Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

Online Data Supplement

Association of Home Noninvasive Positive Pressure Ventilation with Clinical Outcomes and Quality of Life in Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta-analysis

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eTable 1. Search strategy

Search Strategy 1

Ovid

Database(s):
EBM Reviews - Cochrane Central Register of Controlled Trials July 2019, EBM Reviews - Cochrane Database of Systematic Reviews 2005 to November 6, 2019, Embase 1974 to November 6, 2019, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to November 6, 2019.

Search Strategy:

#	Searches
1	*noninvasive ventilation/ or exp *positive-pressure respiration/
2	(BiPAP or BPAP or CPAP or "noninvasive positive pressure ventilation" or "non-invasive positive pressure ventilation" or "noninvasive ventilation" or "non-invasive ventilation" or NPPV or "Positive Airway Pressure*" or "positive end-expiratory pressure*").ti.
3	1 or 2
4	*Amyotrophic Lateral Sclerosis/
5	*Bronchiectasis/
6	*Cystic Fibrosis/
7	*Hypercapnia/
8	*Hypoventilation/
9	*Idiopathic Pulmonary Fibrosis/
10	*Lung Diseases, Interstitial/
11	*Pulmonary Fibrosis/
12	*Idiopathic Pulmonary Fibrosis/
13	*Kyphosis/
14	*Obesity/
15	*Respiratory Insufficiency/
16	*Scoliosis/
17	*Spinal Cord Injuries/
18	*Obesity Hypoventilation Syndrome/
19	*respiratory failure/
20	*Lung Diseases, Obstructive/
21	*Pulmonary Disease, Chronic Obstructive/
22	*Neuromuscular Diseases/
23	*Motor Neuron Disease/
24	*Muscular Atrophy, Spinal/
25	*Muscular Diseases/
26	*Muscular Disorders, Atrophic/
27	*Myopathies, Structural, Congenital/
28	*Myositis/
29	*Myotonic Disorders/
30	("Amyotrophic lateral sclerosis" or "Atrophic Muscular Disorder*" or Bronchiectasis or "Chronic Obstructive Pulmonary Disease*" or "congenital structural myopath*" or "Cystic Fibrosis" or hypercapnia or hypoventilation or "Interstitial Lung Disease*" or kyphosis or "Motor Neuron Disease*" or "Muscular Disease*" or Myositis or "Myotonic Disorder*" or

"Neuromuscular Disease*" or Obesity or "obstructive lung disease*" or "Pulmonary fibrosis" or "respiratory failure" or "respiratory insufficiency" or scoliosis or "Spinal Cord Injur*" or "Spinal Muscular Atrophy" or "structural congenital myopath*").ti.
31 or/4-30
32 3 and 31
33 limit 32 to ("all adult (19 plus years)" or "young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)") [Limit not valid in Embase,CCTR,CDSR; records were retained]
34 limit 33 to (adult <18 to 64 years> or aged <65+ years>) [Limit not valid in CCTR,CDSR,Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained]
35 limit 32 to ("all infant (birth to 23 months)" or "all child (0 to 18 years)" or "newborn infant (birth to 1 month)" or "infant (1 to 23 months)" or "preschool child (2 to 5 years)" or "child (6 to 12 years)" or "adolescent (13 to 18 years)") [Limit not valid in Embase,CCTR,CDSR; records were retained]
36 limit 35 to (embryo or infant or child or preschool child <1 to 6 years> or school child <7 to 12 years> or adolescent <13 to 17 years>) [Limit not valid in CCTR,CDSR,Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained]
37 36 not 34
38 32 not 37
39 exp Guideline/ or exp Practice Guideline/
40 exp meta analysis/
41 exp Meta-Analysis as Topic/
42 exp "systematic review"/
43 exp controlled study/
44 exp Randomized Controlled Trial/
45 exp triple blind procedure/
46 exp Double-Blind Method/
47 exp Single-Blind Method/
48 exp latin square design/
49 exp comparative study/
50 exp Cohort Studies/
51 exp longitudinal study/
52 exp retrospective study/
53 exp prospective study/
54 exp population research/
55 exp observational study/
56 clinical study/
57 exp Evaluation Studies/
58 exp quantitative study/
59 exp validation studies/
60 exp quasi experimental study/
61 exp field study/
62 in vivo study/

63 exp panel study/
64 exp prevention study/
65 exp replication study/
66 exp Feasibility Studies/
67 exp trend study/
68 exp correlational study/
69 exp case-control studies/
70 exp confidence interval/
71 exp regression analysis/
72 exp proportional hazards model/
73 ((evidence adj based) or (meta adj analys*) or (systematic* adj3 review*) or "consensus development" or guideline* or "position statement*" or (control* adj3 study) or (control* adj3 trial) or (randomized adj3 study) or (randomized adj3 trial) or (randomised adj3 study) or (randomised adj3 trial) or "pragmatic clinical trial" or (random* adj1 allocat*) or (doubl* adj blind*) or (doubl* adj mask*) or (singl* adj blind*) or (singl* adj mask*) or (tripl* adj blind*) or (tripl* adj mask*) or (trebl* adj blind*) or (trebl* adj mask*) or "latin square" or placebo* or nocebo* or multivariate or "comparative study" or "comparative survey" or "comparative analysis" or (intervention* adj2 study) or (intervention* adj2 trial) or crossover or "cross-over" or cohort* or "longitudinal study" or "longitudinal survey" or "longitudinal analysis" or "longitudinal evaluation" or longitudinal* or ((retrospective or "ex post facto") adj3 (study or survey or analysis or design)) or retrospectiv* or "prospective study" or "prospective survey" or "prospective analysis" or prospectiv* or (population adj3 (stud* or survey* or analys* or research)) or "concurrent study" or "concurrent survey" or "concurrent analysis" or "incidence study" or "incidence survey" or "incidence analysis" or (("follow-up" or followup) adj (stud* or survey or analysis)) or ((observation or observational) adj (study or survey or analysis)) or "clinical study" or "clinical trial" or "evaluation study" or "evaluation survey" or "evaluation analysis" or "quantitative study" or "quantitative analys*" or "numerical study" or "validation study" or "validation survey" or "validation analysis" or "quasi experimental study" or "quasi experimental analysis" or "quasiexperimental study" or "quasiexperimental analysis" or "field study" or "field survey" or "field analysis" or "in vivo study" or "in vivo analysis" or "panel study" or "panel survey" or "panel analysis" or ((prevention or preventive) adj3 (trial or study or analysis or survey)) or "replication study" or "replication analysis " or "replication trial" or "feasibility study" or "feasibility analysis" or "trend study" or "trend survey" or "trend analysis" or ((correlation* adj2 study) or (correlation* adj2 analys*)) or "case control study" or "case base study" or "case referrent study" or "case referent study" or "case referent study" or "case compeer study" or "case comparison study" or "matched case control" or "multicenter study" or "multi-center study" or "odds ratio" or "confidence interval" or (hazard* adj (model* or analys* or regression or ratio or ratios)) or "Cox model" or "Cox multivariate analyses" or "Cox multivariate analysis" or "Cox regression" or "Cox survival analyses" or "Cox survival analysis" or "Cox survival model" or "change analysis" or ((study or trial or random* or control*) and compar*)).mp,pt.
74 or/39-73
75 38 and 74
76 limit 75 to (editorial or erratum or letter or note or addresses or autobiography or bibliography or biography or blogs or comment or dictionary or directory or interactive tutorial or interview or lectures or legal cases or legislation or news or newspaper article or overall or

patient education handout or periodical index or portraits or published erratum or video-audio media or webcasts) [Limit not valid in Embase,CCTR,CDSR,Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained]

77 from 76 keep 130-138

78 (75 not 76) or 77

79 limit 78 to yr="1995 -Current"

80 remove duplicates from 79

Scopus

1 TITLE(BiPAP or BPAP or CPAP or "noninvasive positive pressure ventilation" or "non-invasive positive pressure ventilation" or "noninvasive ventilation" or "non-invasive ventilation" or NPPV or "Positive Airway Pressure*" or "positive end-expiratory pressure*")

2 TITLE("Amyotrophic lateral sclerosis" or "Atrophic Muscular Disorder*" or Bronchiectasis or "Chronic Obstructive Pulmonary Disease*" or "congenital structual myopath*" or "Cystic Fibrosis" or hypercapnia or hypoventilation or "Interstitial Lung Disease*" or kyphosis or "Motor Neuron Disease*" or "Muscular Disease*" or Myositis or "Myotonic Disorder*" or "Neuromuscular Disease*" or Obesity or "obstructive lung disease*" or "Pulmonary fibrosis" or "respiratory failure" or "respiratory insufficiency" or scoliosis or "Spinal Cord Injur*" or "Spinal Muscular Atrophy" or "structural congenital myopath*")

3 TITLE-ABS-KEY((evidence W/1 based) or (meta W/1 analys*) or (systematic* W/3 review*) or "consensus development" or guideline* or "position statement*" or (control* W/3 study) or (control* W/3 trial) or (randomized W/3 study) or (randomized W/3 trial) or (randomised W/3 study) or (randomised W/3 trial) or "pragmatic clinical trial" or (random* W/1 allocat*) or (doubl* W/1 blind*) or (doubl* W/1 mask*) or (singl* W/1 blind*) or (singl* W/1 mask*) or (tripl* W/1 blind*) or (tripl* W/1 mask*) or (trebl* W/1 blind*) or (trebl* W/1 mask*) or "latin square" or placebo* or nocebo* or multivariate or "comparative study" or "comparative survey" or "comparative analysis" or (intervention* W/2 study) or (intervention* W/2 trial) or crossover or "cross-over" or cohort* or "longitudinal study" or "longitudinal survey" or "longitudinal analysis" or "longitudinal evaluation" or longitudinal* or ((retrospective or "ex post facto") W/3 (study or survey or analysis or design)) or retrospectiv* or "prospective study" or "prospective survey" or "prospective analysis" or prospectiv* or (population W/3 (stud* or survey* or analys* or research)) or "concurrent study" or "concurrent survey" or "concurrent analysis" or "incidence study" or "incidence survey" or "incidence analysis" or (("follow-up" or followup) W/1 (stud* or survey or analysis)) or ((observation or observational) W/1 (study or survey or analysis)) or "clinical study" or "clinical trial" or "evaluation study" or "evaluation survey" or "evaluation analysis" or "quantitative study" or "quantitative analys*" or "numerical study" or "validation study" or "validation survey" or "validation analysis" or "quasi experimental study" or "quasi experimental analysis" or "quasiexperimental study" or "quasiexperimental analysis" or "field study" or "field survey" or "field analysis" or "in vivo study" or "in vivo analysis" or "panel study" or "panel survey" or "panel analysis" or ((prevention or preventive) W/3 (trial or study or analysis or survey)) or "replication study" or "replication analysis " or "replication trial" or "feasibility study" or "feasibility analysis" or "trend study" or "trend survey" or "trend analysis" or ((correlation* W/2 study) or (correlation* W/2 analys*)) or "case control study" or "case base study" or "case referrent study" or "case referent study" or "case referent study" or "case compeer study" or "case comparison study" or "matched case control" or "multicenter

	study" or "multi-center study" or "odds ratio" or "confidence interval" or (hazard* W/1 (model* or analys* or regression or ratio or ratios)) or "Cox model" or "Cox multivariate analyses" or "Cox multivariate analysis" or "Cox regression" or "Cox survival analyses" or "Cox survival analysis" or "Cox survival model" or "change analysis" or ((study or trial or random* or control*) and compar*))
4	PUBYEAR AFT 1994
5	1 and 2 and 3 and 4
6	TITLE-ABS-KEY(newborn* or neonat* or infant* or toddler* or child* or adolescent* or paediatric* or pediatric* or girl or girls or boy or boys or teen or teens or teenager* or preschooler* or "pre-schooler*" or preteen or preteens or "pre-teen" or "pre-teens" or youth or youths) AND NOT TITLE-ABS-KEY(adult or adults or "middle age" or "middle aged" OR elderly OR geriatric* OR "old people" OR "old person*" OR "older people" OR "older person*" OR "very old")
7	5 and not 6
8	DOCTYPE(le) OR DOCTYPE(ed) OR DOCTYPE(bk) OR DOCTYPE(er) OR DOCTYPE(no) OR DOCTYPE(sh)
9	7 and not 8
10	PMID(0*) OR PMID(1*) OR PMID(2*) OR PMID(3*) OR PMID(4*) OR PMID(5*) OR PMID(6*) OR PMID(7*) OR PMID(8*) OR PMID(9*)
11	9 and not 10

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("Amyotrophic lateral sclerosis" or "Atrophic Muscular Disorder*" or Bronchiectasis or "Chronic Obstructive Pulmonary Disease*" or "congenital structual myopath*" or "Cystic Fibrosis" or hypercapnia or hypoventilation or "Interstitial Lung Disease*" or kyphosis or "Motor Neuron Disease*" or "Muscular Disease*" or Myositis or "Myotonic Disorder*" or "Neuromuscular Disease*" or Obesity or "obstructive lung disease*" or "Pulmonary fibrosis" or "respiratory failure" or "respiratory insufficiency" or scoliosis or "Spinal Cord Injur*" or "Spinal Muscular Atrophy" or "structural congenital myopath*") AND (BiPAP OR BPAP OR CPAP OR "noninvasive positive pressure ventilation" OR "non-invasive positive pressure ventilation" OR "noninvasive ventilation" OR "non-invasive ventilation" OR NPPV OR "Positive Airway Pressure*" OR "positive end-expiratory pressure*")
Limited to Adults

