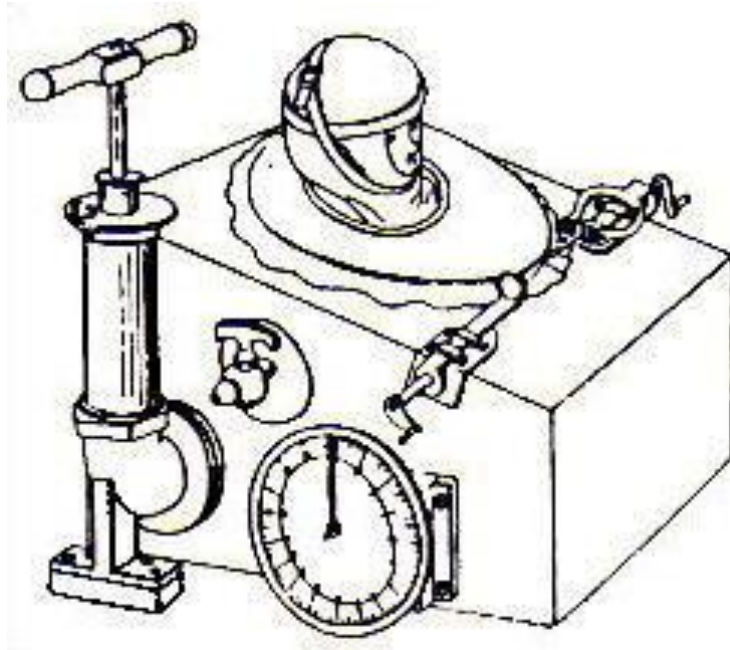


VNI à domicile au cours de la BPCO, pour quels patients ?



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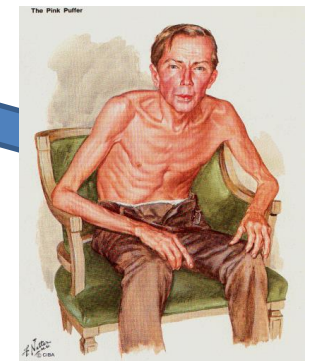
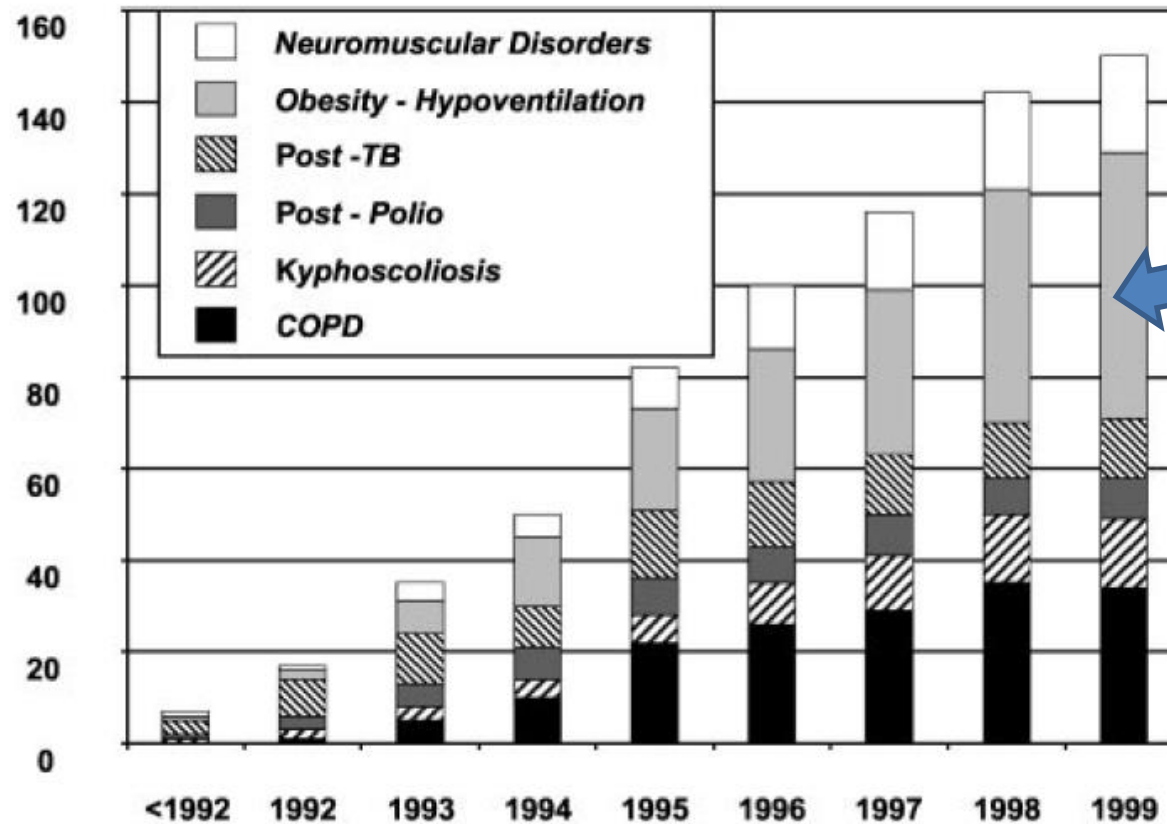


FIGURE 2. Yearly count of the cumulative population of patients treated by NPPV during the study period (1992 to 2000), by diagnostic category.

Qu'en est-il du recours à la VNI lors de BPCO en Europe?

Eur Respir J 2005; 25: 1025–1031
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Patterns of home mechanical ventilation use in Europe: results from the Eurovent survey

S.J. Lloyd-Owen*, **G.C. Donaldson***, **N. Ambrosino[#]**, **J. Escarabill[†]**, **R. Farre⁺**,
B. Fauroux[§], **D. Robert[‡]**, **B. Schoenhofer****, **A.K. Simonds^{##}** and **J.A. Wedzicha***

Lloyd-Owen SJ et al, Eur Respir J 2005

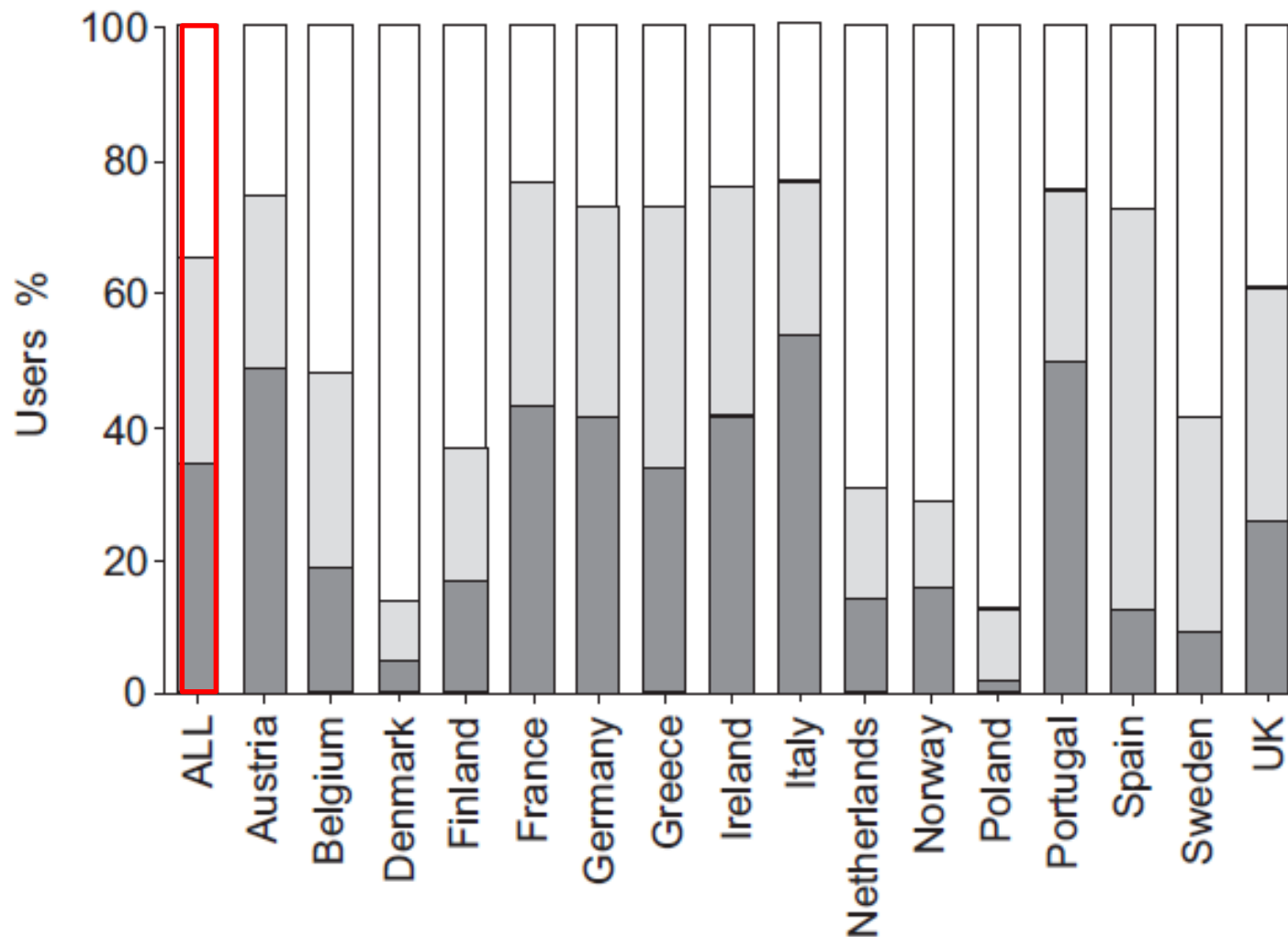
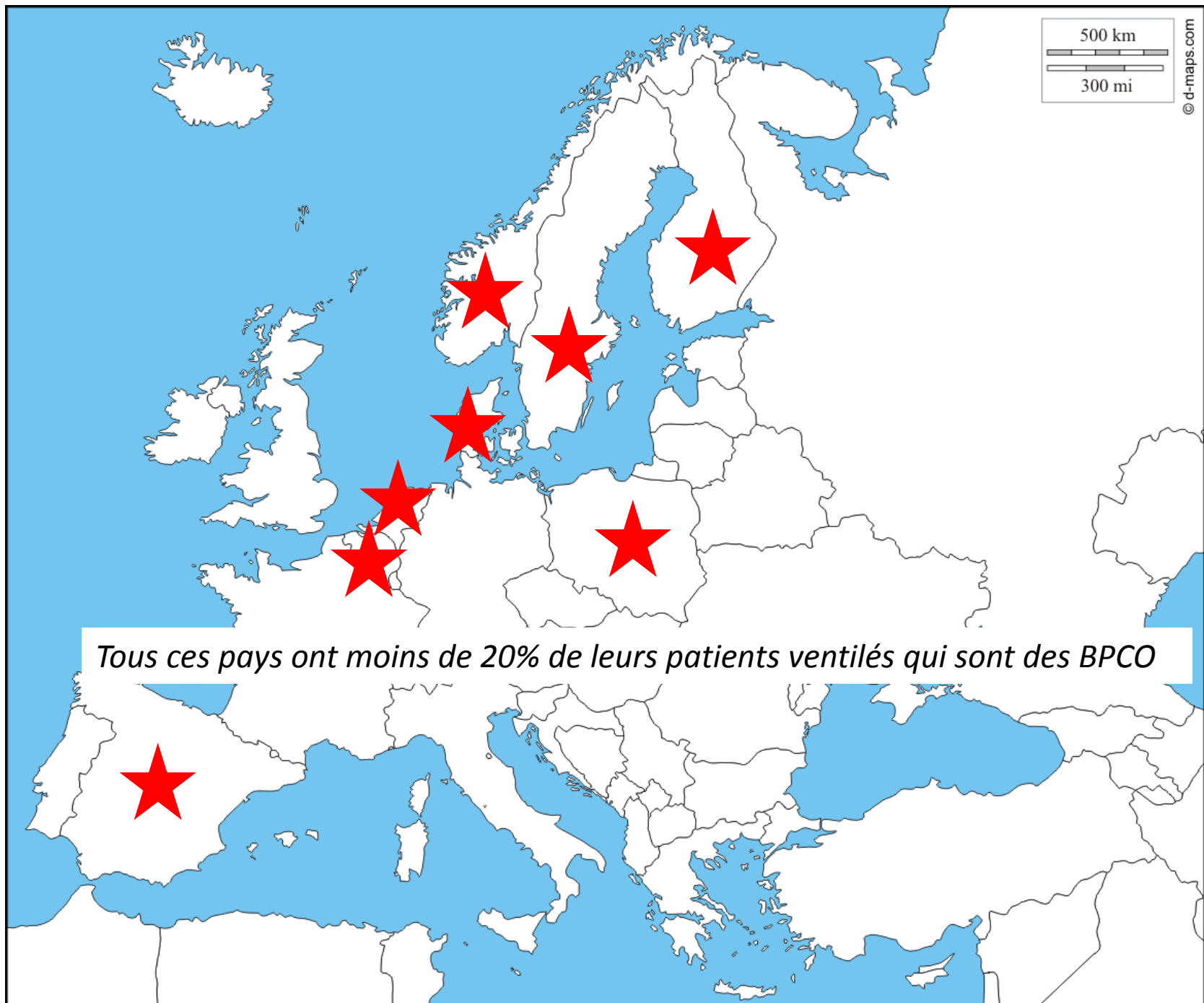
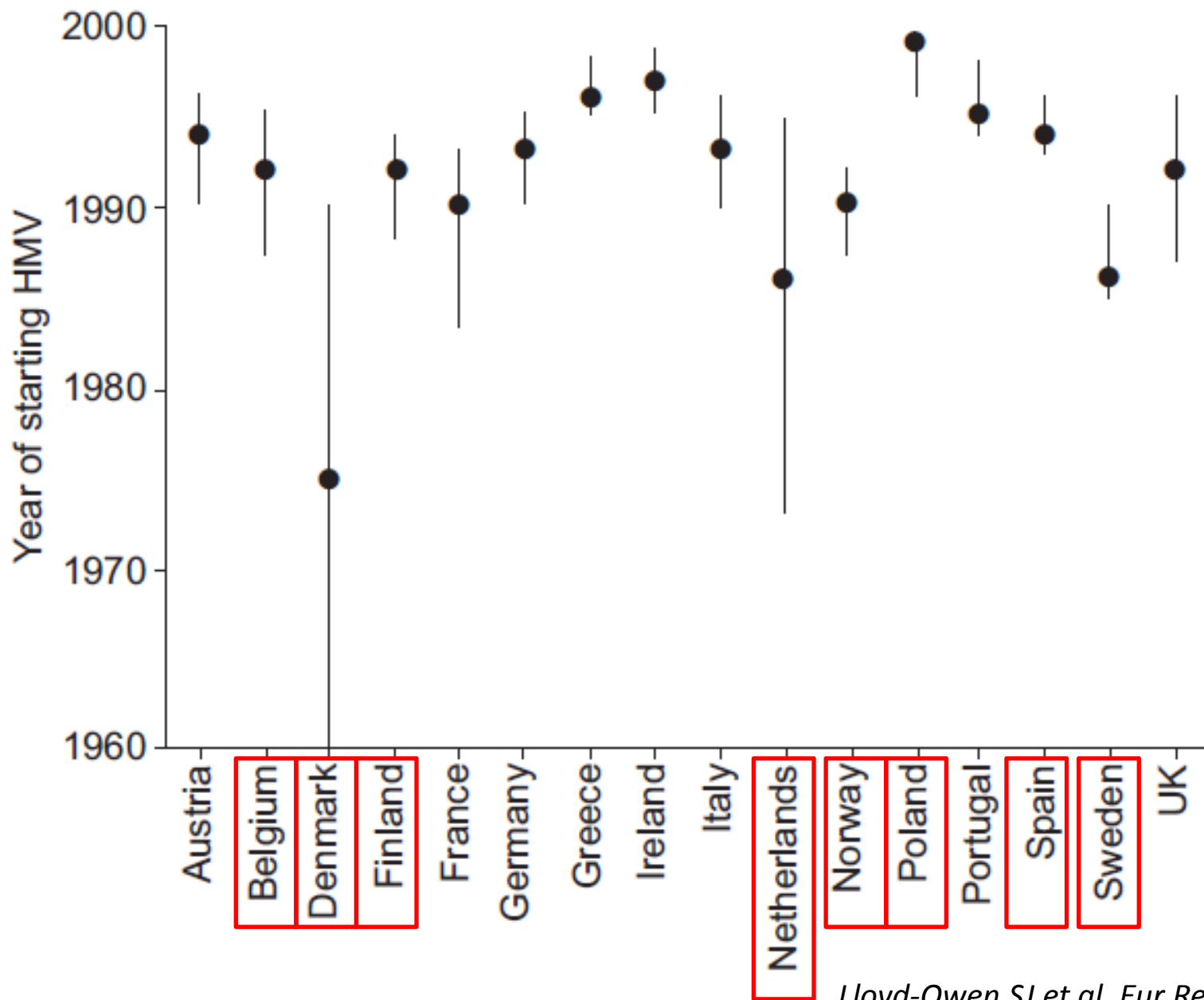


