High flow oxygen through nasal cannula

Dr Mohammad Moghal
Respiratory consultant, BHRUT

Respiratory registrar training day

Thursday 14th November 2019

Topics to be covered

- What is high flow oxygen through nasal cannula?
- Physiology of high flow oxygen therapy
- Published studies/indications which I will not be covering
- Published indications which I will be covering

High flow oxygen through nasal cannula (HFNC) - definition

- HFNC is the delivery of warmed and humidified oxygen/air mixture at high flow rates (up to 60 litres/minute) with variable fraction of inspired oxygen (FiO2) (between 0.21 to 1.0)

HFNC equipment

Adjustable temperature and flow settings

- Three temperature settings (37, 34, 31 °C) help achieve comfort and compliance
- Integrated flow generator delivers a wide flow range 10 - 60 L/min for adult patients and 2 - 25 L/min for pediatric patients. No wall air supply required

Optiflow™+ Nasal Interface

- Soft, flexible prongs
- Wide-bore design reduces gas jetting
- Prongs contoured to the patient's nose

Supplementary oxygen (when required)

- Oxygen can be added from a wall supply or cylinder
- Inbuilt ultrasonic oxygen analyzer requires no calibration, service or replacement

Airspiral™ heated breathing tube

- Dual spiral heater wires and unique integrated temperature sensor
- No separate temperature probes or heater-wire adapters required

Designed for simple setup, use and cleaning

- Helpful onscreen animations assist with setup and troubleshooting

Fisher & Paykel, AIRVO™ 2

Providers of HFNC

- Fisher & Paykel
- Vapotherm
- TNI medical

Current published studies that we are not going to cover

- In paediatrics, for the treatment of acute bronchiolitis
- In anaesthetics: Pre-intubation
- In anaesthetics: post-extubation
- After cardiothoracic surgery
- In patients with advanced malignancy for palliative reasons to relieve shortness of breath

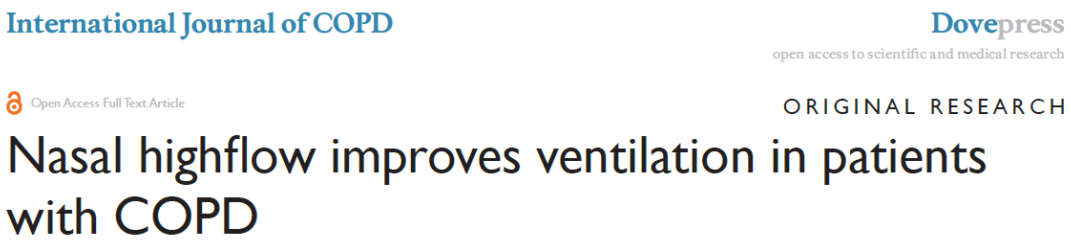
Current published studies that we are going to cover

- For *de novo* acute hypoxaemic respiratory failure
- In patients with acute exacerbations of COPD complicated by hypercapnic respiratory failure
- Use during bronchoscopy
- In patients with acute exacerbations for patients with ILD
- For patients on domiciliary long-term oxygen therapy

Physiological effects of HFNC

HFNC reduce anatomical deadspace and delivers low levels of PEEP

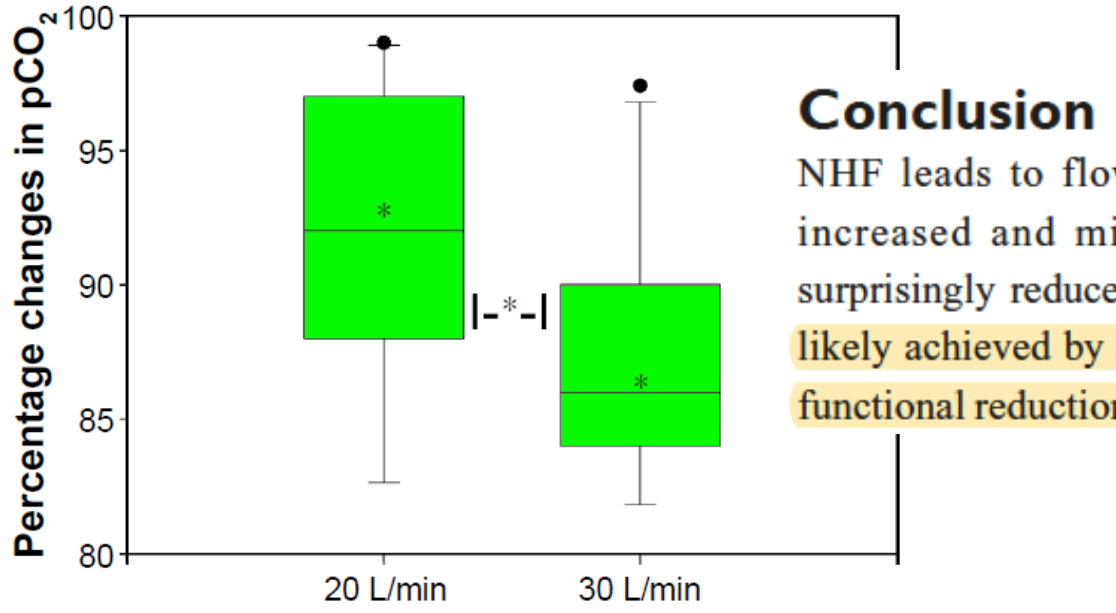
HFNC reduce **anatomical deadspace** and delivers low levels of PEEP



- Patients with stable COPD who were in hospital (without exacerbation or right heart failure) recruited to be studied
- Aim of the study was to characterise the flow rate-dependent ventilatory effects and changes with HFNC / NIV / CPAP

Int J Chron Obstruct Pulmon Dis. 2016 May 25;11:1077-85. doi: 10.2147/COPD.S104616. eCollection 2016.
Nasal highflow improves ventilation in patients with COPD.
Bräunlich J, Köhler M, Wirtz H.