ClinicalTrials.gov

All limited to Adults

("Amyotrophic lateral sclerosis" or "Atrophic Muscular Disorder*" or Bronchiectasis or "Chronic Obstructive Pulmonary Disease*" or "congenital structual myopath*" or "Cystic Fibrosis" or hypercapnia or hypoventilation or "Interstitial Lung Disease*") AND (BiPAP or BPAP or CPAP or "noninvasive positive pressure ventilation" or "non-invasive positive pressure ventilation" or NPPV or "Positive Airway Pressure*" or "positive end-expiratory pressure*") (kyphosis or "Motor Neuron Disease*" or "Muscular Disease*" or Myositis or "Myotonic Disorder*" or "Neuromuscular Disease*" or Obesity or "obstructive lung disease*" or "Pulmonary fibrosis" or "respiratory failure" or "respiratory insufficiency") AND (BiPAP or BPAP or CPAP or "noninvasive positive pressure ventilation" or "non-invasive positive pressure ventilation" or NPPV or "Positive Airway Pressure*" or "positive end-expiratory pressure*")

(scoliosis or "Spinal Cord Injur*" or "Spinal Muscular Atrophy" or "structural congenital myopath*") AND (BiPAP or BPAP or CPAP or "noninvasive positive pressure ventilation" or "non-invasive positive pressure ventilation" or NPPV or "Positive Airway Pressure*" or "positive end-expiratory pressure*")

Search Strategy 2

Ovid

Database(s): EBM Reviews - Cochrane Central Register of Controlled Trials July 2019, EBM Reviews - Cochrane Database of Systematic Reviews 2005 to August 21, 2019, Embase 1974 to 2019 August 26, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to November 6, 2019

Search Strategy:

#	Searches
1	exp Home Care Services/
2	(((domestic or home or domiciliary) adj3 (residence or residences or setting or settings or care or nurs* or help or service* or treatment* or therap* or "respiratory care" or "respiratory treatment*" or "respiratory therap*" or "respiratory service*" or "respiratory assist*" or ventilat*)) or "assisted living" or homecare).ti,ab,hw,kw.
3	"nursing home*".ti,ab,hw,kw.
4	(1 or 2) not 3
5	exp Respiration, Artificial/
6	(((facial or face or nasal) adj3 mask*) or ((respiration* or respiratory or breathing) adj3 (assist* or controlled or mechanical)) or "artificial respiration*" or BiPAP or CPAP or "Fluidic Breathing Assister" or HMV or IPPB or IPPV or NIAV or NIV or NPPV or "Oxygen Regulator*" or PAP or PAV or "Portable Oxygen" or "Positive Airway Pressure*" or "positive end-expiratory pressure*" or "positive pressure*" or respirator or respirators or "Respiratory insufficiency" or Tracheostom* or ventilation or ventilator*).ti,ab,hw,kw.
7	5 or 6
8	4 and 7
9	limit 8 to ("all adult (19 plus years)" or "young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)") [Limit not valid in Embase,CCTR,CDSR; records were retained]
10	limit 9 to (adult <18 to 64 years> or aged <65+ years>) [Limit not valid in CCTR,CDSR,Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained]
11	limit 8 to ("all infant (birth to 23 months)" or "all child (0 to 18 years)" or "newborn infant (birth to 1 month)" or "infant (1 to 23 months)" or "preschool child (2 to 5 years)" or "child (6 to 12 years)" or "adolescent (13 to 18 years)") [Limit not valid in Embase,CCTR,CDSR; records were retained]
12	limit 11 to (embryo or infant or child or preschool child <1 to 6 years> or school child <7 to 12 years> or adolescent <13 to 17 years>) [Limit not valid in CCTR,CDSR,Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained]
13	12 not 10
14	8 not 13

15 exp Guideline/ or exp Practice Guideline/
16 exp meta analysis/
17 exp Meta-Analysis as Topic/
18 exp "systematic review"/
19 exp controlled study/
20 exp Randomized Controlled Trial/
21 exp triple blind procedure/
22 exp Double-Blind Method/
23 exp Single-Blind Method/
24 exp latin square design/
25 exp comparative study/
26 exp Cohort Studies/
27 exp longitudinal study/
28 exp retrospective study/
29 exp prospective study/
30 exp population research/
31 exp observational study/
32 clinical study/
33 exp Evaluation Studies/
34 exp quantitative study/
35 exp validation studies/
36 exp quasi experimental study/
37 exp field study/
38 in vivo study/
39 exp panel study/
40 exp prevention study/
41 exp replication study/
42 exp Feasibility Studies/
43 exp trend study/
44 exp correlational study/
45 exp case-control studies/
46 exp confidence interval/
47 exp regression analysis/
48 exp proportional hazards model/
49 ((evidence adj based) or (meta adj analys*) or (systematic* adj3 review*) or "consensus development" or guideline* or "position statement*" or (control* adj3 study) or (control* adj3 trial) or (randomized adj3 study) or (randomized adj3 trial) or (randomised adj3 study) or (randomised adj3 trial) or "pragmatic clinical trial" or (random* adj1 allocat*) or (doubl* adj blind*) or (doubl* adj mask*) or (singl* adj blind*) or (singl* adj mask*) or (tripl* adj

blind*) or (tripl* adj mask*) or (trebl* adj blind*) or (trebl* adj mask*) or "latin square" or placebo* or nocebo* or multivariate or "comparative study" or "comparative survey" or "comparative analysis" or (intervention* adj2 study) or (intervention* adj2 trial) or crossover or "cross-over" or cohort* or "longitudinal study" or "longitudinal survey" or "longitudinal analysis" or "longitudinal evaluation" or longitudinal* or ((retrospective or "ex post facto") adj3 (study or survey or analysis or design)) or retrospectiv* or "prospective study" or "prospective survey" or "prospective analysis" or prospectiv* or (population adj3 (stud* or survey* or analys* or research)) or "concurrent study" or "concurrent survey" or "concurrent analysis" or "incidence study" or "incidence survey" or "incidence analysis" or (("follow-up" or followup) adj (stud* or survey or analysis)) or ((observation or observational) adj (study or survey or analysis)) or "clinical study" or "clinical trial" or "evaluation study" or "evaluation survey" or "evaluation analysis" or "quantitative study" or "quantitative analys*" or "numerical study" or "validation study" or "validation survey" or "validation analysis" or "quasi experimental study" or "quasi experimental analysis" or "quasiexperimental study" or "quasiexperimental analysis" or "field study" or "field survey" or "field analysis" or "in vivo study" or "in vivo analysis" or "panel study" or "panel survey" or "panel analysis" or ((prevention or preventive) adj3 (trial or study or analysis or survey)) or "replication study" or "replication analysis " or "replication trial" or "feasibility study" or "feasibility analysis" or "trend study" or "trend survey" or "trend analysis" or ((correlation* adj2 study) or (correlation* adj2 analys*)) or "case control study" or "case base study" or "case referrent study" or "case referent study" or "case referent study" or "case compeer study" or "case comparison study" or "matched case control" or "multicenter study" or "multi-center study" or "odds ratio" or "confidence interval" or (hazard* adj (model* or analys* or regression or ratio or ratios)) or "Cox model" or "Cox multivariate analyses" or "Cox multivariate analysis" or "Cox regression" or "Cox survival analyses" or "Cox survival analysis" or "Cox survival model" or "change analysis" or ((study or trial or random* or control*) and compar*)).mp,pt.

50 or/15-49

51 14 and 50

limit 51 to (editorial or erratum or letter or note or addresses or autobiography or bibliography or biography or blogs or comment or dictionary or directory or interactive tutorial or interview or lectures or legal cases or legislation or news or newspaper article or
52 overall or patient education handout or periodical index or portraits or published erratum or video-audio media or webcasts) [Limit not valid in Embase,CCTR,CDSR,Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained]

53 from 52 keep 45-48

54 (51 not 52) or 53

55 remove duplicates from 54

Scopus

1 TITLE-ABS-KEY(((domestic or home or domiciliary) W/3 (residence or residences or setting or settings or care or nurs* or help or service* or treatment* or therap* or "respiratory care" or "respiratory treatment*" or "respiratory therap*" or "respiratory service*" or "respiratory assist*" or ventilat*)) OR "assisted living" OR homecare or HMV)

2 TITLE-ABS-KEY(((facial or face or nasal) W/3 mask*) OR ((respiration* or respiratory or breathing) W/3 (assist* or controlled or mechanical)) OR "artificial respiration*" OR BiPAP OR CPAP OR "Fluidic Breathing Assister" OR HMV OR IPPB OR IPPV OR NIAV OR NIV OR NPPV OR "Oxygen Regulator*" OR PAP OR PAV OR "Portable Oxygen" OR "Positive Airway Pressure*" OR "positive end-expiratory pressure*" OR "positive pressure*" OR respirator OR respirators OR "Respiratory insufficiency" OR Tracheostom* OR ventilation OR ventilator*)

3 TITLE-ABS-KEY((evidence W/1 based) or (meta W/1 analys*) or (systematic* W/3 review*) or "consensus development" or guideline* or "position statement*" or (control* W/3 study) or (control* W/3 trial) or (randomized W/3 study) or (randomized W/3 trial) or (randomised W/3 study) or (randomised W/3 trial) or "pragmatic clinical trial" or (random* W/1 allocat*) or (doubl* W/1 blind*) or (doubl* W/1 mask*) or (singl* W/1 blind*) or (singl* W/1 mask*) or (tripl* W/1 blind*) or (tripl* W/1 mask*) or (trebl* W/1 blind*) or (trebl* W/1 mask*) or "latin square" or placebo* or nocebo* or multivariate or "comparative study" or "comparative survey" or "comparative analysis" or (intervention* W/2 study) or (intervention* W/2 trial) or crossover or "cross-over" or cohort* or "longitudinal study" or "longitudinal survey" or "longitudinal analysis" or "longitudinal evaluation" or longitudinal* or ((retrospective or "ex post facto") W/3 (study or survey or analysis or design)) or retrospectiv* or "prospective study" or "prospective survey" or "prospective analysis" or prospectiv* or (population W/3 (stud* or survey* or analys* or research)) or "concurrent study" or "concurrent survey" or "concurrent analysis" or "incidence study" or "incidence survey" or "incidence analysis" or (("follow-up" or followup) W/1 (stud* or survey or analysis)) or ((observation or observational) W/1 (study or survey or analysis)) or "clinical study" or "clinical trial" or "evaluation study" or "evaluation survey" or "evaluation analysis" or "quantitative study" or "quantitative analys*" or "numerical study" or "validation study" or "validation survey" or "validation analysis" or "quasi experimental study" or "quasi experimental analysis" or "quasiexperimental study" or "quasiexperimental analysis" or "field study" or "field survey" or "field analysis" or "in vivo study" or "in vivo analysis" or "panel study" or "panel survey" or "panel analysis" or ((prevention or preventive) W/3 (trial or study or analysis or survey)) or "replication study" or "replication analysis " or "replication trial" or "feasibility study" or "feasibility analysis" or "trend study" or "trend survey" or "trend analysis" or ((correlation* W/2 study) or (correlation* W/2 analys*)) or "case control study" or "case base study" or "case referrent study" or "case referent study" or "case referent study" or "case compeer study" or "case comparison study" or "matched case control" or "multicenter study" or "multi-center study" or "odds ratio" or "confidence interval" or (hazard* W/1 (model* or analys* or regression or ratio or ratios)) or "Cox model" or "Cox multivariate analyses" or "Cox multivariate analysis" or "Cox regression" or "Cox survival analyses" or "Cox survival analysis" or "Cox survival model" or "change analysis" or ((study or trial or random* or control*) and compar*))

4 1 and 2 and 3

5 TITLE-ABS-KEY(newborn* or neonat* or infant* or toddler* or child* or adolescent* or paediatric* or pediatric* or girl or girls or boy or boys or teen or teens or teenager* or preschooler* or "pre-schooler*" or preteen or preteens or "pre-teen" or "pre-teens" or youth or youths) AND NOT TITLE-ABS-KEY(adult or adults or "middle age" or "middle aged" OR elderly OR

	geriatric* OR "old people" OR "old person*" OR "older people" OR "older person*" OR "very old")
6	4 and not 5
7	DOCTYPE(le) OR DOCTYPE(ed) OR DOCTYPE(bk) OR DOCTYPE(er) OR DOCTYPE(no) OR DOCTYPE(sh)
8	6 and not 7
9	PMID(0*) OR PMID(1*) OR PMID(2*) OR PMID(3*) OR PMID(4*) OR PMID(5*) OR PMID(6*) OR PMID(7*) OR PMID(8*) OR PMID(9*)
10	8 and not 9

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((home OR domestic OR domiciliary or homecare or "assisted living" or HMV) AND (BiPAP OR CPAP OR "face mask*" OR "facial mask*" OR "Fluidic Breathing Assister" OR HMV OR IPPB OR IPPV OR "nasal mask*" OR NIAV OR NIV OR NPPV OR "Oxygen Regulator*" OR PAP OR PAV OR "Portable Oxygen" OR "Positive Airway Pressure*" OR "positive end-expiratory pressure*" OR "positive pressure*" OR respirat* OR Tracheostom* OR ventilat*)) NOT "nursing home*"

