 kPa)	66 (48-81)	No details	No details	No details (not listed as an exclusion criterion)
Ouyang 2009 (2101)	40 (26/40, 65%)	Prospective controlled	12 months	FEV1/FVC all <70% (inclusion criteria)	12 months	Post-hospital	No details	NIV 74.3(5.4), control 72.3(8.4)	"With smoking history": NIV 16/19, control 16/21	No details	Yes. OSA was an exclusion criterion
Pahnke 1997	40 (no details on % male)	Retrospective analysis of data (controll	Up to 8 years	No details	No details	No details	No details	No details	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
		ed)									
Paone 2014	60 (31/60, 52%)	Prospective controlled with matching	24 months	GOLD stage III and IV	All admitted for acute exacerbation	Stable. Patients enrolled three months after discharge from hospital (for exacerbation); free from exacerbations for at least 4 weeks.	Yes ($PaCO_2$ > 50 mmHg) (6.6 kPa)	NIV 70 (64-73), usual care 71 (66 to 77).	5% (3/60)	Exclusion criterion: body mass index > 40 kg/m2	Exclusion criterion: history of obstructive sleep apnoea syndrome
Peng 2014 (646)	62 (42/62, 68%)	Prospective controlled	12 months	No details. Only refer to Chinese guidelines.	No details.	Likely post-hospital	All included patients have hypercapnic respiratory failure ($PaCO_2$ > 50mmHg)	Total 53.4 (range: 48-78)	No details	No details	No details
Qin 2016 (3209)	51 (40/51, 78%)	Prospective controlled	6 months	Mean (SD) FEV1 (L). NIV: 0.35 (0.1); control: 0.34 (0.10) Mean (SD) FVC (L). NIV: 1.1 (0.3); control: 1.2 (0.4)	Admitted to hospital due to acute respiratory failure then discharged after recovery	Post-hospital	All patients have COPD with Type II respiratory failure	NIV: 61.6 (8.1), range 51-79; control : 60.9 (7.8), range: 53-78	No details	No details	No. A proportion of patients have sleep apnoea.
Ren 2013 (6508)	30 (20/30, 67%)	Prospective controlled	24 months	Mean (SD) FEV1% pred. NIV: 27.9 (10.1); control: 27.2 (8.1). Likely GOLD stage	All patients chosen for the study were initially hospitalised in the period between	Post-hospital	All patients have severe COPD and type II respiratory failure (hypercapnia	Overall : 65 (11), range 46-74. NIV: 64 (6);	All patients in the study received regular treatment, including	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
				IV	January 2007 to May 2010 due to to AECOPD. No further information		).	control : 66 (9)	smoking cessation.		
Shang 2013 (6682)	30 (% male not reported)	Prospective controlled	12 months	Mean (SD) FEV1% pred. NIV: 38.20 (6.35); control: 42.15 (5.68)	Patients hospitalised in the previous year due to acute exacerbation of COPD	Post-hospital	All patients have COPD and hypercapnia ($PaCO_2$ > 45 mmHg)	NIV: 70.5 (4.50), control : 69.6 (3.53)	No significant difference in terms of proportion of both groups who are smokers ($P < 0.05$)	No details	No details
Sadigov 2016 (CA)	49 (no details on % male)	Likely prospective	14 months	Described as severe COPD associated with non-CF bronchiectasis	No details	Unclear	Chronic hypercapnic respiratory failure.	No details	No details	No details	No details
Suraj 2018	120 (77/120, 64%)	Prospective controlled	12 months	Severe to very severe COPD with chronic type II respiratory failure	History of ≥3 exacerbations in past year.	Post-hospital. After discharge from hospital. All admitted with severe exacerbation and persistent respiratory acidosis.	Inclusion criterion: $PaCO_2$ >50mmHg (6.0 kPa)	NIV 56.8 (4.1); usual care 59.8 (3.2)	No details.	No details.	Yes. Patients with coexisting obstructive sleep apnoea/obesity hypoventilation syndrome excluded.
Tian 2017 (5310)	70 (37/70, 53%)	Prospective controlled	Appears to be 12 month follow-up.	FEV1% < 50% (seemingly for all 70	No details	Likely post-hospital	All patients have severe COPD and CO_2	NIV: 73.15 (4.95), range	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
				patients). GOLD stage III (severe)			retention (hypercapnia)	60-88; control : 73.15 (4.28), range 62-86			
Tsolaki 2008	49 (31/46, 67%)	Prospective controlled	12 months	FEV_1 <50% predicted and FEV_1/FVC <70% consistent with GOLD stage III and IV.	No details	Stable clinical state, as assessed by a pH >7.35, and free from exacerbations at least 4 weeks preceding recruitment.	Inclusion criterion: $PaCO_2$ >45mmHg (6.6 kPa)	NIV 65.2 (8.9), usual care 68.9 (5.6)	No details. More than 20 pack years (inclusion criterion).	NIV 30.4 (5.7), usual care 27.8 (3.4)	Yes. Patients screened with screened with nocturnal polysomnography and excluded if they presented an apnea–hypopnea index ≥10 episodes/h.
Vitacca 2016	76 (% male No details)	Retrospective controlled (sub-group analysis of previous RCT)	12 months	FEV_1<1.5 L, chronic hypercapnia. Appears most with GOLD stage III and IV according to baseline FEV_1 % and FEV_1/FVC %.	At least one hospitalization for respiratory illness in preceding year.	Stable clinical state, as assessed by a pH >7.35, and no change in drug therapy in previous 3 weeks.	Inclusion criterion: $PaCO_2$ >50mmHg (6.0 kPa)	NIV: 67.2 (10.4); NIV + TA: 67.1 (9.2) Usual care: 75.2 (7.2); usual care +TA: 72.3 (9.7)	No details.	No details.	No. Proportion of patients with suspicion of nocturnal hypoventilation.

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
Waltersp acher 2016	155 (88, 57%)	Cross-sectional	None (previous treatment between (mean) 22 and 30 months)	Appears most with GOLD stage III and IV according to baseline FEV1 % and FEV1/FVC %.	Mean (SD) number of previous weeks of exacerbations with hospitalisations: 61.4 (89.3).	Stable (as defined by GOLD criteria).	Mean $PaCO_2$ 44.9 (6.1) mmHg	NIV: 63.7 (8.3) Usual care: 62.6 (8.0)	No details	NIV: 24.5 (5.6) Usual care: 23.7 (5.1)	No details.
Wang 2019 (1247)	81 (51/81, 63%)	Prospective controlled	24 months	MRC dyspnoea scale: NIV 2.31 (0.67), LTOT, 2.27 (0.59), usual 2.25 (0.62)	No details	Likely post-hospital	No details	NIV 73.3 (8.7), LTOT 70.4 (9.8), usual 71.2 (8.5)	0% - excluded patients who still smoked post-hospitalisation	No details	No details
Wang 2017 (421)	21 (14/21, 67%)	Prospective controlled	6 months	No details. Only refer to Chinese guidelines.	No details.	Post-hospital	All included patients have COPD with hypercapnic respiratory failure	total 67.19 (5.46)	No details	No details	No details
Wang 2009 (2700)	20 (23/29, 79%)	Prospective controlled	12 months	FEV1/FVC %:NIV 42.9(3.24), control 43.2(4.34), FEV1%:NIV 29.32 (7.25), control 29.58 (6.78)	All included patients have ≥3 excerbations per year	Post-hospital	No details	NIV 62-78, control 58-78	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
Xie 2009 (7679)	16 (10/16, 63%)	Prospective controlled	2 months	No details	No details	Post-hospital	All patients have COPD with respiratory failure	All patients: 72.7 (11.6)	No details	No details	"COPD with no other diseases"
Xu 2015 (281)	152 (103/152, 68%)	Prospective controlled	12 months	No details. Only refer to Chinese guidelines.	No details.	Likely stable	All included patients have COPD with hypercapnic respiratory failure ($PaCO_2$>50 mmHg)	total range 52-84	No details	No details	No details
Yang 2014 (6314)	100 (60/100, 60%)	Prospective controlled	24 months	Mean (SD) FEV1 (L). NIV: 0.5 (0.17); control: 0.48 (0.10). Mean (SD) FVC (L). NIV: 1.52 (0.37); control: 1.39 (0.35)	No details	Post-hospital	All patients have severe COPD with hypercapnia	NIV: 69.5, min-max (50-86); control: 68, min-max (52-87)	No details	No details	Patients with "severe… nasal obstruction" were excluded from the study
Yang 2011 (853)	60 (40/60, 67%)	Prospective controlled	12 months	FEV1/FVC %: NIV 59.21(3.46), control 57.84(4.32) FEV1 %: NIV 45.55(3.92), control	No details	Likely stable	No details	NIV 62.40(10.02), control 59.80 (11.33)	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
				46.95(4.39)							
Yu 2011 (3932)	51 (33/51, 65%)	Prospective controlled	12 months up to 5 years	No details	No details	Post-hospital	All 51 patients included had hypercapnia (chronic type 2 respiratory failure)	NIV 71.7 (9.0), oxygen therapy 70.6 (9.5)	No details	No details	No details
Yu 2011 (3420)	64 (43/64, 67%)	Prospective controlled	12 months	FEV1%: NIV 46.82(0.83), control 47.01(0.72)	No details.	Likely post-hospital	All included patients have COPD with hypercapnic respiratory failure ($PaCO_2$>60 mmHg)	NIV 69.6 (5.8), control 63.4 (4.9)	No details	No details	No details
Zhang 2009 (472)	30 (23/30, 77%)	Prospective controlled	24 months	FEV1/FVC %: NIV 43.6 (2.6) ; usual 44.8 (3.6); FEV1%: NIV 28.0 (10.0), usual 27.0 (8.0)	No details	Post-hospital	No details	NIV 62 (4), usual 64 (5)	No details	No details	No details
Zhang 2009 (1474)	80 (no details on % male)	Prospective controlled	12 months	All patients are GOLD III	No details	Likely stable	All included patients have COPD with hypercapnic respiratory failure	No details	No details	No details	No details

Study	n= (n, % male)	Study type	Length of follow-up	GOLD stage (or other description of severity)	History of exacerbations/frequent exacerbators	Stable or post-hospital/post-exacerbation population	Hypercapnia	Mean age	% smokers	BMI	Overlap syndrome ruled out?
Zhao 2018 (1741)	31 (no details on % male)	Prospective controlled	12 months	Inclusion criteria: FEV1/FVC <0.7	No details.	Stable	No details	No details but inclusion criteria : 40-80 years old	No details	No details	Yes. OSA was an exclusion criteria
Zhou 2011 (1398)	22 (15/22, 68%) (male completers/ total completers only)	Prospective controlled	12 months	All patients FEV1%pred <30% and FEV/FVC<70 %	No details.	Post-hospital	All included patients have COPD with hypercapnic respiratory failure (PCO_2 45mmHg)	NIV 62.4 (11.5), usual 61.8 (12.1)	smoking history/ years: NIV 20.0 (4.2); usual 19.0 (6.9)	No details	No details

*includes a wider patient group, little data presented for COPD patients only
CA=conference abstract; TA=tele-assistance

Table 2: Details of NIV -RCTs

Author	Mask	Target	IPAP (cm H_2O)	EPAP(cm H_2O)	NIV kit
Bhatt 2013	Full face	Pressure	Titrated to final pressure of 15	Titrated to final pressure of 5	BiPAP Synchrony Ventilator
Casanova 2000	Nasal	Pressure	At least 8 targeted Mean achieved 12 (2)	At least 4 targeted (minimum of 4 achieved)	DP-90; Taema; Antony Cedex, France (Bilevel pressure ventilation system).
Chen 2016 (1229)	Nasal or oral	Pressure	10 to 18	4 to 6	ResMed Inc. BiPAP ST non-invasive ventilator
Chen 2014 (8672)	No details	Pressure	10- 15	3-6	No details
Cheung 2010	No details	Volume	10-20 (as tolerated to target a tidal volume of 7-10 ml/kg) Mean 14.8 (1.1)	5 at start	BiPAP Synchony™ (Respironics Inc,, Murrysville, PA, USA)
Clini 2002	Nasal	Pressure	Set at maximum tolerated, average 14(3)	Set in range of 2-5, average 2(1)	BiPAP-ST30 'auto-trak'™ ventilator (Respironics Inc, Murrysville, PA, USA, distributed in Italy by Markos-Mefar, Air Liquide Group.)
Duiverman 2008	Nasal (30%) or full face (70%)	Blood gases	Up to maximal tolerated pressure titrated towards an optimal correction of nocturnal arterial blood gases (mean 20 (4) in completers and 18 (1) in drop-outs)	EPAP titrated on patient comfort. Mean 6 (2) in completers and 5 (1) in drop-outs	BiPAP spontaneous/timed mode (no further details)
Duiverman 2011	One patient with nasal mask, remaining with full face mask	Blood gases	23 (4) at start of study	6 (2) at start of study	BiPAP; Synchrony, Respironics, INC., Murrysville, PA, USA
Fan 2011 (259)	Nasal or oral	Pressure	12 - 18	3	BiPAP ventilator (commercial name not reported)
Gao 2011 (1867)	Full face or nasal	Pressure	12-20	3-7	BiPAP (Philips)

Author	Mask	Target	IPAP (cm H_2O)	EPAP(cm H_2O)	NIV kit
Garrod 2000	Nasal	Pressure	Median (range): 16 (13-24)	Median (range): 4 (4-6)	BiPAP ST30 ventilator (Respironics, Inc., Murrysville, PA)
Gay 1996	Nasal	Pressure	10 (target level)	2 (lowest possible)	BiPAP (Respironics, Inc., Murrysville, PA)
Kaminski 1999	Nasal	Blood gases	Settings adjusted to decrease $PaCO_2$, to increase SaO_2>90% and to obtain maximum comfort for patients.	Settings adjusted to decrease $PaCO_2$, to increase SaO_2>90% and to obtain maximum comfort for patients.	Monnal D ventilator (France)
Köhnlein 2014	Face or nasal mask according to judgement of investigator	Blood gases	Mean 21.6 (4.7)	Mean4.8 (1.6)	Ventilators marketed post 2004: ResMed (Martinsried, Germany), Weinmann (Hamburg, Germany) or Tyco Healthcare (Neuburg, Germany).
Li 2016 (2090)	Nasal	Pressure	16 to 20	4 to 6	BiPAP S/T non-invasive ventilator (Respironics Inc,, Murrysville, PA, USA)
Li 2012 (98)	No details	Pressure	18-23	3-5	BiPAP (USA company)
Li 2009 (2035)	Nasal or oral	Pressure	12 to 20	3 to 5	BiPAP S/T non-invasive ventilator (Respironics Inc,, Murrysville, PA, USA) and O'Sullivan BiPAP S/T non-invasive ventilator
Liang 2017 (5431)	No details	No details	No details	No details	No details.
Lin 2015 (178)	Nasal or nasal & oral	Pressure	12 - 18	2 - 4	ResMed bilevel non-invasive ventilator (Australia)
Liu 2014 (1433)	No details	No details	No details	No details	No details.
Liu 2012 (8671)	No details	Pressure	16- 20	4-6	BiPAP (USA)
Luyang 2019 (2229)	Nasal or oral	Pressure	12 to 18	4 to 6	Only stated: non-invasive ventilator. No more details.
Ma 2019 (CA)	No details	No details	No details	No details	No details.
Mao 2015 (2651)	No details	Pressure	16- 18	3-5	No details

Author	Mask	Target	IPAP (cm H_2O)	EPAP(cm H_2O)	NIV kit
Márquez-Martin 2014	Nasal mask	Pressure	Initial 10, increased to a maximum of 20. Median 16.	Median 4.	Respironics
McEvoy 2009	Choice of nasal or full face mask and humidification	Pressure	Gradually increased to maximum tolerated (target of IPAP-EPAP difference of 10 or greater) Mean 12.9 (12.5, 13.4)	Lowest possible level (approx 3)	VPAPs-mode, ResMed, Sydney, Australia
Meecham Jones 1995	Nasal	Pressure	Median 18 (16-22)	Median 2 (none exceeding 4)	BiPAP in S mode (Respironics, Inc, Murrysville, PA)
Meng 2009 (676)	No details	Pressure	12 - 18	3	BiPAP ventilator (commercial name is not reported)
Murphy 2011	No details	Pressure	Discharge setting 26 (3)	Discharge setting 5 (1)	No details
Murphy 2017	Nasal, oronasal, or total face masks per patient preference.	Pressure	Initial 18; median 24 (IQR, 22-26)	Initial 4, median 4 (IQR, 4-5)	Harmony 2 ventilator (PhilipsRespironics) or theVPAPIIISTa ventilator (ResMed) with each centre restricted to a single model.
Perez-Bautista 2016 (CA)	No details	Pressure	Minimum 22 targeted, mean (SD) used was 26 (4)	No details	No details.
Shang 2009 (8675)	No details	Pressure	18- 20	5 -8	BiPAP(USA, Germany)
Sin 2007	Choice of nasal or full face mask	Pressure	Patients started on 8, then titrated up until the highest tolerated level or 20 was reached (whichever came first)	Set at 4	ResMed VPAP II with heated humidifier (HumidAire, ResMed)
Struik 2014	Full face mask	Pressure	19.2 (3.4) at discharge	4.8 (1.0) at discharge	Synchrony, Respironics
Strumpf 1991	Nasal mask	Blood gases	Sufficient to maintain PET CO_2 at least 5mm Hg below the spontaneous resting level. Mean 15 (1) in completers	Set at 2 (lowest possible)	BiPaP ventilator (Respironics, Inc)

Author	Mask	Target	IPAP (cm H_2O)	EPAP(cm H_2O)	NIV kit
Su 2016 (8674)	Full face	Pressure	12- 18	4 -8	BiPAP (USA)
Sun 2010 (3316)	No details	No details	No details	No details	NIPPV (patients' own purchase)
Tang 2010 (1733)	Nasal (facial) mask	Pressure	14 to 20	2 to 4	Different types of BiPAP non-invasive ventilators from different companies. No details on commercial names.
Wang 2014 (8673)	Oral-nasal mask	Pressure	10- 16	4 -6	ResMed VPAP III
Wang 2013 (1985)	No details	No details	No details	No details	No details
Wang 2010 (218)	No details	Pressure	12 - 20	4 - 8	BiPAP Synchrony Ventilator
Xiang 2007	Nasal	Pressure	16-20 at start then adjusted to patient	2-4 at start then adjusted to patient	BiPAP (Hoffrichter GmbH, Schwerin, Germany or US based company-not able to translate)
Xu 2016 (2784)	No details	Pressure	12- 20	3 -5	BiPAP (USA)
Zeng 2019 (3137)	No details	Pressure	12- 18	4 -6	BiPAP (USA)
Zhang 2014 (1647)/ Zhang 2013 (1763)	Facial mask	Pressure	12 to 20	4 to 5	BiPAP non-invasive ventilator (no details on commercial name)
Zhang 2012 (2373)	Nasal or oral	Pressure	10 to 20	4 to 6	BiPAP non-invasive ventilator (no details on commercial name)
Zhang 2009 (988)	Nasal	Pressure	12 to 20	2 to 5	Taema; Antony Cedex, France (Bilevel pressure ventilation system).
Zheng 2012 (2760)	No details	Pressure	12- 20	4 -6	No details
Zhou 2013 (2532)	No details	Pressure	10- 18	4 -6	BiPAP (RESMED, Weikang, Tyco, Xinsong Company)
Zhou 2008	Full face mask	Pressure	Mean 12-16	Mean 2-4	BiPAP (Respironics, Inc., Murrysville, PA)

Author	Mask	Target	IPAP (cm H_2O)	EPAP(cm H_2O)	NIV kit
Zhou 2017	Face or nasal mask depending on patient preference.	Pressure	Titrated to maximally tolerated level and IPAP-EPAP difference >10. Mean 17.8 (2.08)	Set at 4. Mean 4.2 (0.1).	Flexo ST 30 NIV ventilator (Curative Co. SuZhou, China)
Guan 2018 CA Update of Zhou 2017	Assume same for additional patients.	Assume same for additional patients.	Assume same for additional patients.	No details.	Assume same for additional patients.