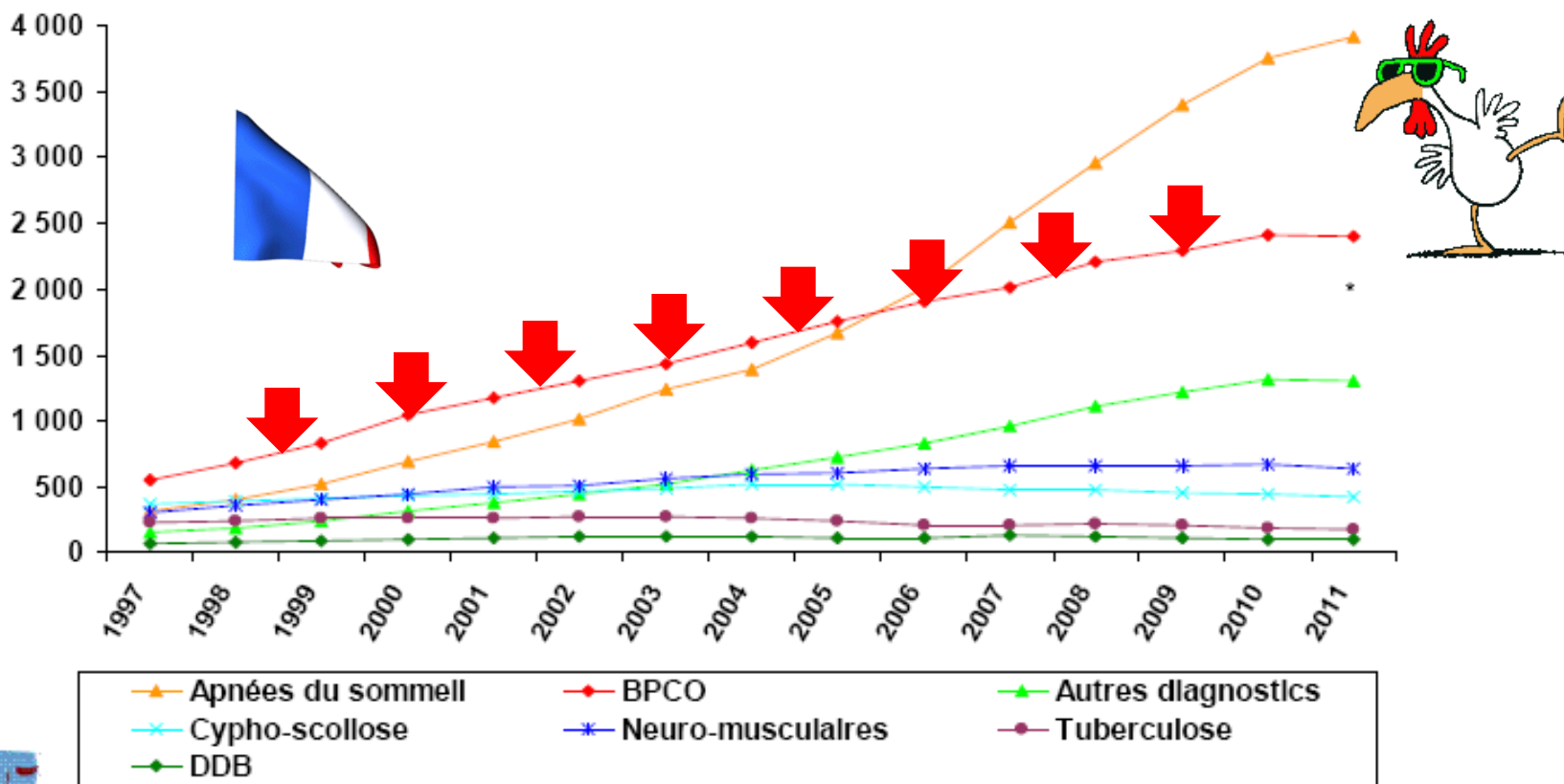
FIGURE 4. Percentage of users in each disease category by country (see *Methods* section for an explanation of disease categories). ■: lung/airways; ■: thoracic cage; □: neuromuscular.





Lloyd-Owen SJ et al, Eur Respir J 2005

BPCO et VNI: données de l'observatoire de l'ANTADIR

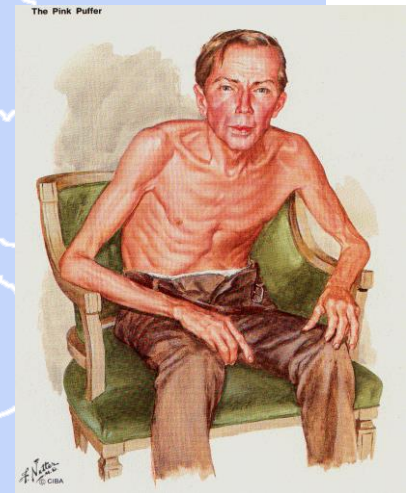


* 2011 : données non exhaustives

Observatoire des patients de l'ANTADIR - 2011

Domiciliary Non-invasive Ventilation in COPD: An International Survey of Indications and Practices

Claudia Crimi, Alberto Noto, Pietro Princi, Antoine Cuvelier, Juan F. Masa, Anita Simonds, Mark W. Elliott, Peter Wijkstra, Wolfram Windisch & Stefano Nava



COPD: Journal of Chronic Obstructive Pulmonary Disease, 13:4, 483-490.