ClinicalTrials.gov

All limited to Adults

((domestic OR home OR domiciliary OR homecare OR "assisted living") NOT "nursing home") AND ((facial OR face OR nasal) AND mask*)

((domestic OR home OR domiciliary OR homecare OR "assisted living") NOT "nursing home") AND ((respiration* OR respiratory OR breathing) AND (assist* OR controlled OR mechanical))

((domestic OR home OR domiciliary OR homecare OR "assisted living") NOT "nursing home") AND ("artificial respiration*" OR BiPAP OR CPAP OR "Fluidic Breathing Assister" OR HMV OR IPPB)

((domestic OR home OR domiciliary OR homecare OR "assisted living") NOT "nursing home") AND (IPPV OR NIAV OR NIV OR NPPV OR "Oxygen Regulator*" OR PAP OR PAV OR "Portable Oxygen")

((domestic OR home OR domiciliary OR homecare OR "assisted living") NOT "nursing home") AND ("Positive Airway Pressure*" OR "positive end-expiratory pressure*" OR "positive pressure*" OR respirator)

((domestic OR home OR domiciliary OR homecare OR "assisted living") NOT "nursing home") AND (respirators OR "Respiratory insufficiency" OR Tracheostom* OR ventilation OR ventilator*)

eTable 2. Criteria used to define HMV and BPAP devices

Device	Rules
HMV	1) The study reported the device model/manufacturer, and the device was classified as a life support ventilator by either the FDA or the manufacturer listed information, or 2) The study reported the device to be a life support device, or 3) The study reported the device was also able to be used interchangeably with invasive mechanical ventilation through a tracheostomy or endotracheal tube, or 4) The study reported the mode to be (or the device was capable of) continuous mandatory ventilation (CMV) in either a pressure controlled PC-CMV (AC-PC) or volume controlled VC- CMV (AC-VC) configuration.
BPAP	1) The study reported the device model/manufacturer, and the device was classified as a BPAP machine or respiratory assist device (RAD) by either the FDA or the manufacturer listed information, or 2) The study reported the device to be an exclusive BPAP machine. 3) Devices were categorized as BIPAP ST if the mode utilized intermittent mandatory ventilation IMV (back up rate) with pressure support (IPAP) PC-IMV. BIPAP S if breath delivery was continuous spontaneous ventilation CSV with pressure support (IPAP) PC-CSV.

BPAP/BIPAP: bi-level positive airway pressure, CMV: continuous mandatory ventilation, CPAP: continuous positive airway pressure, CSV: continuous spontaneous ventilation, FDA: Food and Drug Administration, HMV: home mechanical ventilation, IMV: intermittent mandatory ventilation, IPAP: inspiratory positive airway pressure, PC-CMV: pressure controlled continuous mandatory ventilation, PC-CSV: pressure controlled continuous spontaneous ventilation, PC-IMV: pressure controlled intermittent mandatory ventilation, RAD: respiratory assist device, S: spontaneous mode, ST: spontaneous/timed mode, VC-CMV: volume controlled continuous mandatory ventilation

eTable 3. Scales used for outcome measurement

Domain	Scale and scale characteristics
Quality of life	**COPD Assessment Test[1]** • Scoring: 8 Items each scaled 1 to 5. Total scores range from 0-40, high scores show more severe impact of COPD on a patient's life. • Minimal clinically important difference: Not determined. Mapping against St. George's Respiratory Questionnaire suggests minimal clinically important difference at a group level is 1.6. Experts also suggest that scores <10 have a low impact, 10-20 medium, 21-30 high and >30 very high impact, requiring gradually more interventions.
	Chronic Respiratory Disease Questionnaire[2] • Scoring: 20 total items across 4 components (dyspnea, fatigue, emotional function, and mastery), all items scored from 1 to 7. Higher score represents better outcome. • Minimal clinically important difference: a change in score of 0.5 on a 7 point scale.
	St. George's Respiratory Questionnaire[3] • Scoring: 2 parts (symptoms and activities [activity and impacts]) 50 total items. Total scores range from 0-100, high scores indicating more limitations. • Minimal clinically important difference: a mean change score of 4 units is associated with slightly efficacious treatment, 8 units for moderately efficacious change and 12 units for very efficacious treatment.
	Severe Respiratory Insufficiency Questionnaire Summary Score[4] • Scoring: 49 total items, 7 categories. Total score 0 to 100. Higher scores represent better health related quality of life. • Minimal clinically important difference: The minimal clinically important difference ranged between 5 and 7 points in patients with severe stable COPD.[5]
Activities of daily living	**Gronigen Activity and Restriction Scale[6]** • Scoring: 18 Items, total scores 18-72. Higher score shoes more disabled. • Minimal clinically important difference: not found.
	London Chest Activity of Daily Living Scale[7] • Scoring: 15 total items with 4 components (self-care, domestic, physical, leisure). Each item scores 0-5.Total score from 0-75. Higher scores represent minimum disability. • Minimal clinically important difference: Minimally important differences ranged from -2.1 to -5.9 points.
Dyspnea	**Chronic Respiratory Disease Questionnaire Dyspnea[2]** • Scoring: Dyspnea subscale, 5 activities identified as important by the patient are rated from 1(most dyspnea) to 7(least dyspnea). • Minimal clinically important difference: 0.5 per item within a subscale.
	Medical Research Council Dyspnoea scale[8] • Scoring: Grade 1-5. Higher grade is extreme breathlessness. • Minimal clinically important difference: not found, but may be 0.5 units[9]
	Transitional Dyspnea Index[10] • Scoring: 24 total items with three domains(change in functional impairment, change in magnitude of task, change in magnitude of effort) Items rate in 7 graded from -3 to +3(major improvement) Total scores ranging -9 to +9. Lower score shows more deterioration. • Minimal clinically important difference: Change of ≥1 unit.
Sleep	**Pittsburgh Sleep Quality Index[11]** • Scoring: 19 total items scales from 0-3. Overall scale from 0-21. Lower scores shows better sleep quality. • Minimal clinically important difference: not found.
	Semiqualitative multipoint scale with a range 1(best) to 4(worst)[12] • Scoring: 1-4, Higher score means worse sleep quality. • Minimal clinically important difference: not found.
	Epworth Sleepiness Scale[13] • Scoring: 8 questions scored from 0-3. Total scores 0-24. Higher score indicates severe sleepiness. • Minimal clinically important difference: not found for COPD.

COPD: chronic obstructive pulmonary disease

eTable 4. Categories of adverse events

Type of adverse events	Example
Serious adverse events	Death, hospitalization, and need for intubation were reported as primary efficacy outcomes. Acute respiratory failure Any life-threatening event/illness Any disability or permanent damage Any required intervention to prevent impairment (such as pacemaker) Any congenital anomaly/birth defect
Non serious adverse events	Skin symptoms (e.g. facial rash, nasal ulceration) Eye symptoms (e.g. dry eyes, conjunctivitis) Nose/mouth symptoms (e.g. nasal stuffiness, rhinorrhea, nosebleed, mucosal dryness, oral air leak) Gastrointestinal symptoms (e.g. gastric distension, aerophagia) Device/mask intolerance (e.g. claustrophobia, discomfort, noncompliance) Other

eTable 5. Definitions and grading criteria of strength of evidence

Strength of Evidence (SOE)*	Definition
High	Confident that the estimate of effect lies close to the true effect (the body of evidence has few or no deficiencies and judged to be stable).
Moderate	Moderately confident that the estimate of effect lies close to the true effect (the body of evidence has some deficiencies and is judged to be likely stable)
Low	Limited confidence that the estimate of effect lies close to the true effect (the body of evidence has major or numerous deficiencies and is likely unstable)
Insufficient	No evidence, were unable to estimate an effect, or had no confidence in the estimate of effect)

*Grading criteria: RCTs start as high strength of evidence and observational studies start as low strength of evidence. There are 8 domains that can modify this initial strength of evidence. The domains used to increase or decrease strength of evidence for RCTs are the methodological limitations of the studies (i.e., risk of bias); precision (based on the size of the body of evidence, number of events, and confidence intervals); directness of the evidence to the questions (focusing on whether the outcomes were important to patients vs surrogates); consistency of results (based on qualitative and statistical approaches to evaluate for heterogeneity); and the likelihood of reporting and publication bias. For observational studies, we used the following domains to raise the strength of evidence: dose-response gradient, magnitude of effect, and plausible confounding.

eTable 6. Baseline characteristics of included studies

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
Bhatt, 2013[14]	RCT in USA	Inclusion: Stable COPD with 10 pack year smoking history, low clinical probability of OSA Exclusion: Congestive heart failure, OSA, chronic respiratory conditions other than COPD, age<35 years, diseases limiting life expectancy <2 years, active malignancies in previous 2 years, process precluding a nasal mask.	BPAP NOS	BPAP BiPAP Synchrony; Respironics Inc. (FDA approved 510(k) clearance)	-15 Patients -aged 70(66-73) -47% female -FEV1 % predicted 30.3(7) -Baseline PaCO2 42.4(5.6) -Baseline PaO2 65.1(13.3)	Stable COPD
			No BPAP	No PAP	-12 Patients -aged 68 (IQR 65-78) -0% female -FEV1 % predicted 29.6(7.4) -Baseline PaCO2 41.9(4.6) -Baseline PaO2 73.9(9.9)	
Budweiser, 2007[15]	Observational Prospective in Germany, 01/2002 to 12/2005	Inclusion: Less than 80 years old, severe COPD (GOLD IV), FEV1/FVC <70%, FEV1 <50% predicted, PaCO2 > 50mmHg after therapy/treatment for exacerbation Exclusion: Malignancy diagnosis within prior 5 years, intubation or tracheostomy prior to NIPPV	BPAP (pressure controlled ventilation)	BPAP Twin Air; Airox Inc. (Pau, France) (Not FDA approved) Smart Air; Airox Inc. (Pau, France) (Not FDA approved) BiPAP Synchrony; Respironics Inc. (Murrysville, USA) (FDA approved 510(k) clearance)	-99 Patients -aged 64.2±8.4 -36.4% female -FEV1 % predicted 28.3 ± 8.9 -Baseline PaCO2 60.9 ± 9.5 -Baseline PaO2 64.5 ± 20.4 -54.1% on LTOT	Unstable COPD (recent exacerbation)
			No BPAP	No PAP	-41 Patients -aged 66.6±8.6 -31.7% female -FEV1 % predicted 29.9 ± 8.1 -Baseline PaCO2 58.2 ± 8.2 -Baseline PaO2 70.3 ± 20.4 -56.1% on LTOT	

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
Casanova, 2000[16]	RCT in Spain, 1995 to 1997	Inclusion: Age 45-75 years, smoking history 20 pack years, clinically stable Exclusion: Refusal to stop smoking, OSA, >10 apnea-hypopnea episodes per hour, other etiologies of chronic airway obstruction, significant comorbidities.	BPAP S + standard care	BPAP DP-90; Taema (Paris, France) (Not FDA approved)	-26 Patients -aged 64±5 -0% female -FEV1 L 0.82± 0.23 -Baseline PaCO2 50.7±7.9 -Baseline PaO2 55.7±8.6 -95% on LTOT	Stable COPD
			Standard care	No PAP	-26 Patients -aged 68±4 -4% female -FEV1 L 0.87± 0.22 -Baseline PaCO2 53.2±8.6 -Baseline PaO2 57.5±7.2 -91.7% on LTOT	
Cheung, 2010[17]	RCT in China, 01/2007 to 03/2009	Inclusion: Severe exacerbation with persistent respiratory acidosis (despite treatment with bronchodilators, corticosteroids, antibiotics), required NIPPV treatment Exclusion: Active smokers, RF from non-COPD cause, evidence of pneumonia, transmissible infections, requiring long-term systemic steroids, comorbidity giving life expectancy <1 year, significant OSA, already on home NIPPV, inability to comply with study protocol.	CPAP	CPAP BiPAP Synchrony; Respironics Inc. (Murrysville, USA) (FDA approved 510(k) clearance)	-24 Patients -aged 71±7.7 -8.3% female -FEV1 % predicted 31.3 ± 9.3 -Baseline PaCO2 7.3 ± 1.0kPa -45.8% on LTOT	Unstable COPD (recent exacerbation)
			BPAP ST	BPAP BiPAP Synchrony; Respironics Inc. (Murrysville, USA) (FDA approved 510(k) clearance)	-23 Patients -aged 69.5±7.8 -8.7% female -FEV1 % predicted 28.1 ± 8.5 -Baseline PaCO2 7.7 ± 1.0 -43.5% on LTOT	
Clini, 1996[18]	Observational Prospective in Italy, 12/1991 to 09/1992	Inclusion: Severe COPD, ≥1 admission due to severe exacerbation in prior 18 months Exclusion: Suspicion of sleep apnea, comorbidities making	BPAP ST + home care + oxygen	BPAP BiPAP; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-17 Patients -aged 62±5 -29.4% female -FEV1 % predicted 31±10 -Baseline PaCO2 6.4±1.4kPa -Baseline PaO2 7.2±0.9kPa	Unstable COPD (recent exacerbation)