Details of NIV - non-randomised studies

Author	Mask	Target	IPAP (cm H2O)	EPAP (cm H2O)	NIV kit
Budweiser 2007	Nasal, full-face or custom-made	Blood gases	Mean (SD) 21 (4)	Mean (SD) 4.5 (1.4)	Twin Air® (Airox Inc., Pau, France) (13/99), Smart Air® (Airox Inc., Pau, France) (14/99) or BIPAP Synchrony ST® devices (Respironics Inc, Murrysville, PA)(51/99) or other
Chen 2011 (1084)	Nasal	Pressure	14 - 16	2 - 4	BiPAP (Phillips, USA)
Chen 2010 (3141)	Oral / nasal mask depending on the patient's face shape	Pressure	12-18	4-6 cm	BiPAP
Clini 1998	Nasal	Volume	Minimal pressure to achieve an expiratory tidal volume >8 ml/kg (range 10-16)	Set in order not to overcome the supposed intrinsic positive expiratory pressure (range 2-4)	BiPAP (Respironics, Murrysville, PA)
Clini 1996	Nasal	Volume	Minimal pressure to achieve an expiratory tidal volume >8 ml/kg (range 10-16)	Range 0-2	BiPAP (Respironics, Monroeville, PA)
Coquart 2017	No details	No details	No details	No details	No details
Frazier 2019 (CA)	No details	No details	No details	No details	No details
Fu 2014 (6422)	Nasal and oral	Pressure	10-18	3-5	BiPAP
Gao 2011 (4078)	Nasal	Pressure	No details	No details	BiPAP (USA)
Gu 2019 (3064)	Oral / nasal mask	Pressure	5-15	0-4	Philips Respironics BiPAP
Han 2006 (4178)	Nasal / oral	Pressure	17-20	0-5	No details

Author	Mask	Target	IPAP (cm H2O)	EPAP (cm H2O)	NIV kit
He 2008 (1623)	No details	Pressure	12-16	4-5	BiPAP (Philips, USA)
Heinemann 2011	Nasal, oronasal or individual	Blood gases	22.7 (4.3) mbar (=23.15 cm H_2O)	5 (1.3) mbar (=5.1 cm H_2O)	No details
Huang 2011 (427)	NR	Pressure	8-10, ≤20	4-6, ≤12	BiPAP (no further details)
Jiang 2008 (3764)	Nasal (face)	Pressure	NR	NR	BiPAP (German or Swedish company)
Kang 2016 (522)	Full face or nasal	Pressure	12-20	3-7	BiPAP (Philips)
Laier-Groeneveld 1995	Nasal or oronasal	Blood gases	To achieve adequate pO_2	No details	No details
Lee 2016 (CA)	No details	No details	Mean (SD) 20.0 (4.1)	Mean (SD) 12.0 (3.7)	No details.
Li 2016 (2409)	No details	Pressure	12-18	2-4	BiPAP (Philips, USA)
Li 2013 (6487)	Nasal or nasal/oral mask	No details	Initial IPAP: 8 ; Final IPAP: 16-20	Initial EPAP: 4; Final EPAP: 4-6	BiPAP S/T ; Harmony (USA)
Li 2011 (503)	Nasal or oral-nasal	Pressure	12 - 16	3 -5	Horizon BiPAP (USA), BiPAP (Germany), BiPAP (Philips)
Li 2010 (2513)	Nasal	Pressure	14-18	~4	BiPAP (Philips, USA)
Li 2009 (1401)	No details	Pressure	12-22	3-7	BiPAP (Philips)

Author	Mask	Target	IPAP (cm H2O)	EPAP (cm H2O)	NIV kit
Liu 2015 (5930)	No details	Pressure	12-20. Mean (SD) = 13.1 (2.5)	4-8. Mean (SD) = 5.8 (2.2)	BiPAP
Liu 2012 (1023)	Nasal	Pressure	10-20	4-10	BiPAP (patients' own purchase)
Lu 2012	No details	Blood gases	18.0 (2.0)	5.0 (1.0)	BiPAP-Hamony (Respironics, Inc, Murrysville, PA)
Melloni 2018	No details	No details	No details	No details	No details
Milane 1985	No details	No details	No details	No details	Bird Mark 1, Bird Mark 7, Portabird, Monaghan M515
Ouyang 2009 (2101)	Nasal or oral-nasal	Pressure	14-18	3-5	BiPAP (Sullivan or Philips)
Pahnke 1997	No details	No details	No details	No details	No details
Paone 2014	Nasal or full face mask	Volume	Maximum inspiration pressure value tolerated by patients, able to ensure an exhaled tidal volume of 6 mL/kg (measured body weight). Mean 18.5 (2.66)	Between 2 and 8 cmH_2O	Neftis (Linde, Munich, Germany) or Synchrony (Philips Respironics,, Andover MA, USA).
Peng 2014 (646)	No details	No details	No details	No details	No details
Qin 2016 (3209)	No details	Pressure	16-26	4-8	BiPAP
Ren 2013 (6508)	Nasal and oral (face)	Pressure	10-18	4-8	No details

Author	Mask	Target	IPAP (cm H2O)	EPAP (cm H2O)	NIV kit
Shang 2013 (6682)	No details	Pressure	15-20	6-8	No details
Sadigov 2016 (CA)	No details	No details	Mean 29 (4.2) mb (=29.6 cm H_2O)	No details	No details.
Suraj 2018	Oronasal mask	Pressure	Mean 15.4 (12-18)	Mean 7.4 (5-9)	No details.
Tian 2017 (5310)	No details	No details	No details	No details	No details
Tsolaki 2008	Full face	Pressure	Adjusted according to patient's comfort and synchrony with the ventilator and a marked reduction in use of accessory muscles Mean 15.3 (2), (range 12-18)	Adjusted according to patient's comfort and synchrony with the ventilator and a marked reduction in use of accessory muscles	VPAP III ST, ResMed, Sydney, Australia)
Vitacca 2016	Nasal or facial masks.	Pressure/blood gases.	Set at the maximal tolerated pressure. *Mean 15. 8 (1.9) Author communication*	Set to level tolerated in the range of 2–5cmH_2O.	No details.
			"During hospital stay, effectiveness of NIV had to be proven by an at least 10% decrease in PaCO2 after 1 h of continuous support and by at least 15% PaCO2 decrease from baseline value after a night-time NIV use."		
Walterspacher 2016	No details.	Blood gases	NIV established to achieve normal values of $PaCO_2$ (high intensity NIV).	NIV established to achieve normal values of $PaCO_2$ (high intensity NIV).	No details.
Wang 2019 (1247)	No details	Pressure	10 - 16	4 -6	No details
Wang 2017 (421)	Oral-nasal mask	Pressure	16-22	4-6	BiPAP (USA)

Author	Mask	Target	IPAP (cm H2O)	EPAP (cm H2O)	NIV kit
Wang 2009 (2700)	Nasal	Pressure	10-16	4-6	No details
Xie 2009 (7679)	Mask suited to patient's face	No details	No details	No details	No details
Xu 2015 (281)	No details	Pressure	10-20	4-6	BiPAP (Philips)
Yang 2014 (6314)	Nasal	No details	12-18	4	USA company, ResMed (Australia), German company
Yang 2011 (853)	Nasal	No details	No details	No details	BiPAP (no further details)
Yu 2011 (3932)	Full face	Pressure	14-20cm H2O	4-6cm H2O	BiPAP (USA): BiPAP Pro2 / Harmony ventilator
Yu 2011 (3420)	Nasal	Pressure	12-20	2-5	ResMed (no further details)
Zhang 2009 (472)	Oral-nasal mask	Pressure	1.176-1.960 kPa	0.294-0.490 kPa	BiPAP (USA)
Zhang 2009 (1474)	No details	No details	No details	No details	BiPAP Pro 2 (Philips, USA)
Zhao 2018 (1741)	No details	Pressure	12-22	~4	BiPAP ST25 (Philips, USA)
Zhou 2011 (1398)	No details	Pressure	17.60 (2.59) mmHg	7.10 (2.10) mmHg	BiPAP (RESMED x 6, and "Pioneer" x 14)

Table 3: Risk of bias assessment RCTs

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
Bhatt 2013	LOW	LOW	HIGH	UNCLEAR	LOW	HIGH	LOW
	Random number generator.	Opaque sealed envelopes which were opened during screening visits.	No sham NIV arm.	No details.	No loss to follow up.	3/15 (20%) early withdrawals; analysis in 12/15 (no ITT and no reasons given for withdrawal, or on similarity to completers).	No apparent selective reporting.
Casanova 2000	LOW	LOW	HIGH	UNCLEAR	UNCLEAR	LOW	LOW
	Random numbers table.	Randomisation by independent office, so likely that concealment adequate.	No sham NIV arm.	No details.	6/26 (23%) withdrawals: 5 due to 'pressure being too high'; 1 after diagnosis of significant aortic stenosis. Results for completers only. No details on baseline differences between drop-outs and completers. Stated that "*inclusion of the patients who did not complete the trial (intent-to-treat) did not affect any of the outcomes*."	2/26 (8%) withdrawals due to abnormal echocardiographic findings detected during routine follow-up. Results for completers only. No details on baseline differences between drop-outs and completers. Stated that "*inclusion of the patients who did not complete the trial (intent-to-treat) did not affect any of the outcomes*."	Not all results reported at all time-points though it was mentioned in the text whether there were any significant differences.
Chen 2016 1229	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	No losses to follow up.	No losses to follow up.	No apparent selective reporting.
Chen 2014 8672	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Cheung 2010	LOW	LOW	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR	LOW
	Computer-generated random numbers	Drawing of sequentially numbered and sealed opaque	CPAP as "placebo NIV". This was an open-label study, but "*care had been taken to*	No details.	Withdrawals reported/accounted for (8/23, 35%). The main results in both arms of the study were analysed by an intention-to-treat (ITT) approach. Non-completers were included in the final	Withdrawals reported/accounted for (4/24, 17%). The main results in both arms of the study were analysed by an intention-to-treat (ITT) approach. Non-completers were included in the final	No apparent selective reporting.

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
		envelopes by non-study personnel	*avoid biasing the patients into believing either mode was superior*."		analysis, with their timed data censored on the withdrawal dates. Varying (reducing) numbers of patients included for arterial pH and $PaCO_2$. No details on characteristics of drop-outs and completers.	analysis, with their timed data censored on the withdrawal dates Varying (reducing) numbers of patients included for arterial pH and PaCO2. No details on characteristics of drop-outs and completers.	
Clini 2002	LOW	LOW	HIGH	LOW	UNCLEAR	UNCLEAR	LOW
	Centralised block randomisation.	Centralised randomisation likely to ensure allocation concealment.	No sham NIV arm.	All physiological measurements were performed by personnel blind to treatment and not involved in the study.	Numbers and reasons given for drop-outs in both NPPV and Control groups. Numbers of those lost to follow up in each group was also recorded. Similar number of drop-outs/losses in both groups (12/43 (28%) NIV, 15/47 (32%) LTOT) if early drop-outs included. Slightly more patients lost to follow-up from LTOT group compared to NIV group (7/47 vs. 1/43) and more non-compliers in NIV group (7/43 vs. 1/47). Baseline characteristics of drop-outs stated to be similar to those of completers. "*The main parameters were evaluated both in terms of patient completers and in terms of the intention to treat approach (ITT). Last observation carried forward was used as a method of ITT and data are presented accordingly. Data on patients' compliance were evaluated only in terms of patient completers in order to document "per protocol" analysis*."		It appears that all of the study's pre-specified outcomes have been reported.
Duiverman 2008	LOW	UNCLEAR	HIGH	UNCLEAR	HIGH	UNCLEAR	LOW
	Computerised randomisation (with minimisation for FEV_1, $PaCO_2$ and body mass index)	Randomisation performed by independent statistician.	No sham NIV arm.	No details	Six early drop-outs before baseline measurements (6/37, 2 died, 2 withdrew and 2 had other diseases); 7 further drop-outs during 3 months study (5 intolerance to NIV, 1 noncompliant with rehab, 1 death). Total 35% drop-outs. Non-completers had a lower FEV_1 ($p<0.05$), lower vital capacity ($p<0.05$) and higher residual volume as a percentage of TLC ($p<0.05$). Stated that main outcomes evaluated for completers (not clear how many patients assessed for each outcome).	3/35 (8.6%) drop-outs due to non-compliance. Non-compliers had a higher total lung capacity and residual volume than completers ($p<0.01$). Stated that main outcomes evaluated for completers (not clear how many patients assessed for each outcome).	No apparent selective reporting
Duiverman 2011	LOW	UNCLEAR	HIGH	UNCLEAR	HIGH	HIGH	LOW
	Computerised randomisatio	Randomisation performed by	No sham NIV arm.	No details (but analyses	N=37, 6 early drop-outs (during in-hospital rehab programme, Duiverman	N=35, 3 drop-outs (during in-hospital rehab programme, Duiverman 2008).	No apparent selective reporting.

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
	n (with minimisation for FEV_1, $PaCO_2$ and body mass index)	independent statistician.		performed by an independent statistician)	2008); further 7 drop-outs before start period of this follow-on study. N=24 started home based follow-up period, 9 drop-outs (3 withdrew, 1 aorta dissection, 5 deaths); total 59% drop-out. significantly lower baseline PaO_2 in drop-outs compared to completers. "*All data of all patients available at the start of the home-based period included for analyses and all available data used for analyses until patients dropped out*." Patient numbers stated for different outcomes at different time-points.	N=32 started home based follow-up period, 12/32 (37%) drop-outs (3 non-compliant, 1 lung transplantation, 1 stroke, 1 deterioration in condition, 1 treated with CPAP, 5 deaths); significantly worse CRQ score and 6MWD in drop-outs compared to completers. "*All data of all patients available at the start of the home-based period included for analyses and all available data used for analyses until patients dropped out*." Patient numbers stated for different outcomes at different time-points.	
Fan 2011 259	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW for fatality rate but UNCLEAR for other outcomes	LOW for fatality rate but UNCLEAR for other outcomes.	LOW
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	6/27 withdrawals: 3 lost to follow-up; the other 3 died: 1 due to 'Gastrointestinal bleeding'; 2 due to “respiratory failure”. No details on baseline differences between drop-outs and completers. Fatality rate was calculated based on completers only. Not clear whether inclusion of the patients who did not complete the trial would affect other outcomes.	5/20 withdrawals: 1 died due to "Pulmonary Heart Disease Heart Failure"; 1 died due to "gastrointestinal bleeding"; 3 died due to "respiratory failure". Not clear whether inclusion of the patients who did not complete the trial would affect outcomes (except for fatality rate). Results are not based on completers only.	No apparent selective reporting.
Gao 2011 1867	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	HIGH
	No details.	No details	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	Raw data was not provided for many outcomes and incomplete outcome reporting (pH, 6MWD, PaCO2) for control group.
	UNCLEAR	LOW	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	LOW

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
Garrod 2000	Randomisation using sealed envelopes. No further details.	Sealed envelopes suggest that allocation was likely concealed.	No sham NIV arm.	No details	3/24 (12%) withdrawals (1 TIA, 2 non-compliance). Available for assessments: 17/23 (after 4 week run-in), 18/23 at 8 weeks, 17/23 at 12 weeks (between 22 and 27% loss to follow-up). There were no significant differences in baseline variables between patients who completed all assessments compared with those who withdrew or were unable to attend an assessment.	1/22 (4%) withdrawal (refusal to attend training sessions). Available for assessments: 18/22 (after 4 week run-in), 21/22 at 8 weeks, 20/22 at 12 weeks (between 9 and 18% loss to follow-up). There were no significant differences in baseline variables between patients who completed all assessments compared with those who withdrew or were unable to attend an assessment.	It appears that all of the study's pre-specified outcomes have been reported.
Gay 1996	UNCLEAR	UNCLEAR	LOW	UNCLEAR	HIGH	LOW	LOW
	Stated only that patients were randomised.	No details	Sham NIV (same equipment, but "ventilated" with lowest EPAP level and had no added IPAP or timed breaths). All patients were told that they may be randomised to a "low pressure" setting.	No details.	3/7 (43%) discontinued after a median of 1 month. Significantly more than in sham group (main reason was difficulty sleeping). Results based on completers only.	6/6 completed study, no losses to follow-up	No apparent selective reporting.
Han 2019 2229	LOW	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	LOW
	Drawing of lots.	No details	No sham NIV arm.	No details.	Unclear how many patients were lost to follow-up.	Unclear how many patients were lost to follow-up.	No apparent selective reporting.
Kaminski 1999	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	LOW	LOW
	Stated that allocated randomly	No details	No sham NIV arm.	No details	2/7 (29%) discontinued NIV and crossed over to control arm, 4 deaths, no further losses to follow-up. Last assessment before death included.	5 deaths, no further losses to follow-up. Last assessment before death included.	No apparent selective reporting
Köhnlein 2014	LOW	LOW	HIGH	LOW	LOW for survival. HIGH for quality-of-life UNCLEAR for remaining outcomes	LOW for survival. HIGH for quality-of-life UNCLEAR for remaining outcomes	LOW
	Computer generated	Randomisation hotline, so	No sham NIV arm.	Outcome assessors	2/102 lost to follow-up. ITT for primary outcome survival. Patient numbers not	No losses to follow-up. ITT for primary outcome survival. Patient numbers not	No obvious selective reporting. Quality-of-

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
	block randomisation	assume allocation concealed.		unaware of treatment assignment throughout the study.	always clear for other outcome assessments at different timepoints. HRQoL assessments in sub-groups of patients only.	always clear for other outcome assessments at different timepoints. HRQoL assessments in sub-groups of patients only.	life and compliance only reported for sub-set of patients but made explicit.
Li 2016 2090	LOW	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	Random numbers table.	No details	No sham NIV arm.	No details.	No losses to follow up.	No losses to follow up.	No apparent selective reporting.
Li 2012 98	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Li 2009 2035	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	LOW
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	3/16 patients lost to follow-up: 1 died suddenly; 2 died due to lung infection. No more details.	5/14 patients lost to follow-up 1 died suddenly; 4 died due to respiratory failure. No more details.	No apparent selective reporting.
Liang 2017 5413	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Lin 2015 (178)	LOW	UNCLEAR	UNCLEAR	UNCLEAR	LOW	LOW	LOW
	Coin tossing	No details	LTOT as placebo in control arm. Control arm and NIV arm use	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
			different treatment machines. The paper did not mention any other information about whether the treatments were blind to patients.				
Liu 2014 1433	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	UNCLEAR
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	No losses to follow up.	No losses to follow up.	1. No details on the measurement of one of the outcomes - QoL. 2. Not all analysed results of outcomes (i.e.,QoL) were reported. 3. Baseline data was not reported for any outcomes.
Liu 2012 8671	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Ma 2019 (CA)	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR
	Stated only that randomised.	No details	No sham NIV arm.	No details on outcome assessment.	No details	No details	Conference abstract only.
Mao 2015 2651	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
			treatments were blind to patients.				
Márquez-Martin 2014	LOW	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	Computer generated randomisation sequence.	No details	No sham NIV arm.	No details on outcome assessment.	No loss to follow-up in NIV arm. 1/15 (7%) lost to follow-up due to exacerbation.	1/15 (7%) lost to follow-up due to exacerbation.	No apparent selective reporting.
McEvoy 2009	LOW	LOW	HIGH	UNCLEAR	UNCLEAR (LOW for survival)	UNCLEAR (LOW for survival)	LOW
	The central study coordinator generated a random sequence of treatment assignments that were stratified by centre.	Sealed opaque envelopes; central coordinator verified that the patient met all eligibility criteria before the site research nurse broke the envelope seal.	No sham NIV arm.	Sleep studies were scored by experienced sleep scorers who were blinded to treatment allocation. No details for other outcomes.	4/72 (5%) lost to follow-up (not contactable or withdrawal of consent). Varying number of patients attended for repeat measurements (high mortality rate and reluctance of patients to attend, therefore not ITT and for first 12 months only). ITT and PP analysis for survival.	4/72 (5%) lost to follow-up (not contactable or withdrawal of consent). Varying number of patients attended for repeat measurements (high mortality rate and reluctance of patients to attend, therefore not ITT and for first 12 months only). ITT and PP analysis for survival.	Main outcomes appear to be reported. Results for FVC appear not to be reported.
Meng 2009 676	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	LOW
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	No details	No details	No apparent selective reporting.
Murphy 2011 ABSTRACT (interim trial report)	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR
	Stated only that patients randomised	No details	No sham NIV arm.	No details	No details -data on 20 (of 36 randomised) that have been followed up for 3 months so far	No details -data on 20 (of 36 randomised) that have been followed up for 3 months so far	Results only reported for sleep related outcomes and compliance. However blood gases and HrQoL measures also mentioned in methodology.
Murphy 2017	LOW	LOW	HIGH	LOW	LOW for survival; UNCLEAR for other outcomes	LOW for survival; HIGH for other outcomes	LOW
	Patients randomised by Oxford Clinical Trials Unit using computer-		No sham NIV.	Trial staff conducting the	ITT analysis for survival.		

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
	based minimization software (Minim).			outcome assessments were blinded to treatment allocation			
Perez-Bautista 2016 (CA)	UNCLEAR	UNCLEAR	LOW	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR
	Study only described as randomised.	No details	Sham NIV used.	Study described as double-blind, but unclear if this relates to outcome assessment.	No details	No details	Incomplete reporting of results as conference abstract.
Shang 2009 8675	LOW	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	Random numbers table.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Sin 2007	UNCLEAR	UNCLEAR	LOW	LOW	HIGH	LOW	LOW
	Randomisation occurred at a central site.	Randomisation undertaken at central site by one individual who was unaware of patients' clinical status.	Subjects blinded by using sham therapy; authors state that "*complete blinding may not have been present and we cannot completely eliminate the possibility of a "placebo effect," though this seems unlikely in view of*	All outcome measurements performed and interpreted by personnel who were blinded to treatment allocation.	2/13 (15%) refused NIV after randomisation. Not included in analysis. No details on whether patient characteristics were similar.	No loss to follow-up/drop-outs.	No apparent selective reporting.