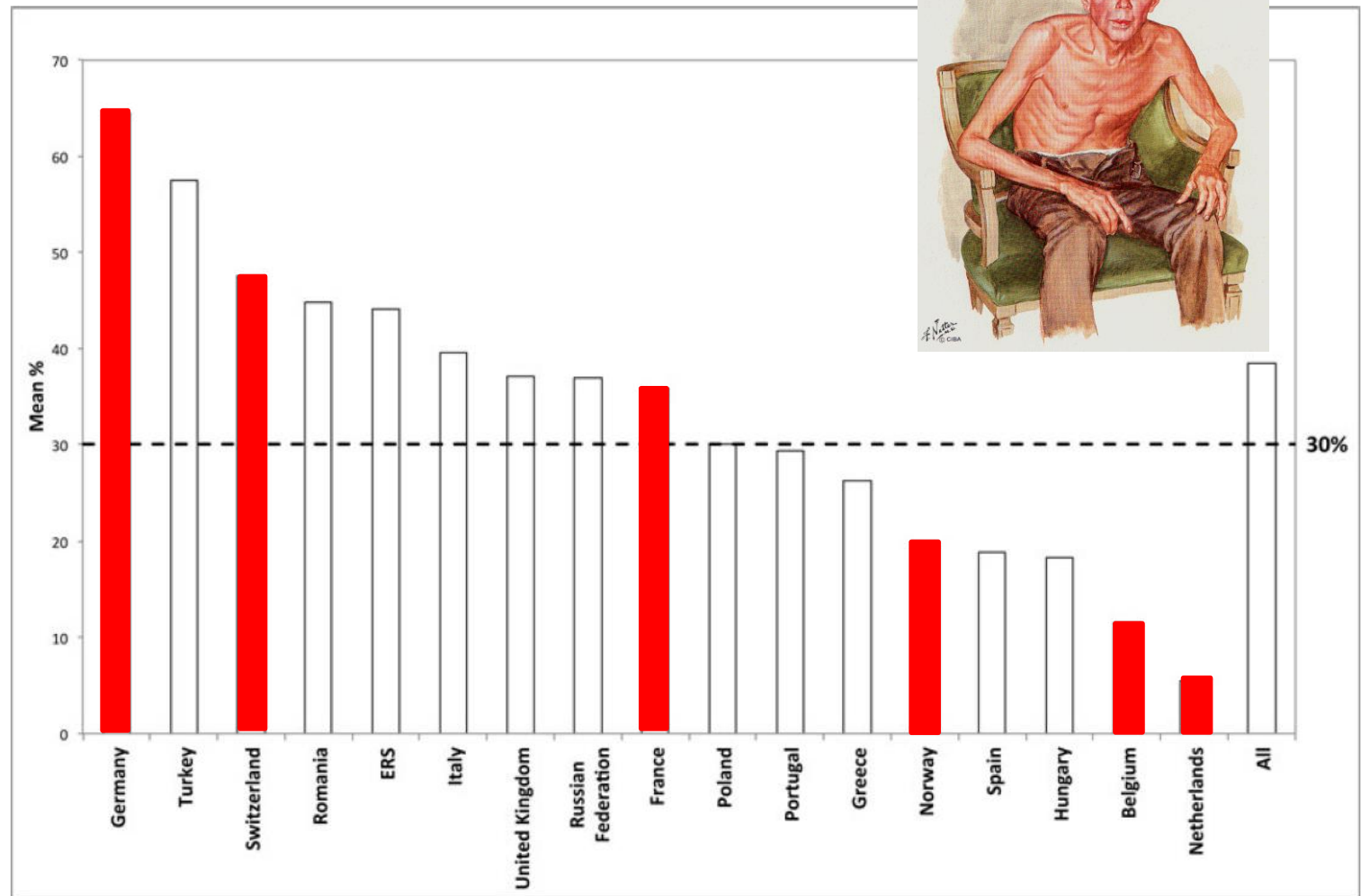


Figure 1. Percentage of domiciliary NIV prescriptions in COPD patients among countries. Abbreviations: ERS = members of European Respiratory Society (ERS) assembly on NIV; ALL = all respondents.

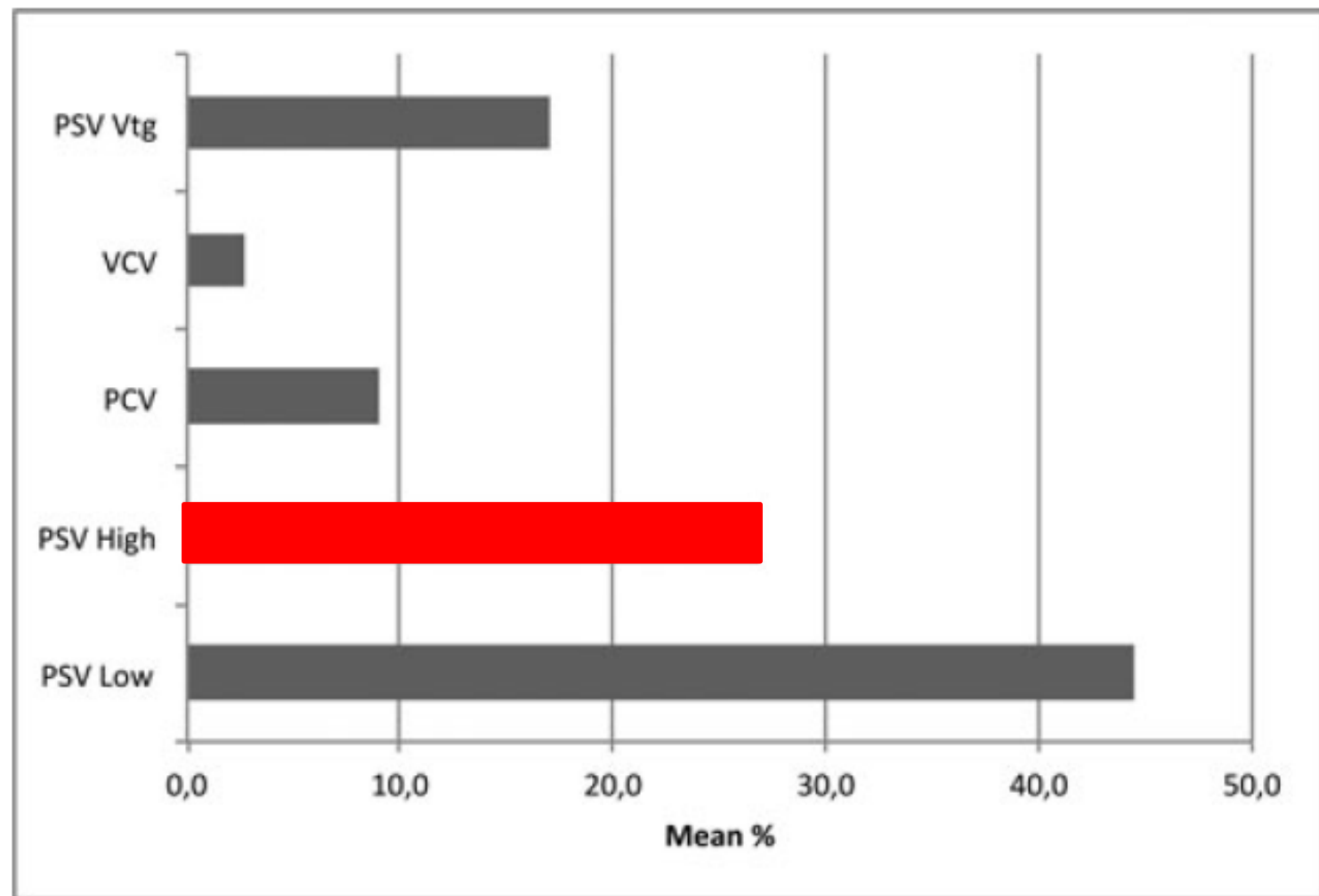


Figure 5. Ventilation mode utilization for domiciliary NIV in severe stable COPD patients. Abbreviations: PSV Low = PSV with low inspiratory support (Pressure support < 20 cm H₂O); PSV High = PSV with high inspiratory support (Pressure support > 20 cm H₂O); PCV = Pressure control ventilation; VCV = Volume control ventilation; PSV-Vtg = Pressure support with volume guarantee.

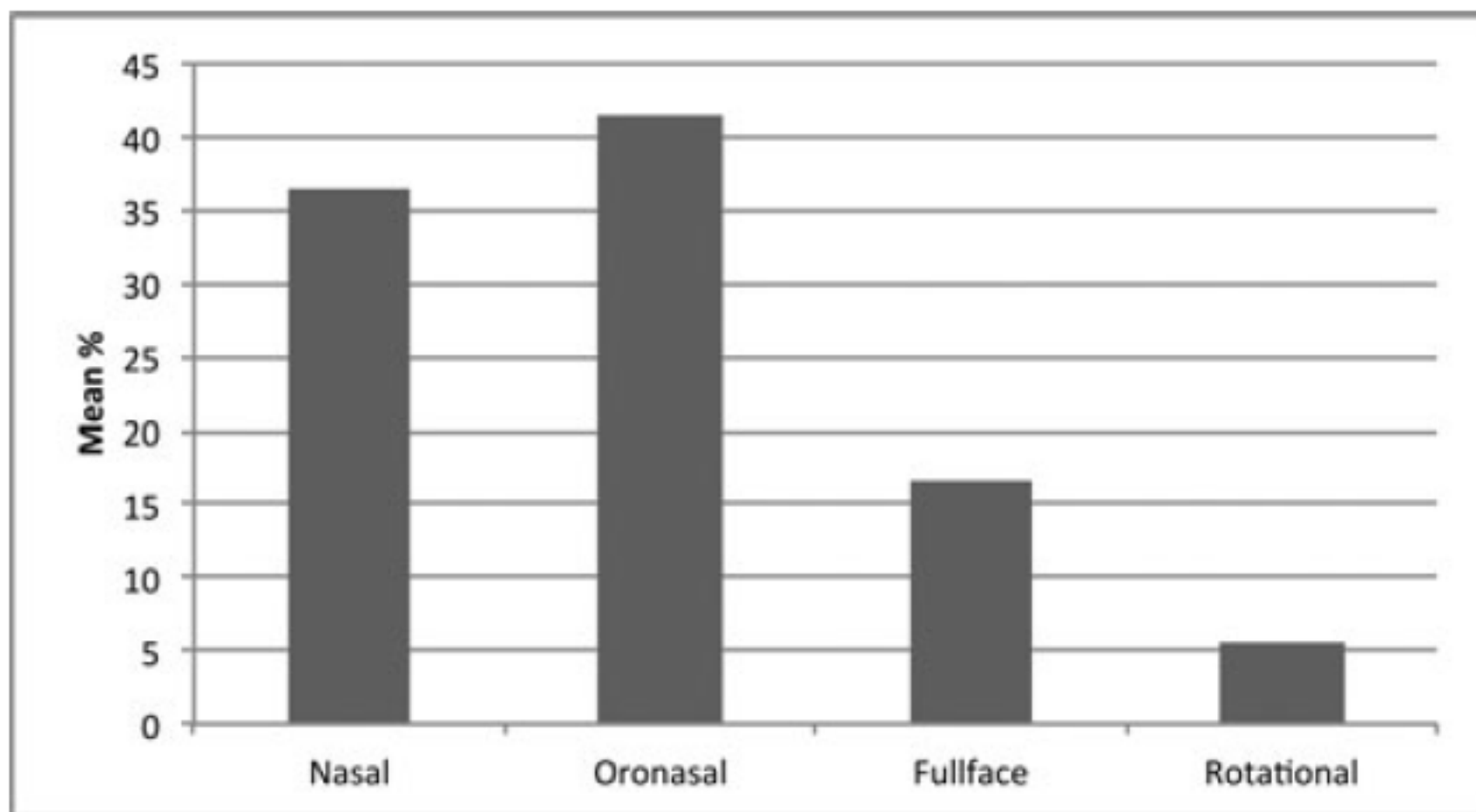


Figure 7. Interface utilization for domiciliary NIV in COPD patients. Nasal = nasal mask; Oronasal = oronasal mask; Fullface = fullface mask; Rotational = rotational strategy.