HFNC reduce **anatomical deadspace** and delivers low levels of PEEP

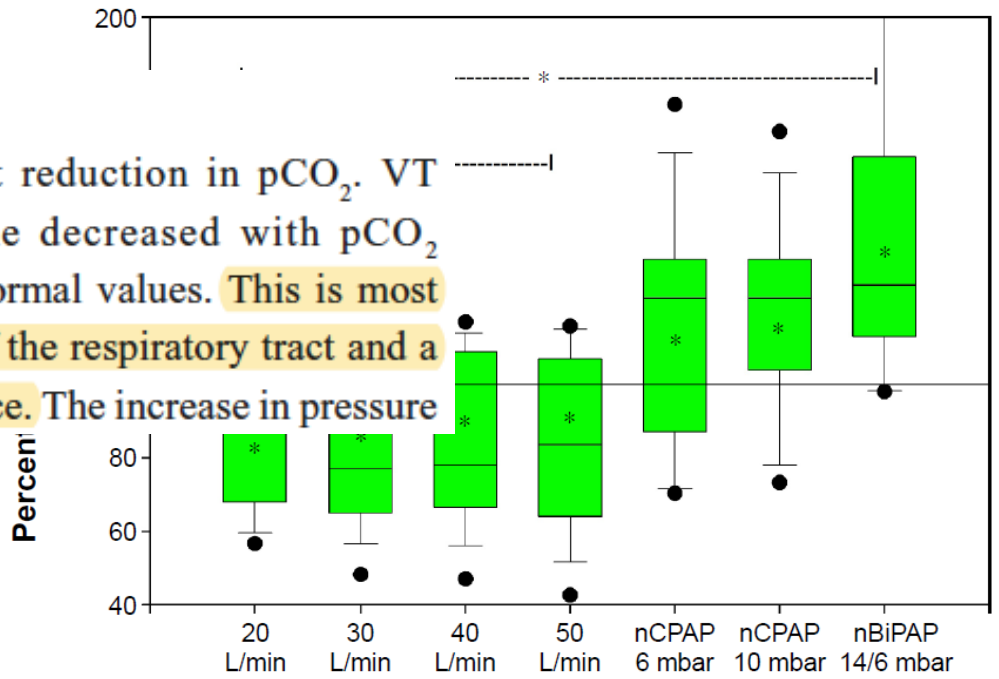


Percentage changes in pCO_2 after 2 hours of NHF breathing (n=54

Conclusion

NHF leads to flow-dependent reduction in pCO_2. VT increased and minute volume decreased with pCO_2 surprisingly reduced to more normal values. This is most likely achieved by a washout of the respiratory tract and a functional reduction in dead space. The increase in pressure

* = significant p-value



** = no significant p-value

* = significant p-value

Int J Chron Obstruct Pulmon Dis. 2016 May 25;11:1077-85. doi: 10.2147/COPD.S104616. eCollection 2016.

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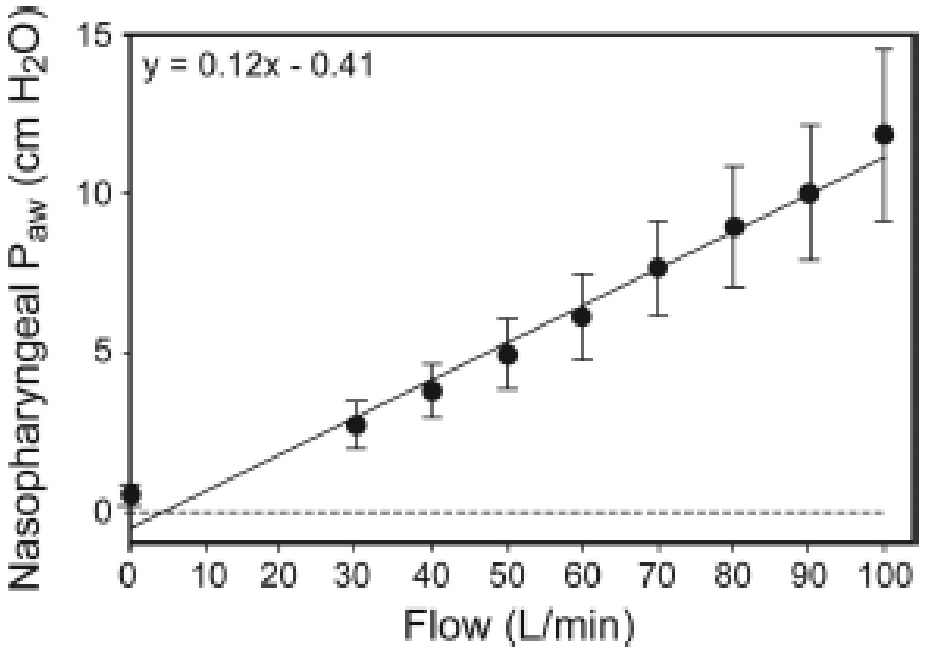
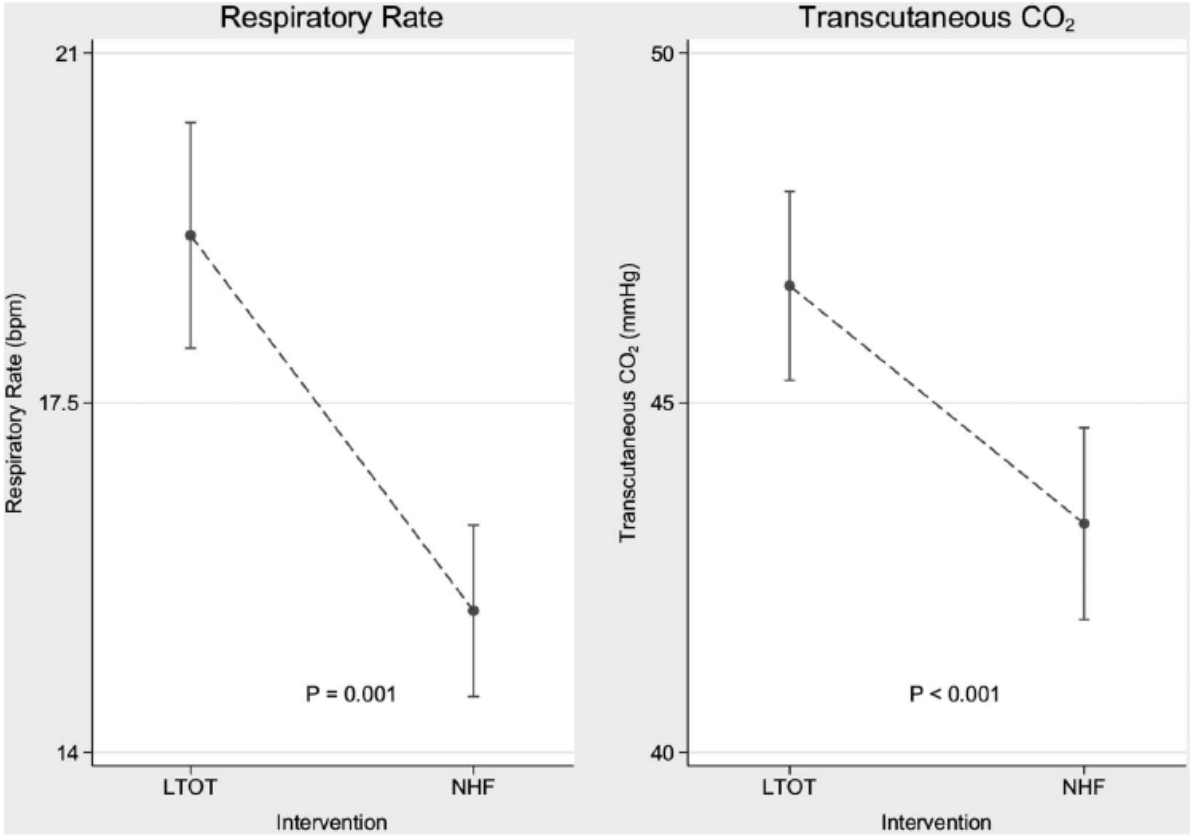


PEEP of approximately 3 cm H_2O

Respir Care. 2015 Oct;60(10):1397-403. doi: 10.4187/respcare.04028. Epub 2015 Sep 1.
Effect of Very-High-Flow Nasal Therapy on Airway Pressure and End-Expiratory Lung Impedance in Healthy Volunteers.
Parke RL, Bloch A, McGuinness SP.