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
			the excellent compliance observed in those assigned to sham therapy."				
Struik 2014	LOW	UNCLEAR	HIGH	UNCLEAR	LOW for survival. HIGH for blood gases and QoL. UNCLEAR for remaining outcomes.	LOW for survival. HIGH for blood gases and QoL. UNCLEAR for remaining outcomes.	LOW
	Computer generated randomisation with minimisation.	No details	No sham NIV arm.	No details	25/101 drop outs. Lack of motivation (15), discomfort associated with treatment (8), dementia (1), cerebrovascular accident (1). ITT analysis for survival, unclear for hospital admissions and exacerbations, completers only for QoL and blood gases.	24/100 drop outs. Lack of motivation (14), unable to come for testing (6), switch to NIV (4). ITT analysis for survival, unclear for hospital admissions and exacerbations, completers only for QoL and blood gases.	No apparent selective reporting
Su 2016 8674	LOW	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	Random numbers table.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Sun 2010 3316	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Tang 2010 1733	LOW	UNCLEAR	HIGH	UNCLEAR	LOW	UNCLEAR	LOW
	Random numbers table.	No details	No sham NIV arm.	No details.	No losses to follow up.	1/13 patient died due to Cerebrovascular accident. No more details. 1985	No apparent selective reporting.

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
Wang 2014 8673	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Wang 2013 1985	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	LOW
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	4/23 patients lost to follow-up but no reasons were provided. Results were based on completers only. No details on baseline differences between drop-outs and completers.	5/23 patients lost to follow-up (2 death) but no reasons were provided. Results were based on completers only. No details on baseline differences between drop-outs and completers.	No apparent selective reporting.
Wang 2010 218	LOW	UNCLEAR	UNCLEAR	UNCLEAR	LOW	LOW	LOW
	Random numbers table.	No details	LTOT as placebo in control arm. The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Xiang 2007	LOW	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	LOW
	Random number table used to generate randomisation sequence	No details	No sham NIV arm.	No details	All results appear to be based on all patients (ITT) but no details on how missing values dealt with.	All results appear to be based on all patients (ITT) but no details on how missing values dealt with.	No apparent selective reporting
Xu 2016 2784	LOW	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	Random numbers table.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	3 loss to follow up.	3 loss to follow up.	No apparent selective reporting.
	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
Zeng 2019 3137	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Zhang 2014 1647	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	UNCLEAR	UNCLEAR	LOW
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	2/25 patients died during the 2-year follow-up. Causes of death were not provided. Results were based on whole population. No details on baseline differences between drop-outs and completers.	7/25 patients died during the 2-year follow-up. Causes of death were not provided. No details on baseline differences between drop-outs and completers.	No apparent selective reporting.
Zhang 2012 2373	LOW	UNCLEAR	HIGH	UNCLEAR	LOW	UNCLEAR	LOW
	Random numbers table.	No details	No sham NIV arm.	No details.	No losses to follow up.	2/11 withdraws: admitted to hospital due to AECOPD and thus discontinued the trial. Results were based on completers only. No other details.	No apparent selective reporting.
Zhang 2009 988	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	HIGH
	Only stated: "patients are randomly allocated".	No details	No sham NIV arm.	No details.	No losses to follow up.	No losses to follow up.	Not all pre-specified primary outcomes were reported. They stated in methodology section that outcomes would include hospitalisations, but the results of hospitalisations were not displayed later.
Zheng 2012 2760	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.

Study	Random sequence generation	Allocation concealment	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data*		Selective outcome reporting
					NIV group	Control group	
Zhou 2017 *NB No further details from Guan 2018 CA*	LOW	LOW	HIGH	LOW	LOW	LOW	LOW
	Computer generated block randomisation.	Remote allocation by independent study coordinator.	No sham NIV arm.	Outcome assessors blinded.	2/57 (4%) withdrawals. All analyses conducted as ITT analyses (though not clear if/how missing data imputed).	3/58 (5%) withdrawals. All analyses conducted as ITT analyses (though not clear if/how missing data imputed).	No apparent selective reporting
Zhou 2013 2532	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	LOW	LOW	LOW
	No details.	No details.	The paper did not state any related information about whether the treatments were blind to patients.	No details.	No loss to follow up.	No loss to follow up.	No apparent selective reporting.
Zhou 2008	LOW	UNCLEAR	HIGH	UNCLEAR	LOW (primary), HIGH (secondary)	LOW (primary), HIGH (secondary)	LOW
	Random number table used to generate randomisation sequence	No details	No sham NIV arm.	No details	Results for primary outcomes appear to be based on all patients. Between 7 and 14% loss-to follow-up for secondary outcomes (results for completers only, no details on similarities)	Results for primary outcomes appear to be based on all patients. Between 7 and 14% loss-to follow-up for secondary outcomes (results for completers only, no details on similarities)	No apparent selective reporting

Quality assessment crossover RCTs

Study	Random sequence generation	Allocation	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data NIV group	Incomplete outcome data control group	Selective outcome reporting	Is it clear that the order of receiving treatments was randomised?	Can it be assumed that the trial was not biased from carry-over effects?	Dropouts after first treatment period (how incorporated into analysis?)	Are data available from both treatment periods?	Was a form of paired analysis used?
Meecham-Jones 1995	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	HIGH		LOW	No Cochrane guidelines for rating risk of bias				
	Stated that randomisation was achieved with a previously generated randomised sequence	No details	No sham NIV arm	No details	4/18 (22%) did not complete all stages of the study. 1/4 was withdrawn because of lung transplantation (during second study period), 1/4 because of development of bronchial carcinoma, 1/4 died at home during acute exacerbation 2 weeks after entering second study period (NIV), 1/4 was withdrawn because of inability to tolerate equipment. Time point of withdrawal was not clear for all. Results based on 14/18 completers		No apparent selective reporting	Yes	No statistical tests for carryover performed	Analysis based on completers only. Of the 4 withdrawals, 2/4 were during the second treatment period and it was unclear for the other 2/4	Yes	Yes
Strumpf 1991	UNCLEAR	UNCLEAR	HIGH	UNCLEAR	HIGH		LOW	No Cochrane guidelines for rating risk of bias				
	Stated only that patients were randomised	No details	No sham NIV arm	No details	23 initially enrolled, 4/23 of whom did not meet eligibility criteria. 7/23 could not tolerate the mask (complaints included intolerable nasal mucosal irritation unresponsive to		No apparent selective reporting	Yes	ANOVA performed to determine whether or not results may have	Unclear when patients dropped out, but dropouts not included in analysis	Yes, but only for 7/19 randomised patients	Yes

Study	Random sequence generation	Allocation	Blinding of patients	Blinding of outcome assessment	Incomplete outcome data NIV group	Incomplete outcome data control group	Selective outcome reporting	Is it clear that the order of receiving treatments was randomised?	Can it be assumed that the trial was not biased from carry-over effects?	Dropouts after first treatment period (how incorporated into analysis?)	Are data available from both treatment periods?	Was a form of paired analysis used?
					corticosteroids or humidification, inability to sleep, excessive anxiety associated with ventilator use). Unclear how many withdrew during first/second treatment period. 5/23 patients withdrew because of other illnesses (3/5 during the NIV treatment period and 2/5 during the control period). Results presented for 7 patients who completed both treatment periods. Total dropout 70%. Stated that baseline pulmonary functions did not differ significantly between the 7 patients who completed both arms and the 23 patients initially enrolled				been affected by sequence effectsno significant trends revealed			

Table 4: Risk of bias assessment non-randomised studies

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
Budweiser 2007[97]	Prospective	NIV initiated or attempted in most patients. Those who refused NIV from the beginning or could not tolerate NIV during hospital stay (mostly because of mask intolerance) formed the control group.	Most baseline characteristics appear to be similar. There was a difference in LTOT at discharge (95% NIV group and 81% in control group); a sub-group analysis was performed for patients on LTOT (with or without NIV) only; also used as variable in adjusted HR	No details. Only survival as an outcome measure (objective measure, blinding not as relevant)	No details. As survival is an objective measure, blinding is not as relevant	Not specifically stated. Details on those who died or discontinued but no mention of losses to follow-up. 12/99 (12%) discontinued NIV (mask intolerance (n=3), decreased motivation (n=3), reported improvement of symptoms (n=4), lung transplantation (n=1), not specified (n=1)). No details on discontinuation rates of LTOT.	Not specifically stated. Details on those who died but no mention of losses to follow-up. No details on discontinuation rates of LTOT.	Follow-up time was slightly longer in the NIV group (19.8 versus 12.9); due to earlier deaths in non NIV group? Patients undergoing long-term NIV were regularly admitted for re-evaluation to hospital and thus may have had more intense contact compared to the control group.	No apparent selective reporting
Chen 2011 1084	Prospective	All from same hospital, over same period of time (Jan 2007 - Dec 2008), No details on allocation process	Yes (age, gender, years of COPD, PaCO2, PaO2, P>0.05)	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Follow-up time was same, No details on method
Chen 2010 3141	Prospective	All patients selected from same hospital between June 2006 and December 2009	No sig difference at baseline between two groups in terms of general data	Unclear	NR	No dropouts or mortality mentioned		No dropouts or mortality mentioned	Follow up time and outcomes followed-up were same in both groups

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
Clini 1998[94]	Prospective	Those not complying with NIV during in-hospital adaptation period. Lack of compliance defined as the patient's inability to use NIV properly for at least 5 hours for even one night (subjective intolerance, excessive air leaks)	Stated that the two groups were not different for anthropometric and functional characteristics; similar severity of airway obstruction and hyperinflation; previous smoking habit and medical therapy did not differ between the two groups, neither did numbers of acute exacerbations over previous 2 years and rates of endotracheal intubation.	6-minute walk test performed and recorded under supervision of a nurse not involved in the study.	Appears to be.	21/49 did not tolerate NIV in adaptation period and formed control group. No further losses to follow-up reported apart from deaths. Unclear how many patients are contributing to results at different time-points. No mention of ITT analysis or how missing data were handled.		Yes	No apparent selective reporting
Clini 1996[95]	Prospective (and also a historical control-data not extracted)	Patients matched for anthropometric, functional and blood gas data; patients in NIV group had suffered from at least one episode of acute respiratory failure needing non-invasive mechanical ventilation or had undergone at	No significant differences at baseline.	No details	No details	No details (except deaths). Blood gases based on varying numbers of patients. Numbers not stated for other hospital related outcomes.		Yes	No apparent selective reporting

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
		least two admissions to respiratory units for severe exacerbations not requiring ventilatory support; 7/17 patients included in the control group had undergone ICU admissions needing mechanical ventilation but were not able to perform long-term NIV							
Coquart 2017	Retrospective	Consecutive COPD patients who were following a home based pulmonary rehabilitation programme.	BMI higher at baseline for NIV group compared with LTOT group.	No details	No details	8%, 11% and 12% of patients not evaluated post PR, at 6 and 12 months respectively.	6%, 11% and 7% of patients not evaluated post PR, at 6 and 12 months respectively.	Appears yes.	No apparent selective reporting
Frazier 2019 (CA)	Retrospective	Patients who had a diagnosis of both CRF and COPD made between 2012 and 2016. Patients were divided into a treatment group	Good balance between the treatment and control groups in demographic characteristics and indices of disease severity – sample weighted using stabilized inverse	No details	No details	Based on data analysis of available data; no further details.		No details.	No apparent selective reporting

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
		depending on whether they received, or did not receive, NIV within two months of initial CRF diagnosis.	probability of treatment weights						
Fu 2014 6422	Prospective	All patients hospitalised in the same hospital between December 2009 and December 2011. Patients divided into the two groups depending on their wishes	"No sig. difference between 2 groups at baseline regarding gender, age, course of disease (P > 0.05)". "2 groups are comparable"	UNCLEAR: NR	NR	Mortality or drop outs were not mentioned: assumed that all 20 patients made it to 12 month follow-up stage		Mortality or drop outs were not mentioned: assumed that all 20 patients made it to 12 month follow-up stage	Both groups tested on same outcomes but no further information
Gao 2011 4078	Prospective	All patients were hospitalised and selected between May 2005 and December 2009 and had severe (but stable) COPD and hypercapnia	No significant difference between 2 groups at baseline in terms of age, PaO2, PaCO2, and FEV1%	UNCLEAR: NR	NR	At least 1 patient lost to follow-up due to death. Total number of patients at follow-up not stated		At least 2 patients lost to follow up due to death. Total number of patients at follow-up not stated.	Follow up consisted of a phone call once a month and a hospital checkup every 6 months for 12 months for both NIV and control groups. At the 6 month follow-up NIV group patients had the

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
									ventilation parameters adjusted according to their needs
Gu 2019 3064	Prospective	All cases admitted to same hospital from between January 2017 to December 2017. Patients divided into groups depending on whether they continued with NIV post-discharge. No further info on how this was decided.	No sig difference between 2 groups at baseline in terms of gender, age, and disease progression	UNCLEAR: NR	NR	No dropouts or mortality mentioned		No dropouts or mortality mentioned	Follow up time and outcomes followed-up were same in both groups
Han 2006 4178	Prospective	All patients selected between December 2002 and June 2005 from the same hospital.	NR	UNCLEAR: NR	NR	No mortality. No drop out mentioned		Group A: 9 patients died. Group B: 0 patients died. Paper mentioned reintubation rate suggesting that NIV was discontinued for an unspecified duration of time; Group A: 10/19, Group B: 6/17	Follow up time and outcomes followed-up were same in both groups
He 2008 1623	Prospective	All from same department/ hospital, all from	Yes (gender, age, history of COPD, $PaCO_2$, PaO_2, BMI, pH)	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Follow-up time was same, No

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
		same time period (Jun 2004 - Jun 2006), NIV vs control group depended on their choice to purchase BiPAP machine							details on method
Heineman n 2011[98]	Retrospecti ve	Those not meeting criteria for NIV (i.e. $PaCO_2$>52.5 and/or pH,7.35) formed the control group.	No. Those discharged without NIV were significantly older and had higher SAPS-II scores (simplified acute physiology score-II) at admission, but better pulmonary function and showed a trend towards lower severity of hypercapnia.	No details	No details	No details (only on deaths)		No. Those on NIV received more intensive medical care as they went for additional check- ups.	No apparent selective reporting
Huang 2011 427	Prospective	All from the same hospital, same time period (Feb 2009 - Feb 2010), No details on allocation process	Yes (age, gender, severity, P>0.05)	Unclear		Unclear	Losses due to follow-up/ mortality/ withdrawal NR	Losses due to follow-up/ mortality/ withdrawal NR	Yes - phone call at 3 months and out-patient appointment at 6 and 12 months
Jiang 2008 3764	Prospective	All patients admitted to same hospital from between January 1998 to July 2005. Patients who received only	No sig difference between 2 groups at baseline in terms of symptoms, age, gender etc.	UNCLEAR: NR		NR	1 patient in the NIV group died before follow-up	NR	Follow up time and outcomes followed-up were same in both groups

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
		LTOT after discharge (unclear whether this was the patient's or clinicians choice) were allocated to the control group and those who received NIV were allocated to the treatment froup.							
Kang 2016 522	Prospective	All from the same department/ hospital, same time period (June 2007 - Sept 2010), No details on allocation process	Yes (age, gender, P>0.05)	Unclear		Unclear	Losses due to follow-up/ mortality/ withdrawal NR	Losses due to follow-up/ mortality/ withdrawal NR	Yes - interview every 4 months
Laier-Groenevel d 1995[89]	Retrospecti ve	Control group were treated during same time period in same clinic.	No. Control group were normocapnic, NIV group were hypercapnic. Control group patients would not have been able to receive NIV. Higher pO_2 and FEV_1 in control group (though not clear if statistically significant difference)	Stated that investigator blinded regarding NIV but in context of measuring arrhythmias, so not relevant. Not relevant for survival.		No details	No details	Appears yes	No apparent selective reporting
Lee 2016 (CA)	Retrospecti ve	Sequential patients referred to University teaching hospital	Larger proportion of obese patients in NIV group. No further details.	No details	No details	No details	No details	Appears yes.	Limited reporting as conference abstract.

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
Li 2016 2409	Prospective	Source NR, all from same time period (Apr 2014 - Jan 2015), No details on allocation process	Yes (gender, age, years of COPD, P>0.05)	Unclear	Unclear	Losses due to follow-up/ mortality/ withdrawal NR	Losses due to follow-up/ mortality/ withdrawal NR	Follow-up time was same, No details on method	NR
Li 2013 6487	Prospective	All patients discharged from the emergency ICU of Shengjing hospital between Jan 2007 and Dec 2010	No significant difference between the two groups in terms of gender, age, course of illness, smoking history, lung function, PaO2, PaCO2	UNCLEAR: NR	NR	Time points for assessment were 6 months, 1 year, and 2 years. In the NIV group no patients were lost to follow up	8 patients in the control group died before the 2 year follow up point, but no further detail so unable to specify after which follow up point the patient was lost	Follow up methods (questionnaires, telephone follow up, hospital follow ups) were the same for both groups.	NR
Li 2011 503	Prospective	All from same hospital, over same period of time (Oct 2005 - Apr 2009), control group refused NIV due to cost and other reasons	Comparison of baseline characteristics NR, but baseline of outcome parameters no sig. diff. P>0.05	Unclear	Unclear	No losses to follow-up	No losses to follow-up	Follow-up time was same, No details on method	data not reported for QoL despite stated in methods
Li 2010 2513	Prospective	All from same hospital, over same period of time (Jan 2005 - Jun 2007), No details on allocation process	Yes (age, gender, P>0.05)	Unclear	Unclear	No losses to follow-up	No losses to follow-up	Yes - follow-up at 6, 12 and 24 months	NR

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
Li 2009 1401	Prospective	NR - source nor time, No details on allocation process	Yes (age, gender, health status, relevant outcomes, P>0.05)	Unclear	Unclear	Losses due to follow-up/ mortality/ withdrawal NR	Losses due to follow-up/ mortality/ withdrawal NR	Yes - interview every 3 months	NR
Liu 2015 5930	Prospective	All patients were hospitalised in the same hospital from June 2010 to June 2012	No sig difference in age, gender, course/severity of disease, lung function, and other basic data between two groups at baseline (P > 0.05)	UNCLEAR: NR	NR	NR	NR	Both groups tested on same outcomes but no further information	NR
Liu 2012 1023	Prospective	All from same hospital, same time period (Dec 2008 - Oct 2010), NIV group had purhcased BiPAP machines, control group were those who were on LTOT post-hospitalisation.	Yes (blood gas, lung function, P>0.05)	Unclear	Unclear	Losses due to follow-up/ mortality/ withdrawal NR	Losses due to follow-up/ mortality/ withdrawal NR	Yes - regular fixed follow-ups	NR
Lu 2012[99]	Retrospective	All groups are selected from the patients who were in hospital from Jan 2009-Dec 2010, and with stable COPD ($PaCO_2 \geq 55$ mm Hg) after treatment; no details on how control group was	All baseline characteristics appear to be similar.	No details	No details	No losses to follow-up	Not specifically stated. Details on those who were lost to follow up and died.	Yes	No apparent selective reporting

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
		selected versus NIV group							
Melloni 2018	Retrospective	Sub-groups from ANTADIR registry 2001-2015 (French database including 14 regional facilities).	No details	No details	No details	No details	No details	No details.	No apparent selective reporting.
Milane 1985[87]	Retrospective	Group selected from patients hospitalised during 1973-1983 due to an exacerbation (same centre). Blood gas measurements determined eligibility for NIV or not.	Stated that similar for age. Slightly better blood gas values in those not receiving home NIV	No details	No details	No details	No details	NIV patients received additional home visits to check medication and ventilator technique.	No apparent selective reporting
Ouyang 2009 2101	Prospective	Source NR, all from same time period (Aug 2003 - Aug 2005), No details on allocation process	Yes (gender, age, history of smoking, and blood gases, P>0.05)	Unclear	Unclear	7/19 lost to follow-up due to withdrawal	3/21 lost to follow-up due to withdrawal	Yes - follow-ups every 3 months	NR
Pahnke 1997	Retrospective	Control group- those who refused NIV a priori or within first 3 months	No details	No details	No details	No details	No details	No details	No apparent selective reporting

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
Paone 2014	Prospective	Patients allocated to NIV or control group on basis of compliance (during an NIV trial) and/or willingness to be trained.	Propensity matched scores obtained and used for adjusted analyses. No obvious difference between groups at baseline.	No details (only hospitalisations and survival as outcome measures, both objective so blinding less relevant).	No details	No details on loss to follow-up during the 24 month follow-up period. Four patients crossed over to NIV, but these are included in the main analysis.		Appears to be. All had regular clinical evaluations every two months.	No apparent selective reporting
Peng 2014 646	Prospective	All from same hospital, over same period of time (Feb 2010 - Feb 2013), No details on allocation process	Yes (No details on parameters, P>0.05)	Unclear - outcomes collected in outpatient clinic or over telephone	Unclear	No losses to follow-up	No losses to follow-up	Yes - use of family interviews and questionnaires	NR
Qin 2016 3209	Retrospective	All patients selected between December 2012 and December 2014	No sig difference at baseline between two groups in terms of general data (P > 0.05)	UNCLEAR: NR	NR	No dropouts or mortality mentioned	No dropouts or mortality mentioned	Follow up time and outcomes followed-up were same in both groups	NR
Ren 2013 6508	Prospective	All patients chosen for study hospitalised due to AECOPD between January 2007 and May 2010 in the same hospital	No sig difference between 2 groups in terms of age, gender, symptoms, physical signs, etc.	UNCLEAR: NR	NR	No mortality or drop out mentioned: assumed that data is complete at 24 month follow up	No mortality or drop out mentioned: assumed that data is complete at 24 month follow up	Both groups tested on same outcomes but no further information	NR
Shang 2013 6682	Prospective	All patients selected between 2008 and 2011	No sig difference at baseline between two groups in terms of general data (P < 0.05)	UNCLEAR: NR	NR	No mortality or drop out mentioned: assumed that data is complete at 12 month follow up	2 patients died before follow-up, no further information	Follow up time and outcomes followed-up were same in both groups	NR