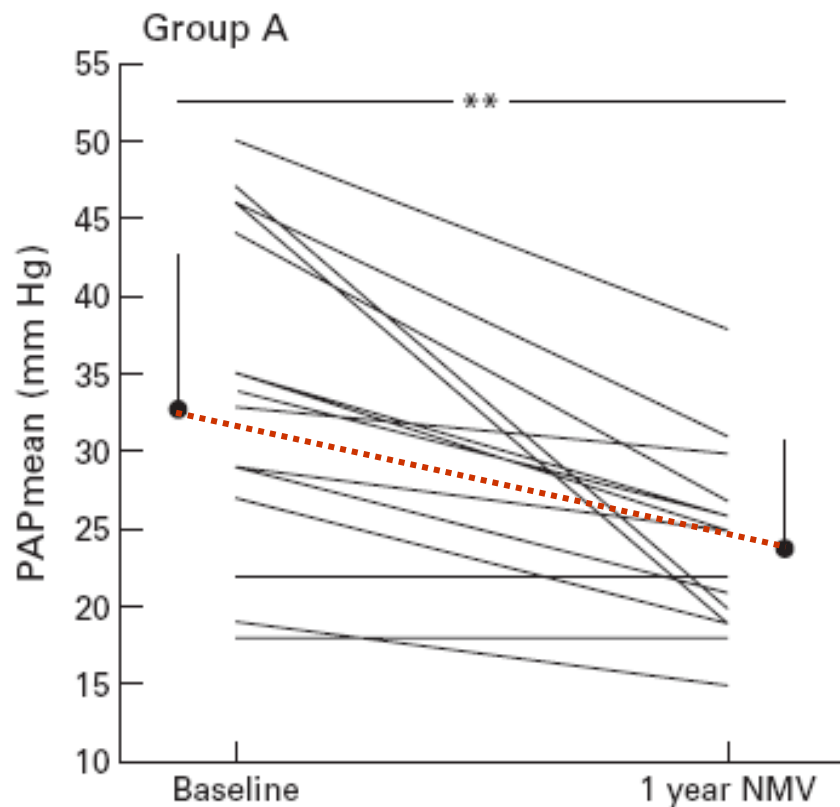
VNI et BPCO: constats

- Constat: utilisation très variable d'un pays à l'autre en Europe
- Plusieurs pays d'Europe occidentale dans lesquels la VNI est largement implantée ont moins de 20% de leurs patients sous VNI pour BPCO
- En France, augmentation linéaire des cas depuis la fin des années '90
- La stratégie prônée par nos collègues allemands (Haute intensité) n'est appliquée que dans 25% des cas

Cela «fait-il du sens» sur le plan physiopathologique?

- La fatigue des muscles respiratoires lors de BPCO sévère au repos et en situation chronique n'est pas démontrée
- Bien qu'en situation mécanique défavorable, leur force paraît aussi conservée (*T Similowski, N Engl J Med, 1991*)
- L'effet protecteur de la VNI sur l'apparition d'un cœur pulmonaire et d'une hypertension pulmonaire n'est pas démontré lors de BPCO (*B Schönhofer et al; Thorax 2001*)
- Le traitement des apnées centrales lors de cardiopathie fait aussi du sens... (cf SERVE-HF)

Restrictive CRF



Obstructive CRF

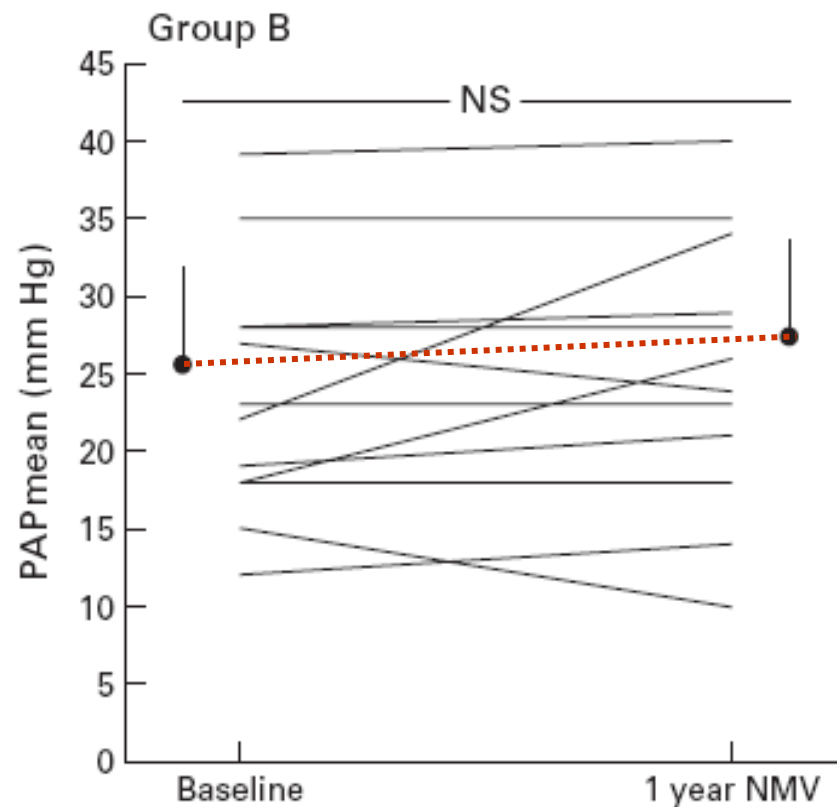


Figure 1 Individual values of mean pulmonary artery pressure (PAPmean) before and after 1 year of NMV in patients with thoracic restriction (group A) and patients with COPD (group B). ** $p < 0.01$ (Wilcoxon).

Que dit la littérature? (depuis 2009)

PaO ₂ (mm Hg, air)	52.5 (50.1 to 54.9) (n = 62)	54.8 (52.4 to 57.2) (n = 61)
Paco ₂ (mm Hg, air)	54.4 (52.6 to 56.2) (n = 62)	52.6 (51.0 to 54.2) (n = 61)
SGRQ	64.1 (49.9–70.8)*	69 (57.2–77.2)*

Table 2 Baseline sleep study results in the control and treatment groups and effects of NIV treatment on sleep architecture and gas exchange during sleep in the treatment group

	LTOT	NIV + LTOT	NIV + LTOT
	Baseline	Baseline	NIV treatment
Total sleep time (min)	243 (226 to 260)	249 (231 to 267)	252 (234 to 271)
Sleep efficiency (%)	61.0 (56.8 to 65.2)	59.6 (55.4 to 63.8)	59.7 (55.7 to 63.7)
% NREM	85.0 (83.0 to 87.0)	86.7 (84.6 to 88.8)	82.6 (80.4 to 84.8)*
% REM	15.2 (13.2 to 17.3)	13.3 (11.2 to 15.4)	17.5 (15.3 to 19.7)*
Apnoea-hypopnoea index (events/h)	6.1 (4.8 to 7.5)	4.5 (3.4 to 5.6)	2.8 (1.6 to 4.0)*
Tcco ₂ sleep increase (mm Hg)	18.8 (16.5 to 21.0)	16.5 (14.7 to 18.3)	12.6 (10.9 to 14.3)*
IPAP (cm H ₂ O)			12.9 (12.5 to 13.4)
EPAP (cm H ₂ O)			5.1 (4.8 to 5.3)

Values are mean (95% CI).

*p<0.05 compared with corresponding baseline values.

EPAP, expiratory partial airway pressure; IPAP inspiratory partial airway pressure; LTOT, long-term oxygen therapy; NIV + LTOT, nocturnal non-invasive ventilation plus long-term oxygen therapy; % NREM, non-rapid eye movement sleep expressed as a percentage of total sleep time; % REM, rapid eye movement sleep expressed as a percentage of total sleep time; Tcco₂, transcutaneous partial pressure of carbon dioxide.

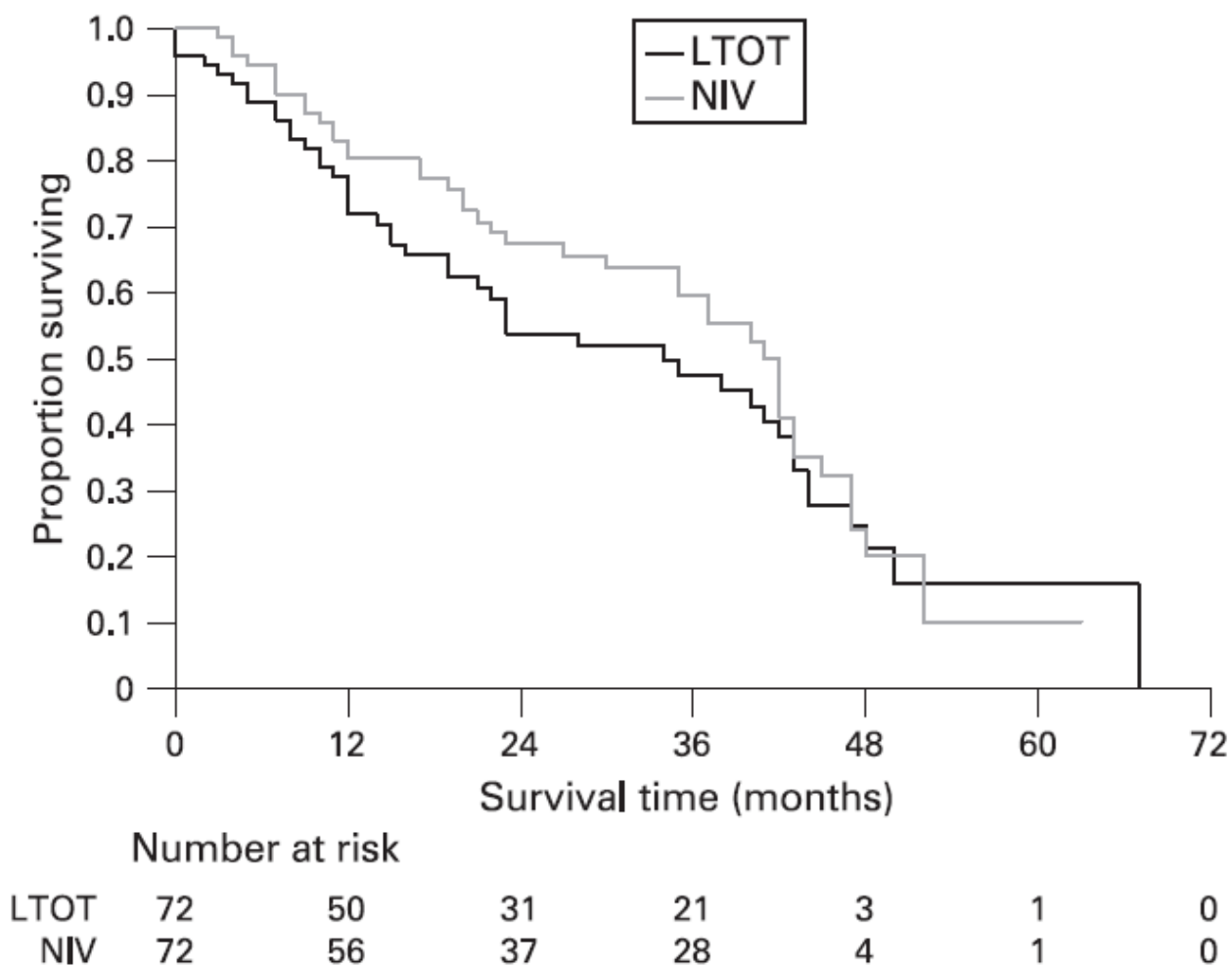


Figure 2 Survival curves of patients randomised to non-invasive ventilation plus long-term oxygen therapy (NIV + LTOT) and long-term oxygen therapy (LTOT) alone.

Table 4 SF36 measured quality of life at 12 months

Variable	LTOT			NIV			Significance*
	No	Median	IQR	No	Median	IQR	
SF36 Physical functioning	40	10.0	28.8	50	5.0	17.5	0.307
SF36 Role physical	40	12.5	43.8	50	0.0	50.0	0.470
SF36 Bodily pain	40	73.0	47.5	50	61.0	61.3	0.253
SF36 General health	39	32.0	25.0	50	20.0	26.3	0.002
SF36 Vitality	40	45.0	25.0	50	35.0	25.0	0.107
SF36 Social functioning	40	56.3	50.0	50	50.0	65.6	0.340
SF36 Role emotional	40	100.0	66.7	50	66.7	100.0	0.286
SF36 Mental health	40	80.0	16.0	50	70.0	40.0	0.009

*Adjusted for ranked baseline values.
IQR, interquartile range; LTOT, long-term oxygen therapy; NIV, non-invasive ventilation.