HFNC reduce CO_2 and RR in patients with stable COPD on home LTOT

- Patients with stable COPD on domiciliary LTOT.
- Randomised cross over study to investigate the effects of HFNC on RR and CO_2



Thorax. 2016 Aug;71(8):759-61. doi: 10.1136/thoraxjnl-2015-207962. Epub 2016 Mar 25.

Nasal high flow oxygen therapy in patients with COPD reduces respiratory rate and tissue carbon dioxide while increasing tidal and end-expiratory lung volumes: a randomised crossover trial.

Fraser JF, Spooner AJ, Dunster KR, Anstey CM, Corley A.

Clinical studies in acute hypoxaemic respiratory failure

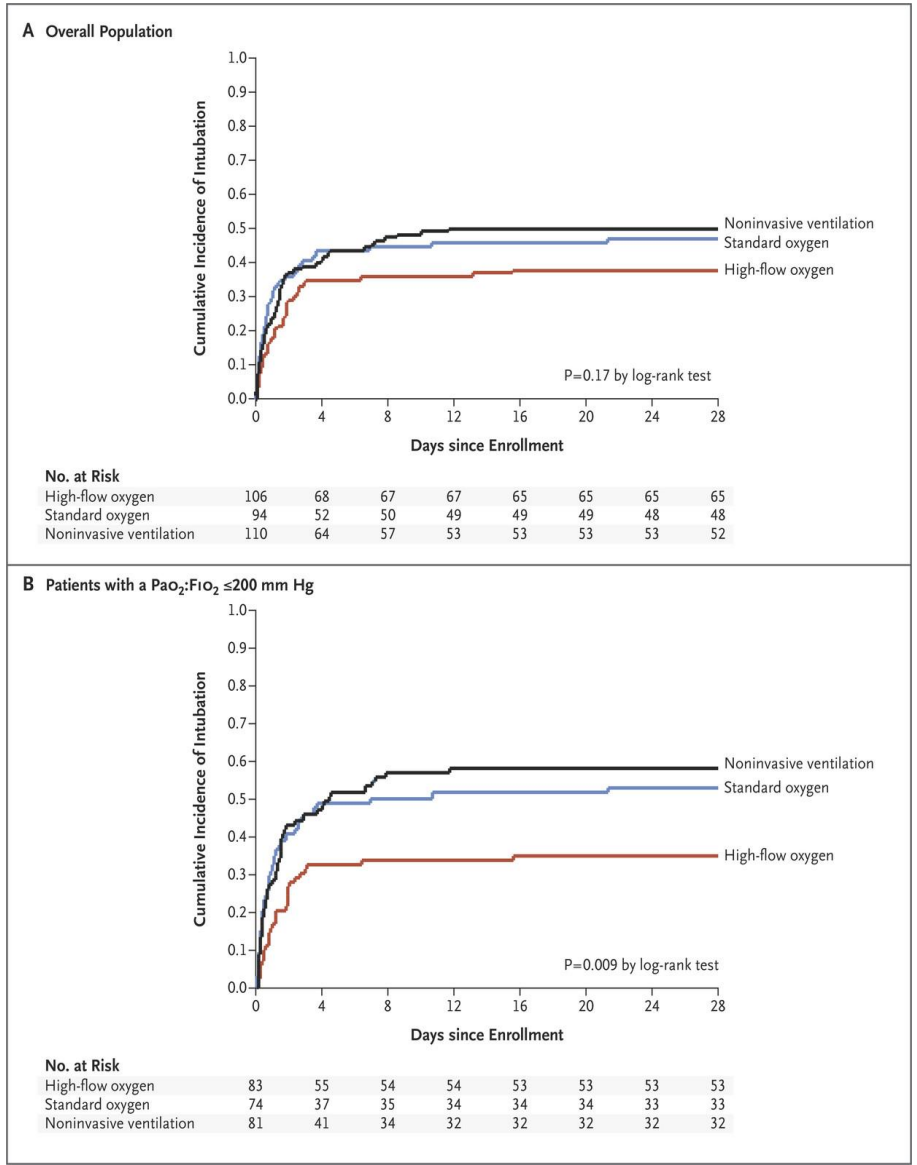
FLORALI Study: HFNC reduces mortality compared to NIV and standard oxygen therapy

- Multicenter, open-label
- Acutely hypoxaemic patients assigned to either NIV (n=110) or HFNC (n=106) or oxygen via face mask (n=94). No patients with hypercapnia
- Hypoxia: defined as the ratio of PO_2 (mmHg) to fraction of inspired oxygen of 300 mmHg or less
- Primary outcome was the proportion of intubated patients at 28 days
- Secondary outcomes were all cause mortality at 90 days and ventilator free days at 28 days

Frat J et al. N Engl J Med 2015;372:2185-2196.

FLORALI Study: HFNC reduces mortality compared to NIV and standard oxygen therapy