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
Sadigov 2016 (CA)	Prospective	No details	No details	No details	No details	No details	No details	No details	Limited reporting as conference abstract.
Suraj 2018	Prospective	Of all patients advised to start on NIV, only 30/120 were willing to, for “financial and social reasons.”	No obvious differences, except proportion of males (71% NIV group, 60% usual care).	No details	No details	2/30 died, no (0%) loss to follow-up.	10/90 died, 8 (9%) lost to follow-up.	All patients followed for one year; blood gases measured at same intervals in both groups.	No apparent selective reporting
Tian 2017 5310	Prospective	All patients were treated with medication and NIV during hospitalisation at the same hospital from January to November 2016. Patients divided into groups based on their own wishes.	No sig difference in general information between two groups at baseline (P > 0.05)	UNCLEAR: NR	NR	9 patients were classed in the category: "symptoms worsened, combined with heart / respiratory failure, even leading to death". Unclear how many made it to follow-up	10 patients were classed in this category (see adjacent column <--)	Both groups tested on same outcomes but no further information	NR
Tsolaki 2008	Prospective	Those who had good compliance with ventilator during hospital stay, but refused to continue NIV at home on a long-term basis.	No statistically significant differences between groups for baseline characteristics; trend towards higher BMI in NIV group.	No details	No details	3/27 early drop-outs due to poor compliance with ventilator (<5h/day). Appear to be no further drop-outs (except deaths). Numbers assessed for outcomes at different time-points not specifically stated.	Appear to be no losses to follow-up (except deaths). Numbers assessed for outcomes at different time-points not specifically stated.	Stated that all patients followed up in an identical pattern and closely supervised for adherence to medical treatment	Not all time-points presented for PaO_2 and HCO_3. Otherwise no selective reporting

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
						Early drop-outs not included in analysis.			
Vitacca 2016	Retrospective	Sub-group from previously conducted RCT (broader population).	Patients in usual care (with no tele-assistance) group were significantly older than those in usual care + tele-assistance or groups with NIV.	No details	No details	Stated that no drop-outs from study.	Stated that no drop-outs from study.	No. Patients in tele-assistance group had no scheduled outpatient visits.	No apparent selective reporting.
Walterspacher 2016	Cross-sectional	Patients screened for eligibility and recruited from 2 study centres.	Patients receiving NIV had a higher degree of air flow limitation, reduced vital capacity and higher $PaCO_2$ values.	No details	No details	N/A (cross-sectional). No details on response rate (questionnaire).		N/A.	No apparent selective reporting.
Wang 2019 1247	Prospective	All from same hospital, over same period of time (Jan 2013-Jan 2016), No details on allocation process	Yes (age, gender, years of COPD, P>0.05)	Unclear - outcomes collected in outpatient clinic or over telephone	Unclear	No losses to follow-up		No losses to follow-up	Follow-up via out-patient clinic or telephone
Wang 2017 421	Prospective	All from same hospital, over same period of time (May 2011 - Jun 2014), No details on allocation process	NR	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Follow-up time was same, NIV group were seen as out-patient for 6 months follow-up, NR for control group
Wang 2009 2700	Prospective	All from same department/ hospital, same	NR	Unclear	Unclear	Losses due to follow-up/ mortality/ withdrawal NR		Losses due to follow-up/ mortality/ withdrawal NR	Follow-up time was same, No

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
		time period (Apr 2003 - Oct 2007), control group refused NIV due to cost and other reasons							details on method
Xie 2009 7679	Prospective	All patients selected between May 2006 and December 2007 from the same hospital	No sig difference in gender, age, or disease severity at baseline for both groups	UNCLEAR: NR	NR	No mortality or dropouts mentioned		No mortality or dropouts mentioned	Follow up time and outcomes followed-up were same in both groups
Xu 2015 281	Prospective	All from same hospital, over same period of time (Jan 2013 - Sept 2014), No details on allocation process	Yes (gender, age, severity of COPD, P>0.05)	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Follow-up time was same, No details on method
Yang 2014 6314	Prospective	All patients hospitalised between Oct. 2008 and April 2012, admitted to same hospital	No sig. difference between 2 groups at baseline regarding 6MWD, FVC, FEV1, PaO2, PaCO2, hospitalisation duration	UNCLEAR: NR	NR	4 patients died before full 24 month follow up, but PaO2, PaCO2, FVC, FEV1, 6MWD was measured twice (every 12 months) during the full follow up time, so unclear as to whether these 4 patients had their results included		10 patients died before full 24 month follow up, but again same problem as with the NIV group <--	Follow up time was every 12 months for two years, and outcomes measured were the same. Methods of measuring unclear / not recorded, but stated in the

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
									paper that both groups recorded their results at around 10am
Yang 2011 853	Prospective	All from the same hospital, same time period (Feb 2008 - May 2010), NIV group had purchased BiPAP machines, control group were randomly chosen	Yes (gender, age, P>0.05)	Unclear	Unclear	Losses due to follow-up/ mortality/ withdrawal NR		Losses due to follow-up/ mortality/ withdrawal NR	Yes - telephone interview every month
Yu 2011 3932	Prospective	All were hospitalised at around the same time	No significant difference between 2 groups at baseline in terms of age, gender, pH, PaO2, PaCO2, hospitalisation frequency, number of days in hospital, and hospitalisation expenditure	UNCLEAR: NR		Only 2 patients were followed up for the full 5 years, but all 25 patients were followed up after the initial 12 months		Only 2 patients were followed up for the full 5 years, but 25 patients were followed up after the initial 12 months. Only one patient was lost before the 12 months follow up (1 died after half a year of treatment)	Follow up time was every 12 months up to 5 years for both groups: (control; up to 1yr=7patients, 2yr=9, 3yr=4, 4yr=3, 5yr=2) (NIHMV; 1yr=4, 2yr=8, 3yr=6, 4yr=5, 5yr=2). Method of follow up i.e. outcomes measured were the

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
									same, no further details
Yu 2011 3420	Prospective	All are patients of author, from same time period (Mar 2008 - Dec 2010), inclusion criterias for NIV group only (e.g. able to use face mask, PaO2<60mmHg, PaCO2>60mmHg)	Yes (gender, age, history of COPD, P>0.05)	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Follow-up time was same, No details on method
Zhang 2009 472	Prospective	All from same hospital, over same period of time (Jan 2004 - June 2006), No details on allocation process	Yes (gender, age, P>0.05)	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Yes - house-visit every 2 months
Zhang 2009 1474	Prospective	Source NR, all from same time period (Jun 2005 - Jun 2006), No details on allocation process	Yes (age, gender, history of COPD, smoking, P>0.05)	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Yes - monthly house-visits or telephone interview
Zhao 2018 1741	Prospective	All from same hospital, same time period (May 2013 - Nov 2015), No details on allocation proces	Yes (age, gender, P>0.05)	Unclear	Unclear	No losses to follow-up		No losses to follow-up	Follow-up time was same, No details on method

Study	Prospective or retrospective	How were NIV and control groups selected (e.g. from the same source, at the same time)	Were NIV and control groups similar at baseline	Blinding of outcome assessment	Was blinding of outcome assessment the same for both groups?	NIV group incomplete outcome data	Control group incomplete outcome data	Was follow-up time and method of follow-up the same in both groups?	Selective reporting
Zhou 2011 1398	Prospective	All from same hospital, over same period of time (May 2008 - Jan 2009), No details on allocaiton process	Yes (gender, age, history of COPD, smoking, lung function, blood index, P>0.05)	Unclear - outcomes collected in hospital	Unclear	No losses to follow-up		No losses to follow-up	Yes - conducted interview after 1 month, and completed follow-up at 1 year in hospital

Table 5: Exacerbations reported in RCTs and non-randomised studies

Study	Design	Length of follow-up	Outcome	Results	Direction of effect	Indication of severity/ Comment
Stable population						
Bhatt 2013	RCT	6 months	Number of exacerbations	NIV: 1/15, usual care 1/12 or 1/15 (unclear)	No difference. NB not pre-defined outcome but all reported.	No details on severity
Casanova 2000	RCT	3 and 12 months	Percentage of patients affected by exacerbation	3 months: NIV: 52 %, usual care: 56% 12 months: NIV: 66%, usual care: 69%	Slight trend favouring NIV, but no significant differences Unclear if % relates to ITT population or completers.	No details on severity
Duiverman 2011	RCT	24 months	Number of exacerbations	Median of 3 exacerbations per year for both NIV and usual care	No significant difference. No other outcome statistics reported.	No details on severity
Ma 2019 (CA)	RCT	12 months	"Acute recurrence" (not further defined)	No numerical data presented.	Significant improvement in both groups but unclear of between group difference.	No details on severity
Perez-Bautista 2016 (CA)	RCT	12 months	Exacerbation rate (not further defined) and % reduction in rate of exacerbations.	Mild/moderate exacerbations: NIV: 0.22 (0.15, 0.29) Usual care: 0.38 (0.24, 0.51) Severe exacerbations:	Mild/moderate exacerbations: reduction by 55% with NIV (p=0.012) Severe exacerbations: no significant difference.	Distinguished between mild/moderate and severe exacerbations (not defined).

Study	Design	Length of follow-up	Outcome	Results	Direction of effect	Indication of severity/ Comment
				20% reduction rate with NIV (no other data presented).		
Wang 2010 (218)	RCT	12 months	Mean number of exacerbations	NIV: 1.8 (0.8) Usual care: 4.8 (0.5)	Significant difference in favour of NIV	No details on severity
Zhou 2013 (2532) *Likely stable population*	RCT	12 months	Number of acute exacerbations of chronic obstructive pulmonary disease (AECOPD) per year	NIV: 2.18 (1.05) Usual care: 5.74 (3.26)	Significant difference in favour of NIV	No details on severity
Zhou 2008	RCT	12 months	Exacerbations per patient per year	NIV: 3.73(1.03) Usual care: 4.86(1.71)	Significant difference in favour of NIV	No details on severity. This study also reports hospitalisations and it is likely that some of the exacerbations will have led to hospitalisation.
Li 2009 (1401)	Controlled	12 months	Number of days of exacerbations	NIV: 1.6 (1.0) Usual care: 4.8 (0.9)	Significant difference in favour of NIV	No details on severity
Sagidov 2016	Controlled	14 months	Exacerbations per patient per year	NIV: 1.2 (0.5) Usual care: 3.5 (0.9)	Significant difference in favour of NIV	No details on severity. NB patients with COPD and bronchiectasis.
Tsolaki 2008	Controlled	12 months	Exacerbations per patient per year	NIV: 1.4 (2.1) Usual care: 1.8 (1.4)	No significant difference.	This includes all exacerbations, including those leading to hospitalisations.

Study	Design	Length of follow-up	Outcome	Results	Direction of effect	Indication of severity/ Comment
			Exacerbations per patient per year leading to hospitalisation	*NIV: 1.0 (2.2)* *Usual care: 1.7 (1.3)*	*No significant difference.*	*Exacerbations assumed to be severe, as resulted in hospitalisations (included in section **Error! Reference source not found.**).*
Vitacca 2016	Controlled	12 months	Proportion with at least one exacerbation	NIV: 94% Usual care: 100% NIV + tele-assistance: 62% Usual care + tele-assistance: 92%	Not stated.	Exacerbations requiring antibiotics and/or oral steroids.
			Mean (SD) exacerbation rate per patient	NIV: 8.0 (7.9) Usual care: 12.8 (11.3) NIV + tele-assistance: 2.0 (3.1) Usual care + tele-assistance: 4.0 (6.3)	Not stated.	
			Mean time (days) to next exacerbation	NIV: 45 Usual care: 80 NIV + tele-assistance:190 Usual care + tele-assistance:80	Statistically significant reduction in exacerbation risk when tele-assistance added to NIV. Both tele-assistance and NIV were able to predict exacerbations (multivariate Cox regression HR; reduced risk compared to patients without tele-assistance or NIV).	

Study	**Design**	**Length of follow-up**	**Outcome**	**Results**	**Direction of effect**	**Indication of severity/** **Comment**
Xu 2015 (281) *Likely stable population*	Controlled	12 months	Number of exacerbations	NIV: 1.97 (1.04) Usual care: 4.58 (2.36)	Significant difference in favour of NIV	No details on severity
Yang 2011 (853) *Likely stable population*	Controlled	12 months	Number of exacerbations	NIV: 1.04(0.05) Usual care: 3.46(1.05)	Significant difference in favour of NIV	No details on severity
Post-hospital population						
Cheung 2010	RCT	12 months	Exacerbation without AHFR	NIV: 5/23, usual care: 4/24	No details on statistical significance	Outcome listed as adverse event, not predefined outcome (but all reported).
			Recurrent severe COPD exacerbation with AHRF (primary outcome)	*NIV: 7/23, usual care: 14/24* *HR 0.39 (0.16, 0.98)*	*Statistically significant difference favouring NIV.*	*Severe, therefore assumed to results in hospitalisation (included in section* ***Error! Reference source not found.****).*

Study	Design	Length of follow-up	Outcome	Results	Direction of effect	Indication of severity/ Comment
Gao 2011 (1876)	RCT	24 months	Number of exacerbations per year	NIV: 1.7 (0.6) Usual care: 4.8 (0.9)	Significant difference in favour of NIV	No details on severity
Li 2012 (98)	RCT	2-3 years	Number of exacerbations	NIV: 4.21 (0.29) Usual care: 4.25 (0.08)	No significant difference	No details on severity
Murphy 2017	RCT	12 months	Median number of exacerbations/year	NIV: median 3.8 (IQR 1.7, 6.0) Usual care: median 5.1 (IQR 1.0, 9.2) Unadjusted rate ratio 0.64 (95% CI 0.44, 0.94) Adjusted rate ratio 0.66 (95% CI 0.46, 0.95) (adjusted for number of COPD admissions in previous year, prior use of long term oxygen therapy (LTOT), age and BMI.	Statistically significant difference favouring NIV for both unadjusted and adjusted rate ratio.	No details on severity.
Shang 2009 (8675)	RCT	12 months	Mean number of exacerbations	NIV: 2.15 (0.85) Usual care: 5.36 (0.35)	Significant difference in favour of NIV	No details on severity.
Struik 2014	RCT	12 months	Annual number of exacerbations at home (median (range))	NIV: 1 (0-9) Usual care: 2 (0-14)	No statistically significant difference (p=0.26).	Exacerbation defined as an event in the natural course of the disease characterised by a change in the patient's baseline dyspnoea, cough, and/or sputum that is beyond day-to-day variations, is

Study	Design	Length of follow-up	Outcome	Results	Direction of effect	Indication of severity/ Comment
						acute in onset, and treated with antibiotics and/or prednisolone.
Sun 2010 (3316)	RCT	12 months	Mean number of exacerbations	NIV: 1.42 (0.81) Usual care: 3.02 (0.85)	Significant difference in favour of NIV	No details on severity.
Zeng 2019 (3137) *Likely post-hospital population*	RCT	6 months	Mean number of exacerbations	NIV: 0.59 (0.24) Usual care: 2.43 (0.57)	Significant difference in favour of NIV	No details on severity.
Gao 2011 (4078)	Controlled	12 months	Number of acute exacerbations	NIV: 2.8 (0.5) Usual care: 4.9 (0.5)	Significant difference in favour of NIV	No details on severity.
Han 2006 (4178)	Controlled		Proportion of patients hospitalised after exacerbation	NIV: 3/11 (27.3%). Usual care: 14/19 (73.7%) LTOT: 6/17 (53.5%)	Significant difference in favour of NIV	Requiring hospitalisation
Huang 2011 (427)	Controlled	12 months	Number of days of exacerbations	NIV: 1.80 (1.68) Usual care: 3.30 (1.13)	Significant difference in favour of NIV	No details on severity.
Jiang 2008 (3764)	Controlled	12 months	Number of acute exacerbations	NIV: 2.09 (1.78) Usual care: 6.07 (3.57)	Significant difference in favour of NIV	No details on severity.

Study	Design	Length of follow-up	Outcome	Results	Direction of effect	Indication of severity/ Comment
Kang 2016 (522)	Controlled	36 months	Number of exacerbations per year	NIV: 1.7 (0.6) Usual care: 4.8 (0.9)	Significant difference in favour of NIV	No details on severity.
Li 2016 (2409)	Controlled	12 months	Number of days of exacerbations	NIV: 3.7 (1.1) Usual care: 4.9 (1.7)	Significant difference in favour of NIV	No details on severity.
Li 2011 (503)	Controlled	24 months	Number of exacerbations	Numerical data not reported *("decrease in NIV group, increase in usual care group")*	Not reported	No details on severity.
Li 2010 (2513)	Controlled	24 months	Number of exacerbations per year	NIV: 1.56 (1.10), Usual care: 4.54 (2.35)	Significant difference in favour of NIV	No details on severity.
Ouyang 2009 (2101)	Controlled	12 months	Number of exacerbations Number of days with exacerbation Number of days IV medication required	NIV: 0.7 (0.8); usual care: 1.7 (0.9) NIV: 10.5(9.9); usual care: 42.0 (21.9) NIV: 8.00 (6.3); usual care: 32.6 (17.7)	Significant difference in favour of NIV (all outcomes)	No details on severity.
Shang 2013 (6682)	Controlled	12 months	Number of exacerbations per year	NIV: 2.3 (1.65) Usual care: 5.1 (3.15);	Significant difference in favour of NIV	No details on severity.
Tian 2017 (5310) *Likely post-*	Controlled	Not reported	Number of exacerbations per year	NIV: 2.1 (0.6) Usual care: 3.2 (0.2)	Significant difference in favour of NIV	No details on severity.

Study	Design	Length of follow-up	Outcome	Results	Direction of effect	Indication of severity/ Comment
hospital population						
Wang 2019 (1247) *Likely post-hospital population*	Controlled	24 months	Number of exacerbations per year	NIV: 3.53 (0.39) LTOT: 4.08 (0.69) Usual care: 6.52 (0.79)	Significant difference in favour of NIV	No details on severity.
Wang 2017 (421)	Controlled	6 months	Number of exacerbations	NIV: 2 Usual care: 6	Significant difference in favour of NIV	No details on severity.
Yu 2011 (3932)	Controlled	Up to 5 years	Upper respiratory tract infections and emergency visits to hospital /year	NIV: 0-5 Usual care: 2-8	Not reported	No details on severity.
Yu 2011 (3420) *Likely post-hospital population*	Controlled	12 months	Number of exacerbations	NIV: 2.26 (1.01) Usual care: 3.92 (1.22)	Significant difference in favour of NIV	No details on severity.
Unclear population						
Lee 2016 (CA)	Prospective (?) controlled	14 months (?)	Exacerbation rate per year	NIV: 1.2 (0.5) Usual care: 3.5 (0.9)	Significantly lower rate with high intensity NIV ($p<0.001$)	No details

Table 6: Quality-of-life (RCTs and non-randomised studies)

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Stable populations					
SF-36					
Köhnlein 2014[77]	RCT	12 months	3, 6, 9 and 12 months	NB: general health perception sub-score only: 8.6 (1.8 to 13.3) point greater improvement in NIV group	No significant difference for summary score (results not reported). Significant difference in favour of NIV for general health perception sub-score (p=0.013). Results based on small sub-group of patients only.
Liang 2017 (5431) *Likely stable population*	RCT	Not reported	Not reported	NIV group: 64.85 (5.16) before treatment vs 89.58 (3.26) after treatment; in control group: 64.58 (5.16) before treatment vs 77.28 (3.12) after treatment	Significant difference in favour of NIV.
McEvoy 2009	RCT	Median 28.5 (NIV) and 20.5 (usual care) months; up to 5 years	12 months	Results presented separately for the 8 sub-scales of SF-36. No summary scores.	Statistically significant difference for 2/8 sub-scales (general health and mental health) favouring the usual care group. No significant differences for other sub-scales.
Tsolaki 2008	Prospective controlled	12 months	1, 3, 6, 9 and 12 months	Results for mental and physical summary scores	Statistically significant difference favouring NIV for mental and physical scores at 6, 9 and 12 months
SGRQ					

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Clini 2002[100]	RCT	24 months	24 months	Score changes: -5% in NIV group, -4% in usual care group (increase in QoL in both arms)	No significant difference
Köhnlein 2014[77]	RCT	3, 6, 9 and 12 months	12 months	6.2 (0.7 to 11.8) point greater improvement in NIV group.	Statistically significant difference in favour of NIV (p=0.029), but results based on small sub-group of patients only.
Lin 2015 (178) *Likely stable population*	RCT	12 months	12 months	SGRQ score: in NIV group: 73.46 (6.87) before treatment vs 61.62 (6.51) after treatment; in control group: 73.51 (6.92) before treatment vs 67.58 (6.39) after treatment	Significant difference in favour of NIV
McEvoy 2009[75]	RCT	Median 28.5 (NIV) and 20.5 (usual care) months; up to 5 years	12 months	No data reported	No significant difference
Clini 2002[100] & McEvoy 2009[75]	*IPD data from both RCTs**	*See above*	*12 months*	*Mean difference of 0.9 (95% CI -19.21 to 21.01)*	*No significant difference (small benefit in favour of usual care arm)*
Meecham-Jones 1995[78]	RCT	3 months	3 months	Only individual results presented in graph; no summary data	Significant difference for symptom, activity and total score in favour of NIV; no

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
					significant difference for activity scale
Wang 2013 (1985)	RCT	6 months	6 months	NIV group: 66.9 (14.7) before treatment VS 54.4 (9.2) after treatment; Control group: 63.6 (12.3) before treatment VS 66 (10.3) after treatment	Significant difference in favour of NIV
Xu 2016 (2784) *Likely stable population*	RCT	12 months	12 months	NIV group: 58.94 (8.58) before treatment VS 32.17 (7.41) after treatment; in control group: 57.73 (9.16) before treatment VS 48.56 (8.57) after treatment	Significant difference in favour of NIV
Zhang 2013 (1763) *Likely stable population*	RCT	24 months	24 months	NIV group: 76.3 (8.4) before treatment VS 65.0 (7.5) after treatment; Control group: 78.6 (9.0) before treatment VS 72.4 (11.2) after treatment	Significant difference in favour of NIV
Chen 2010 (3141)	Controlled	6 months	6 months	Symptoms component: NIV group: 65.45 (18.41) before treatment vs 25.61 (16.77) after treatment; control group: 68.84 (19.26) before treatment vs 56.48 (17.64) after treatment. Activities component: NIV group: 78.35 (15.83) before treatment vs 28.64 (16.52) after treatment; control group: 75.22 (17.10)	Significant difference in favour of NIV (all components).