Table 5 Profile of mood states (POMS) at 12 months

Variable	LTOT			NIV			Significance*
	No	Median	IQR	No	Median	IQR	
POMS Depression-dejection	37	2.0	4.0	44	4.5	13.3	0.163
POMS Anger-hostility	37	2.0	3.0	47	2.0	5.0	0.819
POMS Confusion-bewilderment	38	3.0	4.0	46	5.0	6.3	0.020
POMS Fatigue	37	6.0	8.0	46	8.0	10.3	0.581
POMS Tension-anxiety	38	3.0	7.3	47	8.0	10.0	0.067
POMS Vigour	37	14.0	10.5	45	11.0	6.5	0.050
POMS Total mood	35	5.0	21.0	43	22.0	48.0	0.318

*Adjusted for ranked baseline values.
IQR, interquartile range; LTOT, long-term oxygen therapy; NIV, non-invasive ventilation.

Nocturnal noninvasive positive pressure ventilation in stable COPD: A systematic review and individual patient data meta-analysis

F.M. Struik^{a,b,*}, Y. Lacasse^c, R.S. Goldstein^d,
H.A.M. Kerstjens^{a,b}, P.J. Wijkstra^{a,b}

Respiratory Medicine (2014) 108, 329–337



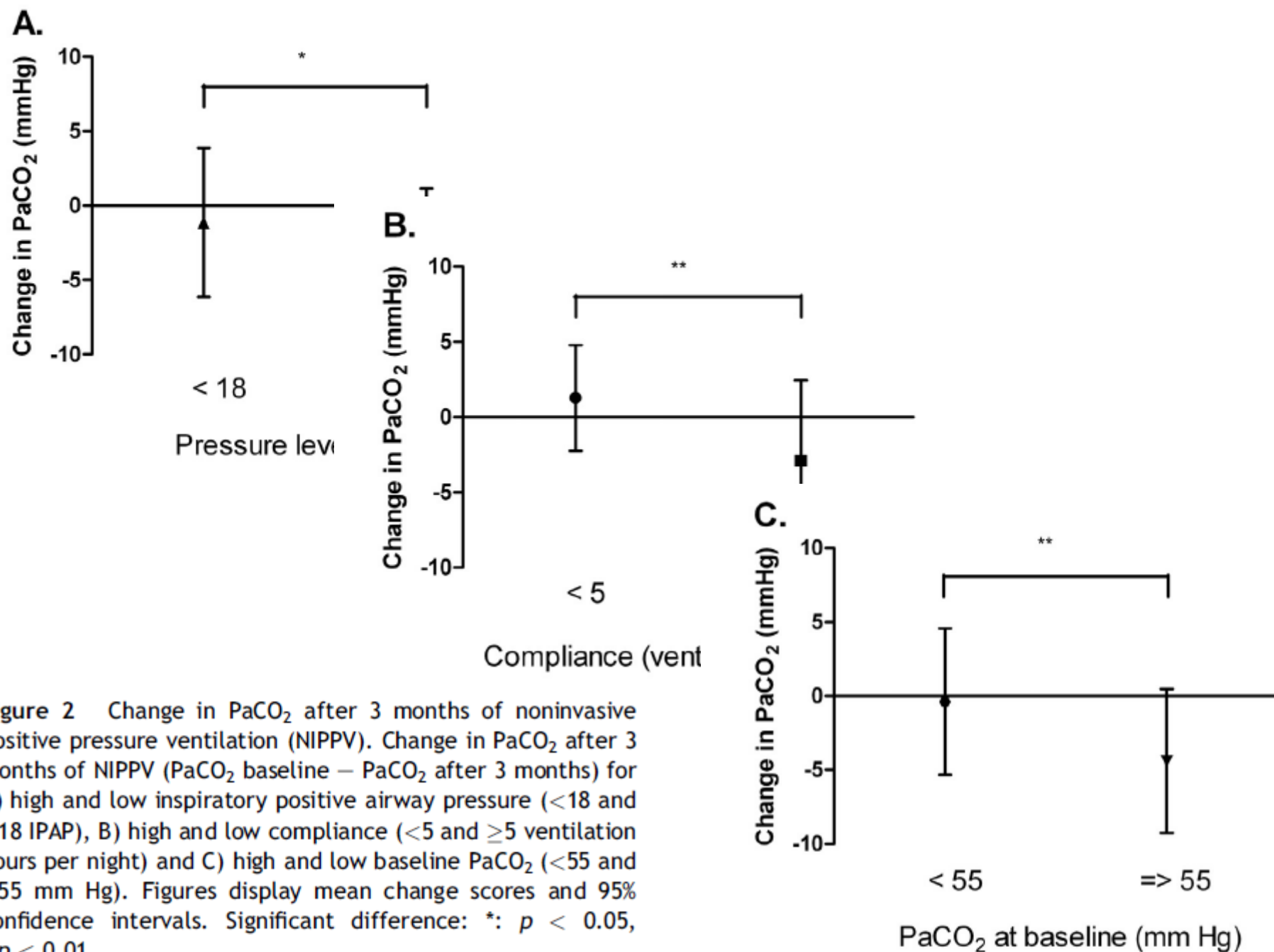


Figure 2 Change in PaCO_2 after 3 months of noninvasive positive pressure ventilation (NIPPV). Change in PaCO_2 after 3 months of NIPPV (PaCO_2 baseline – PaCO_2 after 3 months) for A) high and low inspiratory positive airway pressure (<18 and ≥ 18 IPAP), B) high and low compliance (<5 and ≥ 5 ventilation hours per night) and C) high and low baseline PaCO_2 (<55 and ≥ 55 mm Hg). Figures display mean change scores and 95% confidence intervals. Significant difference: *: $p < 0.05$, ** $p < 0.01$.

Le point.....

Si la VNI peut éventuellement apporter quelque chose lors de BPCO:

- C'est chez des sujets hypercapniques ($\text{PaCO}_2 > 55 \text{ mmHg}$)
- Se ventilant plus de 5:00 hrs/24
- Et avec une pression inspiratoire (IPAP) $> 18 \text{ cmH}_2\text{O}$ lors de VDNP

Nocturnal non-invasive ventilation in COPD patients with prolonged hypercapnia after ventilatory support for acute respiratory failure: a randomised, controlled, parallel-group study

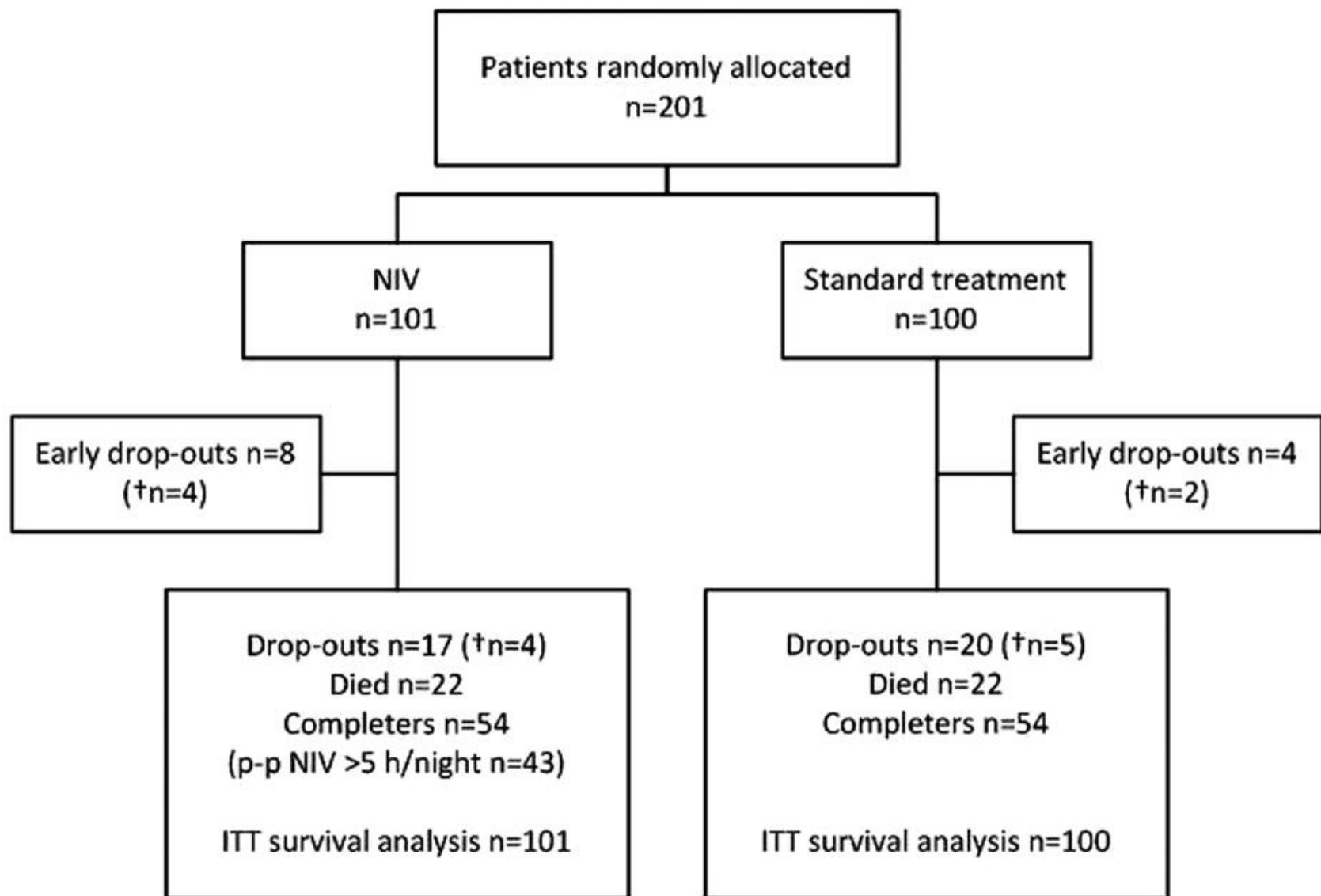
F M Struik,^{1,2} R T M Sprooten,³ H A M Kerstjens,^{1,2} G Bladder,¹ M Zijnen,⁴ J Asin,⁵ N A M Cobben,³ J M Vonk,^{2,6} P J Wijkstra^{1,2}

What is the key question?

- What is the effect of nocturnal non-invasive positive pressure ventilation (NIV) alongside standard medical treatment in COPD patients with prolonged hypercapnia after ventilatory support for acute respiratory failure?

What is the bottom line?

- We could not demonstrate an improvement in time to readmission or death by adding NIV for 1 year in COPD patients with prolonged hypercapnia after an episode of NIV for acute respiratory failure.