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
		patients unsuitable for long-term trials	Home care + oxygen	No PAP	-17 Patients -aged 67±7 -47% female -FEV1 % predicted 33±10 -Baseline PaCO2 6.4±0.5kPa -Baseline PaO2 6.6±0.6kPa	
			Oxygen	No PAP	-29 Patients -aged 62±8 -34.5% female -FEV1 % predicted 31±12 -Baseline PaCO2 6.7±0.6kPa -Baseline PaO2 6.8±0.6kPa	
Clini, 1998[19]	Observational Prospective in Italy, 12/1991 to 12/1994	Inclusion: Clinically stable, ≥1 ICU admission due to severe exacerbation within 2 years prior, care-giver at home, geographical allocation allowing access to the hospital Exclusion: other organ failure, cancer, inability to cooperate to long-term trials, suspicion of sleep apnea.	BPAP ST + oxygen	BPAP BiPAP; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-28 Patients -aged 66±6 -21.4% female -FEV1 % predicted 31±8 -Baseline PaCO2 7.0±0.6 kPa -Baseline PaO2 6.5±0.9 kPa	Stable COPD
			Oxygen	No PAP	-21 Patients -aged 66±8 -33% female -FEV1 % predicted 32±10 -Baseline PaCO2 6.8±0.6 kPa -Baseline PaO2 6.4±1.0 kPa	
Clini, 2002[20]	RCT in Italy/France, 06/1996 to 01/2000	Inclusion: Age ≤75 years, LTOT ≥ 6 months, dyspnea score (assessed by Medical Research Council) ≥2, FEV1 <1.5 liters, FEV1/FVC <60%, TLC ≥90% predicted, PaCO2 >6.6 kPa, PaO2 <7.8 kPa breathing room at rest	BPAP ST + LTOT	BPAP BiPAP ST 30; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-39 Patients -aged 64±7 -18% female -FEV1 % predicted 27±8 -Baseline PaCO2 7.2±0.6kPa -Baseline PaO2 6.7±0.8kPa -100% on LTOT	Stable COPD

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
		Exclusion: 15% increase FEV1 after salbutamol, pH ≤7.34, active smokers, history of OSA (defined by apnea-hypopnea index >10 episodes per hour), therapy with systemic steroids, concomitant chronic systemic diseases (HF, diabetes, infections, neoplasm, etc.), other chronic respiratory diseases (fibrothorax, bronchiectasis, cystic fibrosis), home care program other than LTOT	LTOT	No PAP	-47 Patients -aged 66±14 -21.3% female -FEV1 % predicted 31±11 -Baseline PaCO2 7.4±0.6kPa -Baseline PaO2 6.6±0.8kPa -100% on LTOT	
De Backer, 2011[21]	RCT in Belgium	Inclusion: Age 18-80 years, COPD stage III/IV, exacerbation hospitalization, persisting hypercapnia, stopped smoking, no home NIPPV before admission Exclusion: Invasive ventilation, asthmatic, restrictive lung disease, malignancy, heart failure, OSA.	BPAP NOS	<u>BPAP</u> BiPAP synchrony; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-10 Patients -aged 65±7 -FEV1 % predicted 29.5±9.0 -Baseline PaCO2 55.4±7.7 -Baseline PaO2 59±13)	Unstable COPD (recent exacerbation)
			Standard care	No PAP	-5 Patients -aged 66±6 -FEV1 % predicted 30.5±5.1 -Baseline PaCO2 52.4±6.0 -Baseline PaO2 65±6	
Dreher, 2010[22]	RCT in Germany	Inclusion: CHRF due to COPD stage IV Exclusion: Acute RF, invasive ventilation via tracheostomy, weaned from invasive ventilation, intubated during prior 3 months, other ventilatory support prior to study.	HMV (pressure assist/control) (time period 1)	<u>HMV</u> Breas Vivo 40; Breas Medical AB (Molnlycke, Sweden) (FDA approved 510(k) clearance) Smart Air; Airox (Pau Cedex, France) (Not FDA approved)	-9 Patients -FEV1 L 0.76 ±0.29 (both groups)	Stable COPD
			HMV (PSV ST) (time period 1)		-8 Patients -FEV1 L 0.76 ±0.29 (both groups)	
			HMV (PSV ST) (time period 2)			

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
			HMV (pressure assist/control) (time period 2)			
Duiverman, 2011[23,24]	RCT in Netherlands	Inclusion: COPD stage III/IV, age 40-76 years, clinically stable, chronic hypercapnic RF Exclusion: cardiac/neuromuscular disease limiting exercise tolerance, exposure to pulmonary rehab program (previous 18 months), previous exposure to chronic NIPPV ever, apnea-hypopnea index ≥10h.	BPAP ST + pulmonary rehabilitation	<u>BPAP</u> BiPAP Synchrony; Respironics Inc. (FDA approved 510(k) clearance)	-24 Patients -aged 63±10 -33.3% female -58% on LTOT	Stable COPD
			Pulmonary rehabilitation alone	No PAP	-32 Patients -aged 61±8 -46.9% female -56% on LTOT	
Duiverman, 2017[25]	RCT in Netherlands	Inclusion: COPD (GOLD III or IV), ≥ 2 AECOPD with acute hypercapnic respiratory failure (pH<7.35) per year, daytime PaCO2 ≥6.7 kPa (50 mmHg) or nocturnal PaCO2 ≥7.3 kPa (55 mmHg) or nighttime rise in PtCO2 ≥1.3 kPa (10 mmHg), stable (no AECOPD in prior 4 weeks, pH>7.35). Exclusion: TRD, NMD	HMV/BPAP mix (pressure controlled ventilation) (high intensity)	<u>HMV</u> Vivo 50; Breas Medical (Molndal, Sweden) (FDA approved 510(k) clearance) <u>BPAP</u> Stellar 100; Resmed (Martinsried, Germany) (FDA approved 510(k) clearance)	-Crossover – 14 patients -aged 68.7±8.5 -54% female -FEV1 % predicted 34(9) -Baseline PaCO2 6.8(0.9)kPa -Baseline PaO2 29.3(2.7)kPa	Stable COPD
			HMV/BPAP mix (pressure support ventilation) (low intensity)			
Duiverman, 2019[26]	RCT in Netherlands	Inclusion: COPD (GOLD III or IV), daytime PaCO2 ≥6.0 kPa, no COPD exacerbation in the prior 4 weeks, pH>7.35, sufficient social support network making initiation of HMV at home possible.	BPAP ST started in the hospital	<u>BPAP</u> BiPAP A30; Philips Respironics (FDA approved 510(k) clearance)	-34 patients -aged 63.1±7.0 -65% female -Baseline PaCO2 7.4±1.0kPa -Baseline PaO2 7.3±1.5kPa -6% AHI>15	Stable COPD

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
		Exclusion: unstable severe cardiac comorbidities (left ventricular ejection fraction below 45% and unstable angina pectoris complaints), living in a nursing home, prior home PAP therapy	BPAP ST started in the home using telemedicine	BiPAP A40; Philips Respironics (FDA approved 510(k) clearance)	-33 patients -aged 63.6±8.6 -55% female -Baseline PaCO2 7.3±0.9kPa -Baseline PaO2 6.8±1.3kPa -3% AHI>15	
Durao, 2018[27]	Observational Retrospective in Portugal, 08/1/2011 to 07/31/2014	Inclusion: COPD NOS Exclusion: No clinical assessment in prior 6 months, OSA with a history of noncompliance with CPAP	HMV/BPAP mix started in AECOPD	BPAP VPAP ST S9; Resmed (FDA approved 510(k) clearance) VPAP ST STA; Resmed (FDA approved 510(k) clearance)	-62 patients -aged 64.6±10.4 -12.9% female -FEV1 % predicted 38.6±14.9 (both groups) -Baseline PaCO2 52.9±7.7 (both groups) -Baseline PaO2 61.7±8.8 (both groups) -50% with OSA (both groups)	Stable COPD

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
			HMV/BPAP mix started in stable disease	BIPAP PR1; Philips Respironics (FDA approved 510(k) clearance) BiPAP A30; Philips Respironics (FDA approved 510(k) clearance) BiPAP A40; Philips Respironics (FDA approved 510(k) clearance) <u>HMV</u> Trilogy 100; Philips Respironics (FDA approved 510(k)	-47 patients -aged 66.9±8.4 -17% female -FEV1 % predicted 38.6±14.9 (both groups) -Baseline PaCO2 52.9±7.7 (both groups) -Baseline PaO2 61.7±8.8 (both groups) -50% with OSA (both groups)	
Funk, 2011[28]	RCT in Austria, 04/01/2003 to 02/28/2007	Inclusion: COPD requiring invasive/non-invasive mechanical ventilation due to acute RF, clinically stable, hypercapnic Exclusion: Severe psychiatric disorder likely to impair NIPPV compliance, other severe pulmonary diseases not COPD, other severe non-pulmonary diseases limiting prognosis, noncompliance to NIPPV, women of childbearing age, evidence of sleep apnea.	BPAP NOS for more than 6 months	BPAP - Not reported ("various types of patient-triggered bi-level positive pressure ventilators were used")	-13 Patients -aged 62±6 -46% female -FEV1 % predicted 31±17 -Baseline PaCO2 92±19	Unstable COPD (recent exacerbation)
			BPAP NOS for 6 months		-13 Patients -aged 65±6 -38% female -FEV1 % predicted 30±12 -Baseline PaCO2 95±26	

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
Gad, 2015[29]	Observational Prospective in Egypt, 10/2012 to 04/2014	Inclusion: Severe COPD stage III/IV, FEV1/FVC <70%, clinically stable Exclusion: invasive mechanical ventilation, OSA, cardiac disease limiting exercise tolerance, NMDs, orthopedic impairment of shoulder girdle	BPAP ST + exercise program	BPAP	-15 Patients -aged 65.70±10 -40% female -FEV1 % predicted 34.4±5.8 -Baseline PaCO2 58.3±5.6 -Baseline PaO2 58.5±5.8 -33% on LTOT	Stable COPD
			Exercise program	No PAP	-15 Patients -aged 66.41±9 -26.7% female -FEV1 % predicted 35.7±7.3 -Baseline PaCO2 57.7±6.8 -Baseline PaO2 59.1±4.2 -27% on LTOT	
Galli, 2014[30]	Observational Retrospective in USA, 01/2011 to 12/2011	Inclusion: Primary/secondary discharge diagnosis of AECOPD, hypercapnic RF during hospitalization Exclusion: discharged to hospice, no documented hypercapnia, not receiving NIPPV during hospitalization.	BPAP NOS post hospital admission	BPAP	-78 Patients -aged 61.6±10.2 -57.7% female -FEV1 % predicted 34.5±16.3 -Baseline PaCO2 61.2±11.2 -47% history of OSA/OHS	Unstable COPD (recent exacerbation)
			No BPAP post hospital admission	No PAP	-88 Patients -aged 64.9±10.8 -67% female -FEV1 % predicted 40±16.3 -Baseline PaCO2 55.2±11.4 -26% history of OSA/OHS	
Garrod, 2000[31]	RCT in England	Inclusion: Severe COPD, all patients had limited exercise tolerance due to dyspnea and no previous exposure to NIPPV Exclusion: unstable angina, intermittent claudication, and other mobility-limiting conditions.	BPAP S + pulmonary rehabilitation	BPAP BiPAP ST 30; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-23 Patients -aged 63 -FEV1 % predicted 33.2(7.96) -Baseline PaCO2 44.2(6.68) -Baseline PaO2 63.7(8.55)	Stable COPD
			Pulmonary rehabilitation	No PAP	-22 Patients -aged 67 -FEV1 % predicted 35.12(9.17) -Baseline PaCO2 46.1(9.07) -Baseline PaO2 67.2(9.38)	

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
Gay, 1996[32]	RCT in USA, 1989 to 1992	Inclusion: Age<80 years, BMI≤30, FEV1 <40% Exclusion: activated for lung transplantation, active psychiatric disease that necessitated sedative or hypnotic meds, current use of nocturnal ventilation or continuous PAP, major illness likely to preclude completion of prolonged trial.	BPAP ST	BPAP BiPAP; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-7 Patients -aged 71.0±4.5 -28.6% female -FEV1 L 0.62(0.25) -Baseline PaCO2 54.7(8.8) -Baseline PaO2 66.4(15.1) -86% on LTOT	Stable COPD
			Sham BPAP ST (CPAP at lowest setting)	No Device	-6 Patients -aged 66.5±9.1 -16.6% female -FEV1 L 0.72(0.06) -Baseline PaCO2 48.5(2.5) -Baseline PaO2 57.8(11.5) -100% on LTOT	
Heinemann, 2011[33]	Observational Retrospective in Germany, 01/2002 to 02/2008	Inclusion: COPD, prolonged weaning from invasive mechanical ventilation Exclusion: Intubated from cardiogenic edema or cardiopulmonary resuscitation	BPAP (pressure controlled ventilation)	BPAP NOS	-39 Patients -aged 64.6±10.8 -30.1% female -FEV1 % predicted 32.3±10.1 -Baseline PaCO2 49.5±9.0 -Baseline PaO2 72.0±14.3	Unstable COPD (recent exacerbation)
			No BPAP	No PAP	-43 Patients -aged 72.8±8.6 -25.6% female -FEV1 % predicted 43.4±13.2 -Baseline PaCO2 46.5±7.5 -Baseline PaO2 69.0±10.5	
Köhnlein, 2014[34]	RCT in Germany and Austria, 10/29/2004 to 07/31/2011	Inclusion: Clinically stable, hypercapnic stage IV COPD, no acute exacerbation Exclusion: Thorax/lung abnormalities other than COPD, BMI≥35, other conditions resulting in hypercapnia, previously initiated NIPPV, malignant	BPAP ST + standard care	BPAP Models not reported, but all were BPAP machines from these manufacturers: ResMed (Martinsried, Germany), Weinmann (Hamburg, Germany, or Tyco Healthcare (Neubrug, Germany)	-102 Patients -aged 62.2±8.6 -36% female -FEV1 % predicted 23(11) -Baseline PaCO2 7.8(0.8)kPa -Baseline PaO2 8.6(2.1)kPa -66% on LTOT	Stable COPD