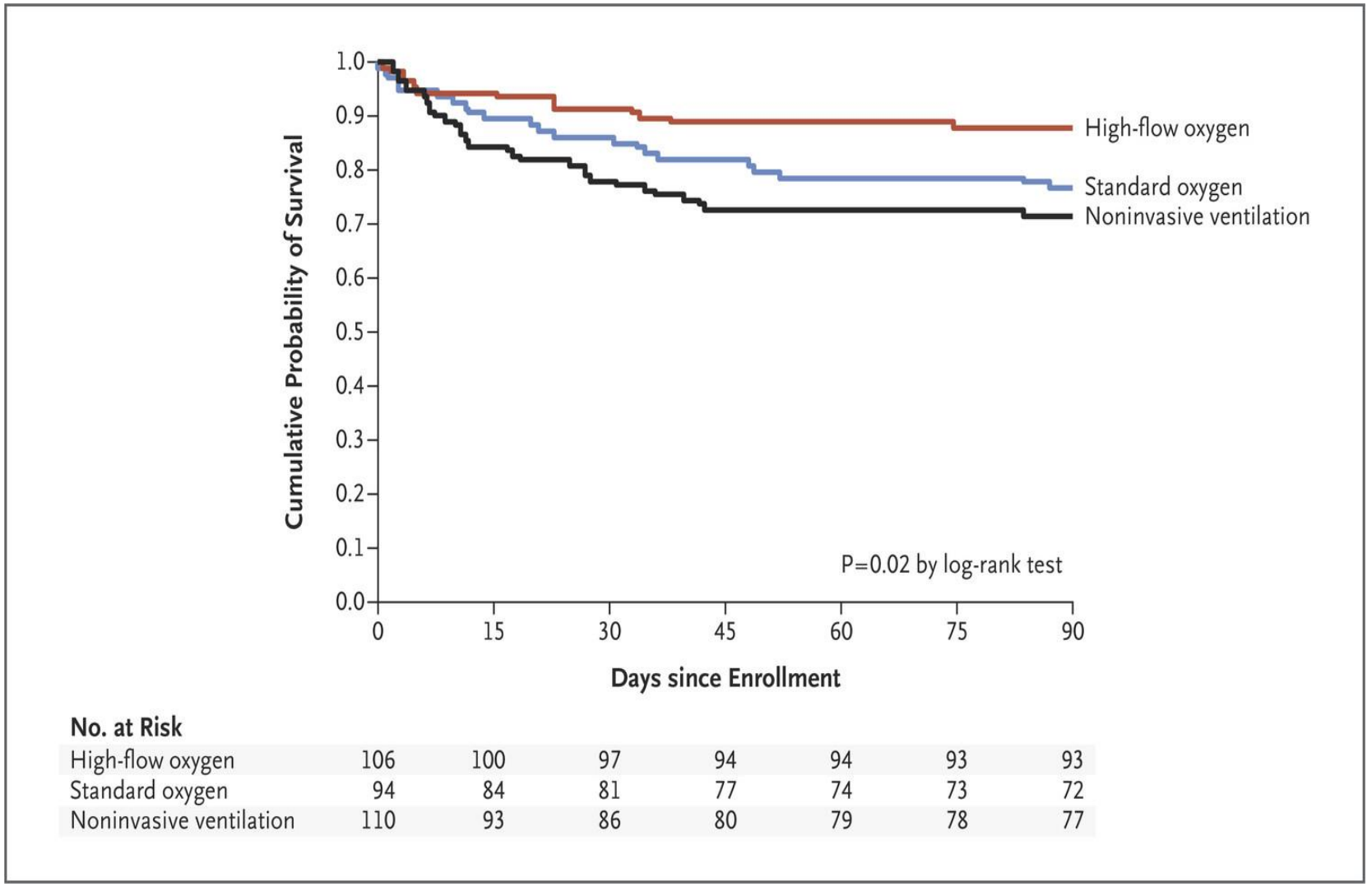
Kaplan–Meier Plots of the Cumulative Incidence of Intubation from Randomization to Day 28.



Frat J et al. N Engl J Med 2015;372:2185-2196.

FLORALI Study: HFNC reduces mortality compared to NIV and standard oxygen therapy

Kaplan–Meier Plot of the Probability of Survival from Randomization to Day 90.



No. at Risk							
High-flow oxygen	106	100	97	94	94	93	93
Standard oxygen	94	84	81	77	74	73	72
Noninvasive ventilation	110	93	86	80	79	78	77

Frat J et al. N Engl J Med 2015;372:2185-2196.

Randomized Controlled Trial of Humidified High-Flow Nasal Oxygen for Acute Respiratory Distress in the Emergency Department: The HOT-ER Study

- Open label, randomized trial
- Patients with hypoxaemia ($SpO_2 \leq 92\%$ on air) and tachypnea (RR ≥22 breaths per minute) were randomised to conventional oxygen vs HFNC.
- The primary outcome was the need for intubation in the ER

Respir Care. 2016 Mar;61(3):291-9. doi: 10.4187/respcare.04252. Epub 2015 Nov 17.
Randomized Controlled Trial of Humidified High-Flow Nasal Oxygen for Acute Respiratory Distress in the Emergency Department: The HOT-ER Study.
Jones PG, Kamona S, Doran O, Sawtell F, Wilsher M.

Randomized Controlled Trial of Humidified High-Flow Nasal Oxygen for Acute Respiratory Distress in the Emergency Department: The HOT-ER Study

Outcome	HFNC (n = 165)	Standard O_2 (n = 138)	P
Conversion to mechanical ventilation in emergency department, n, % (95% CI)	6, 3.6 (1.5–7.9)	10, 7.2 (3.8–13)	.16
90-d mortality, n, % (95% CI)	35, 21.2 (15.6–28.1)	24, 17.4 (11.9–24.6)	.40
Pneumothorax, n, % (95% CI)	0, 0 (0–3)	0, 0 (0–3)	
Subcutaneous emphysema, n, % (95% CI)	0, 0 (0–3)	0, 0 (0–3)	
Pressure sore, n, % (95% CI)	0, 0 (0–3)	0, 0 (0–3)	
Apnea, n, % (95% CI)	0, 0 (0–3)	1, 0.7 (0–4)	.45
Fall in GCS ≥2 points, n, % (95% CI)	1, 0.6 (0–3.7)	6, 4.3 (1.8–9.4)	.050
Fall in GCS due to CO_2 retention,* n, % (95% CI)	0, 0 (0–3)	3, 2.2 (0.4–6)	.09
Intubated,* n, % (95% CI)	1, 0.6 (0–4)	3, 2.2 (0.5–6)	.33
Admitted to ICU,* n, % (95% CI)	8, 4.8 (2.3–9.4)	5, 3.6 (1.3–8.4)	.60
Mechanical ventilation within 24 h,* n, % (95% CI)	9, 5.5 (2.8–10.2)	16, 11.6 (7.2–18.1)	.053
In-hospital mortality,* n, % (95% CI)	15, 9.1 (5.5–14.6)	11, 8.0 (4.4–13.8)	.73
Emergency department LOS, median (IQR) h	4.5 (3.6–5.8)	4.9 (3.6–5.9)	.32
Hospital LOS, median (IQR) d	5.0 (2.8–8.3)	5.6 (2.8–9.3)	.43
Time to mechanical ventilation in emergency department,* median (IQR) min	6, 139.5 (70–214.5)	10, 126 (19.75–197.75)	.43
Time to mechanical ventilation in ward,* median (IQR) min	3, 1,040 (755.5–1,222.5)	6, 857 (395–1,116)	.71

* Post hoc analyses.
HFNC = high-flow nasal cannula
GCS = Glasgow coma score
LOS = length of stay
IQR = interquartile range
Mechanical ventilation includes noninvasive and invasive ventilation.

Respir Care. 2016 Mar;61(3):291-9. doi: 10.4187/respcare.04252. Epub 2015 Nov 17.
Randomized Controlled Trial of Humidified High-Flow Nasal Oxygen for Acute Respiratory Distress in the Emergency Department: The HOT-ER Study.
Jones PG, Kamona S, Doran O, Sawtell F, Wilsher M.