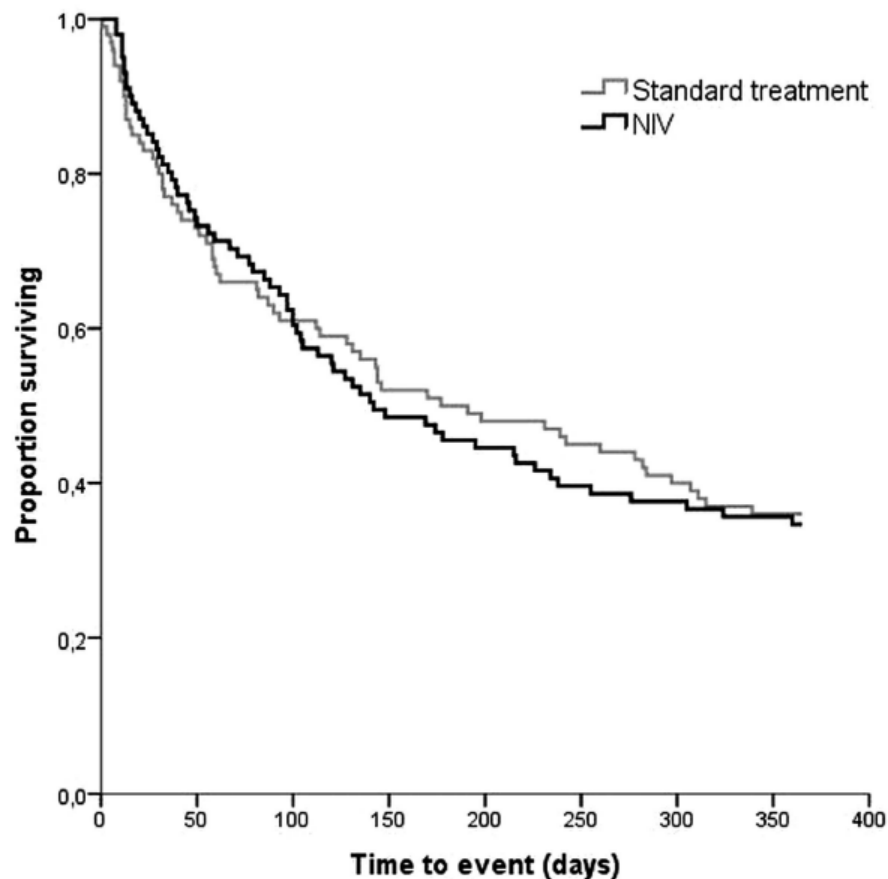


Figure 2 Kaplan-Meier plot of time to event (readmission for respiratory cause or death) in patients randomised to non-invasive positive pressure ventilation (NIV) and standard treatment.

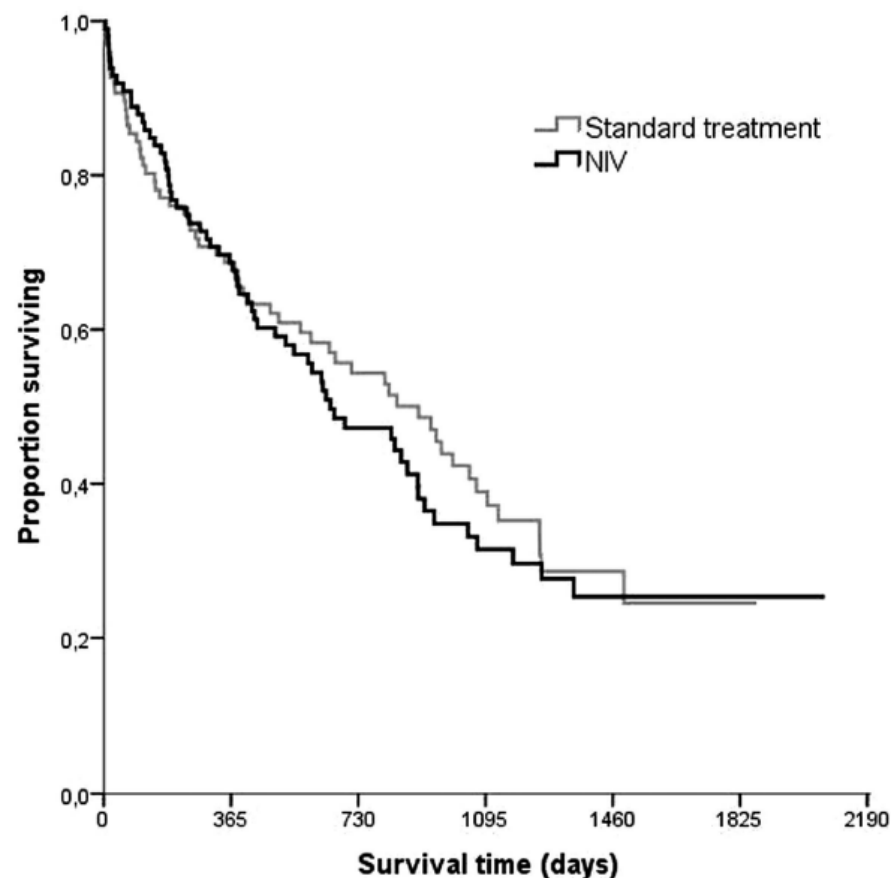


Figure 3 Kaplan-Meier plot of long-term survival curves of patients randomised to non-invasive positive pressure ventilation (NIV) and standard treatment. Because of small numbers of patients followed up after 3 years, the right-hand end of the survival plots remains uncertain.

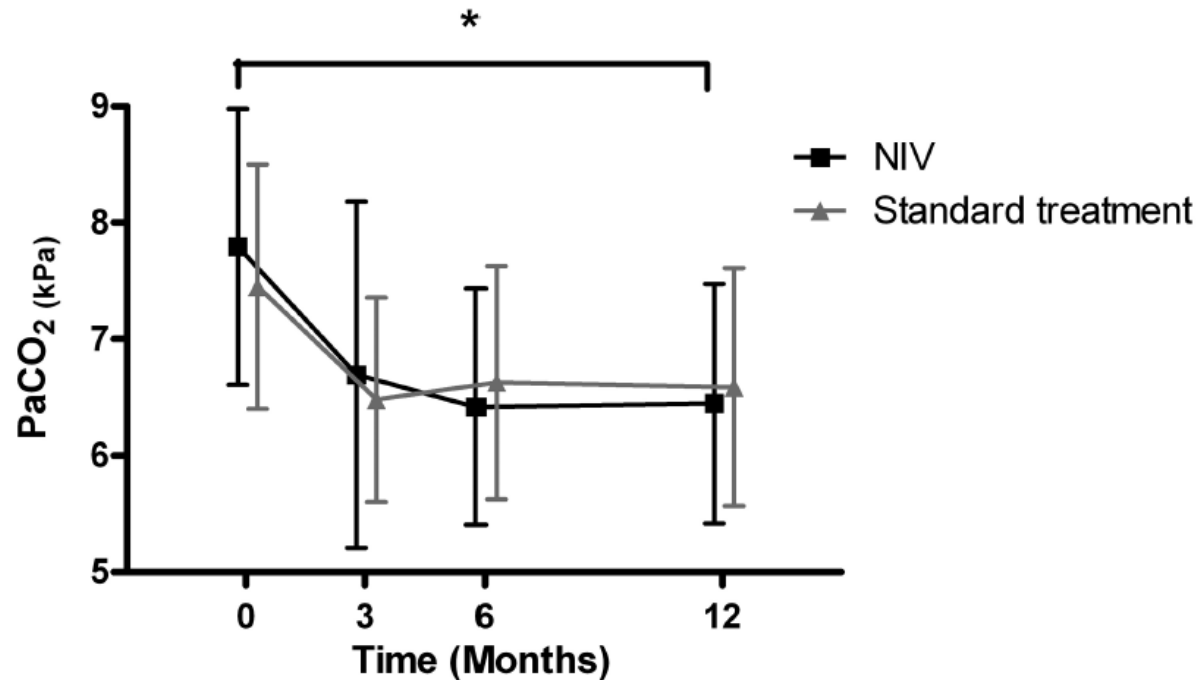
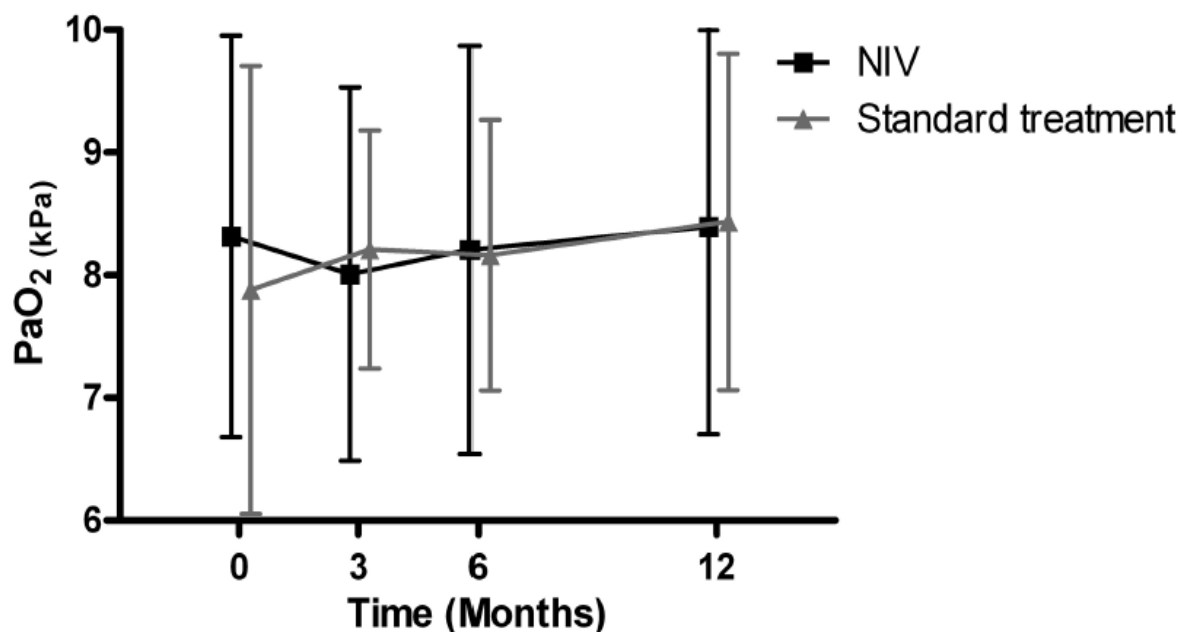
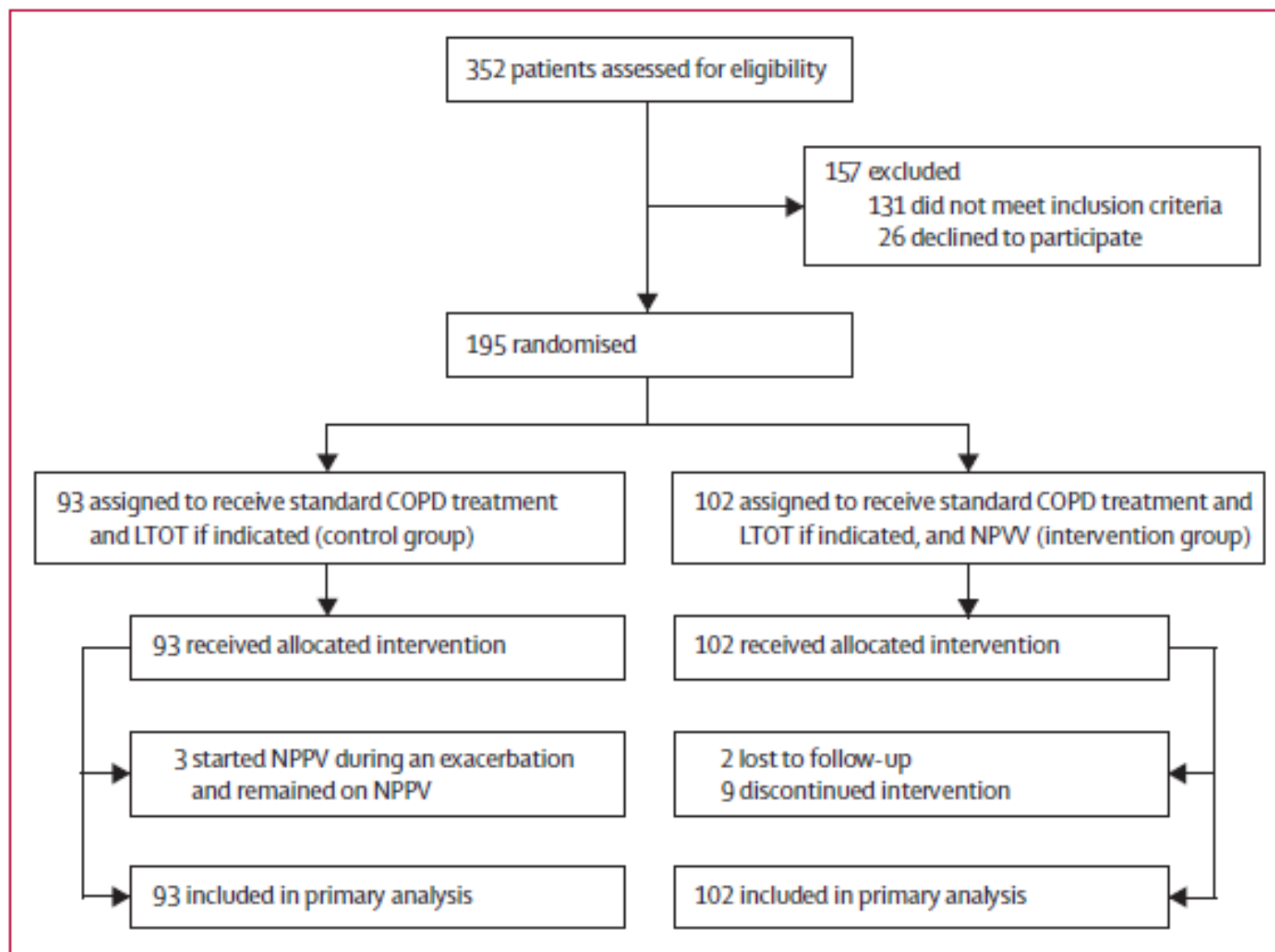