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
		comorbidities, severe HF, unstable angina, severe arrhythmias.	Standard care	No PAP	-93 Patients -aged 64.4±8.0 -40% female -FEV1 % predicted 27.5(8.9) -Baseline PaCO2 7.7(0.7)kPa -Baseline PaO2 8.7(1.9)kPa -65% on LTOT	
Marquez-Martin, 2014[35]	RCT in Spain, 05/2007 to 09/2011	Inclusion: Adults with COPD, clinically stable, chronic RF with hypoxemia.	BPAP ST	BPAP BiPAP; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-15 Patients -aged 69 (64-73) -FEV1 % predicted 35 (median) -Baseline PaCO2 51 (median) -Baseline PaO2 52 (median)	Stable COPD
			Exercise program	No PAP	-14 Patients -aged 69 (64-73) -FEV1 % predicted 39 (median) -Baseline PaCO2 48 (median) -Baseline PaO2 54 (median)	
			BPAP ST + exercise program	BPAP + no PAP	-14 Patients aged 69 (64-73) -FEV1 % predicted 28 (median) -Baseline PaCO2 50 (median) -Baseline PaO2 56 (median)	
McEvoy, 2009[36]	RCT in Australia, 06/30/1998 to 05/15/2004	Inclusion: Age<80 years, severe COPD secondary to smoking, stable hypercapnic ventilatory failure, on LTOT ≥3 months, not currently smoking Exclusion: significant comorbidities (malignancies, left ventricular heart failure,	BPAP S + Oxygen	BPAP VPAP S mode; ResMed (Sydney, Australia) (FDA approved 510(k) clearance)	-72 Patients -aged 67.2 (IQR 65.3 to 69.1) -31% female -FEV1 % predicted 57.5 (53.9-61.1) -Baseline PaCO2 52.6 (52.4-57.2) -Baseline PaO2 54.8 (52.4-57.2)	Stable COPD

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
		unstable angina) likely affecting 2 year survival, severe psychiatric disorder impairing ability to comply to NIPPV, BMI>40, evidence of sleep apnea.	Oxygen alone	No PAP	-72 Patients -aged 68.8 (IQR 67.1 to 70.5) -39% female -FEV1 % predicted 54.8 (51.0-58.6) -Baseline PaCO2 54.4 (52.6-56.2) -Baseline PaO2 52.5 (50.1-54.9)	
Murphy, 2017[37]	RCT in United Kingdom, 2010 to 2015	Inclusion: Persistent hypercapnia and hypoxemia, >30% sleep time <90% oxygen saturation, arterial pH >7.30 breathing room air Exclusion: BMI >35, OSA, other RF causes.	BPAP ST + Home oxygen	BPAP Harmony 2; Philips Respironics (FDA approved 510(k) clearance) VPAP III STa; ResMed (FDA approved 510(k) clearance)	-57 Patients -aged 66.4±10.2 -51% female -FEV1 % predicted 24.0(8,6) -Baseline PaCO2 59(7) -Baseline PaO2 48(9) -Baseline AHI 2.4(0.9-6.2) -70% on LTOT	Unstable COPD (recent exacerbation)
			Home oxygen	No PAP	-59 Patients -aged 67.1±9.0 -54% female -FEV1 % predicted 22.9 (8.6) -Baseline PaCO2 59(7) -Baseline PaO2 48(8) -Baseline AHI 2.0(0.8-3.9) -68% on LTOT	
Oscroft, 2010[38]	Observational Retrospective in United Kingdom, 01/2000 to 12/2003	Inclusion: COPD diagnosis, smoking history >20 pack years, ventilatory failure with a daytime PaCO2 > 7 kPa with a pH > 7.35 or nocturnal transcutaneous PaCO2 > 9	BPAP ST started after AECOPD	BPAP NIPPY I, 2 or 3; B & D Electromedical (Stratford, United Kingdom) (Not FDA approved)	-31 Patients -aged 66±6 -FEV1 % predicted 23(10) -Baseline PaCO2 8.8(1.3)kPa -Baseline PaO2 7.3(1.8)kPa	Unstable COPD (recent exacerbation)
					-16 Patients	

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
		kPa, hospital admission immediately prior to referral with clinical diagnosis of exacerbation of COPD Exclusion: Age>80 years, other respiratory disease, BMI>35, significant OSA, tracheostomy, impaired left ventricular function.	BPAP ST started in stable patient without exacerbation		-aged 63±7 -FEV1 % predicted 20(7.8) -Baseline PaCO2 8.2(0.8)kPa -Baseline PaO2 7(2.5)kPa	
Oscroft, 2010[39]	RCT in United Kingdom, 07/01/2005 to 09/30/2006	Inclusion: COPD, FEV1<50%, FEV1/FVC<70%, TLC>80%, >20 pack year smoking history, pH 7.35-7.45, PaCO2>7.5 kPa or PtcCo2>9kPa, treated with NIPPV for at least 3 months with compliance at least 4 hours/day, clinical stability (no increased breathlessness, cough or sputum in the prior 4 weeks, no increase in PaCO2 and no decrease in FEV1 since study initiation) Exclusion: >80 years old, other respiratory disease (interstitial lung disease, asthma, bronchiectasis, neuromuscular or restrictive chest wall disorders, left ventricular ejection fraction <40%	BPAP (pressure controlled ventilation)	BPAP NIPPY 2; B and D Electromedical (Stratford, United Kingdom) (Not FDA approved)	-5 Patients -aged 69.2±7.4 -FEV1 L 30.3(4.5) (both groups) -PaCO2 6.6(1)kPa (both groups) -PaO2 8.3(1.4)kPa (both groups)	Stable COPD
			BPAP (pressure controlled ventilation) discontinued (no PAP)	No PAP	-5 Patients -aged 58.6±6.3 -FEV1 L 30.3(4.5) (both groups) -PaCO2 6.6(1)kPa (both groups) -PaO2 8.3(1.4)kPa (both groups)	

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
Oscroft, 2014[40]	RCT in United Kingdom, 09/2007 to 12/2011	Inclusion: COPD diagnosis, smoking history >20 pack years, ventilatory failure with a daytime PaCO2 > 7 kPa with a pH > 7.35 or nocturnal transcutaneous PaCO2 > 9 kPa Exclusion: Age>80 years, other respiratory disease, BMI>40, significant OSA.	BPAP IVAPS	BPAP Intelligent volume assured pressure support (iVAPS); ResMed (Bella Vista, Australia (FDA approved 510(k) clearance)	-20 Patients -aged 67.6±7.9 -55% female -FEV1 % predicted 29.4(11) -Baseline PaCO2 7.84(0.8)kPa -Baseline PaO2 7.06(1.0)kPa -55% on LTOT	Unstable COPD (recent exacerbation)
			BPAP ST	BPAP NIPPY 3; B and D Electromedical (Stratford, United Kingdom) (Not FDA approved)	-20 Patients -aged 67.4±8.2 -50% female -FEV1 % predicted 26.4(9.6) -Baseline PaCO2 8.20(1.1)kPa -Baseline PaO2 7.16(1.1)kPa -60% on LTOT	
Paone, 2014[41]	Observational Prospective in Italy, 3/2007 and 1/2010	Inclusion: Acute RF needing NIPPV, clinical stability with symptoms of nocturnal Hypoventilation, FEV1 < 50% predicted, <20% improvement in FEV1 following bronchodilator and a ratio FEV1/FVC < 0.70 Exclusion: Significant comorbidities affecting survival (cancer, left ventricular heart failure, unstable angina), psychiatric disorders potentially affecting ability to undergo NIPPV, other chronic respiratory disease, history of OSA, BMI>40, systemic steroids therapy.	BPAP ST (PSV ST) + Home oxygen	BPAP Synchrony; Philips Respironics (Andover MA, USA) (FDA approved 510(k) clearance) Neftis; Linde (Munich Germany) (Not FDA approved)	-48 Patients -aged 69 (IQR 64-74) -56.2% female -FEV1 % predicted 27.5 (23.0-32.8) -Baseline PaCO2 57.8(52.9-67.3) -Baseline PaO2 72.4 (66.6-80.9)	Unstable COPD (recent exacerbation)
			Home oxygen	No PAP	-45 Patients -aged 72 (IQR 66-78) -48.9% female -FEV1 % predicted 30.0 (23.5-24.5) -Baseline PaCO2 55.6(48.7-61.9) -Baseline PaO2 72.2 (62.5-84.4)	

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
Sin, 2007[42]	RCT in Canada,	Inclusion: Diagnosis of COPD, age≥40 years, >10 pack year smoking history Exclusion: Comorbidities making survival <6 months unlikely, clinical history of left ventricular heart failure, apnea-hypopnea index >20	BPAP NOS + standard care	BPAP VPAP II, ResMed (Sydney, Australia) (FDA approved 510(k) clearance)	-11 Patients -aged 64.1±10.6 -64% female -FEV1 % predicted 37.6±17.7 -Baseline PaCO2 45.2±13.5 -Baseline PaO2 59.3±10.1	Stable COPD
			Sham BPAP (CPAP 4)	Sham Device S7Elite; ResMed (Sydney, Australia) (FDA approved 510(k) clearance)	-10 Patients -aged 66.6±9.7 -40% female -FEV1 % predicted 24.8±7.0 -Baseline PaCO2 43.1±4.9 -Baseline PaO2 60.7±8.3	
Struik, 2014[43]	RCT in the Netherlands, 12/01/2007 to 07/01/2012	Inclusion: COPD (GOLD III/IV), >48 hours independence from ventilator support for acute RF, hypercapnia (PaCO2 >6.0 kPa) daytime at rest	BPAP ST	BPAP BiPAP Synchrony; Respironics (Murrysville, USA) (FDA approved 510(k) clearance)	-101 Patients -aged 63.92±8.6 -59% female -FEV1 % predicted 25.6(7.8) -Baseline PaCO2 7.9(1.2)kPa -Baseline PaO2 7.9(2.1)kPa -75% on LTOT	Unstable COPD (recent exacerbation)
			Standard care	No PAP	-100 Patients -aged 63.5±7.9 -58% female -FEV1 % predicted 25.7(8.6) -Baseline PaCO2 7.7(1.3)kPa -Baseline PaO2 7.5(1.7)kPa -78% on LTOT	
Tsolaki, 2008[44]	Observational Prospective in Greece, 09/2005 to 12/2006	Inclusion: Age ≤75 years, smoking history >20 pack years Exclusion: Significant comorbidities (OSA, OHS, RF from disease other than	BPAP ST	BPAP VPAP III ST; ResMed (Sydney, Australia) (FDA approved 510(k) clearance)	-24 Patients -aged 65.2±8.9 -29.2% female -FEV1 % predicted 34.7±11.3 -Baseline PaCO2 54.1±4.4) -Baseline PaO2 58.9±5.7 -Baseline AHI 4.2±3.7	Stable COPD

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
		COPD), important concomitant chronic systemic disorders, poor ventilator compliance, apnea-hypopnea index ≥10 episodes/hr.	Standard care	No PAP	-22 Patients -aged 68.9±5.6 -36.4% female -FEV1 % predicted 35.1±10.3 -Baseline PaCO2 55.4±4.6) -Baseline PaO2 58.4±4.8 -Baseline AHI 5.7±3.1	
Vasquez, 2017[45]	Observational Retrospective in USA, 01/1/2009 to 10/31/2014	Inclusion: At least 2 COPD claims, age ≥40 years, continuous enrollment 12 month prior & 6 months after claim	BPAP NOS	BPAP	-9,156 Patients -35.8% female -59.1% Sleep disordered breathing	Unstable COPD (recent exacerbation)
			CPAP NOS	CPAP	-39,385 Patients -45.1% female -57.4% Sleep disordered breathing	
			HMV NOS	HMV	-315 Patients -48.9% female -20.3% Sleep disordered breathing	
Zhou, 2017[46]	RCT in China, 10/01/2015 to 05/31/2016	Inclusion: Clinically stable, stage III/IV flow limitation & chronic hypercapnic, age > 40 years Exclusion: Abnormalities of lung/thorax other than COPD, previously treated on NIPPV, OSA, severe HF, severe arrhythmias, unstable angina, malignant comorbidities, COPD with OSA overlap syndrome, impairments that could affect ability for follow up.	BPAP ST	BPAP Flexo ST 30 NIV; Curative Co. (SuZhou, China) (Not FDA approved)	-57 Patients -aged 66.91±7.1 -36.8% female -FEV1 % predicted 23.34±7.48 -Baseline PaCO2 57.78±2.88 -Baseline PaO2 69.76±15.83	Stable COPD
			Standard care	No PAP	58 Patients -aged 68.47±6.57 -39.7% female -FEV1 % predicted 28.02±11.97 -Baseline PaCO2 58.07±3.50 -Baseline PaO2 73.99±27.85	

Author, Year	Study Country, Study Design, Study Period	Inclusion / Exclusion Criteria	Intervention and comparisons (Groups)	Device used (HMV, CPAP, BPAP) manufacturer, brand name, model no.	Patient Characteristics	Disease
Satici, 2018[47]	Observational Retrospective in Turkey, 01/2016 to 07/2016	-COPD -Prescribed home NIPPV for 6 months -PaCO2 >55mmHg or PaCO2 50-55mmHg and nocturnal desaturation (<88% for at least 5 min) or -2 hospitalizations in 1 year Exclusion: severe comorbidities (cancer, left heart failure, unstable angina pectoris, etc.), psychiatric disorders (which might interfere with NIPPV use), chronic pulmonary diseases comorbid with COPD (such as fibrothorax, scoliosis, bronchiectasis, cystic fibrosis, and pulmonary fibrosis), history of obstructive sleeping apnea syndrome, refused to participate in the study, or data in their digital Secure Digital (SD) memory card data could not be accessed	BPAP S Treatment adherent (≥4 hours per day on ≥70% of days)	BPAP S	-27 Patients -aged 61.9±8.6 -15% female -FEV1 % predicted 30±13 -100% on LTOT	Unstable COPD (recent exacerbation)
			BPAP S Treatment non-adherent		-27 Patients -aged 66.2±9.2 -30% female -FEV1 % predicted 29±12 -100% on LTOT	

Note: ± denotes standard deviation.