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
				before treatment vs 61.34 (16.70) after treatment. Disease impact component: NIV group: 67.49 (15.24) before treatment vs 20.71 (14.32) after treatment; control group: 74.85 (14.93) before treatment vs 57.66 (15.64) after treatment.	
Fu 2014 (6422)	Controlled	12 months	12 months	[Pre-treatment] NIV: 74.24 (7.36); control: 73.45 (6.89). [Post-treatment] NIV: 61.63 (6.51); control: 67.57 (6.39)	Significant difference in favour of NIV
Li 2009 (1401)	Controlled	12 months	12 months	NIV before 77.33(8.56), NIV after 60.2(5.66); control before 78.56(5.53), control after 71.62(10.65)	Significant difference in favour of NIV
Zhao 2018 (1741)	Controlled	12 months	12 months	NIV before 48.4(1.9), NIV after 39.0(1.1); control before 47.7(1.8), control after 45.1(0.8)	Significant difference in favour of NIV
SRI					
Duiverman 2008 [80]	RCT	3 months	3 months	NIV: 60.1 (11), usual care 55.7 (15). Between group difference adjusted for baseline: 3.1 (-2, 8.2)	Trend for better QoL in NIV group but not statistically significant

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Duiverman 2011[81]	RCT	24 months	6, 12, 18, 24 months	6 months: NIV: 59.5 (14.4); usual care: 55.6 915.2) 12 months: NIV: 60.5 (10.9); usual care: 55.8 (13.4) 18 months: NIV: 56.8 (12.7); usual care: 54.4 (11.8) 24 months: adjusted difference in change 2.9 (-1.9, 7.8)	Trend for better QoL in NIV group at all time-points but not statistically significant
Köhnlein 2014[77]	RCT	3, 6, 9 and 12 months	12 months	5.6 (0.1 to 11.1) point greater improvement in NIV group.	Statistically significant difference in favour of NIV (p=0.0445), but results based on small sub-group of patients only.
Zhou 2017	RCT	3 months	3 months	Change from baseline NIV: 24.7% (15.3%, 34.1%); usual care: 5.5% (-0.9%, 11.9%). Difference: 19.2% (2.1%, 17.6%)	No significant difference (p=0.21).
Guan 2018 CA	RCT-update of Zhou 2017	6 months	6 months	NIV: 57.7 (9.9); usual care: 51.43 (12.25)	Significant between group difference in favour of NIV (p=0.032).

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Walterspacher 2016	Cross-sectional	Treatment duration (mean (SD) months) NIV: 22.1 (25.7) Usual care: 30.2 (25.3)		NIV: 53.2 (18.6) Usual care: 46.3 (15.6)	Statistically significant between group difference p=0.01 (summary score). NIV scores higher on all sub-scales, statistically significant difference for 5/7.
CRDQ					
Bhatt 2013[84]	RCT	6 months	6 weeks, 3 months, 6 months	No total score given, only for sub-scales at 6 weeks, 3 months and 6 months.	Significant difference at 6 months for mastery sub-score in favour of NIV, but no significant difference for other 3 sub-scales. No significant improvement in total score.
Duiverman 2008[80]	RCT	3 months	3 months	NIV: 96.8 (15), usual care 87.9 (20). Between group difference adjusted for baseline: 7.5 (-1, 16)	Trend for better QoL in NIV group but not statistically significant
Duiverman 2011[81]	RCT	24 months	6, 12, 18 and 24 months	6 months: NIV: 94.4 (20.3); usual care: 86.3 (18.4) 12 months: NIV: 93.5 (16.5); usual care: 87.7 (19.14) 18 months:	Trend for better QoL in NIV group at all time-points but not statistically significant

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
				NIV: 89.9 (17.3); usual care: 88.7 (21.5) 24 months: adjusted difference in change -1.3 (-9.7, 7.4)	
Garrod 2000[85]	RCT	3 months	1,2 and 3 months	1 and 2 month data in graph only. 3 months: NIV: 92.2 (17); usual care: 85.1 (23.9). mean difference in change 12.3 (1.19, 23.4) , p=0,03	Statistically significant difference in favour of NIV at 3 months
Márquez-Martin 2014	RCT	3 months	3 months	All median (IQR) NIV baseline: 4.1 (3.76, 4.67) NIV post-treatment: 4.6 (4.06, 5.21) NIV + exercise baseline: 4.12 (3.82, 4.73) NIV + exercise post-treatment: 5.26 (4.54, 5.57) Exercise only baseline: 4.78 (4.13, 5.32) Exercise only post-treatment: 5.61 (5.04, 5.79)	No significant differences between groups.
MRF					

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Clini 2002[100]	RCT	24 months	24 months	Mean difference (adjusted for baseline) 7.1 (0.13-4.07), p=0.041	Statistically significant difference in favour of NIV at 24 months
Duiverman 2008[80]	RCT	3 months	3 months	Mean difference (adjusted for baseline) -9.7 (-18 to -1), p<0.05	Statistically significant difference in favour of NIV at 3 months
Duiverman 2011[81]	RCT	24 months	6, 12, 18 and 24 months	Mean difference (adjusted for baseline) 12 months: -13.4 (-22.7, -4.2) , p<0.05	Statistically significant difference in favour of NIV at 24 months (statistical significance not reported for earlier time-points)
Coquart 2017	Controlled	12 months	8 weeks (post pulmonary rehabilitation), 6 and 12 months.	NIV baseline: 51.7 (21.8) NIV post PR: 44.7 (23.4) NIV 6 months: 46.3 (25.7) NIV 12 months: 43.4 (25.5) LTOT baseline: 56.1 (20.9) LTOT post PR: 47.9 (22.0) LTOT 6 months: 45.9 (21.7) LTOT 12 months: 50.0 (22.4)	No significant differences between groups.
POMS					

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
McEvoy 2009[75]	RCT	Median 28.5 (NIV) and 20.5 (usual care) months; up to 5 years	12 months	NIV Total mood score median 22 (IQR 48), usual care 5 (IQR 21); p=0.318	No statistically significant difference for total score; statistically significant difference in favour of usual care for two sub-groups on POMS (vigour, confusion and bewilderment).
CAT (COPD Assessment Test)					
Luyang 2019 (2229)	RCT	12 months	12 months	NIV group: 33.84 (3.14) before treatment VS 24.21 (2.47) after treatment; Control group: 33.75 (3.25) before treatment VS 28.32 (2.25) after treatment	Significant difference in favour of NIV
Zhou 2013 (2532)	RCT	12 months	12 months	NIV group: 19.63 (4.89) before treatment vs 19.96 (4.13) after treatment; in control group: 18.57 (5.73) before treatment vs 23.74 (5.38) after treatment	Significant difference in favour of NIV
Zhou 2017	RCT	3 months	3 months	Change from baseline NIV -14.7% (-21.3%, -10.2%), usual care -11.9% (-18.3%, -5.5%). Difference: 2.5% (5.3%, -3.2%).	Better score in NIV arm, no significant difference (p=0.06).
Liu 2015 (5930)	Controlled	24 months	24 months	NIV: before treatment 19.82 (5.26); after treatment 17.26 (4.75). Control: before treatment	Significant difference in favour of NIV

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
				19.27 (5.03); after treatment 23.56 (1.12)	
Xu 2015 (281) Likely stable population	Controlled	12 months	12 months	NIV before 20.72 (3.81), NIV after 15.14 (4.01); control before 19.86 (4.63), control after 20.42 (4.28)	Significant difference in favour of NIV
VSRQ					
Coquart 2017	Controlled	12 months	8 weeks (post pulmonary rehabilitation), 6 and 12 months.	NIV baseline: 32.5 (13.3) NIV post PR: 39.5 (15.7) NIV 6 months: 39.3 (16.1) NIV 12 months: 39.3 (16.7) LTOT baseline: 30.3 (15.5) LTOT post PR: 37.3 (16.7) LTOT 6 months: 37.6 (16.5) LTOT 12 months: 34.1 (14.8)	No significant differences between groups.
VQ11					

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Coquart 2017	Controlled	12 months	8 weeks (post pulmonary rehabilitation), 6 and 12 months.	NIV baseline: 32.9 (8.4) NIV post PR:30.7 (10.1) NIV 6 months: 28.8 (9.5) NIV 12 months: 28.8 (11.1) LTOT baseline: 36.0 (8.5) LTOT post PR: 32.4 (8.8) LTOT 6 months: 30.6 (8.3) LTOT 12 months: 33.3 (8.9)	No significant differences between groups.
No specific tool (symptom based)					
Li 2011 (503) *Likely stable population*	Controlled	24 months	24 months	No numerical data *("improvement in NIV, no improvement/ worsened in usual care")*	Not reported
Post-hospital population					
SF-36					
Zeng 2019 (3137) *Likely post-hospital population*	RCT	6 months	6 months	NIV:78.58 ± 13.25 Usual care:58.97 ± 8.45	Statistically significant difference in favour of NIV.
SGRQ					

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Gao 2011 (1867)	RCT	24 months	Not reported	No data - improvement in both NIV (P<0.000) and control (P<0.040)	Not reported
Mao 2015 (2651)	RCT	12 months	12 months	NIV group: 63.22 (7.92) before treatment vs 43.12 (5.01) after treatment; in control group: 62.81 (6.83) before treatment vs 53.11 (6.03) after treatment	Significant difference in favour of NIV
Murphy 2017	RCT	12 months	6 weeks, 3, 6 and 12 months	Mean difference in change adjusted for baseline (95% CI): 6 weeks: 0.4 (-3.4, 4.2) 3 months: -4.3 (-8.4, -0.2) 6 months: 2.2 (-2.8, 7.1) 12 months: 2.27 (-2.59, 7.14) Mean difference in change fully adjusted model* (95% CI): 6 weeks: 0.7 (-3.2, 4.5) 3 months: -4.9 (-8.8, -0.9) 6 months: 3.0 (-2.0, 8.0) 12 months: 2.3 (-2.6, 7.1) *adjusted for baseline values and number of COPD admissions within past year	Statistically significant difference in favour of NIV at 3 months only.

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Tang 2010 (1733)	RCT	6 months	6 months	After treatment QoL: NIV group: 69.1 (2.7); usual care group: 71.8 (2.6).	Significant difference in favour of NIV
Zhang 2009 (988) *Likely post-hospital population*	RCT	12 months	12 months	NIV group: 69± 7 (before treatment); 57 ± 8 (after treatment); Control group: 67 ± 8 (before treatment); 74 ± 5 (after treatment)	Significant difference in favour of NIV
Gao 2011 (4078)	Controlled	12 months	6 months	NIV group: after treatment 45.8 (5.5); control group: after treatment 56.4 (5.6)	Significant difference in favour of NIV
Kang 2016 (522)	Controlled	36 months	36 months	NIV before 12.01 (1.01), NIV after 11.01 (2.25); control before 11.21 (2.02), control after 11.98 (1.19)	Significant difference in favour of NIV
Li 2013 (6487)	Controlled	24 months	6, 12, 24 months	NIV: before treatment 71.4 (8.5), 6 months 68.5 (6.5), 1 year 64.6 (7.4), 2 years 60.6 (6.7). Control: before treatment 73.4 (6.3), 6 months 70.6 (5.7), 1 year 69.3 (5.5), 2 years 67.8 (6.6)	Significant difference in favour of NIV
Li 2010 (2513)	Controlled	24 months	6, 12, 24 months	NIV 0 months 78.31(4.30), NIV 6 months 70.62(5.21), NIV 12 months 65.22(4.29), NIV 24 months 57.20(5.45); control 0 months 76.20(4.57), control 6 months 74.70(6.68),	Significant difference in favour of NIV

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
				control 12 months 75.81(5.05), control 24 months 74.80(3.79)	
Ren 2013 (6508)	Controlled	24 months	24 months	SGQR score: NIV group is significantly improved compared to pre-treatment NIV group and post-treatment control group (P < 0.01 for both).	Significant difference in favour of NIV
Wang 2019 (1247) *Likely post-hospital population*	Controlled	24 months	24 months	NIV before 69.48 (7.41), NIV after 55.85 (8.29); LTOT before 68.92 (8.14), LTOT after 61.71 (7.38); usual before 68.59 (8.47), usual after 70.97 (8.03)	Significant difference in favour of NIV
Zhou 2011 (1398)	Controlled	12 months	1 and 24 months	NIV 0 months 60.90 (7.42), NIV 1 month 35.90 (15.26), NIV 12 months 35.70 (19.30); usual care 0 months 61.67 (10.14), usual care 1 month 44.33 (14.09), usual care 12 months 57.50 (10.85)	Significant difference in favour of NIV
CCQ					
Struik 2014[76]	RCT	12 months	12 months	Mean difference in change -0.04 (-0.5 to 0.4)	Not statistically significant between groups. Based on completers only.
MRF					

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Struik 2014[76]	RCT	12 months	12 months	Mean difference in change -1.5 (-8.6 to 5.7)	Not statistically significant between groups. Based on completers only.
The Seattle Obstructive Lung Disease Questionnaire (SOLQ)					
Li 2016 (2090)	RCT	12 months	12 months	Only reported data after treatment: NIV group: 76.21 (6.67) vs Control group: 65.70 (5.79)	Significant difference in favour of NIV group.
Li 2009 (2035) *Likely post-hospital population*	RCT	24 months	24 months	NIV group: 12.32 (8.35) before treatment VS 51.12 (14.8) after treatment; Control group: 11.28 (8.24) before treatment VS 10.35 (11.2) after treatment	Significant difference in favour of NIV group.
Peng 2014 (646) *Likely post-hospital population*	Controlled	12 months	12 months	NIV group: 70.4 (7.1); control 63.2 (5.9)	Significant difference in favour of NIV group.
Zhang 2009 (472) *Likely post-hospital population*	Controlled	24 months	24 months	NIV group: 12.32 (8.35) before treatment vs 51.12 (14.81) after treatment; Usual care: 11.28 (8.24) before treatment vs 10.35 (11.21) after treatment	Significant difference in favour of NIV group.
CRDQ					

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Struik 2014[76]	RCT	12 months	12 months	Mean difference in change 0.01 (-0.4 to 0.4)	Not statistically significant between groups. Based on completers only.
SRI					
Murphy 2017	RCT	12 months	6 weeks, 3, 6 and 12 months	Mean difference in change adjusted for baseline (95% CI): 6 weeks: 4.9 (0.4, 9.3) 3 months: 3.7 (-0.8, 8.2) 6 months: 2.0 (-3.0, 6.9) 12 months: 0.1 (-5, 5.2) Mean difference in change fully adjusted model* (95% CI): 6 weeks: 4.9 (0.4, 9.3) 3 months: 3.7 (-0.8, 8.2) 6 months: 2.0 (-3.0, 6.9) 12 months: 0.1 (-5, 5.2) *adjusted for baseline values and number of COPD admissions within past year	Statistically significant difference in favour of NIV at 6 weeks only.
Struik 2014[76]	RCT	12 months	12 months	Mean difference in change 4.8 (-0.1 to 9.7)	Not statistically significant between groups. Based on completers only.

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Suraj 2018	Controlled	12 months	12 months	NIV: baseline 51.7 (5.3), 12 months 67.6 (7) Usual care: baseline 50.9 (3.2), 12 months 55.4 (3.2)	Significant difference in favour of NIV.
Pittsburgh Sleep Quality Index (PSQI)					
Ren 2013 (6508)	Controlled	24 months	24 months	NIV group is significantly better compared to control group ($P < 0.05$)	Significant difference in favour of NIV.
CAT					
Gu 2019 (3064)	Controlled	6 months	6 months	NIV group: 15.89 (8.87) before treatment VS 11.13 (7.65) after treatment; control group: 16.06 (8.77) before treatment VS 16.28 (7.96) after treatment	Significant difference in favour of NIV.
QOL score (total of 100 points, higher score=better QoL)					
Gu 2019 (3064)	Controlled	6 months	6 months	NIV group: 62.25 (10.07) before treatment vs 66.98 (8.86) after treatment; control group: 63.06 (9.98) before treatment vs 61.16 (8.75) after treatment	Significant difference in favour of NIV group.
Unclear assessment tool					
Liu 2014 (1433)	RCT	Not reported	Not reported	After treatment QoL: NIV group: 71.8 (2.9); usual care group: 65.8 (3.2).	Not reported

Study	Design	Length of follow-up	Time-points for assessment	Results	Direction of effect
Shang 2009 (8675)	RCT	12 months	12 months	NIV:11. 25 ± 1. 35 Usual care:20. 73 ± 2. 26	Significant difference in favour of NIV group.
Ouyang 2009 (2101)	Controlled	12 months	3, 6, 12 months	NIV 0 months 62.7 (7.5), NIV 3 months 50.3 (6.7), NIV 6 months 42.8 (4.8), NIV 12 months 43.3 (4.6); control 0 months 62.0 (6.3), control 3 months 54.1 (5.9), control 6 months 50.6 (6.0), control 12 months 51.2 (4.6)	Significant difference in favour of NIV group.

Table 7: Adherence and adverse events -RCTs

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Bhatt 2013	Respiratory therapists called the subjects every day during the first week to ensure optimal usage and to troubleshoot complications; also home visit during first week and as needed thereafter.	All night or for at least 6 hours every night for 6 months	Patient reported hours of use and machine downloaded data (machine downloaded data used for analyses).	Number of hours per night: Patient report: 3.9(3.4), Machine report: 3.1(3.3).	No patients discontinued NIV. % days used (42 (36)), % use greater than 4 hours per night (40%), initial compliance (usage >4 hours/night in first week): 8 (53%))	13 patients experienced symptoms in the NIV group (1 dryness of eyes, 5 sinus congestion, 1 nose bleed, 5 discomfort, 1 skin break. 2 patients experienced symptoms in the usual care group (1-dryness of eyes, 1 nose bleed)	None
Casanova 2000	2 nights in hospital to optimise settings, and to instruct patients in use; 'close contact' with the patient during the first 3 weeks to ensure good coupling with the ventilator during sleep.	Nocturnal. No details regarding recommended times, but used ≥5 hours/day as cut-off for sub-group analysis (compliant versus non-compliant)	Electrical time counters	Average of 6.2 hours/day (month 3 and 6), 5.9 h/d during following 6 months.	5/26 (19%) discontinued during the first 3 weeks.	High pressure. No other adverse events reported.	High pressure (5 patients)
Chen 2016 1229	Period of adaptation is not reported. Only mentioned that: both patient and family members are trained before using the ventilator.	More than 8h per day.	NR	NR	NR	In NIV group, 5 patients: psychological fear; 2 patients: facial compression injury; 1 patient: bloating; 3 patients: oropharyngeal dryness.	None

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Chen 2014 8672	Period of adaptation not reported.	8-12 hours per day	NR	NR	NR	NR	NR
Cheung 2010	No details on length. Patients and/or family members were educated by specialist respiratory nurses on the use of NIV/CPAP and interfaces; and proficiency assessed before discharge.	8 hours during sleep every night	Built-in timer	At 3 months: 8.1 (1.8), based on n=14; 6 months: 8.5 (2.2), based on 12 patients; 12 months: 8.7 (1.3) based on 8 patients	4/23 (17%) withdrew consent and a further 4 were withdrawn due to significant concurrent illness. 1/24 withdrew consent in usual care arm (CPAP as placebo NIV), 1 protocol violation, and a further 2 withdrawn due to significant concurrent illness and inadequate home support.	4/23 (17%) withdrew consent due to discomfort associated with treatment. 1/24 withdrew consent in usual care arm due to discomfort associated with treatment.	Discomfort associated with treatment (4 patients)
Clini 2002	Patients assigned to NIV treatment were admitted to hospital for 3–4 days for education and familiarisation with the device	≥ 5 hours per night	Time counter and daily cards	9 (2) hours (in compliant patients)	12/43 drop-outs in total. 4/12 early drop-outs due to non-compliance to NIV, 3/12 drop-outs due to non-compliance after discharge. Reasons for non-compliance not stated.	No details on adverse events associated with NIV.	