Systematic review and meta-analysis

Intensive Care Med (2019) 45:563–572
https://doi.org/10.1007/s00134-019-05590-5

SYSTEMATIC REVIEW

High flow nasal cannula compared with conventional oxygen therapy for acute hypoxemic respiratory failure: a systematic review and meta-analysis

B. Rochwerg[1,2,22*], D. Granton[1], D. X. Wang[3], Y. Helviz[4], S. Einav[4,5], J. P. Frat[6,7,8], A. Mekontso-Dessap[9,10], A. Schreiber[11], E. Azoulay[12,13], A. Mercat[14], A. Demoule[15,16], V. Lemiale[12,13], A. Pesenti[17,18], E. D. Riviello[19], T. Mauri[17,18], J. Mancebo[20], L. Brochard[21] and K. Burns[21]

Systematic review and meta-analysis

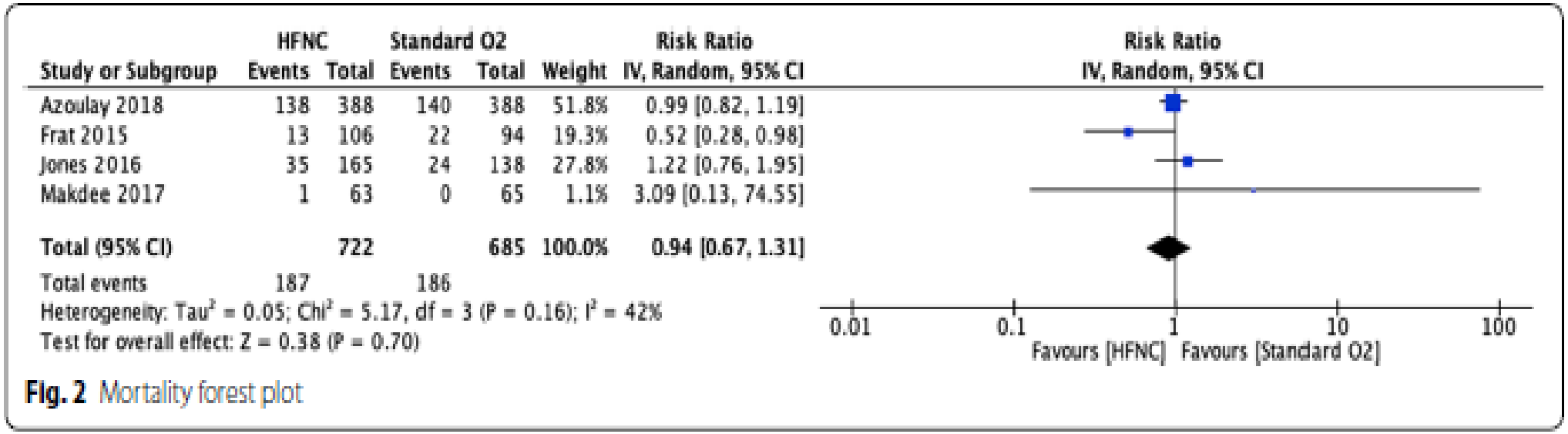


Fig. 2 Mortality forest plot

High flow nasal cannula compared with conventional oxygen therapy for acute hypoxemic respiratory failure: a systematic review and meta-analysis.

Rochwerg B[1,2,3], Granton D[4], Wang DX[5], Helviz Y[6], Einav S[6,7], Frat JP[8,9,10], Mekontso-Dessap A[11,12], Schreiber A[13], Azoulay E[14,15], Mercat A[16], Demoule A[17,18], Lemiale V[14,15], Pesenti A[19,20], Riviello ED[21], Mauri T[19,20], Mancebo J[22], Brochard L[23], Burns K[23].

Intensive Care Med. 2019 May;45(5):563-572. doi: 10.1007/s00134-019-05590-5. Epub 2019 Mar 19.

Systematic review and meta-analysis

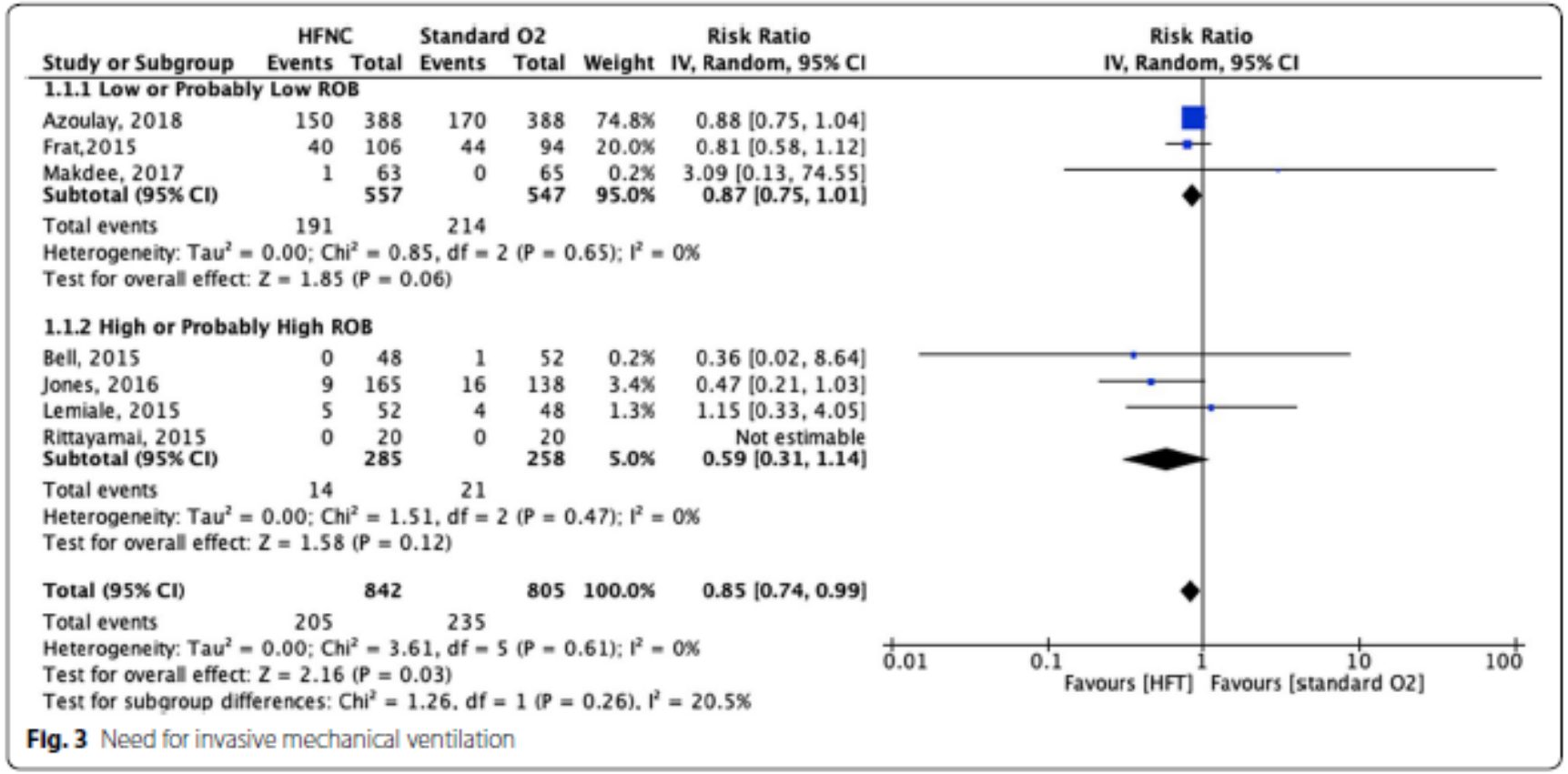


Fig. 3 Need for invasive mechanical ventilation

High flow nasal cannula compared with conventional oxygen therapy for acute hypoxemic respiratory failure: a systematic review and meta-analysis.