AECOPD: acute exacerbation of chronic obstructive pulmonary disease, ALS: amyotrophic lateral sclerosis, AVAPS: average volume assured pressure support, AHI: apnea hypopnea index, BMI: Body Mass Index, BPAP: Bilevel Positive Airway Pressure, CHRF: chronic hypercapnic respiratory failure, COPD: chronic obstructive pulmonary disease, CPAP: Continuous Positive Airway Pressure, FDA: Food and Drug Administration, FEV1: Forced expiratory volume in one second, FVC: Forced vital capacity, HF: heart failure, HMV: Home Mechanical Ventilation, ICU: Intensive Care Unit, IQR: Interquartile range, kPa: kilopascal , LTOT: Long term oxygen, mmHg: millimeters of mercury (pressure), NIPPV: Noninvasive positive pressure ventilation, NMD: Neuromuscular Disease, NOS: Not otherwise Specified, OHS: Obesity hypoventilation syndrome, OSA: Obstructive sleep apnea, PaCO2: partial pressure of arterial carbon dioxide, PAP: positive airway pressure, pH: potential of hydrogen, PSV: Pressure support ventilation, RCT: randomized controlled trial, REM: rapid eye movement, ROB: risk of bias, RF: Respiratory Failure, S: spontaneous mode, SE: standard error, SpO2: Blood oxygen saturation level, ST: spontaneous/timed breath mode, tcCO2/PtCO2: transcutaneous carbon dioxide, TRD: Thoracic Restrictive Disorder, TWD: Thoracic Wall Diseases, USA: United States of America

eTable 7. Initiation criteria of included studies (new initiation of home device)

Author, Year, Study Design	Device/mode	Patient characteristics to start or continue device	Laboratory characteristics to start or continue device	Device titration	Actual ventilator usage and settings
Murphy, 2017[37] RCT	BPAP ST	-COPD (FEV1 < 50%) -NIPPV during hospital admission	-PaCO2 >53 mmHg -PaO2 <55 mmHg or PaO2 < 60 mmHg with polycythemia, pulmonary hypertension or cor pulmonale -ST 90<30% -pH >7.30 (daytime, room air)	"High pressure ventilation strategy" titrated during polysomnography	-4.7 (2.5-5.6) hours/day (6 weeks) -7.6(3.6-8.4) hours/day (12 months). -IPAP: 24 (22-26) cm H20 -EPAP: 4 (4-5) cmH20 -Rate: 14 (14-16) breaths/minute
Oscroft, 2014[40] RCT	BPAP IVAPS	-COPD (FEV1 < 50%) -Mixed stable disease or following AECOPD	-PaCO2 >7 kPa (53 mmHg) -pH >7.35 or PtcCO2 >9 kPa (68 mmHg) (daytime)	Target minute ventilation and target back up respiratory rates were the mean minute ventilation and rates that the patients had during a one hour trial of pressure support ventilation at 15 cmH2O while awake. The device then attempted to reproduce target minute ventilation overnight by automatically adjusting the inspiratory pressures in the range 7-25 cmH2O. (Titration took on average 3.3 [SD 1.6] days)	-Target minute ventilation 8.4 [5.7-9.8] L/minute -EPAP: 4 (4-4) cmH20 -Rate: 15 (13.3-19.4) breaths/minute
	BPAP ST			IPAP and backup rate were adjusted to optimize ventilation with the aim of reducing PtcCO2. EPAP set at 5cmH20. (Titration took on average 5.2 [SD 2.8] days)	-IPAP: 28 (27.3-30) cmH20 -EPAP: 5 (5-5) cmH20 -Rate: 15.0 (15-15) breaths/minute
Paone, 2014[41] Observational	BPAP ST	-COPD (FEV1 < 50%) -NIPPV during hospital admission	-PaCO2 > 50 mmHg (after awakening from a night without NIPPV)	Maximum tolerated IPAP to target tidal volume of 6 mL/kg (measured body weight). EPAP set at 2-8 cmH2O. Backup rate set at 12 breaths/min.	-IPAP: 18.5 ± 2.66 cm H2O -EPAP: 3.9 ± 1 cm H2O -Rate: 12 breaths/minute

Author, Year, Study Design	Device/mode	Patient characteristics to start or continue device	Laboratory characteristics to start or continue device	Device titration	Actual ventilator usage and settings
Galli, 2014 [30] Observational	BPAP NOS	-COPD (ICD-9) -NIPPV during hospital admission	-PaCO2 > 45 mmHg	NR	-IPAP: 22.1 ± 6.2 cm H2O -EPAP: 5.9 ± 1.8 cm H2O
Bhatt, 2013[14] RCT	BPAP NOS	-COPD (FEV1 NOS) -Stable (no AECOPD in prior 4 weeks)	-PaCO2 <52 mmHg	IPAP set at 15 cmH2O. EPAP set at 5 cmH2O. Initiation performed in home by respiratory therapist over 1 week.	-IPAP: 15 cm H2O -EPAP: 5 cm H2O
Duiverman, 2011[23,24] RCT	BPAP ST	-COPD (FEV1<50%) -Stable (no AECOPD in prior 4 weeks)	-PaCO2 >6.0 kPa (45 mmHg) -pH >7.35 (daytime, room air)	Maximum tolerated IPAP to target PaCO2<6.0 kPa and PaO2 > 8.0 kPa.	Followup #1: -IPAP: 23 ± 4 cm H2O -EPAP: 6 ± 2 cm H2O -Rate: 18(3) breaths/minute Followup #2: -7.7 (5.8-8.5) hours/day -IPAP: 20 ± 4 cm H2O -EPAP: 6 ± 2 cm H2O -Rate: 18 ± 3 breaths/minute
Duiverman, 2019[26] RCT	BPAP ST started in the hospital	-COPD (FEV1<50%) -Stable (no AECOPD in prior 4 weeks)	-PaCO2 >6.0 kPa (45 mmHg) -pH >7.35 (daytime, room air)	Settings adjusted to achieve normocapnia during the night or at least a reduction in nocturnal mean PtCo2 of 20% compared with the first night of spontaneous breathing. Initiation period ended once the patient could sleep 6 consecutive hours with the ventilator and the gas exchange goals were achieved.	-7.5 ± 2.0 hours/day -IPAP: 25.7 ± 3.4 cm H2O -EPAP: 6.0 ± 1.3 cm H2O -Rate: 15.4 ± 3.0 breaths/minute
	BPAP ST started in the home using telemedicine				-8.2 ± 1.7 hours/day -IPAP: 23.6 ± 2.3 cm H2O -EPAP: 4.6 ± 0.9 cm H2O -Rate: 13.9 ± 2.0 breaths/minute
Oscroft, 2010[38] Observational	BPAP ST started in AECOPD	-COPD (FEV1 <50%) -NIPPV during hospital admission for AECOPD	-PaCO2 >7.5 kPa (56 mmHg) -pH 7.35-7.45 (daytime) or -PaCO2 >6.5 kPa (49 mmHg) -pH 7.35-7.45 + PtcCO2 >9 kPa (68 mmHg) (daytime)	NR	NR

Author, Year, Study Design	Device/mode	Patient characteristics to start or continue device	Laboratory characteristics to start or continue device	Device titration	Actual ventilator usage and settings
	BPAP ST started in stable COPD	-COPD (FEV1 <50%) -Stable (no current AECOPD)	-PaCO2 >7.5 kPa (56 mmHg) -pH 7.35-7.45 (daytime) or -PaCO2 >6.5 kPa (49 mmHg) -pH 7.35-7.45 + PtcCO2 >9 kPa (68 mmHg) (daytime)		
Cheung, 2010[17] RCT	CPAP	-NIPPV during hospital admission for AECOPD	-PaCO2 > 6 kPa (45 mmHg) -pH <7.35	CPAP set at 5 cmH2O	NR
	BPAP ST			Maximum tolerated IPAP (range 10 to 20 cmH2O) to target tidal volume 7-10 mL/kg. EPAP set at 5 cmH2O. Backup rate set at 14 breaths/min.	-7-9 hours/night -IPAP: 14.8 ± 1.1 cm H2O -EPAP: 5 ± 0 cm H2O
Casanova, 2000[16] RCT	BPAP S	-COPD (FEV1 <45%) -Stable (no AECOPD in prior 3 months)	NR	Maximum tolerated IPAP (≥8 cmH2O above EPAP) to target 20% decrease in respiratory rate and visible decrease in accessory muscle use and dyspnea. EPAP set at 4 cmH2O. (Titrated in hospital for 1 week).	-6.2 hours/day (at 3 months) -5.9 hours/day (at 6 months) -IPAP: 12 ± 2 cm H2O
Garrod, 2000[31] RCT	BPAP S	-COPD (FEV1 <50%) -Stable (no AECOPD in prior 4 weeks) -exercise intolerance due to dyspnea	NR	Maximum tolerated IPAP and EPAP. (Titrated over 1 week).	-IPAP: 16 (13-24) cm H2O -EPAP: 4 (4-6) cm H2O
Clini, 1998[19] Observational	BPAP ST	-COPD (FEV1<50%) -Stable (no AECOPD in prior 4 weeks) -LTOT ≥12 months -≥1 ICU admission due to AECOPD in prior 2 years	-PaCO2 >6 kPa (45 mmHg) -pH >7.35 -PaO2 <8 kPa (60 mmHg) (daytime, room air, rest)	Minimal IPAP to achieve an expiratory tidal volume > 8ml/kg. EPAP was set in order not to overcome the intrinsic PEEP. Backup rate set at 10 breaths/min.	-7.4 ± 1.3 hours/day -IPAP: 10-16 cm H2O -EPAP: 2-4 cm H2O
Clini, 1996[18] Observational	BPAP ST	-COPD (FEV1 30-49%) -LTOT ≥18 months -≥1 hospital admission due to AECOPD in prior 18 months	-PaCO2 >6.7 kPa (50 mmHg)	Minimal IPAP to achieve an expiratory tidal volume > 8ml/kg. Rate set at 10 breaths/min (Titration over 15 days in hospital).	NR