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Duiverman 2008	Patients hospitalised to practice NIV under supervision; the practice period lasted until patients could sleep at least 6 hours with NIV (mean days necessary 5 (6)).	Patients discharged from hospital once they could sleep for 6 hours with NIV	Ventilator counter readings	No details	5/31 could not adapt to NIV (this excludes early drop-outs). Completers used NIV on average 96% of the days with a median daily use of 7.7 h (IQR 5.8-8.5 h/day).	5/31 (16%) could not adapt to NIV (no further details)	
Duiverman 2011			No details	Median use per day 6.9 hours (range 40 minutes to 11.4/24 hours).	After 2 years, patients used their ventilator 94% of the days (range 75-100%)	No details	No details
Fan 2011 259	NR	No less than 5 hours per day	NR	NR	NR	In NIV group, 15 patients: psychological fear; 5 patients: air leaking from mask; 12 patients: bloating; 8 patients: oropharyngeal dryness.	None
Gao 2011 1867	relevant training was provided for patient and relatives	4-16 hours per day	NR	NR	NR	NR	NR
Garrod 2000	4-week run-in period (with twice-weekly contact to encourage compliance)	At least 8 hours/day. Where patients reported being unable to sleep with ventilation, they were advised to use the machines for at least 6 hours during the day.	Time counter and daily diary cards	Median 2.08 h/d (0-11.4) from counter readings. Sixteen patients returned completed diary cards with reported use of 3.8 (0-9.8) h/d.	Of 17 patients who reached the end of the study, 29% used the ventilator for more than 4 h/d, and 47% for more than 3 hours. 2/23 patients lost from the study due to non-compliance.	4/23 patients complained of dry mouth and throat (humidification provided). Reasons for poor compliance overall ranged from upper airway problems to complaints regarding disturbance to spouse and inability to sleep.	2/23 patients lost from the study due to non-compliance (unclear if due to adverse events)

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Gay 1996	1.5 days in hospital	Throughout night	Concealed counter on the ventilator and patient diary	NIV: 5.1 (3.8) hours/night. Sham NIV: 4.8 (3.5) hours/night.	NIV: Missed nights 20.8 (12.6). Sham NIV: Missed nights 16 (10.3).	3/7 (43%) stopped using the device and did not return for follow-up assessments (primary reason was an inability to sleep)	
Han 2019 2229	NR	8 to 14 hours per day.	NR	NR	NR	NR	NR
Kaminski 1999	Adaptation period in hospital before discharge. Length of time not stated.	During night time	No details	7.2 (4) hours/day	2/7 discontinued NIV due to intolerance. No further details.		
Köhnlein 2014	Patients trained by specialist nurses in use of equipment. At study entry, NIV patients were admitted to hospital for a mean of 5.6 (SD 1.1) days (usual care: 2.5 days (0.2)).	Six hours per day, preferably during the night, but day time use permitted.	Internal time meters on ventilators.	Based on 48/102 patients and 3 month follow-up period: mean NIV usage was 5.9 hours/day.	Based on 48/102 patients and 3 month follow-up period: 65% exceeded the prescribed time of 6 hours; usage time was less than 3 hours in 18.8%.	14 (14%) with skin rash (managed by changing mask type); no other AEs that could be attributed to intervention.	9/102 discontinued NIV; mask intolerance in 5 and perceived lack of effect of NIV in 4
Li 2016 2090	Period of adaptation is not reported. Only mention: both patient and family members are trained before using the ventilator.	More than 8h per day; mainly during the night time.	NR	NR	NR	NR	NR
Li 2012 98	Period of adaptation not reported. Patient and family given relevant training. Regular follow-up sent.	no less than 5 hours per day	NR	NR	NR	3 experienced fear or discomfort, 4 felt mask was leaking, 5 experienced bloating, 5 experienced dry oropharynx	NR
Li 2009 2035	Period of adaptation is not reported. Only mention: both patient and related patient's family members are trained before using the ventilator.	More than 8h per day.	NR	NR	NR	NR	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Liang 2017 5413	NR	NR	NR	NR	NR	NR	NR
Lin 2015 (178)	Period of adaptation is not reported. Only mentioned that: both patient and family members are trained before using the ventilator.	2 - 3 times per day, and 2 -3 hours each time	NR	NR	NR	NR	NR
Liu 2014 1433	NR	NR	NR	NR	NR	No adverse events.	NR
Liu 2012 8671	NR period of adaptation. Patient and their family members are trained before using the ventilator.	Cumulative time >8 hours per day	NR	NR	NR	NR	NR
Ma 2019 (CA)	NR	NR	NR	NR	NR	NR	
Mao 2015 2651	NR	Cumulative time >5 hours per day	NR	NR	NR	NR	NR
Márquez-Martin 2014	NR	6-8 hours per night	NR	7 (6.5, 9) h/night	NR	NR	
McEvoy 2009	3-4 days in hospital. NIV considered to be successfully established when at least 3 hours sleep were confirmed on NIV with an IPAP-EPAP difference of at least 5 cm H_2O.	Consistent use defined as an average of >4 hours per night	Hour meter values on the NIV and oxygen concentrator devices read out by patient or family member and recorded. Nurses read the hour meter at 6 monthly visits.	4.5 (3.2) h/night	4/72 lost to follow-up (not contactable or withdrew consent). 41/72 (60%) used NIV for >4 h/night.	No details-reasons for withdrawals not stated.	
Meecham Jones 1995	2-4 days in hospital	During night time	Patient diary cards recording total daily hours of	Patient reported median (range) of 7.1 (4.3 to 11)	One patient (1/18) withdrawn from study due to inability to tolerate equipment.		

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
			nasal ventilation. Also timers on ventilators.	hours, measured median (range) of 6.9 (4.2 to 10.8) hours			
Meng 2009 676	NR	3 times per day and 2 hours each time.	NR	NR	NR	NR	NR
Murphy 2011 Abstract	No details	NR	NR	3 h 41 min (1 h 41 min) at 6 weeks, 4 h 30 min (1 h 44 min) at 3 months	NR	NR	NR
Murphy 2017	Acclimatisation to NIV during wakefulness plus one overnight sleep study (additional nights if required). NIV training provided by team at the home ventilation centres.	Minimum 6 hours/night.	Internal clock on ventilator and diary cards.	Ventilator use at 6 weeks was 4.7 hours per night (IQR, 2.5-5.6 hours), which increased during the trial to 7.6 hours per night (IQR, 3.6-8.4 hours) at 12 months.	Number of patients with adherence data (of those who attended); median usage hrs/night (25^{th} to 75^{th} percentile). 6 weeks: 38/45; 4.73 (2.5, 5.6) 3 months: 34/40; 6.02 (4.0, 7.4) 6 months: 30/40; 5.37 (3.48, 7.1) 12 months: 26/36; 7.61 (3.55, 8.37)	NR	NR
Perez-Bautista 2016 (CA)	No details	NR	NR	10 hours/day	NR	NR	NR
Shang 2009 8675	3 days adaptation. Patient and their family members are trained before using the ventilator	10-15 hour per day	NR	NR	NR	NR	NR
Sin 2007	At least 4 hours training at University Sleep laboratory	During night time	Hours recorded by ventilator counter.	NIV:3.7 (3.4) hours per night	2/13 refused NIV after randomisation (reasons not stated)	NR	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
				Sham NIV: 5.3 (4.4) hours per night NB not clear whether this relates to total study period			
Struik 2014	Experienced nurse practitioners started NIV. No details on length of time.	Use during night and during day/nap times if desired.	Time counter on NIV machine.	Mean duration of NIV until death or last follow-up: 6.3 hours (2.4) per night (total group) and 7.7 (1.5) in completers.	25/101 (25%) discontinued NIV. Reasons: Lack of motivation (15), discomfort associated with treatment (8), dementia (1), cerebrovascular accident (1)	8/101 (8%) discontinued treatment due to discomfort associated with treatment.	
Strumpf 1991	2-3 hours in hospital, then 3 x weekly visits at home until patient had adapted to ventilator, less frequent visits thereafter	Patients asked to use device every evening and to gradually extend periods of use until they could sleep using it throughout the night	Electronic timer	Average 6.7 (06) h/night for 7 completers	7/23 could not tolerate mask. Unclear how many withdrew during first/second treatment period. Of 7 completers, no patients interrupted use of ventilator for more than 3 consecutive nights.	Complaints included intolerable nasal mucosal irritation unresponsive to corticosteroids or humidification, inability to sleep, excessive anxiety associated with ventilator use.	
Su 2016 8674	Period of adaptation not reported. Patient and their family members are trained before using the ventilator.	Cumulative time >8 hour per day	NR	NR	NR	NR	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Sun 2010 3316	NR	More than 10 hours per day	NR	NR	NR	NR	NR
Tang 2010 1733	Period of adaptation is not reported. Only mention: both patient and family members are trained before using the ventilator. Telephone guidance was provided if necessary during the treatment.	2 - 3 times per day, and 2 -3 hours each time.	NR	NR	100%	In NIV group, 2 patients experienced nasal/ facial compression injury; 3 patients experienced bloating.	None
Wang 2014 8673	2-5 days adaptation. Patient and their family members are trained before using the ventilator	Cumulative time >6 hour per day	NR	NR	NR	NR	NR
Wang 2013 1985	NR Only stated that: specialist personnel visited patients once a month to provide help.	NR	NR	NR	2/21 patients discontinued for 1 weak (due to exacerbation) during the trial but returned to trial afterwards. 3/21 patients discontinued the trial because their family members could not actively	None	None

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
					cooperate with the treatment. No details on the length of time.		
Wang 2010 218	Period of adaptation is not reported. Only mention: both patient and family members are trained before using the ventilator.	4-14 hours per day	NR	NR	NR	NR	NR
Xiang 2007	Patients discharged with NIV once patients and relatives were used to the treatment (time not stated).	At least 8 hours/day during night or day-time nap.	NR	NR	1/20 patients discontinued NIV	Abdominal distension (5/20), localised skin pressure damage (2/20), 1 suspected pulmonary barotrauma/pneumothorax	1 suspected pulmonary barotrauma/pneumothorax
Xu 2016 2784	NR	6 hours per day	NR	NR	NR	NR	NR
Zeng 2019 3137	NR	Two times a day, each time 2 hours	NR	NR	NR	Pharyngeal dryness1 case, aspiration 1 case, sputum excretion difficulty 1 case	NR
Zhang 2014 1647	Period of adaptation is not reported. Only stated: guidance on NIV usage was provided to patients every 3 months.	8 to 12 hours per day. NIV during the night time was recommended but no details on recommended period of use.	NR	NR	NR	In NIV group, 3 patients experienced facial compression injury; 4 patients experienced bloating.	None
Zhang 2012 2373	NR	3 times per day and 2 to 3 hours each time.	NR	NR	2/11 (18%) discontinued due to AECOPD.	NR	NR
Zhang 2009 988	NR	Only stated: "using NIV at every night". No details on recommended period of use.	NR	NR	NR	NR	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Zheng 2012 2760	NR	Cumulative time >8 hours per day	NR	NR	NR	One patient developed chest tightness and claustrophobia, which was quickly improved after patient psychological counselling and training. One patient developed abdominal distension, which disappeared after adjustment of ventilator pressure parameters and guidance of ventilator use.	NR
Zhou 2017	One hour NIV treatment in hospital under observations, education provided on ventilator use/mask fitting.	Recommendation to use NIV 'during sleep'; time according to patient preference.	Built-in ventilator software.	Mean 5.6 (1.4) hours/day.	No details.	Seven (12%) reported a skin rash; one case of mask intolerance.	The case of mask intolerance led to discontinuation (1/57).
Guan 2018 CA (update of Zhou 2018)	No details.	No details.	No details.	No details.	No details.	Incidence of adverse events was "low".	
Zhou 2013 2532	NR	Two or three times a day, each time 2 to 4 hours, Cumulative time 8-10 hours per day	NR	NR	NR	NR	NR
Zhou 2008	NR	Intermittent ventilation. Either 3 time a day, for 3	NR	NR	NR	NR	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
		hours or twice a day for 2 hours + 5 h at night depending on patient characteristics. At least 9 hours in total.					

Adherence and adverse events -non-randomised studies

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Budweiser 2007	NR	Nocturnal NIV was offered during hospital stay	Counter readings on ventilator for hours of daily use	6.5 (2.5) hours per day	12/99 (12%) discontinued NIV within 2-27 months (mean 6.3 months). Reasons were: mask intolerance (n=3), decreased motivation (n=3), reported improvement in symptoms (n=4), lung transplantation (n=1) or not specified (n=1) 6/99 (6%) used NIV for <3 hours/day	Mask intolerance (n=3/99)	
Chen 2011 1084	NR	2-3 times per day, 2-4 hours each time	NR	NR	NR	NR	NR
Chen 2010 5781	Patients and their families have been trained in how to use the ventilators and instructed on how to adjust the number and times of ventilations according to the patient's condition.	3-4 times use per day of 2-3 hours each time	NR	NR	NR	NR	NR
Clini 1998	All patients performed an in-hospital trial of NIV spending at least 15 days in hospital. Effects of NIV tested during two daily practice trials.	At the end of trial period, patients instructed to use NIV for at least 5 consecutive hours per night.	Patient and relative interview and device time counter.	7.4 (1.3) h/night	21/49 initially did not comply NIV during adaptation period and formed the usual care group (lack of compliance defined as the patient's inability to use NIV	Nasal skin lesion n=6 (21%), gastric distension n=4 (14%), rhinrrhoea n=4 (14%), mucosal dryness n=2 (7%), skin inflammation n=1 (4%).	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence- how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
					properly for at least 5 hours for even one night (subjective intolerance, excessive air leaks)		
Clini 1996	In hospital trial for at least 15 days	Minimum of 8 hours at night	NR	NR	NR	NR	NR
Coquart 2017	NR	NR	NR	NR	NR	NR	NR
Frazier 2019 (CA)	NR	NR	NR	NR	NR	NR	NR
Fu 2014 6422	Patients and families trained how to use ventilator	4-8 hours/day	NR	NR	NR	NR	NR
Gao 2011 4078	Patients and their families are trained in how to use the ventilator and are given 5-7 days to try the ventilator in hospital	Post-hospitalisation: more than 10 hours during the day and more than 6 hours during the night recommended	NR	NR	NR	Flatulence 2 cases, nasal/facial skin injury 1 case, epistaxis 1 case,	NR
Gu 2019 3064	NR	6-10 hours per day	NR	NR	NR	NR	NR
Han 2006 4178	NR	> 8 hours per day	NR	NR	NR	NR	NR (only hospital reintubation rates mentioned)
He 2008 1623	NR	≥ 8 hours per day	NR	NR	NR	NR	NR
Heinemann 2011	Unclear, but NIV initiated in hospital after weaning.	NR	Patients using NIV admitted regularly at 3, 6 or 12 months to verify adherence.	NR	NR	Only stated that patients with dryness of the mucosa used a passive heat and moisture exchanger, which was switched to a heated humidification system if dryness persisted. Number of patients experiencing this not stated.	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence- how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Huang 2011 427	relevant training was provided for patient and relatives	≥ 4 hours per day	NR	NR	NR	NR	NR
Jiang 2008 3764	NR	6-10 hours per day	NR	NR	1 patient in the treatment group died suddenly after one month of treatment from heart problems	NR	NR (1 patient died 1 month into NIV treatment from heart problems)
Kang 2016 522	relevant training was provided for patient and relatives	4-16 hours per day	NR	NR	NR	NR	NR
Laier-Groeneveld 1995	NR	Nocturnal (whole night) and if required during the day (length according to normalisation of blood gases)	NR	NR	NR	NR	NR
Lee 2016 (CA)	NR	NR	NR	NR	NR	NR	NR
Li 2016 2409	relevant training was provided for patient and relatives. Weekly follow-up interviews.	initially 3h/time, 3 times/day. Can be adjusted when ideal blood gas index is achieved.	NR	NR	NR	NR	NR
Li 2013 6487	Patients and their families are only allowed to take the ventilator home from hospital once they are trained to use the ventilator proficiently	Used mainly during the night, 8 or more hours each time	NR	NR	NR	NR	NR
Li 2011 503	NR	8-10 hours per day	NR	NR	NR	NR	NR
Li 2010 2513	NR	~ 6-12 hours per day	NR	NR	NR	3 bloating, 1 sleep disturbance	None

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence- how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Li 2009 1401	relevant training was provided for patient and relatives	2-16 hours per day	NR	NR	NR	5 bloating	None
Liu 2015 5930	NR	≥8 hours a day (mainly during sleep at night and daytime naps), each incidence of use lasting 2-4 hours	NR	NR	NR	NR	NR
Liu 2012 1023	relevant training was provided for patient and relatives	>10 hours per day	NR	NR	NR	NR	NR
Lu 2012	Patients discharged with NIV once patients and relatives were used to the treatment.	At least 8 hours (mainly at night and during mid-day rest)	NR	NR	Stated that patients had "good" tolerance and compliance to NIV. No patients appeared to discontinue. There was no pulmonary barotrauma.		
Melloni 2018	NR	NR	NR	NR	NR	NR	NR
Milane 198	NR	15 minutes per hour when awake, up to a minimum of 4 hours per day	NR	NR	NR	NR	NR
Ouyang 2009 2101	Patient and relatives given relevant training. Monthly follow-ups	≥ 12 hours per day for 1st month. ≥ 8 hours per day for remaining.	NR	NR	NR	NR	NR
Pahnke 1997	NR	NR	NR	NR	15/40 patients refused NIV or discontinued within first 3 months. Reasons include: social (flat too small, disturbs partner/neighbours, too technical) rational (due to age reached with COPD) or fear of mask/claustrophobia	Pahnke 1997	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence- how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
					or of becoming dependent.		
Paone 2014	No details, but allocation to NIV group on the basis of compliance and/or willingness to be trained.	No details but compliance defined as ≥5 hours/night	NR	7.4 (1.3) hours mean daily use	NR	Paone 2014	No details, but allocation to NIV group on the basis of compliance and/or willingness to be trained.
Peng 2014 646	NR	> 6 hours per day	NR	NR	NR	4 fear, 7 dry oropharynx, 2 skin damage from pressure of mask, 5 bloating	NR
Qin 2016 3209	Patients and their families are trained in how to use the ventilator prior to home use	NR	NR	NR	NR	NR	NR
Ren 2013 6508	NR	At least 8 hours per day	NR	NR	NR	NR	NR
Shang 2013 6682	2 days prior to discharge are spent in hospital whilst NIV is adjusted to suit patient's needs	10-15 hours per day	NR	NR	NR	NR	NR
Sadigov 2016	NR	NR	NR	NR	NR	NR	NR
Suraj 2018	Patients given instructions on how to use NIV and service centre contacts given for emergencies.	During 1st month: patients instructed to use NIV in bed an intermittently for 2 hrs while awake (1 hr in morning and 1 hr in afternoon) After 1 month: minimum of 6 hrs per night.	Questionnaire and details collected over phone (at 4, 8 and 10 months).	Mean nocturnal use >5 hours per night.	NR	10/28 patients with NIV reported minor adverse events (abdominal distension, nasal drying and nasal bridge ulceration)	No adverse events requiring discontinuation of NIV.
Tian 2017 5310	NR	NR	NR	NR	NR	NR	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence-how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Tsolaki 2008	2-3 days in hospital until patients were confident in use	At least 5 hours/night	NR	9 (2.2) hours/day	3/27 drop-outs from NIV group due to poor compliance (<5 hours/day).	NR	NR
Vitacca 2016	One overnight use of NIV at hospital. Tele-assistance in proportion of patients.	Night time. No further details.	Three monthly follow-up out-patient visits for those patients not receiving tele-assistance.	NR	NR	NR	NR
Walterspacher 2016	NR	≥6 h within 24h.	NR	NR	NR	NR	NR
Wang 2019 1247	NR	≥ 12 hours per day	NR	NR	NR	NR	NR
Wang 2017 421	relevant training was provided	> 8 hours per day	NR	NR	NR	NR	NR
Wang 2009 2700	NR	6-10 hours per day	NR	NR	NR	NR	NR
Xie 2009 7679	Nurses explain to patient prior to discharge how to use NIV	6-10 hours per day	NR	NR	NR	1 patient had abdominal distension, 1 patient had injury to the cheek, some patients had bloating	NR
Xu 2015 281	NR	> 6 hours	NR	NR	NR	NR	NR
Yang 2014 6314	Patients trained to monitor blood oxygen saturation and heart rate before using	8-12 hours per day	NR	NR	NR	NR	NR (mortality aside)
Yang 2011 853	relevant training was provided for patient and relatives	~12 hours per day	NR	NR	NR	NR	NR
Yu 2011 3932	NR	4-12 hours per day	NR	NR	NR	NR	NR
Yu 2011 3420	NR	Daytime: 1-2 times per daytime, >2 hours per time night: 12-16 breaths/min	NR	NR	NR	NR	NR

Study	Period of adaptation/help in adapting to NIV	Recommended period of use	Adherence- how measured	Adherence – mean hours use	Adherence -% of patients or other	Adverse events associated with NIV (compare to usual care if reported)	Adverse events leading to NIV discontinuation
Zhang 2009 472	Period of adaptation not reported. Patient and family given relevant training.	more than 8 hours per day	NR	NR	NR	3 did not understand treatment method/ experienced fear using the mask, 5 experienced bloating/ flatulence	None
Zhang 2009 1474	Monthly follow-up telephone calls or home visits.	≥ 8 hours per day	NR	NR	NR	NR	NR
Zhao 2018 1741	NR	> 5 hours at night	NR	NR	NR	NR	NR
Zhou 2011 1398	2 days of adaptation in respiratory ward. Monthly follow-up telephone calls to guide and ease patients.	NR	hours used per day	7.10 (2.10)	NR	NR	NR

Appendix 1 Search strategies

Searches were run from 2014 where these were updating the authors' searches for a previous systematic review. Databases not previously included were searched from inception.