Rochwerg B[1,2,3], Granton D[4], Wang DX[5], Helviz Y[6], Einav S[6,7], Frat JP[8,9,10], Mekontso-Dessap A[11,12], Schreiber A[13], Azoulay E[14,15], Mercat A[16], Demoule A[17,18], Lemiale V[14,15], Pesenti A[19,20], Riviello ED[21], Mauri T[19,20], Mancebo J[22], Brochard L[23], Burns K[23].

Intensive Care Med. 2019 May;45(5):563-572. doi: 10.1007/s00134-019-05590-5. Epub 2019 Mar 19.

Systematic review and meta-analysis

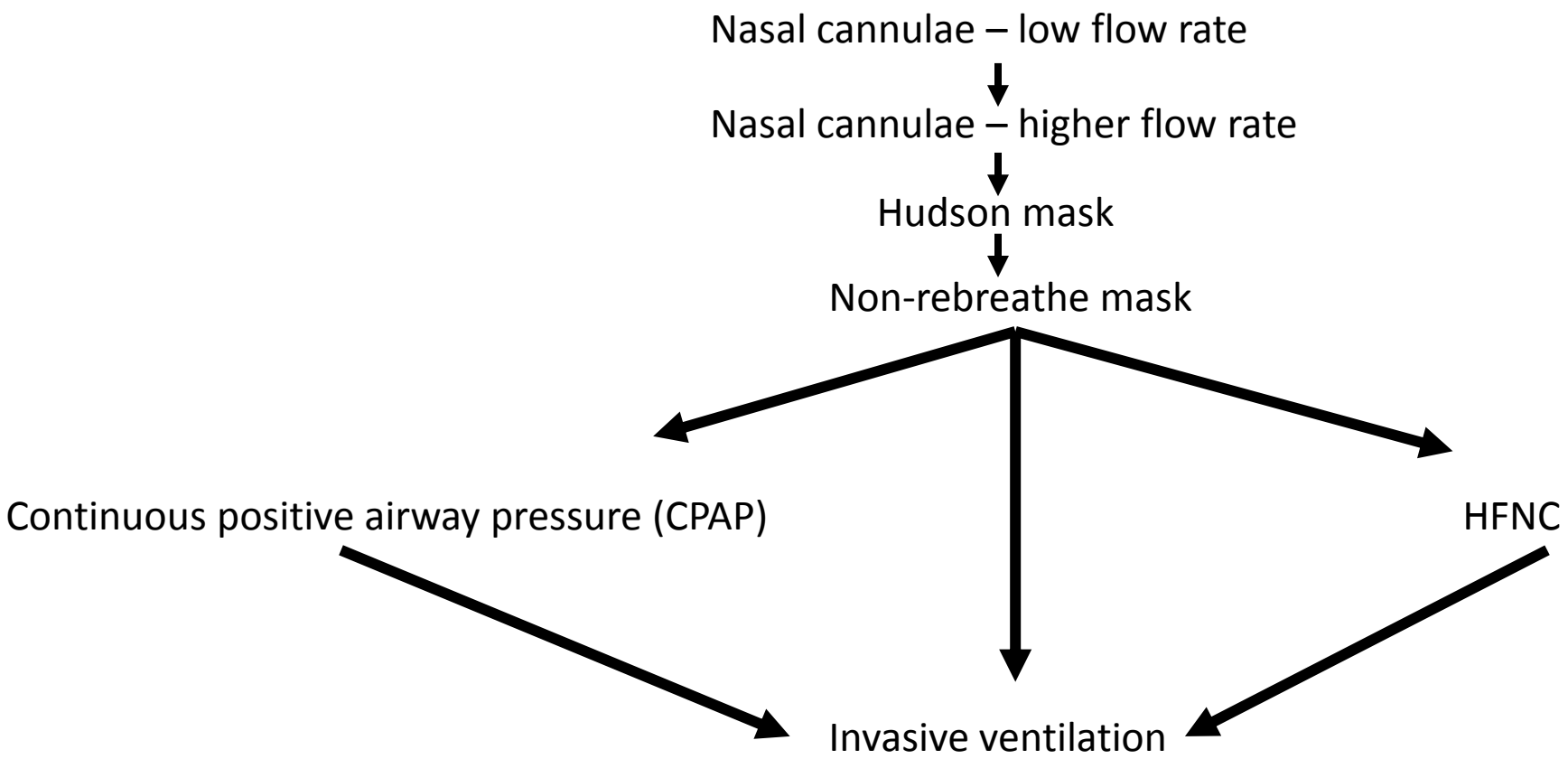
- No effect on patient-reported dyspnoea
- Little harm from HFNC
- Future research to investigate subsets of acutely hypoxaemic patients who would benefit form HFNC

High flow nasal cannula compared with conventional oxygen therapy for acute hypoxemic respiratory failure: a systematic review and meta-analysis.

Rochwerg B[1,2,3], Granton D[4], Wang DX[5], Helviz Y[6], Einav S[6,7], Frat JP[8,9,10], Mekontso-Dessap A[11,12], Schreiber A[13], Azoulay E[14,15], Mercat A[16], Demoule A[17,18], Lemiale V[14,15], Pesenti A[19,20], Riviello ED[21], Mauri T[19,20], Mancebo J[22], Brochard L[23], Burns K[23].

Intensive Care Med. 2019 May;45(5):563-572. doi: 10.1007/s00134-019-05590-5. Epub 2019 Mar 19.

For acute hypoxaemic respiratory failure – treatment algorithm



HFNC for acute hypercapnic respiratory failure

April 2016 Volume 71 Supplement 2

Thorax
AN INTERNATIONAL JOURNAL OF RESPIRATORY MEDICINE

BTS/ICS Guidelines for the Ventilatory Management of Acute Hypercapnic Respiratory Failure in Adults

British Thoracic Society/Intensive Care Society Acute Hypercapnic Respiratory Failure Guideline Development Group

thorax.bmj.com

BMJ

Initial treatment for hypercapnic respiratory failure

- ❑ Controlled oxygen therapy to maintain SpO_2 88 – 92%
- ❑ Treat the underlying cause:
  - COPD: nebs / steroids / antibiotics
  - CCF: diamorphine / diuretics / GTN / treatment for myocardial ischaemia

When to consider NIV in the acute setting

- pH < 7.35 and PCO_2 > 6.5 kPa despite optimal medical management

Commonest causes of acute hypercapnic respiratory failure necessitating NIV in the UK

- COPD (presumptive diagnosis) - 61% - 70%
- Cardiogenic pulmonary oedma – 8% - 10%
- Obesity-hypoventilation – 8%
- Chest-wall / neuromuscular disease – 4%