Author, Year, Study Design	Device/mode	Patient characteristics to start or continue device	Laboratory characteristics to start or continue device	Device titration	Actual ventilator usage and settings
Zhou, 2017[46] RCT	BPAP ST	-COPD (FEV1<50%) -Stable (no AECOPD in prior 4 weeks)	-Hypercapnia (daytime, rest) NOS	Maximum tolerated IPAP (≥ 10 cmH2O). EPAP set at 4 cmH2O. Backup rate set at 16 breaths/min.	-5.6 ± 1.4 hours/day -IPAP: 17.8 ± 2.08 cm H2O -EPAP: 4.2 ± 0.1 cm H2O
Marquez-Martin, 2014[35] RCT	BPAP ST	-COPD (FEV1<50%) -Stable (no AECOPD in prior 3 months)	-PaCO2 > 45 mmHg -PaO2 < 60 mmHg	Maximum tolerated IPAP (10-20 cmH2O) to target good clinical response and SaO2. EPAP set at 4 cmH2O. Backup rate set at 12 breaths/min.	-7 (6.5-9) hours nightly -IPAP: 16 cm H2O (median) (both NIPPV groups) -EPAP: 4 cm H2O (median, both NIPPV groups)
Köhnlein, 2014[34] RCT	BPAP ST	-COPD (FEV1<30%) -Stable (no AECOPD in prior 4 weeks)	-PaCO2 ≥ 7 kPa (53 mmHg) -pH ≥ 7.35 (daytime, rest)	Targeted to reduce baseline PaCO2 by ≥ 20% or achieve PaCO2 <6.5 kPa (49 mmHg).	-IPAP: 21.6 ± 4.7 cm H2O -EPAP: 4.8 ± 1.6 cm H2O -Rate: 16.1 ± 3.6 breaths/minute -Ventilator use measured in 48 (47%) of patients. In these 48 patients, 65% exceeded the prescribed usage of ≥ 6 hours daily)
De Backer, 2011[21] RCT	BPAP NOS	-COPD (FEV1<50%) -AECOPD requiring hospitalization	-PaCO2 >45 mmHg on day 5-12 of hospitalization	Targeted SaO2 >90% during 90% of time and reduction in PaCO2 ≥ 5% in 1 hour.	NR
Dreher, 2010[22] RCT	HMV (pressure controlled ventilation)	-COPD (Gold stage IV) -Stable (no current AECOPD).	-PaCO2 >45 mmHg (daytime) and PaCO2 >50 mmHg (nocturnal)	Maximum tolerated IPAP to target maximum reduction in PaCO2 (normocapnia if possible). EPAP set to avoid dynamic hyperinflation (3-6 cmH2O). I:E ratio set at 1:2 and modified per patient tolerance. Inspiratory flow trigger set to 3 l/min.	-IPAP: 28.6 ± 1.9 cm H2O -EPAP: 4.5 ± 0.7 cm H2O -Rate: 17.5 ± 0.7 breaths/minute
	HMV (pressure support ventilation)			IPAP set to 14-16 mbar. Backup rate set to 8 breaths/minute. Inspiratory flow trigger set to 3 l/min. Expiratory trigger set to 70% of maximal inspiratory flow.	-IPAP: 14.6 ± 0.8 cm H2O -EPAP: 4 ± 0 cm H2O -Rate: 8.0 ± 0 breaths/minute
McEvoy, 2009[36] RCT	BPAP S	-COPD (FEV1<50% or <1.5L) -Stable disease -LTOT for ≥3 months	-PaCO2 >46 mmHg (at least twice in prior 6 months during stability)	Maximum tolerated IPAP-EPAP difference (≥5 cmH2O). EPAP set at 3 cmH2O and titrated up to	-4.5 (3.2) hours/day -IPAP: 12.9 (12.5-13) cm H2O -EPAP: 5.1 (4.8-5.3) cm H2O

Author, Year, Study Design	Device/mode	Patient characteristics to start or continue device	Laboratory characteristics to start or continue device	Device titration	Actual ventilator usage and settings
				target reduction of snoring and obstructive hypopneas/apneas in polysomnogram. (Titration performed in elective hospital admission for 3-4 days.)	
Tsolaki, 2008[44] Observational	BPAP ST	-COPD (FEV1 <50%) -Stable (no AECOPD in prior 4 weeks)	-PaCO2>50 mmHg -PaO2<60 mmHg (room air)	IPAP and EPAP to target patient comfort, decreased accessory muscle use, lower respiratory rate, and decrease in PaCO2 >5% after 1 hour. (Titration in hospital).	-9 ± 2.2 hours/day -IPAP: 15.3 ± 2 cm H2O -EPAP: 5.4 ± 0.7 (4-8) cm H2O
Gay, 1996[32] RCT	BPAP ST versus sham CPAP lowest setting	-COPD (FEV1 < 40%) -Stable disease	-PaCO2 > 45 mmHg (daytime, rest)	IPAP set to 10 cmH2O. EPAP set to lowest possible. Backup rate to target patient comfort.	-5.1 ± 3.8 hours/day
Gad, 2015[29] Observational	BPAP ST	-COPD (FEV1 < 50%) -Stable (no AECOPD in prior 4 weeks) PaCO2>50 mmHg	-PaCO2 >50 mmHg -pH > 7.35 (daytime)	Maximum tolerated IPAP (targeting 15-20 cmH2O). EPAP 3-6 cmH2O. (Titration occurred in hospital over 2-3 day period.)	-IPAP: 15.5 ± 4.2 cm H2O -EPAP: 4.0 ± 0 cm H2O -9 ± 2 hours/day
Sin, 2007[42] RCT	BPAP NOS versus sham CPAP 4 cmH2O	-COPD (FEV1 NOS) -Stable disease		Maximum tolerated IPAP (maximum of 20 cmH2O). EPAP set at 4 cmH2O.	NR
Heinemann, 2011[33] Observational	BPAP (pressure controlled ventilation)	-COPD (FEV1 NOS) -invasive mechanical ventilation for AECOPD, pneumonia, or postoperative respiratory failure -prolonged weaning from invasive mechanical ventilation	-PaCO2>52.5mmHg or -pH<7.35 (recurrent acidosis)	NR	-IPAP: 22.7 ± 4.3 mbar -EPAP: 5.0 ± 1.3 mbar -Rate: 16.8 ± 3.0 breaths/minute
Budweiser, 2007[15] Observational	BPAP (pressure controlled ventilation)	-COPD (FEV1 <50%) -Stable and unstable disease	-PaCO2>50mmHg -pH<7.35 (recurrent acidosis)	Maximum tolerated IPAP to achieve maximum reduction in PaCO2.	-6.5 ± 2.5 hours/day -IPAP: 21.0 ± 4.0 cm H2O -EPAP: 4.5 ± 1.4 cm H2O -Rate: 17.3 ± 2.5 breaths/minute
Clini, 2002[20] RCT	BPAP ST	-COPD (FEV1 NOS) -Stable (no AECOPD in prior 4 weeks)	-PaCO2 >6.6 kPa (50 mmHg) -pH>7.35 (daytime, room air)	Maximum tolerated IPAP with goal decrease in PaCO2 >5% after 1 hour;	-9 ± 2 hours/day -IPAP: 14 ± 3 cm H2O -EPAP: 2 ± 1 cm H2O

Author, Year, Study Design	Device/mode	Patient characteristics to start or continue device	Laboratory characteristics to start or continue device	Device titration	Actual ventilator usage and settings
				and nocturnal SaO2≥90% for 90% of time. (Titration in hospital).	
Struik, 2014[43] RCT	BPAP ST	-COPD (FEV1 <50%) -NIPPV or invasive mechanical ventilation in hospital admission	-PaCO2 >6 kPa (45 mmHg)	Maximum tolerated IPAP to achieve normal PaCO2. Respiratory rate was set to match respiratory rate of patient, I:E set to 1:3 with a short rise time and then titrated on comfort.	-6.3 ± 2.4 hours/day -IPAP: 19.2 ± 3.4 cm H2O -EPAP: 4.8 ± 1.0 cm H2O -Rate: 15 ± 3 breaths/minute -Inspiratory time 1.1 ± 0.3 s
Durao, 2018[27] Observational	HMV/BPAP mix	-COPD (NOS) -AECOPD	NR	Maximum tolerated IPAP to achieve maximum reduction in PaCO2. Backup raespiratory rate was increased above resting respiratory rate if persistent hypercapnia. Pressure support ventilation was switched to pressure controlled ventilation if persistent hypercapnia. Volume assured pressure assisted/controlled ventilation was used if prolonged ventilation (>12 hours/day) or intolerant to IPAP >25 cmH2O)	-8.8 ± 4.3 hours/day -IPAP: 23.7 ± 5.3 cm H2O -Rate: 15.2 ± 1.4 breaths/minute
	HMV/BPAP mix	-COPD (NOS) -Stable (no current AECOPD)			-8.9 ± 2.1 hours/day -IPAP: 23.4 ± 5.3 cm H2O -Rate: 15.2 ± 1.4 breaths/minute
Duiverman, 2017[25] RCT	HMV /BPAP mix (pressure controlled ventilation)	-COPD (FEV1 NOS) -Stable (no AECOPD in prior 4 weeks) -≥ 2 AECOPD with acute hypercapnic respiratory failure (pH<7.35) per year	-PaCO2 ≥6.7 kPa (50 mmHg) (daytime) or -PaCO2 ≥7.3 kPa (55 mmHg) (nighttime) or -Nighttime rise in PtCO2 ≥1.3 kPa (10 mmHg)	Maximum tolerated IPAP to achieve maximum reduction in PaCO2. Backup rate set just above spontaneous breathing frequency. EPAP set at 4-6cm H2O.	-4.6 (0.11-9.2) hours/day -IPAP: 23.6 ± 3.1 cm H2O -EPAP: 5.4 ± 0.9 cm H2O -Rate: 15.4 ± 0.8 breaths/minute
	HMV /BPAP mix (pressure support ventilation)			Maximum tolerated IPAP, with maximum IPAP of 18 cmH2O and maximum backup rate of 14 breaths/minute	-4.2 (0.04-7.5) hours/day -IPAP: 15.5 ± 1.1 cm H2O -EPAP: 5.2 ± 0.6 cm H2O -Rate: 11.6 ± 1.5 breaths/minute
Funk, 2011[28] RCT	BPAP NOS for 6 months	-COPD "standard criteria" NOS	-PaCO2 > 45 mmHg	Maximum tolerated IPAP (10-20 cmH2O). EPAP set	NR

Author, Year, Study Design	Device/mode	Patient characteristics to start or continue device	Laboratory characteristics to start or continue device	Device titration	Actual ventilator usage and settings
	BPAP NOS more than 6 months	-AECOPD requiring NIPPV or invasive ventilation -chronic nocturnal NIPPV use at home for ≥ 6 months	(stable, measured immediately after awakening from a night without mechanical ventilation	to 5 cmH2O. Inspiratory time was limited to a maximum of 1.3 s to avoid leak-induced prolongation of inspiration.	
Vasquez, 2017[45] cohort	BPAP NOS versus CPAP NOS versus HMV NOS	-COPD (ICD-9)	NR	NR	NR
Oscroft, 2010[39] RCT	BPAP (pressure controlled ventilation)	-COPD, FEV1<50%, FEV1/FVC<70%, TLC>80%, >20 pack year smoking history -Stable (no current AECOPD: no increased breathlessness, cough or sputum in the prior 4 weeks, no increase in PaCO2 and no decrease in FEV1 since study initiation) -Chronic nocturnal NIPPV use at home for ≥ 3 months	-pH 7.35-7.45 -PaCO2>7.5 kPa or PtcCo2>9kPa	NR	NR
Satici, 2018[47] Observational	BPAP S Treatment adherent (≥4 hours per day on ≥70% of days)	-COPD -Prescribed home NIPPV for 6 months -PaCO2 >55mmHg or PaCO2 50-55mmHg and nocturnal desaturation (<88% for at least 5 min) or -2 hospitalizations in 1 year	-PaCO2 >55mmHg or PaCO2 50-55mmHg and nocturnal desaturation (<88% for at least 5 min) or 2 hospitalizations in 1 year	NR	-8.3± 4.0 hours/day -IPAP: 22.3 ± 3.9 cm H2O -EPAP: 8.3 ± 1.5 cm H2O
	BPAP S Treatment non-adherent				-2.1± 2.0 hours/day -IPAP: 20.9 ± 3.5 cm H2O -EPAP: 7.7 ± 1.6 cm H2O

AECOPD: acute exacerbation of chronic obstructive pulmonary disease, BPAP: Bilevel Positive Airway Pressure, cmH2O: centimeters of water (pressure), COPD; chronic obstructive pulmonary disease, CPAP: Continuous Positive Airway Pressure, EPAP: expiratory positive airway pressure, FEV1: Forced expiratory volume in one second, HMV: Home Mechanical Ventilation, ICU: Intensive Care Unit, IPAP: inspiratory positive airway pressure, IVAPS: intelligent volume assured pressure support, kPa: kilopascal, LTOT: long term oxygen therapy, mmHg: millimeters of mercury (pressure), NIPPV: Noninvasive positive pressure Ventilation, NOS: Not otherwise Specified, PaO2: partial pressure of arterial oxygen, PaCO2: partial pressure of arterial carbon dioxide, PEEP: positive end expiratory pressure, pH: potential of hydrogen, PSV: Pressure support ventilation, RCT: randomized controlled trial, S: spontaneous mode, SaO2: arterial blood oxygen saturation, ST: spontaneous/timed breath mode

eTable 8. Risk of bias for randomized controlled trials (Cochrane ROB tool) for included studies