Database: Cochrane (Wiley) CENTRAL Register of Controlled Trials

#1 copd
#2 "chronic obstructive pulmonary disease"
#3 "chronic obstructive lung disease"
#4 "chronic obstructive airway disease"
#5 "chronic respiratory disorder*"
#6 "smoking related lung disease*"
#7 MeSH descriptor: [Pulmonary Disease, Chronic Obstructive] explode all trees
#8 emphysema
#9 MeSH descriptor: [Emphysema] explode all trees
#10 MeSH descriptor: [Bronchitis] explode all trees
#11 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10
#12 non-invasive near/2 ventilation
#13 noninvasive near/2 ventilation
#14 MeSH descriptor: [Positive-Pressure Respiration] explode all trees
#15 MeSH descriptor: [Intermittent Positive-Pressure Ventilation] explode all trees
#16 cpap
#17 bipap
#18 "bi-level ventilation"
#19 "bilevel ventilation"
#20 niv
#21 nippv
#22 nppv
#23 "positive pressure ventilation"
#24 "positive airway pressure"
#25 #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24
#27 #11 and #25 from 1980 to 2014

Database: MEDLINE (Ovid) 2014-September 2019

1 chronic obstructive pulmonary disease.mp. or exp Pulmonary Disease, Chronic Obstructive/
2 copd.mp.
3 chronic obstructive lung disease.mp.
4 chronic obstructive airway disease.mp.
5 chronic respiratory disorder$.mp.
6 smoking-related lung disease$.mp.
7 Pulmonary Emphysema/
8 exp Bronchitis/
9 emphysema.mp.
10 or/1-9
11 exp positive-pressure respiration/ or intermittent positive-pressure ventilation/
12 cpap.mp.
13 bipap.mp.

14 bi-level ventilation.mp.
15 niv.mp.
16 nippv.mp.
17 positive pressure ventilation.mp.
18 positive airway pressure.mp.
19 ((noninvasive or non-invasive) adj2 ventilation).mp.
20 nppv.mp.
21 or/11-20
22 10 and 21
23 limit 22 to yr="1980 - 2014"

Database: MEDLINE (Ovid) In-Process & Other Non-Indexed Citations September 2019

1 copd.mp.
2 chronic obstructive lung disease.mp.
3 chronic obstructive airway disease.mp.
4 chronic respiratory disorder$.mp.
5 smoking-related lung disease$.mp.
6 emphysema.mp.
7 chronic obstructive pulmonary disease$.mp.
8 bronchitis.mp.
9 or/1-8
10 cpap.mp.
11 bipap.mp.
12 bi-level ventilation.mp.
13 niv.mp.
14 nippv.mp.
15 positive pressure ventilation.mp.
16 positive airway pressure.mp.
17 ((noninvasive or non-invasive) adj2 ventilation).mp.
18 nppv.mp.
19 positive pressure respiration.mp.
20 or/10-19
21 9 and 20
22 limit 21 to yr="1980 - 2014"

Database: EMBASE (Ovid) 2014-September 2019

1 chronic obstructive lung disease/
2 chronic obstructive pulmonary disease.mp.
3 copd.mp.
4 chronic obstructive lung disease.mp.
5 chronic obstructive airway disease.mp.
6 chronic respiratory disorder$.mp.
7 smoking-related lung disease$.mp.
8 lung emphysema/
9 emphysema.mp.
10 exp bronchitis/

11 or/1-10
12 noninvasive ventilation.mp. or exp noninvasive ventilation/
13 positive end expiratory pressure/
14 positive pressure respiration.mp.
15 positive pressure ventilation.mp.
16 cpap.mp.
17 bipap.mp.
18 bi-level ventilation.mp.
19 niv.mp.
20 nippv.mp.
21 positive airway pressure.mp.
22 nppv.mp.
23 ((noninvasive or non-invasive) adj2 ventilation).mp.
24 or/12-23
25 11 and 24
26 limit 25 to yr="1980- 2014"

Database: CINAHL (EBSCO) 2014-September 2019

S1 MH "pulmonary disease, Chronic Obstructive+"
S2 chronic obstructive pulmonary disease
S3 chronic obstructive lung disease
S4 copd
S5 chronic obstructive airway disease
S6 chronic respiratory disorder*
S7 smoking-related lung disease
S8 MH "Emphysema"
S9 MH "bronchitis+"
S10 emphysema
S11 S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10
S12 MH "positive pressure ventilation+"
S13 cpap
S14 bipap
S15 bi-level ventilation
S16 niv
S17 nippv
S18 nppv
S19 positive pressure ventilation
S20 positive airway pressure
S21 non-invasive ventilation
S22 "noninvasive N2 ventilation"
S23 S12 or S 13 or S14 or S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22
S24 S11 and S23
S25 S11 and S23 limited by years 1980-2014

Database: Science Citation Index (Web of Knowledge) 2014-September 2019

#1 Topic=(copd) OR Topic=(chronic obstructive pulmonary disease) OR Topic=(chronic obstructive lung disease) OR Topic=(chronic obstructive airway disease) OR Topic=(chronic respiratory disorder*) OR Topic=(smoking related lung disease) OR Topic=(emphysema) OR Topic=(bronchitis)
#2 Topic=(cpap or bipap or niv or nippv or nppv) OR Topic=(positive pressure respiration) OR Topic=(positive pressure ventilation) OR Topic=(bi-level ventilation) OR Topic=(positive airway pressure) OR Topic=(noninvasive ventilation) OR Topic=(non-invasive ventilation).
#3 #1 and #2
Databases: SCI Expanded Timespan – 1980-2014 Searched 8 September 2014

Database: CNKI Inception to February 2020

(SU = '慢性阻塞性肺疾病' OR SU = '慢性阻塞性肺部疾病' OR SU = '慢性阻塞性肺' OR SU = '慢性阻塞性肺炎' OR SU = '慢阻肺' OR SU = '慢性阻塞性' OR SU = 'COPD' OR SU = '肺气肿' OR SU = '慢性支气管炎' OR SU = '吸烟肺炎') AND (SU = '正压无创通气' OR SU = '无创正压通气' OR SU = '非侵入性治疗' OR SU = '双水平气道正压' OR SU = '无创通气' OR SU = '气道正压')

Translation:
(SU = 'COPD' OR SU = 'COPD' OR SU = 'COPD' OR SU = 'COPD' OR SU = 'COPD' OR SU = 'Chronic obstructive' OR SU = 'COPD' OR SU = 'emphysema' OR SU = 'chronic bronchitis' OR SU = 'Smoking related pulmonary') AND (SU = 'Positive pressure non-invasive ventilation' OR SU = 'Non-invasive positive pressure ventilation' OR SU = 'Non-invasive treatment' OR SU = 'Bi-level positive airway pressure' OR SU = 'Non-invasive ventilation' OR SU = 'Positive airway pressure')

NB there are several ways to describe the term 'COPD' in Chinese hence the term appears several times in English; SU=Subject

Database: Wanfang Inception to February 2020

主题:("慢性阻塞性肺疾病"+ "慢性阻塞性肺部疾病" + "慢性阻塞性肺"+ "慢性阻塞性肺炎" + "慢阻肺" + "慢性阻塞性" + "COPD"+ "肺气肿"+ "慢性支气管炎"+ "吸烟肺炎") AND ("正压无创通气"+ "无创正压通气"+ "非侵入性治疗"+ "双水平气道正压"+ "无创通气"+ "气道正压")

Translation:
Subject: ("Chronic Obstructive Pulmonary Disease" + "Chronic Obstructive Pulmonary Disease" + "Chronic Obstructive Pulmonary Disease" + "Chronic Obstructive Pulmonary Disease" + "Chronic Obstructive Pulmonary Disease" + "Chronic Obstructive Pulmonary Disease" + "COPD" + "Pulmonary emphysema" + "chronic bronchitis" + "Smoking related pulmonary") AND ("Positive pressure non-invasive ventilation" + "Non-invasive positive pressure ventilation" + "Non-invasive treatment" + "Bi-level positive airway pressure" + "Noninvasive ventilation" + "Positive airway pressure")

NB Use of '+' here signifies 'OR'.

Included studies

'Western'/English language RCTs

Study	Stable or post-hospital	Outcomes (in bold: included in MA)
Bhatt SP, Peterson MW, Wilson JS, Durairaj L. Noninvasive positive pressure ventilation in subjects with stable COPD: a randomized trial. Int J Chron Obstruct Pulmon Dis 2013;8:581–9. http://dx.doi.org/10.2147/COPD.S53619	Stable	QoL, exacerbations, adherence, adverse events
Casanova C, Celli BR, Tost L, Soriano E, Abreu J, Velasco V, et al. Long-term controlled trial of nocturnal nasal positive pressure ventilation in patients with severe COPD. Chest 2000;118:1582–90. http://dx.doi.org/10.1378/chest.118.6.1582	Stable	**Mortality,** exacerbations, adherence, adverse events
Cheung AP, Chan VL, Liong JT, Lam JY, Leung WS, Lin A, et al. A pilot trial of non-invasive home ventilation after acidotic respiratory failure in chronic obstructive pulmonary disease. Int J Tuberc Lung Dis 2010;14:642–9.	Post-hospital	**Hospitalisations,** exacerbations adherence, adverse events
Clini E, Sturani C, Rossi A, Viaggi S, Corrado A, Donner CF, et al. The Italian multicentre study on noninvasive ventilation in chronic obstructive pulmonary disease patients. Eur Respir J 2002;20:529–38. [Erratum appears in Eur Respir J 2002;20:1617.] http://dx.doi.org/10.1183/09031936.02.02162001	Stable	**Mortality, hospitalisations, days in hospital,** QoL, adherence
Duiverman ML, Wempe JB, Bladder G, Jansen DF, Kerstjens HA, Zijlstra JG, et al. Nocturnal non-invasive ventilation in addition to rehabilitation in hypercapnic patients with COPD. Thorax 2008;63:1052–7. http://dx.doi.org/10.1136/thx.2008.099044 Duiverman ML, Wempe JB, Bladder G, Vonk JM, Zijlstra JG, Kerstjens HA, et al. Two-year home-based nocturnal noninvasive ventilation added to rehabilitation in chronic obstructive pulmonary disease patients: a randomized controlled trial. Respir Res 2011;12:112. http://dx.doi.org/ 10.1186/1465-9921-12-112	Stable	**Mortality, hospitalisations,** QoL, exacerbations, adherence
Garrod R, Mikelsons C, Paul EA, Wedzicha JA. Randomized controlled trial of domiciliary noninvasive positive pressure ventilation and physical training in severe chronic obstructive pulmonary disease. Am J Respir Crit Care Med 2000;162:1335–41. http://dx.doi.org/10.1164/ajrccm.162.4.9912029	Stable	QoL, adherence, adverse events
Gay PC, Hubmayr RD, Stroetz RW. Efficacy of nocturnal nasal ventilation in stable, severe chronic obstructive pulmonary disease during a 3-month controlled trial. Mayo Clin Proc 1996;71:533–42.http://dx.doi.org/10.4065/71.6.533	Stable	Adherence, adverse events
Kaminski D, Sliwinski P, Bielen´ P, Zielin´ ski J. Noninvasive positive pressure ventilation in COPD patients with hypercapnic respiratory failure. Pneumonol Alergol Pol 1999;67:45–52.	Stable	**Mortality, hospitalisations,** adherence
Köhnlein T, Windisch W, Kohler D, Drabik A, Geiseler J, Hartl S, et al. Non-invasive positive pressure ventilation for the treatment of severe stable chronic obstructive pulmonary disease: a prospective, multicentre, randomised, controlled clinical trial. Lancet Respir Med 2014;2:698–705. http://dx.doi.org/10.1016/S2213-2600(14)70153-5	Stable	**Mortality, hospitalisations,** QoL, adherence, adverse events
Ma, T., et al. (2019). "The Analysis of Non-Invasive Positive Pressure Ventilation in Treating COPD Patients Accompanied with Chronic Respiratory Failure." American journal of respiratory and critical care medicine 199.	Unclear	Exacerbations
Marquez-Martin, E., et al. (2014). "Randomized trial of non-invasive ventilation combined with exercise training in patients with chronic hypercapnic failure due to chronic obstructive pulmonary disease." Respiratory medicine 108(12): 1741-1751.	Stable	QoL, adherence
McEvoy RD, Pierce RJ, Hillman D, Esterman A, Ellis EE, Catcheside PG, et al. Nocturnal non-invasive nasal ventilation in stable hypercapnic COPD: a randomised controlled trial. Thorax 2009;64:561–6. http://dx.doi.org/10.1136/thx.2008.108274	Stable	**Mortality,** QoL, adherence
Meecham-Jones DJ, Paul EA, Jones PW, Wedzicha JA. Nasal pressure support ventilation plus oxygen compared with oxygen therapy alone in hypercapnic COPD. Am J Respir Crit Care Med 1995;152:538–44. http://dx.doi.org/10.1164/ajrccm.152.2.7633704	Stable	QoL adherence, adverse events
Murphy PB, Moxham J, Polkey MI, Hart N. UK HOT-HMV trial: Acceptability and tolerability of high pressure domiciliary non-invasive ventilation (NIV) in COPD. Thorax 2011; British Thoracic Society Winter Meeting 2011, London: A55.	Post-hospital	**Mortality, hospitalisations,** QoL,

Study	Stable or post-hospital	Outcomes (in bold: included in MA)
Murphy, P. B., et al. (2017). "Effect of Home Noninvasive Ventilation With Oxygen Therapy vs Oxygen Therapy Alone on Hospital Readmission or Death After an Acute COPD Exacerbation: a Randomized Clinical Trial." JAMA 317(21): 2177-2186.		exacerbations, adherence
Perez-Bautista, O., et al. (2016). "Non invasive positive pressure ventilation for reducing exacerbation in very severe chronic obstructive pulmonary disease (COPD)." European respiratory journal 48(Suppl 60): PA3051.	Stable	Exacerbations, adherence
Sin DD, Wong E, Mayers I, Lien DC, Feeny D, Cheung H, et al. Effects of nocturnal noninvasive mechanical ventilation on heart rate variability of patients with advanced COPD. Chest 2007;131:156–63. http://dx.doi.org/10.1378/chest.06-1423	Unclear	Adherence
Struik FM, Sprooten RT, Kerstjens HA, Bladder G, Zijnen M, Asin J, et al. Nocturnal non-invasive ventilation in COPD patients with prolonged hypercapnia after ventilatory support for acute respiratory failure: a randomised, controlled, parallel-group study. Thorax 2014;69:826–34. http://dx.doi.org/10.1136/thoraxjnl-2014-205126	Post-hospital	**Mortality, hospitalisations,** QoL, exacerbations, adherence, adverse events
Strumpf DA, Millman RP, Carlisle CC, Grattan LM, Ryan SM, Erickson AD, et al. Nocturnal positive-pressure ventilation via nasal mask in patients with severe chronic obstructive pulmonary disease. Am Rev Respir Dis 1991;144:1234–9. http://dx.doi.org/10.1164/ajrccm/144.6.1234	Stable	Adherence, adverse events
Xiang PC, Zhang X, Yang JN, Zhang EM, Guo WA, Ju LX, et al. The efficacy and safety of long term home noninvasive positive pressure ventilation in patients with stable severe chronic obstructive pulmonary disease. Zhonghua Jie He He Hu Xi Za Zhi 2007;30:746–50.	Post-hospital	**Mortality, hospitalisations** adherence, adverse events
Zhou X, Yang J, Shen C. Effect of non-invasive positive pressure ventilation and long-term oxygen therapy in patients with stable COPD. Clinical Medical Journal of China 2008;15:486–8.	Stable	**Mortality, hospitalisations,** exacerbations
Zhou, L., et al. (2017). "Home noninvasive positive pressure ventilation with built-in software in stable hypercapnic COPD: a short-term prospective, multicenter, randomized, controlled trial." International journal of chronic obstructive pulmonary disease 12: 1279-1286. Guan, L. L., et al. (2018). "Home Noninvasive Ventilation with Built-in Software in Chronic Hypercapnic COPD Patients: a Mid-term Prospective, Multicenter, Randomized, Controlled Trial." European Respiratory Journal 2018 52: Suppl. 62, PA1677. *NB This is an update of Zhou 2016*	Stable	QoL adherence, adverse events

Chinese language RCTs

Study	Stable or post-hospital	Outcomes (bold: included in forest plots)
Chen Jianli, Xu Chao. Observation on the effect of non-invasive ventilator in stable COPD with chronic respiratory failure. Journal of Medical Forum. 2014,35(3):84-85.(8672)	Post-hospital	**Hospitalisations**
Chen Lixian. Long-term Home Noninvasive Positive Pressure Ventilation Therapy for Severe COPD with Type Ⅱ Respiratory Failure Patients [J].China & Foreign Medical Treatment.2016,35(30):24-26. (1229)	Post-hospital	Adverse events
Fan Min-juan; Zha Guo-hou ; Wen Shen; Wen Lin-qiao; Wang Shu-kun. Clinical Observation Of Long-term Domiciliary Non-invasive Positive Pressure Ventilation In The Treatment Of Severe Chronic Obstructive Pulmonary Disease In Stable Phase. JF MEDICAL INFORMATION. 2011; 24(4): 1255-1256. (259)	Unclear	**Mortality, hospitalisations**, **days in hospital,** adverse events
Gao Xiu-ling and Kong Jun. Effect of home non-invasive positive pressure ventilation in treatment of stable COPD. Chinese Community Doctors. 2011, 30(13):27. (1867)	Post-hospital	**Days in hospital**, exacerbations, QoL