Figure 4 Daytime PaCO₂ and PaO₂ at baseline, 3, 6 and 12 months (means±SD). Measurements performed in complete case group (n=54 per group) regardless of oxygen use. NIV, non-invasive positive pressure ventilation; PaCO₂, arterial carbon dioxide pressure (kPa); PaO₂, arterial oxygen pressure (kPa). *Change in PaCO₂ was significantly better in the NIV group after 12 months (p<0.05).



Le point avant l'étude de T Kohnlein.....

- Jusqu'en 2014, on peut raisonnablement dire qu'aucune méta-analyse, aucune étude randomisée contrôlée n'a pu démontrer un bénéfice de la VNI sur la survie, les EFR, la qualité de vie, chez des BPCO chroniquement hypercapniques ce en dépit de quelques démonstrations de bénéfices physiologiques dans des travaux non randomisés, en particulier par nos collègues allemands, utilisant la VNI dite à « haute intensité »
- La mise sous VNI au long cours suite à une décompensation hypercapnique n'est pas associée à un bénéfice clinique.



	Control group (n=93)	Non-Invasive positive pressure ventilation group (n=102)
Age, years	64.4 (8.0)	62.2 (8.6)
Male, n (%)	56 (60%)	65 (64%)
Body-mass index, kg/m ²	24.5 (5.8)	24.8 (5.8)
FVC, % predicted	53.3% (13.8)	50.4% (13.3)
FEV ₁ , % predicted	27.5% (8.9)	26% (11.0)

pH	7.39 (0.05)	7.39 (0.04)
PaCO ₂ , kPa	7.7 (0.7)	7.8 (0.8)

Base excess, mmol/L	0.0 (3.9)	1.0 (3.0)
6-min walk distance, m	249.6 (145.3)	226.7 (121.2)
Long-term oxygen treatment, n (%)	60 (65%)	67 (66%)

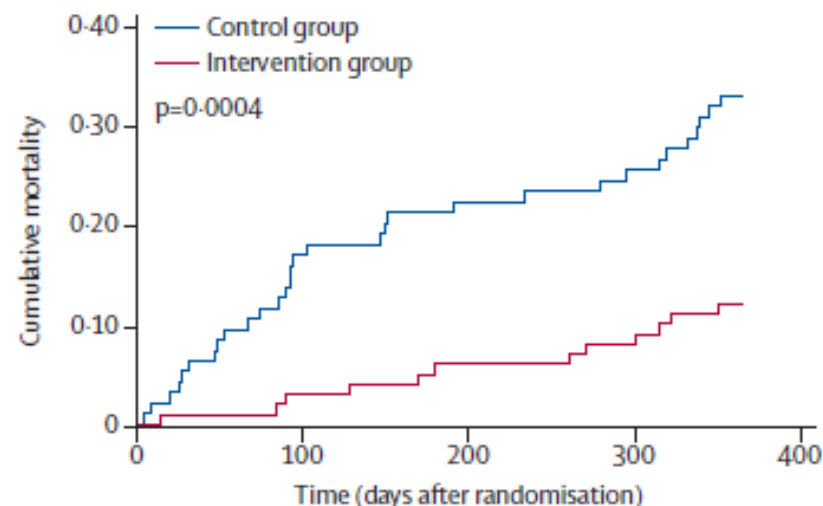
Data are mean (SD), unless otherwise stated. FVC=forced vital capacity. FEV₁=forced expiratory volume in 1 s. PaCO₂=arterial carbon dioxide pressure. PaO₂=arterial oxygen pressure. SaO₂=arterial oxygen saturation. HCO₃⁻=bicarbonate. *In patients with long-term oxygen treatment, oxygen was applied via nasal cannula at the previously prescribed flow rate.

Table 1: Baseline demographic and clinical characteristics of patients

	3 months	6 months	9 months	12 months
Overall	0.8 (3.5)	2.1 (5.7)	0.9 (4.0)	2.6 (8.6)
Non-invasive positive pressure ventilation group	0.2 (1.1)	1.4 (4.7)	1.3 (4.9)	2.2 (10.2)
Control group	1.5 (4.9)	3.0 (6.9)	0.4 (1.9)	3.1 (5.4)

Values are mean (SD).

Table 2: Emergency hospital admissions per patient by follow-up period and treatment group



Number at risk

Control group	93	77	72	69
Intervention group	102	95	92	90

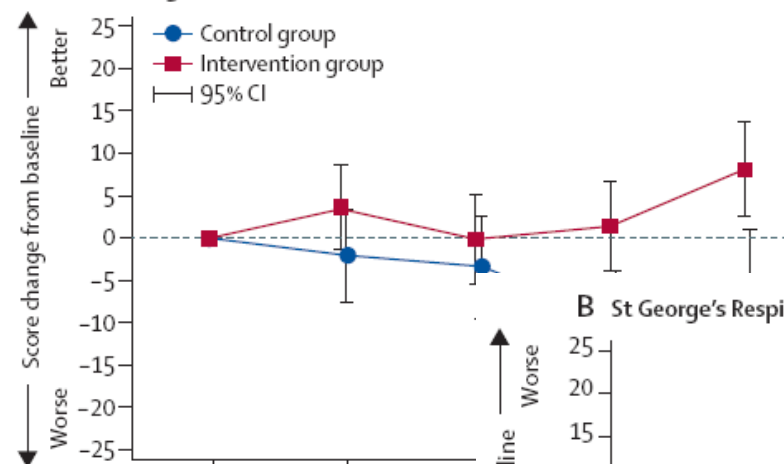
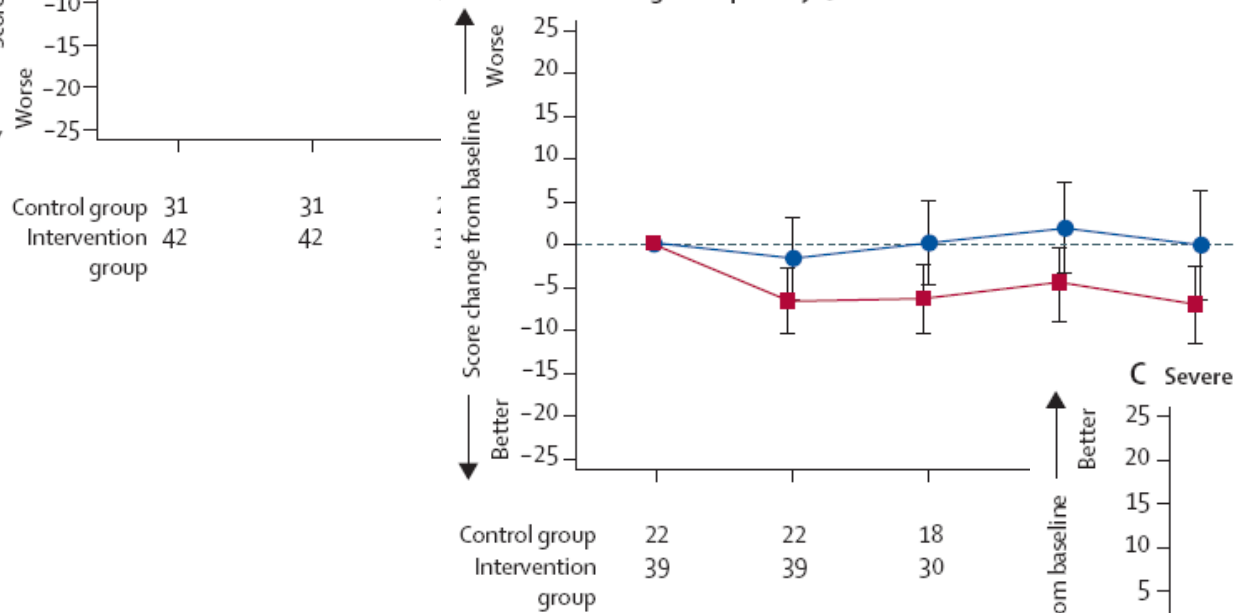
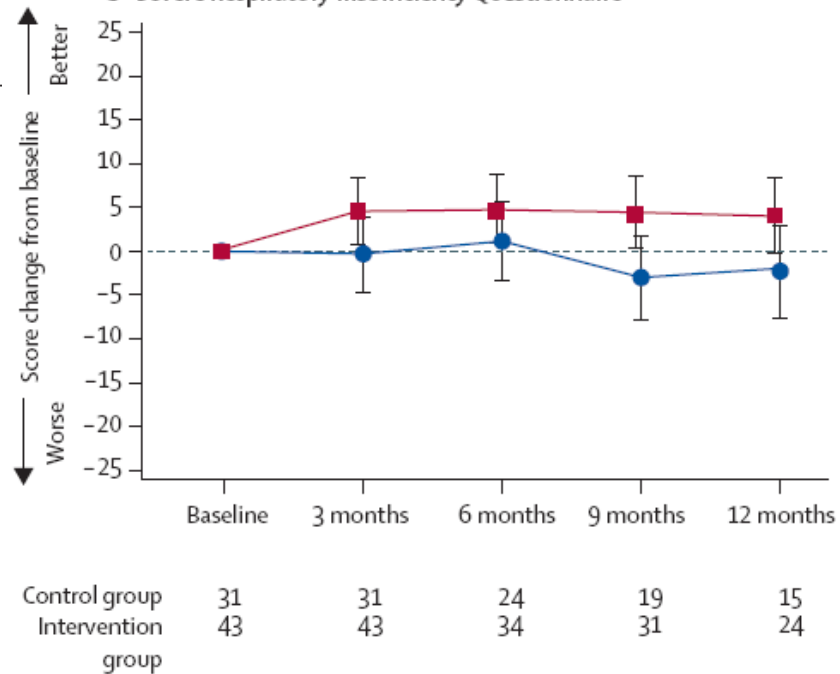
Figure 2: Kaplan-Meier estimate of cumulative all-cause mortality during the first year after randomisation (primary outcome)

The p value results from a log-rank test of the between-group difference.

	Baseline	14 days	3 months	6 months	9 months	12 months
All patients	7.9 (0.8)	7.0 (1.1)	7.0 (1.1)	6.7 (1.0)	6.8 (0.9)	6.9 (1.1)
Control group	7.9 (0.7)	7.5 (1.1)	7.4 (0.9)	7.1 (1.0)	7.3 (0.8)	7.4 (1.2)
Non-invasive positive pressure ventilation group	8.0 (0.8)	6.6 (0.9)	6.6 (1.1)	6.4 (0.9)	6.4 (0.9)	6.5 (0.9)

Values are mean (SD).