Author, Year	Sequence Generation	Allocation Concealment	Blinding of Participants, Personnel	Blinding of Outcome Assessors	Incomplete Outcome Data	Selective Outcome Reporting	Other Sources of Bias	Overall RoB
Bhatt, 2013[14]	Low ROB	Low ROB	High ROB	Unclear	Low ROB	Low ROB	High ROB	High ROB
Casanova, 2000[16]	Low ROB	Unclear	High ROB	Low ROB	Unclear	Unclear	Unclear	High ROB
Cheung, 2010[17]	Low ROB	Low ROB	High ROB	Unclear	High ROB	Low ROB	Low ROB	High ROB
Clini, 2002[20]	Unclear	Low ROB	High ROB	Low ROB	High ROB	Low ROB	High ROB	High ROB
De Backer, 2011[21]	Unclear	Unclear	Unclear	Unclear	Low ROB	Unclear	Low ROB	Moderate ROB
Dreher, 2010[22]	Unclear	Unclear	High ROB	High ROB	Low ROB	Unclear	High ROB	High ROB
Duiverman, 2008, 2011[23,24]	Low ROB	Unclear	High ROB	Unclear	Low ROB	Low ROB	Low ROB	Moderate ROB
Duiverman, 2017[25]	Unclear	Unclear	High ROB	High ROB	High ROB	Low ROB	High ROB	High ROB
Duiverman, 2019[26]	Unclear	Unclear	High ROB	High ROB	High ROB	Low ROB	Low ROB	High ROB
Funk, 2011[28]	Low ROB	Unclear	High ROB	High ROB	Low ROB	Low ROB	Low ROB	Moderate ROB
Garrod, 2000[31]	Unclear	Low ROB	High ROB	Unclear	Low ROB	Unclear	Unclear	High ROB
Gay, 1996[32]	Unclear	Unclear	High ROB	High ROB	Low ROB	Unclear	Unclear	High ROB
Köhnlein, 2014[34]	Low ROB	Low ROB	High ROB	Low ROB	Low ROB	Low ROB	High ROB	High ROB
Marquez-Martin, 2014[35]	Low ROB	Unclear	High ROB	Unclear	Low ROB	Unclear	Low ROB	Moderate ROB
McEvoy, 2009[36]	Low ROB	Low ROB	High ROB	Unclear	Low ROB	Low ROB	Low ROB	Moderate ROB
Murphy, 2017[37]	Low ROB	Low ROB	High ROB	Low ROB	Low ROB	Low ROB	High ROB	High ROB
Oscroft, 2010[39]	Low ROB	Unclear	High ROB	Unclear	Low ROB	Low ROB	Low ROB	Moderate ROB
Oscroft, 2014[40]	Low ROB	Low ROB	High ROB	High ROB	Low ROB	Unclear	High ROB	High ROB
Sin, 2007[42]	Low ROB	Unclear	Low ROB	Low ROB	Unclear	Unclear	Unclear	Moderate ROB
Struik, 2014[43]	Low ROB	Unclear	High ROB	Unclear	Low ROB	Low ROB	High ROB	Moderate ROB
Zhou, 2017[46]	Low ROB	Low ROB	High ROB	Low ROB	Low ROB	Unclear	High ROB	High ROB

ROB: Risk of Bias

eTable 9. Risk of bias for observational studies (Newcastle-Ottawa Quality Assessment Scale) for included studies

Author, Year	Representativeness of the Study Population	Ascertainment of Exposure	Assessment of Outcome	Adequate of Followup	Conflict of Interest	Overall RoB
Budweiser, 2007[15]	Low ROB	Low ROB	Low ROB	Low ROB	Low ROB	Low ROB
Clini, 1996[18]	High ROB	Low ROB	Low ROB	Low ROB	Unclear	High ROB
Clini, 1998[19]	High ROB	Low ROB	Low ROB	Low ROB	Low ROB	Low ROB
Durao, 2018[27]	Low ROB	Low ROB	Low ROB	Unclear	Low ROB	Low ROB
Gad, 2015[29]	Low ROB	Low ROB	High ROB	Low ROB	Low ROB	Moderate ROB
Galli, 2014[30]	Low ROB	Low ROB	Low ROB	Low ROB	High ROB	Low ROB
Heinemann, 2011[33]	Low ROB	Low ROB	High ROB	Low ROB	Unclear	High ROB
Oscroft, 2010[38]	High ROB	Low ROB	Low ROB	Low ROB	Unclear	Moderate ROB
Paone, 2014[41]	Low ROB	Low ROB	Low ROB	High ROB	Low ROB	Low ROB
Tsolaki, 2008[44]	High ROB	Low ROB	High ROB	Low ROB	Unclear	High ROB
Vasquez, 2017[45]	Low ROB	Low ROB	Unclear	Unclear	Unclear	Moderate ROB
Satici,2018[47]	High ROB	Low ROB	Low ROB	Low ROB	Low ROB	Moderate ROB

ROB: Risk of Bias

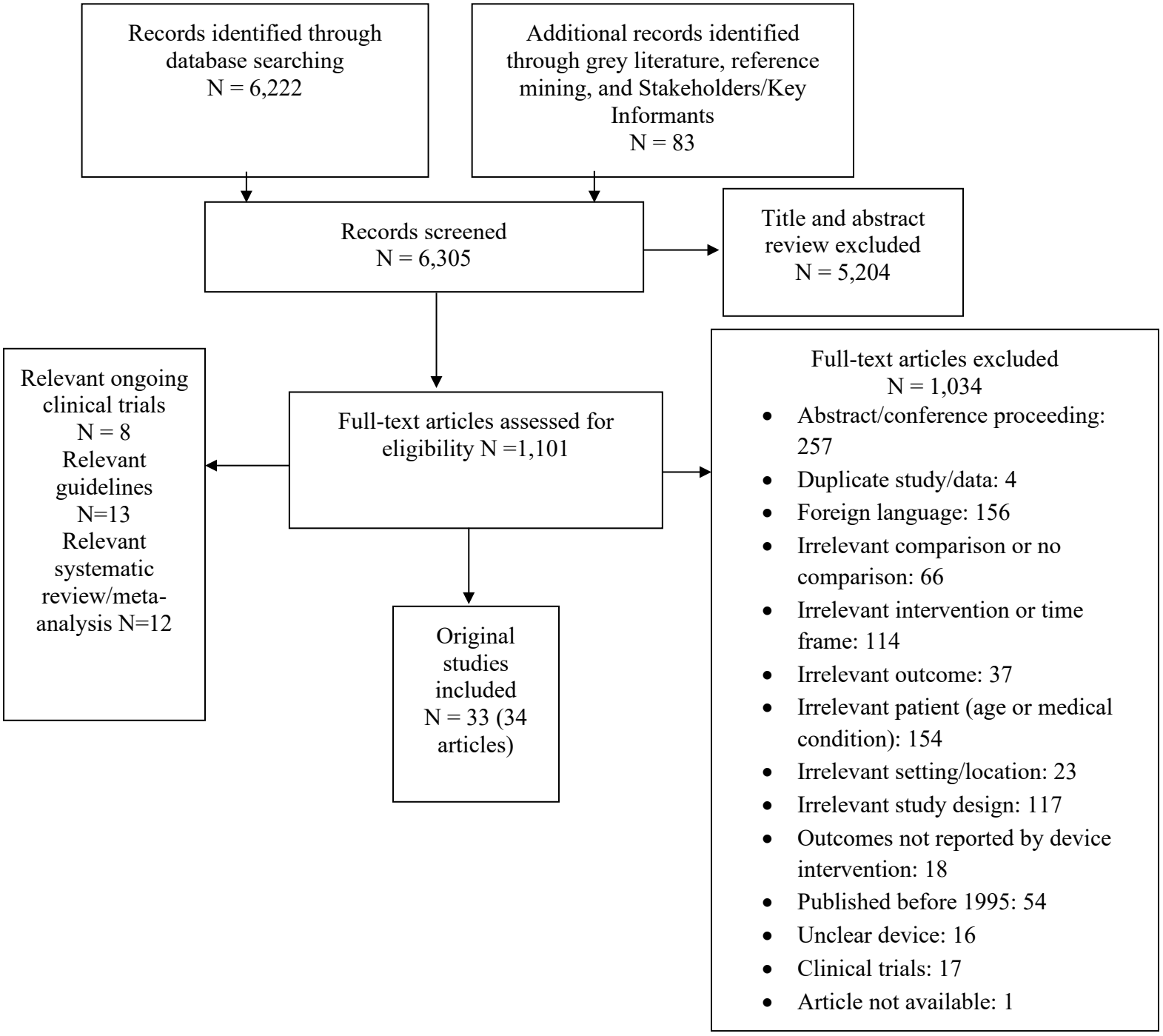
eTable 10. Effectiveness outcomes in patients with COPD who used home NIPPV (compared with other NIPPV devices or device settings)

Comparison	Outcome	Study Design	Findings	Overall Evidence Strength (Direction of Effect)
HMV vs. CPAP	Number of patients with all-cause hospital admission	1 Observational study[45]; 39,700 patients	Significantly less in HMV than CPAP (p<0.001)	Low (reduction with HMV)
	Number of patients with hospital admission for respiratory causes	1 Observational study[45]; 39,700 patients	Significantly less in HMV than CPAP (p=0.01)	N/A
HMV vs. BPAP	Number of patients with all-cause hospital admission	1 Observational study[45]; 9,471 patients	Significantly less in HMV than BPAP (p<0.001)	Low (reduction with HMV)
BPAP vs. CPAP	Number of patients with exacerbations	1 RCT[17]; 49 patients	30.43% vs. 53.85%; RD: -0.23, 95% CI: -0.50 to 0.03; OR: 0.38, 95% CI: 0.12 to 1.22; I^2= N/A	N/A
BPAP volume assured pressure support ventilation vs. BPAP ST	Mortality	1 RCT[40]; 40 patients	5.00% vs. 10.00%; RD: -0.05, 95% CI: -0.21 to 0.11; OR:0.47; 95% CI: 0.04 to 5.69; I^2= N/A	Insufficient
	Quality of life (Saint George's Respiratory Questionnaire, higher score represents worse outcome)	1 RCT[40]; 40 patients	WMD: -4.70; 95% CI: -15.97 to 6.57; I^2=N/A	Insufficient
	Shuttle Walk Test	1 RCT[40]; 40 patients	WMD: -4.00 meters; 95% CI:-54.24 to 46.24; I^2=N/A	N/A
	Sleep quality (Epworth Sleepiness Scale, higher score represents worse outcome)	1 RCT[40]; 40 patients	WMD: -2.70; 95% CI: -6.07 to 0.67; I^2=N/A	N/A
	Dyspnea (Medical research council scale, higher score represents worse outcome)	1 RCT[40]; 40 patients	WMD: -0.70; 95% CI: -1.60 to 0.20; I^2=N/A	N/A
HMV (pressure controlled ventilation) vs. HMV (pressure support ventilation)	Quality of life (Severe Respiratory Insufficiency Questionnaire Summary Score, higher score represents better outcome)	1 RCT[22]; 17 patients	WMD: -0.14, 95% CI: -4.90 to 4.60; I^2=N/A	Insufficient
	6-minute walk distance test (meters)	1 RCT[22]; 17 patients	WMD: 14; 95% CI: -42 to 70; I^2=N/A	N/A
BPAP for 6 months vs. BPAP for more than 6 months	6-minute walk distance test (meters)	1 RCT[28]; 26 patients	43% increase vs. 11% decrease, p=0.04	N/A
	Quality of life (Saint George's Respiratory Questionnaire, higher score represents worse outcome)	1 RCT[28]; 26 patients	57 vs. 53, p=0.80	N/A
	Number of patients with ICU admission	1 RCT[28]; 26 patients	23.08% vs. 15.38%; RD: 0.08, 95% CI: -0.23 to 0.38; OR: 1.65; 95% CI: 0.23 to 11.99, I^2=N/A	N/A
HMV/BPAP mix (pressure controlled ventilation) (high intensity) vs. HMV/BPAP	Quality of life (the COPD assessment test, higher score represents worse outcome)	1 RCT[25]; 14 patients	WMD: 2.30, 95% CI: -2.35 to 6.95, I^2=N/A	N/A

Comparison	Outcome	Study Design	Findings	Overall Evidence Strength (Direction of Effect)
mix (pressure support ventilation) (low intensity)				
BPAP S Treatment adherent (≥4 hours per day on ≥70% of days) vs. BPAP S Treatment non-adherent	Number of all-cause hospital admissions	1 Observational study[47], 54 patients	0.4 vs. 1.0 (p<0.01)	Low (reduction with BPAP S Treatment adherent)
	Number of ICU admission	1 Observational study[47], 54 patients	0.6 vs. 1.2 (p=0.37)	N/A
BPAP ST started in the home using telemedicine vs. BPAP ST started in the hospital	Mortality	1 RCT[26], 67 patients	6.06% vs. 2.94%; RD: 0.03, 95% CI:-0.07 to 0.13; OR: 2.13; 95% CI: 0.18 to 24.67; I^2=N/A	Insufficient
	Quality of life (Severe Respiratory Insufficiency Questionnaire Summary Score, higher score represents better outcome)	1 RCT[26], 67 patients	WMD: -1.20; 95% CI: -9.92 to 7.52; I^2=N/A	Insufficient
	Dyspnea (Medical research council scale, higher score represents worse outcome)	1 RCT[26], 67 patients	WMD: 0.10; 95% CI: -0.50 to 0.70; I^2=N/A	N/A
	6-minute walk distance test (meters)	1 RCT[26], 67 patients	WMD: -19.00; 95% CI: -64.60 to 29.60; I^2=N/A	N/A
	Number of all-cause hospital admissions	1 RCT[26], 67 patients	WMD: -0.10; 95% CI: -0.60 to 0.40; I^2=N/A	Insufficient
	Number of exacerbations	1 RCT[26], 67 patients	No significant difference between the two groups	N/A

AECOPD: acute exacerbation of chronic obstructive pulmonary disease, BPAP: bi-level positive airway pressure, CI: confidence interval, COPD: chronic obstructive pulmonary disease, CPAP: continuous positive airway pressure, HMV: home mechanical ventilation, N/A: not applicable, NOS: not otherwise specified, OR: odds ratio, RCT: randomized controlled trial, RD: risk difference; ST: spontaneous/timed mode, WMD: weighted mean difference

Figure 1. Flow chart



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