Study	Stable or post-hospital	Outcomes (bold: included in forest plots)
Li Xue-Hua, Li Bao-Chun, Zhang Yu-Fei, et al. Clinical observation of long-term domiciliary non-invasive positive pressure ventilation in the treatment of chronic obstructive pulmonary disease. Geriatr Health Care. 2012, 18(6):376-378. (98)	Post-hospital	**Mortality (>2yrs)**, exacerbations, adverse events
Li Yuelian. Clinical study on the application of family noninvasive ventilator in the treatment of acute exacerbation of chronic obstructive pulmonary disease with type Ⅱ respiratory failure [J].Guangxi Medical Journal, 2016,38(2):282-284. (2090)	Post-hospital	**Hospitalisations and days in hospital**, QoL
Li Zhancheng, Zhang Qingjun, Zhang Xiangjie, Zhai Chengkai. The clinical value of family noninvasive positive pressure ventilation for severe COPD during the stable period [J].CHINESE JOURNAL OF MODERN DRUG APPLICATION,2009,3(14):51-53. (2035)	Likely post-hospital	**Mortality, hospitalisations**, QoL
Liang Junjun, Xie Aiping, Ou Hongyuan. Household noninvasive ventilator in patients with chronic obstructive pulmonary disease with type Ⅱ of respiratory failure with acute aggravating effect research. Contemporary Medicine.2017,23(13):60-62. (5431)	Post-hospital	QoL
Lin Guoyong. The application value of long-term noninvasive positive pressure ventilation in patients with stable-phase chronic obstructive pulmonary disease (COPD) combined with type Ⅱ respiratory failure. Mod Diagn Treat. 2015; 20: 4752-4753 (178)	Likely stable	QoL
Liu Haixia, Sun Defeng, Chen Yulan. A study on the applicability of noninvasive ventilator at home in patients with stable and severe COPD. Journal of Clinical Pulmonary Medicine.2012,17(4):739-740. (8671)	Likely stable	**Hospitalisations**
Liu Jiaoyan. Analysis of the effectiveness of family non-invasive ventilator in the treatment of COPD with acute exacerbation of type Ⅱ respiratory failure[J].Medical Aesthetics and Cosmetology,2014,(12):166-167.(1433)	Post-hospital	**Days in hospital**, QoL, adverse events
Luyang Han. Analysis of the efficacy of family noninvasive positive pressure ventilation together with tiotropium bromide and budesonide formoterol in patients with COPD[J].ournal of Shandong Medical College, 2019, 41(2):111-112. (2229)	Stable	**Hospitalisations**, QoL
Mao Suping, Wu Chunling, Chen Chengshui. Efficacy and compliance of non-invasive ventilator in elderly patients with chronic obstructive pulmonary disease combined with respiratory failure. Chinese journal of gerontology. 2015,35(23):6802-6804. (2651)	Likely post-hospital	QoL
Meng Lingru, Chen Yingjing , Chen Weimin et al.. Clinical Observation on 64 Cases of Long-term Family Noninvasive Ventilation in Patients with Chronic Obstructive Pulmonary Disease with Chronic Respiratory Failure[J].China healthcare frontiers,2009,04(7):85-86. (676)	Post-hospital	**Hospitalisations and days in hospital**
SHANG Yu-long, LUO Wei, LU Juan. The treatment of long term noninvasive positive pressure ventilation in patients with stable severe chronic obstructive pulmonary disease. Journal of Clinical Pulmonary Medicine.2009,14(9):1151-1152. (8675)	Post-hospital	**Days in hospital**, exacerbations, QoL
Su AF. Clinical effect of noninvasive ventilator outside the hospital on stable chronic obstructive pulmonary disease. Practical Journal of Cardiac Cerebral Pneumal and Vascular Disease. 2016, 24(4): 121-123. (8674)	Post-hospital	**Mortality**, **hospitalisations**
Sun Chunjuan, Wang Wenming. Observation of long-term family non-invasive positive pressure ventilation in stable COPD. Inner Mongolia Medical Journal. 2010,42(10):1262-1263. (3316)	Post-hospital	Exacerbations
Tang Meng Zhu Junfei, Chen Xiao, Wu Wenlong. Analysis of effectiveness of family non-invasive ventilation added to long-term oxygen therapy in patients with stable COPD and type Ⅱ respiratory failure [J].CHINESE JOURNAL OF POSTGRADUATES OF MEDICINE. 2010,33(22):39-41. (1733)	Post-hospital	**Mortality**, QoL adherence, adverse events
Wang Bin. Effect observation of for patients with chronic obstructive pulmonary disease. Chinese Journal of Chinical Rational Drug Use. 2014,7(7):19-20. (8673)	Post-hospital	**Hospitalisations**
Wang Feng, Yanli Li, Zhanxiang Liu. Clinical value of home non-invasive positive pressure ventilation in patients with stable-phase chronic obstructive pulmonary disease. Chinese Journal of Practical Medicine. 2010; 37(16): 36-38. (218)	Stable	**Days in hospital**, exacerbations
Wang Xin, Li Li, Song Shiheng, Hao Zhifang, Long Xuejuan, Liu Ning. Efficacy of home-based pulmonary rehabilitation in very severe COPD patients.[J].JOURNAL OF HEBEI MEDICAL UNIVERSITY,2013,34(8):892-895. (1985)	Likely stable	**Mortality**, QoL, adherence
Xu Jian Qiang, Dai Yue, Feng Juan, et al. Effect analysis of household long-term noninvasive ventilation combined with tiotropium bromide and seretide in treatment of	Likely stable	**Hospitalisations**, QoL

Study	Stable or post-hospital	Outcomes (bold: included in forest plots)
severe COPD patients with stable stage. China Modern Medicine. 2016,23(23):31-35. (2784)		
Zeng Xiangfu, Zeng Xiangyi, Fu Huiheng, et al. Application of noninvasive ventilation in severe and extremely severe COPD with chronic respiratory failure. Shenzhen Journal of Integrated Traditional Chinese and Western Medicine. 2019,29(7):85-87. (3137)	Likely post-hospital	Exacerbations, QoL, adverse events
Zhang Baozhu, Fu Qiangzu. Impact of LTOT combined with NIPPV at night on the prognosis of patients with stable COPD[J].China Medical Herald. 2009,6(29):39-41.(988)	Likely post-hospital	QoL
Zhang Wei, Shi Xiaofang, Gao Feng, Na Jie.The effect of family noninvasive positive pressure ventilation therapy on ventilation and oxygenation status [J].Clinical Journal of Medical Officers, 2012,40(1):113,116. (2373)	Likely stable	Adherence
Zhang Zhida.Efficacy of long-term home oxygen therapy and home non-invasive ventilation in stable COPD patients and type II respiratory failure [J].Frontier of Medicine, 2014,(24):131-132. (1647) Zhang Zhida, Zhang Aimei, Wu Haiyan,Chen Le'rong, Peng Jianping. Efficacy of Long-term Family Noninvasive Positive Pressure Ventilation in Stable COPD Patients with Type Ⅱ Respiratory Failure[J].PRACTICAL JOURNAL OF CARDIAC CEREBRAL PNEUMAL AND VASCULAR DISEASE, 2013, 21(12):8-10. (1763)	Likely stable	**Mortality, hospitalisations**, QoL, adverse events
Zheng Xiaolu, Li Mingsheng, Wei Houhua.Curative effects of home bi-level non-invasive positive airway pressure ventilation in the treatment of patients with severe chronic obstructive pulmonary disease of stable phase. China Medical Herald. 2012,9(01):132-134. (2760)	Likely stable	**Mortality, hospitalisations.** adverse events
Zhou Weixiong, Xu ting, Liu Dan. Clinical study on long-term treatment of COPD with chronic respiratory failure with noninvasive ventilation. Modern diagnosis and treatment. 2013,24(06):1266-1267. (2532)	Likely stable	**Hospitalisations**, exacerbations, QoL

'Western'/English language non-randomised studies

Study	Stable or post-hospital	Outcomes (bold: included in forest plots)
Budweiser S, Hitzl AP, Jorres RA, Heinemann F, Arzt M, Schroll S, et al. Impact of noninvasive home ventilation on long-term survival in chronic hypercapnic COPD: a prospective observational study. Int J Clin Pract 2007;61:1516–22. http://dx.doi.org/10.1111/j.1742-1241.2007.01427.x	Post-hospital	**Mortality,** adherence, adverse events
Clini E, Sturani C, Porta R, Scarduelli C, Galavotti V, Vitacca M, et al. Outcome of COPD patients performing nocturnal non-invasive mechanical ventilation. Respir Med 1998;92:1215–22. http://dx.doi.org/10.1016/S0954-6111(98)90424-3	Stable	**Mortality, hospitalisations, days in hospital** adherence, adverse events
Clini E, Vitacca M, Foglio K, Simoni P, Ambrosino N. Long-term home care programmes may reduce hospital admissions in COPD with chronic hypercapnia. Eur Respir J 1996;9:1605–10. http://dx.doi.org/10.1183/09031936.96.09081605	Stable	**Mortality, hospitalisations, days in hospital**
Coquart, J. B., et al. (2017). "Real-life feasibility and effectiveness of home-based pulmonary rehabilitation in chronic obstructive pulmonary disease requiring medical equipment." International journal of chronic obstructive pulmonary disease 12: 3549-3556.	Unclear	QoL
Frazier, W., Sussell J., van Eijndhoven E. at al. Impact of non-invasive ventilation on health costs and outcomes. Chest volume 156, issue 4, supplement , a1121,October 01, 2019 doi:https://doi.org/10.1016/j.chest.2019.08.1024	Unclear	**Mortality (HR)**

Study	Stable or post-hospital	Outcomes (bold: included in forest plots)
Heinemann F, Budweiser S, Jorres RA, Arzt M, Rosch F, Kollert F, et al. The role of non-invasive home mechanical ventilation in patients with chronic obstructive pulmonary disease requiring prolonged weaning. Respirology 2011;16:1273–80. http://dx.doi.org/10.1111/j.1440-1843.2011. 02054.x	Post-hospital	**Mortality,** adverse events
Laier-Groeneveld G, Criee CP. [Long-term effects and life expectancy after six years intermittent self ventilation]. Med Klin (Munich) 1995;90:S62–3.	Unclear	**Mortality**
Lee, P., et al. (2016). "Mortality Outcomes Of Long-Term Domiciliary Non-Invasive Ventilation In Stable Chronic Obstructive Pulmonary Disease With Chronic Type 2 Respiratory Failure." American journal of respiratory and critical care medicine 193.	Unclear	**Mortality (>2 yrs)**
Lu P, Wu XM, Li ZG, Yang CC. Clinical observation of home noninvasive positive pressure ventilation in hypercapnic patient with stable severe chronic obstructive pulmonary disease. Chin Med J (Engl) 2012;92:401–4.	Post-hospital	**Mortality,** adherence, adverse events
Melloni, B., et al. (2018). "Home-Based Care Evolution in Chronic Respiratory Failure between 2001 and 2015 (Antadir Federation Observatory)." Respiration 96(5): 446-454.	Unclear	Mortality (not in MA)
Milane J, Jonquet O. Intermittent positive pressure breathing in the treatment of respiratory insufficiency by chronic lung disease. Agressologie 1985;26:651–5.	Post-hospital	**Mortality**
Pahnke J, Bullemer F, Heindl S, Karg O. Patient-related rejection of nasal IPPV therapy. Patients, reasons, follow-up. Med Klin (Munich) 1997;92:S73–4.	Unclear	**Mortality** adherence, adverse events
Paone G, Conti V, Biondi-Zoccai G, De FE, Chimenti I, Peruzzi M, et al. Long-term home noninvasive mechanical ventilation increases systemic inflammatory response in chronic obstructive pulmonary disease: a prospective observational study. Mediators Inflamm 2014;2014:503145. http://dx.doi.org/10.1155/2014/503145	Stable	**Mortality,** adherence
Sadigov, A. (2016). "Long-term Noninvasive Ventilation in COPD Associated With Non-Cystic Fibrosis Bronchiectasis: Is High-Intensity NIV the Right Way to Go?" CHEST 150: 881A-881A.	Unclear	Exacerbations
Suraj, K. P., et al. (2018). "Role of Domiciliary Noninvasive Ventilation in Chronic Obstructive Pulmonary Disease Patients Requiring Repeated Admissions with Acute Type II Respiratory Failure: A Prospective Cohort Study." Indian Journal of Critical Care Medicine 22(6): 397-401.	Post-hospital	**Mortality,** adherence, adverse events
Tsolaki V, Pastaka C, Karetsi E, Zygoulis P, Koutsokera A, Gourgoulianis KI, et al. One-year non-invasive ventilation in chronic hypercapnic COPD: effect on quality of life. Respir Med 2008;102:904–11. http://dx.doi.org/10.1016/j.rmed.2008.01.003	Stable	**Mortality, hospitalisations, days in hospital,** QoL, exacerbations, adherence
Vitacca, M., et al. (2016). "Is There Any Additional Effect of Tele-Assistance on Long-Term Care Programmes in Hypercapnic COPD Patients? A Retrospective Study." COPD 13(5): 576-582.	Stable	**Mortality, hospitalisations,** exacerbations
Walterspacher, S., et al. (2016). "The Severe Respiratory Insufficiency Questionnaire for Subjects With COPD With Long-Term Oxygen Therapy." Respiratory Care 61(9): 1186-1191.	Stable	QoL

Chinese language non-randomised studies

Study	Stable or post-hospital	Outcomes (bold: included in forest pots)
Chen Haiyan. The effect of NIHMV on the quality of life of patients with COPD and type II respiratory failure in stable phase. Clinical Education of General Practice. 2010,18(2):180-181 (3141)	Likely stable	QoL
Chen Le-rong, Lei Jian-ping. The clinical value of domiciliary non-invasive positive presure ventilation in pateints suffering from COPD with type II respiratory failure during stable phase. China Medicine. 2011, 6(9):1062-1064. (1084)	Post-hospital	**Mortality, hospitalisations**

Study	Stable or post-hospital	Outcomes (bold: included in forest pots)
Fu Ping, Li Jiaoyang. Study into the effect of non-invasive home mechanical ventilation on the treatment of stable phase COPD with type II respiratory failure. Medical Journal of Chinese People's Health. 2014,26(5):45-46 (6422)	Stable	QoL
Gao Songfeng, Zhou Ning, Liu Benhong, et al. Efficacy and Safety Observation of Domiciliary Non-Invasive Positive Pressure Ventilation on Patients with Severe Chronic Obstructive Pulmonary Disease in Stable Phase. Guide of Chinese Medicine. 2011,9(24):196-198 (4078)	Post-hospital	**Mortality, hospitalisations**, exacerbations, QoL, adverse events
Gu Jun, Jing Zhiqiang. Application value of home non-invasive ventilation in patients with stable period COPD and chronic respiratory failure. Clinical Medicine. 2019:16-18 (3064)	Post-hospital	QoL
Han Jizheng, Qi Mei, Zhao Hui, et al. The Application of Home Oxygen Treatment and Non-invasive Home Mechanical Ventilation on the Treatment of Patients with Acute Respiratory Exacerbation and COPD. Shandong Journal Of Medicine. 2006,46(34):24-25 (4178)	Post-hospital	**Mortality**
He Jing-tang, Liu Hai-tao, Zhang Jing, et al. Influence of long-term home noninvasive positive pressure ventilation on respiratory muscle strength in patients with stable severe chornic obstructive pulmonary disease. Chinese Journal of General Practice. 2008, 7(8):524-526. (1623)	Stable	**Mortality, hospitalisations**
Huang Qiang-hua, Zhao Qiang-guang, Yang Bo, et al. Observation of the effect of home oxygen therapy plus intermittent non-invasive ventilation for patients with COPD. Medical Information Journal. 2011, 24(6):25. (427)	Post-hospital	**Hospitalisations**, exacerbations
Jiang Yanwen, Pan Lei, Hu Zheng, et al. Observation of the rehabilatory effect of home non-invasive ventilation on patients with COPD. Chinese journal of rehabilitation medicine. 2008,23(5):438-439 (3764)	Post-hospital	**Mortality, hospitalisations and days in hospital**, exacerbations
Kang Xiao-da. Effect of home non-invasive positive pressure ventilation in stable COPD patients. Chinese and Foreign Medical Research. 2016, 14(4):133-134. (522)	Post-hospital	**Days in hospital**, exacerbations, QoL
Li Cui-ping, Li Li-ping, Liu Xue-bai. Treatment effects of long term home non-invasive positive pressure ventilation in patients with stable serious chronic obstructive pulmonary disease. Int J Respir. 2011, 31(20):1543-1545. (503)	Likely stable	**Mortality, exacerbations**, QoL
Li Kui. Effect of home oxygen therapy and non-invasive ventilation for patients with COPD. The Journal of Medical Therapy and Practice. 2016, 29(5):692-693. (2409)	Post-hospital	**Hospitalisations**, exacerbations
Li Li, Li Juan and Ji Ming. Home non-invasive positive pressure ventilation in COPD with hypercapic respiratory failure during stable phase. Hebe Medicine. 2009, 14(10):1135-1137. (1401)	Stable	**Days in hospital**, exacerbations, QoL, adverse events
Li Tiegang, Fu Lei. Non-invasive Ventilation Treatment At Home For Emergency Patients With COPD and Type II Respiratory Failure. Practical Pharmacy And Clinical Remedies. 2013,16(12):1139-1143 (6487)	Post-hospital	**Mortality**, QoL
Li Yongcheng, Ding Yingying, Cao Jianhua, et al. Observation of effectiveness of home non-invasiv positive pressure ventilation on patients with stable COPD. Zhejiang Medicine. 2010, 32(4):574-576. (2513)	Post-hospital	**Mortality, days in hospital**, exacerbations, QoL, adverse events
Liu Peng-zhen, Liu Yan-qin and Song-Chun-yu. Observation of the effect of home non-invasive ventilation in patients with COPD. Journal of Clinical Pulmonary Medicine. 2012, 17(5):922-923. (1023)	Post-hospital	**Hospitalisations**
Liu Wenqi, Ding Zhen, Gao Feng, et al. Observation of the effect of home non-invasive ventilation on severe and extremely severe COPD with chronic respiratory failure. Journal of clinical pulmonology. 2015,20(10):1902-1904 (5930)	Stable	**Hospitalisations,** QoL
Ouyang Xiu-he, Hu Cui-hua, Dong Liang, et al. Clinical observation of non-invasive positive pressure ventilation for patients with severe COPD in stable phase. Chinese Journal of Geriatrics. 2009, 28(2):140-142. (2101)	Post-hospital	**Mortality, days in hospital**,

Study	Stable or post-hospital	Outcomes (bold: included in forest pots)
		exacerbations, QoL
Peng Bi-yu. Effectiveness of home non-invasive positive pressure ventilation in COPD with type II respiratory failure. Journal of clinical medicine. 2014, 1(7):1173-1175. (646)	Likely post-hospital	**Hospitalisations, days in hospital**, QoL, adverse events
Qin Wenjing, Liang Yu, Qi Hongsong, et al. Treatment of stable stage COPD coupled with chronic respiratory failure. Chinese Modern Doctor. 2016,54(9):25-27,30 (3209)	Post-hospital	Hospitalisations
Ren Xiaoyan, Shi Yongfang. The clinical effect of non-invasive home mechanical ventilation in the treatment of severe COPD. Chinese Remedies and Clinics. 2013,13(11):1477-1479 (6508)	Post-hospital	QoL
Shang Yong, Wang Huaizhen. Observation of the curative effect of non-invasive home mechanical ventilation on COPD patients. China Medical Engineering. 2013,21(3):46-47 (6682)	Post-hospital	**Mortality, hospitalisations**, **days in hospital**, exacerbations
Tian Yali. The application of NIHMV in adjuvant therapy in patients with severe COPD. Chinese practical medicine. 2017,12(26):98-99 (5310)	Likely post-hospital	**Hospitalisations,** exacerbations
Wang Jin-liang, Yu Hong-tao, Cheng Rui-lian, et al. Home non-invasive ventilation in COPD. Journal of Medical Forum. 2009, 30(7):33-34. (2700)	Post-hospital	**Hospitalisations**
Wang Shi-bo, Hou Jian-hua, Yu Xiao-li, et al. Therapeutic effects of family non invasive positive pressure ventilation in patients with COPD and Type II respiratory failure. Guide of China Medicine. 2017, 28(5). (421)	Post-hospital	Hospitalisations (not in MA), Exacerbations
Wang Sheng. The effect of long-term home oxygen therapy on quality of life in COPD patients with chronic respiratory failure. Practical Journal of Clinical Medicine. 2019, 16(4):158-160. (1247)	Likely post-hospital	**Mortality, hospitalisations**, exacerbations, QoL
Xie Xin. Observation of the effect of Non-invasive home ventilation on the treatment of COPD patients. Practical journal of cardio-cerebral pulmonary vascular disease. 2009,17(9):831-832 (7679)	Post-hospital	Adverse events
Xu Yue-qing, Wang Xiao-ling, Fang Hong-wei, et al. Clinical efficacy of NIPPV at home in treatment of stable patients of COPD complicated with chronic type II respiratory failure. Journal of Nongken Medicine. 2015, 37(2):133-135. (281)	Likely stable	**Mortality, hospitalisations**, exacerbations, QoL
Yang Chengkui, Yao Jingjuan, Tan Qinghiu. Analysis of The Effectiveness of Non-invasive Home Mechanical Ventilation for patients with severe and stable COPD. Chinese Journal of Practical Medicine. 2014,9(22):109-110 (6314)	Post-hospital	**Mortality**
Yang Hong-ping and Hong Zhe-yuan. Application of family non-invasive ventilation in nursing of patients with chronic obstructive pulmonary diseases. Chinese Journal of Nosocomiology. 2011, 21(2):267-269. (853)	Likely stable	**Hospitalisations**, exacerbations
Yu Biyun, Wu Hongcheng, Tang Yaodong, et al. Observation on Patients with chronic type II Respiratory Failure During Non-invasive Home Mechanical Ventilation. Zhejiang Journal of Integrated Traditional Chinese and Western Medicine. 2011,21(2):81-83 (3932)	Post-hospital	**Mortality (>2 yrs), hospitalisations, days in hospital**, exacerbations
Yu Yimin and Shen Guanle. Clinical observation of long-term family noninvasive positive pressure ventilation plus oxygen therapy in the treatment of COPD combined with respiratory failure. China Medical Herald. 2011, 8(21):62-64. (3420)	Likely post-hospital	**Mortality, days in hospital**, exacerbations
Zhang J, Yang B, Liu Q, et al. Clinical study of family ventilator combined with breathing physical in treatment of chronic obstructive pulmonary diseases [in Chinese]. Chinese Journal of Misdiagnosis. 2009;17:4064-4065. (1474)	Likely stable	**Mortality, hospitalisations**
Zhang Qing-jun, Zhang Xiang-jie, Li Rong-kai, et al. Home non-invasive positive pressure ventilation on patients with chronic obstructive pulmonary disease during stable phase. Journal of Xinxiang Medical College. 2009, 26(6):581-583. (472)	Likely post-hospital	**Mortality, Hospitalisations**, QoL, adverse events
Zhao Fei, Liu Zhi-guang, Zhang Wei-dong, et al. Effect of long term home-used non-invasive positive pressure ventilation in patients with stable severe chronic obstructive pulmonary disease. Hunan Medical Journal. 2018, 35(2):260-262. (1741)	Stable	QoL

Study	Stable or post-hospital	Outcomes (bold: included in forest pots)
Zhou Ning, Cao Jie, Deng Yuan, et al. Therapeutic effect with domicilliary non-invasive positive pressure ventilation for a year in patients with COPD. Int J Respr. 2011, 31(9):677-681. (1398)	Post-hospital	**Mortality, hospitalisations**, QoL, adherence