Davies M. British Thoracic Society NIV Audit 2012 (national audit period 1 February – 31 March 2012) www.brit-thoracic.org.uk/document-library/audit-and-quality-improvement/audit-reports/bts-adult-niv-audit-report-2012/

Davies M. British Thoracic Society NIV Audit 2013 (national audit period 1 February – 31 March 2013) www.brit-thoracic.org.uk/document-library/audit-and-quality-improvement/audit-reports/bts-adult-niv-audit-report-2013/

Case report

The use of high-flow nasal oxygen therapy in the management of hypercarbic respiratory failure

Jonathan Millar, Stuart Lutton and Philip O'Connor

Ther Adv Respir Dis

2014, Vol. 8(2) 63–64

DOI: 10.1177/1753465814521890

57, female, admitted with an exacerbation of COPD. Declined NIV due to previous experience. Put of Optiflow, 50 litres/minute, FiO_2 28% at 37 degrees centigrade. Also had Abxs/ Steroids / nebs

	Arrival	30 minutes	60 minutes	6 hours
pH	7.31	7.33	7.35	7.36
P_aCO_2 (kPa)	9.2	8.3	7.7	7.3
P_aO_2 (kPa)	7.7	7.9	8.0	9.1
Base excess (mmol/l)	5.6	4.6	4.6	4.3
SO_2 (%)	87.6	90.2	90.8	92.7

Randomised trials

Pulmonol. 2019;25(6):348–354

PULMONOLOGY

www.journalpulmonology.org

REVIEW

High flow through nasal cannula in exacerbated COPD patients: a systematic review

L. Pisani[a,*], M. Astuto[b], I. Prediletto[a], F. Longhini[c]

[a] *Respiratory and Critical Care Unit, S. Orsola-Malpighi Hospital, Alma Mater University, Bologna, Italy*
[b] *Department of Clinical and Experimental Medicine, University of Catania, Catania, Italy*
[c] *Intensive Care Unit, University Hospital Mater Domini, Department of Medical and Surgical Sciences, Magna Graecia University, Catanzaro, Italy*

Received 7 August 2019; accepted 20 August 2019

5 randomised trials identified:

1 – HFNC for breaks during NIV on ICU

2 – Post extubation effects in patients with COPD

2 – NIV in acute COPD

Randomised trials

Official Journal of the Asian Pacific Society of Respirology
Respirology

ORIGINAL ARTICLE

Physiological effects of titrated oxygen via nasal high-flow cannulae in COPD exacerbations: A randomized controlled cross-over trial

JANINE PILCHER,[1,2,3] LEONIE EASTLAKE,[1] MICHAEL RICHARDS,[1] SHARON POWER,[1,3] TERRIANNE CRIPPS,[1,3] SUSAN BIBBY,[1,3] IRENE BRAITHWAITE,[1,2,3] MARK WEATHERALL[4] AND RICHARD BEASLEY[1,2,3]

- Single centre, randomized cross-over trial in patients with acute exacerbation of COPD requiring oxygen therapy. 24 patients. Patients are already in hospital (not in AE)
- Patients received HFNC (35 litres/minute) or oxygen via nasal prongs for 30 minutes. Washout period of 15 minutes between the 2 interventions.
- Primary outcome was the change transcutaneous carbon dioxide.

Result: difference of -1.4 mmHg (95% CI: -2.2 t0 -0.6) [p = 0.001]) in favour of HFNC after 30 minutes.

Randomised trials

Received: 20 November 2016 | Revised: 28 August 2017 | Accepted: 26 January 2018
DOI: 10.1111/crj.12772

ORIGINAL ARTICLE

WILEY

High flow nasal cannulae oxygen therapy in acute-moderate hypercapnic respiratory failure

Myoung Kyu Lee[1] | Jaehwa Choi[1] | Bonil Park[1] | Bumjoon Kim[1] | Seok Jeong Lee[1] | Sang-Ha Kim[1] | Suk Joong Yong[1] | Eun Hee Choi[2] | Won-Yeon Lee[1]

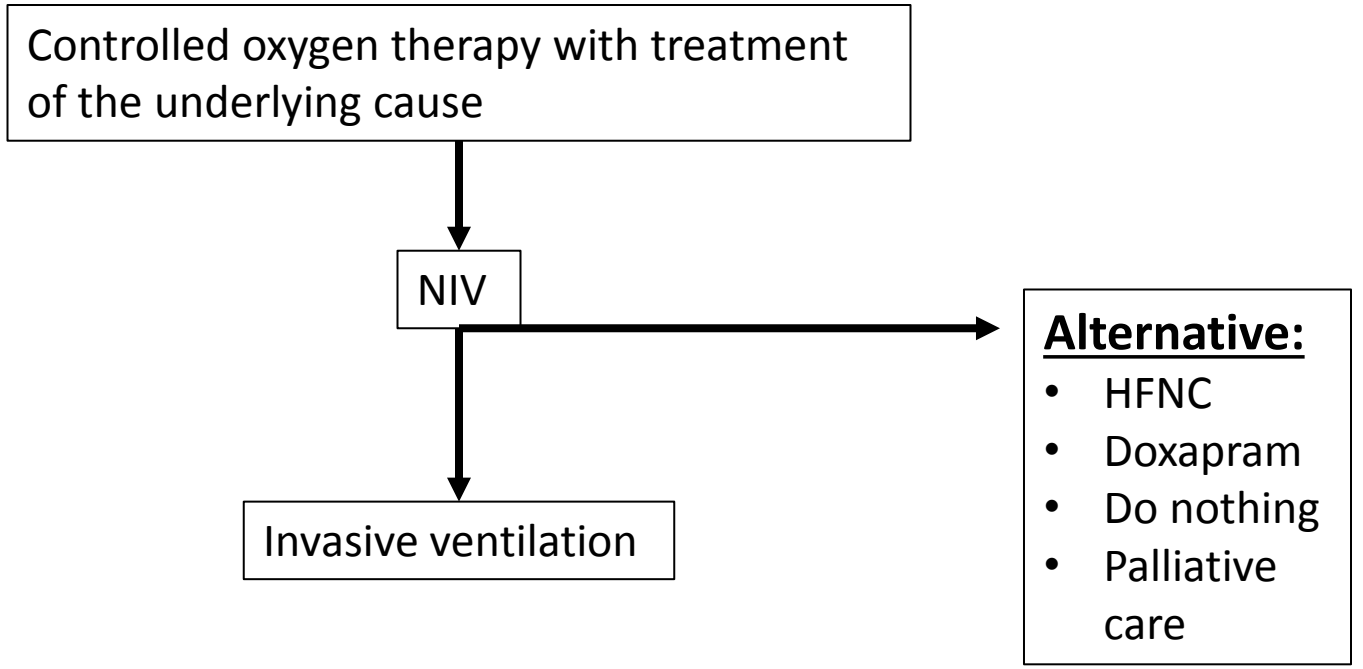
- Prospective, randomised study of patients with acute exacerbation of COPD with hypercapnic respiratory failure. Randomised to HFNC or NIV.
- 88 patients included in the final analysis
- Primary outcome of intubation rate.