Table 4: Arterial carbon dioxide pressure (kPa) during the 1-year study

A SF-36**B St George's Respiratory Questionnaire****C Severe Respiratory Insufficiency Questionnaire**

Interpretation

After follow-up of 12 months, long-term treatment with NPPV with increased ventilatory pressures that reduced hypercapnia was associated with significant and sustained improvements in overall mortality, quality of life, and exercise capacity in patients with severe, stable hypercapnic COPD. Thus, long-term NPPV seems to offer important benefits in this patient group, but the treatment success might be dependent on effective ventilatory strategies.

Que penser de ce travail?

- Ce travail est *la seule étude randomisée contrôlée depuis 2000* à montrer un impact positif sur la survie de la VNI au long cours lors de BPCO hypercapnique après de nombreuses méta-analyses et RCT sérieuses, toutes négatives.
- Il a fallu 7 ans à 36 centres hospitaliers pour récolter 195 patients souffrant de BPCO Gold IV avec une $\text{PaCO}_2 > 7 \text{ kPa}$, soit 5.4 cas/centre en moyenne..., ou moins d'1 cas/an/centre

T Kohnlein et al; Lancet Respir Med 2014

Dernière minute..... Dernière minute..... Dernière minute



L'étude HOT-NIV (HOT: Home Oxygen Therapy) P Murphy et al (N Hart)

Etude randomisée contrôlée

Patients inclus: Hypercapnie persistante ($\text{PaCO}_2 > 7\text{kPa}$) 2-4 semaines après une insuffisance respiratoire aiguë de type II

Patients exclus: BMI $> 35 \text{ kg/m}^2$ ou SAOS

Endpoint primaire: Temps passé sans rehospitalisation sur 1 an

Resultats: 116 patients (67.0 ± 9.6 and, 53% F, BMI $21.6 (18.2-26.1) \text{ kg/m}^2$, VEMS $0.6 \pm 0.2 \text{ L}$ et $\text{PaCO}_2 (7.9 \pm 0.9 \text{ kPa})$).

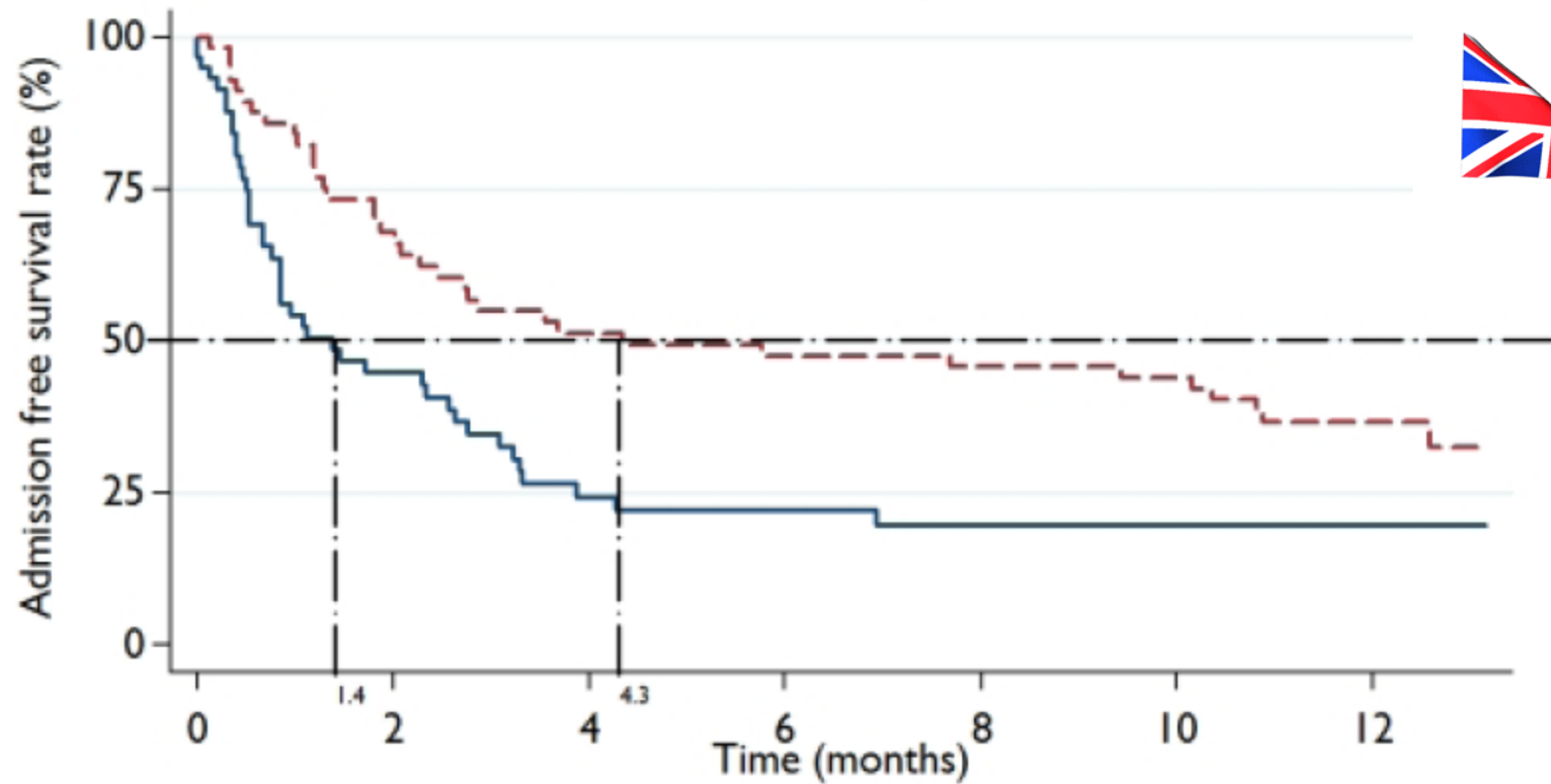
59 patients dans le groupe HOT; 57 dans le groupe HOT-HMV ($\text{O}_2 1.0 (0.5-1.5) \text{ Lpm}$); IPAP 24 (22-26) cmH_2O , EPAP 4 (4-5) cmH_2O ; FS: 14 (14-16).

Temps median passé sans rehospitalisation: 4.3 mois pour le groupe HOT-HMV et 1.4 months pour le groupe HOT; OR (multivarié): 0.49 (0.31-0.77); $p=0.002$.

Conclusion: En dépit d'un pronostic sombre pour ces patients, la mise sous VNI retarde les readmissions en milieu hospitalier



Admission free survival by treatment arm



Number at risk

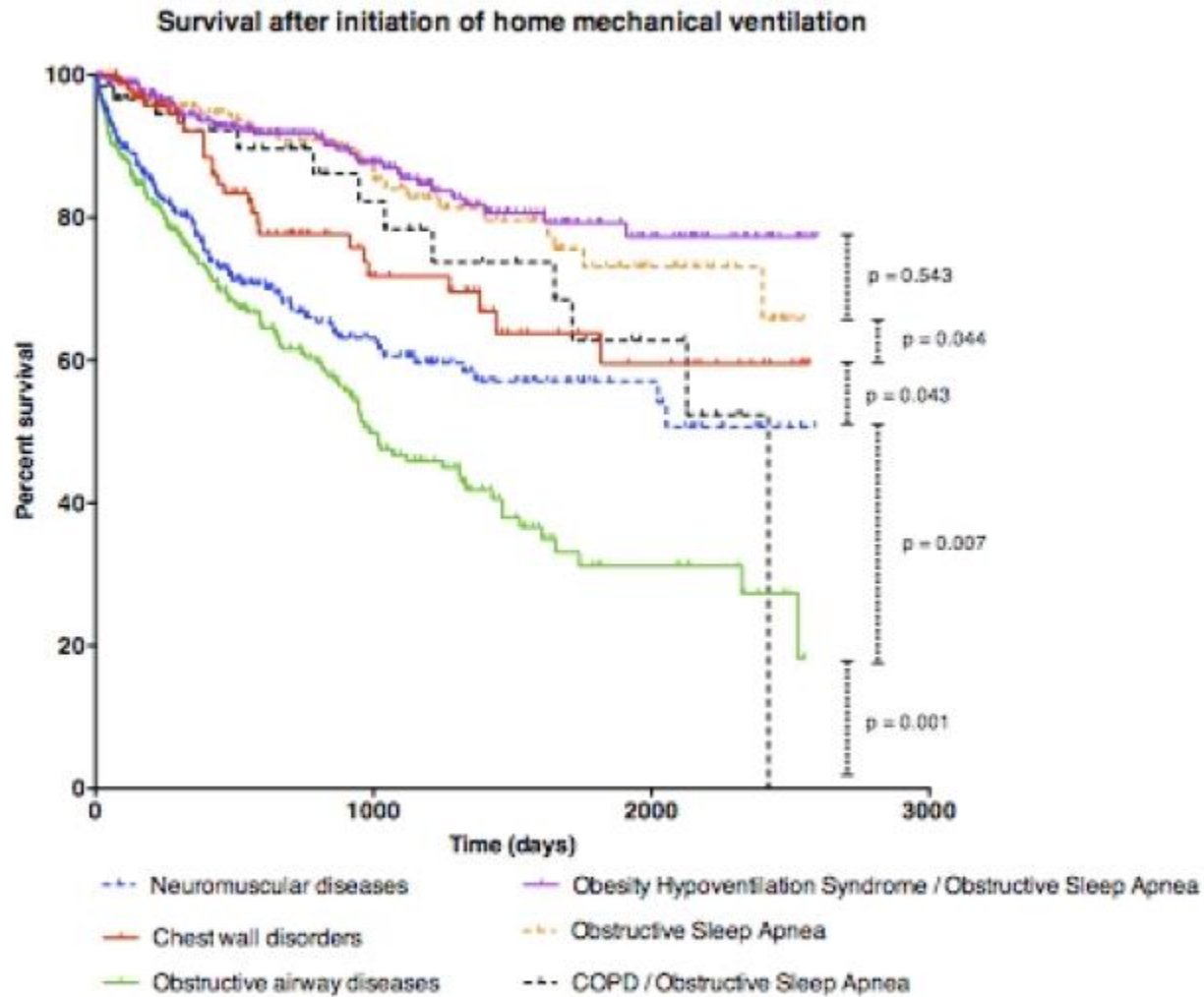
HOT	59	23	11	10	8	8	6
HOT HMV	57	37	28	26	25	24	16

— HOT

--- HOT HMV

— · — · Median admission free survival time

M Patout et al; 1135 patients sous VNI



Conclusions

- La VNI lors de BPCO hypercapnique « fait du sens »:
 - Si en période stable, le patient a une $\text{PaCO}_2 > 55 \text{ mmHg}$
 - Si les pressions d'insufflation sont suffisantes pour diminuer la PaCO_2 d'au moins 20%
 - Si l'adhérence au traitement est d'au moins 5 hrs/nuit
- Au décours d'une décompensation hypercapnique, la VNI ne serait recommandée que chez des patients qui ayant un $\text{BMI} < 35 \text{ kg/m}^2$, sans « overlap syndrome », et ayant une $\text{PaCO}_2 > 7 \text{ kPa}$ (52.5 mmHg) 2 à 4 semaines après l'épisode aigu
- Le pronostic de ces patients reste assez sombre par rapport aux autres indications de VNI

Merci pour votre attention.....



Kinder in der eisernen Lunge. Sie ermöglicht den an Kinderlähmung erkrankten das Atmen, 1938.
Ursprünglich wollte Hansel Mieth Ärztin werden. Später als Fotografin
galt ihr besonderes Interesse daher immer medizinischen oder naturwissenschaftlichen Themen.