	HFNC	NIV	P-value
Intubation rate at day 30, %	25	27.3	0.857
Mortality at 30 days, %	15.9	18.2	0.845
pCO_2 at 6 hours, mmHg	46.8± 15.2	51.7±17.2	0.160

Future studies

- NCT03370666: Italian Study. Patients with acute exacerbations of COPD with an acidosis (pH 7.25< pH < 7.35) and hypercapnia (PCO_2 ≥55) are randomised to have HFNC or NIV. Primary outcome is change in PCO_2 at 2 hours after intervention. Non-inferiority study

For acute hypercapnic and acidotic respiratory failure due to an exacerbation of COPD – treatment algorithm



HFNC in acute exacerbations of ILD

High mortality in acute exacerbations of ILD

- 30 day mortality in acute exacerbation in IPF up to 40%
- Hospital mortality of 50–100% in CTD-ILDs and 75–100% in patients with hypersensitivity pneumonitis

Original Article

Respiratory management of acute exacerbation of interstitial pneumonia using high-flow nasal cannula oxygen therapy: a single center cohort study

Jiro Ito[1], Kazuma Nagata[1], Takeshi Morimoto[2,3], Mariko Kogo[1], Daichi Fujimoto[1], Atsushi Nakagawa[1], Kojiro Otsuka[1], Keisuke Tomii[1]

Clinical outcomes	Pre-HFNC cohort (n=53)	Post-HFNC cohort (n=43)	P
In-hospital mortality	26 (49.1)	12 (27.9)	0.04
90-day mortality	26 (49.1)	15 (34.9)	0.16
Length of hospital stay, d	16 [9–27]	22 [12–33]	0.13
Length of ICU/IMCU stay, d	3 [0–8]	5 [2–9]	0.05

Clinical Investigations

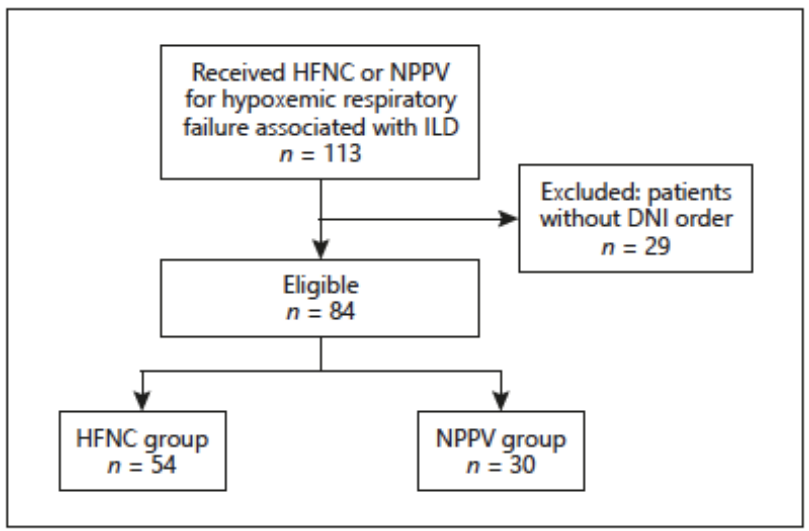
Respiration

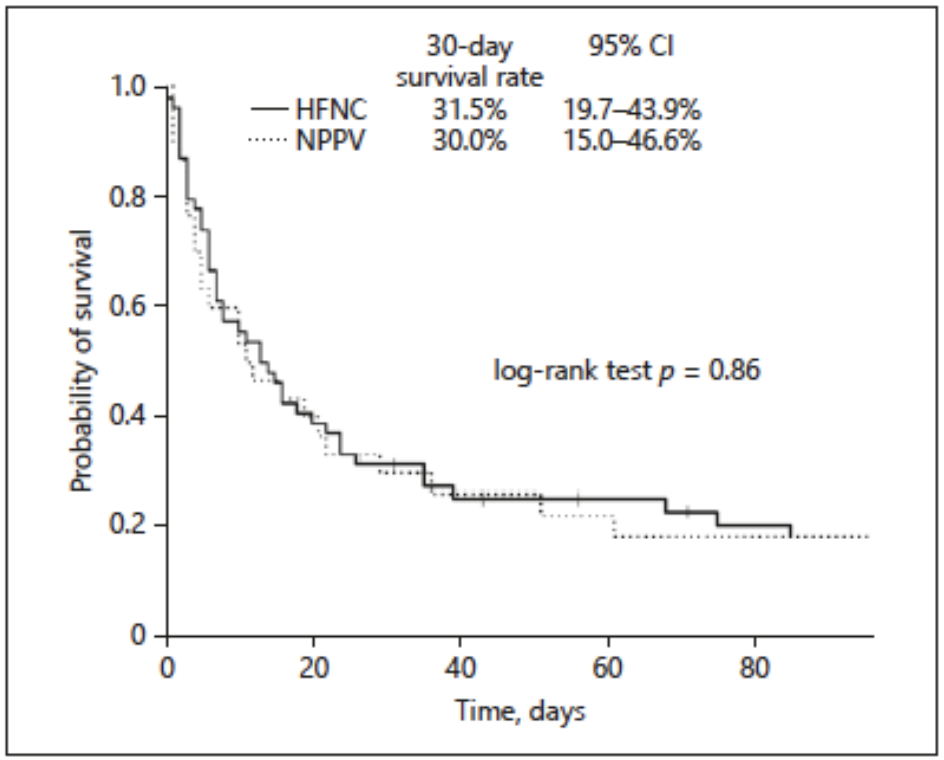
Respiration 2018;96:323–329
DOI: 10.1159/000489890

Received: March 10, 2018
Accepted after revision: May 1, 2018
Published online: June 28, 2018

Efficacy and Tolerability of High-Flow Nasal Cannula Oxygen Therapy for Hypoxemic Respiratory Failure in Patients with Interstitial Lung Disease with Do-Not-Intubate Orders: A Retrospective Single-Center Study

Takafumi Koyauchi[a] Hirotsugu Hasegawa[a] Kei Kanata[a] Takuya Kakutani[a]
Yusuke Amano[a] Yuichi Ozawa[a] Takashi Matsui[a] Koshi Yokomura[a]
Takafumi Suda[b]





Domiciliary use of HFNC

Domiciliary High-Flow Nasal Cannula Oxygen Therapy for Patients with Stable Hypercapnic Chronic Obstructive Pulmonary Disease

A Multicenter Randomized Crossover Trial

Kazuma Nagata[1], Takashi Kikuchi[2], Takeo Horie[3], Akira Shiraki[4], Takamasa Kitajima[5], Toru Kadowaki[6], Fumiaki Tokioka[7], Naohiko Chohnabayashi[8], Akira Watanabe[9], Susumu Sato[10], and Keisuke Tomii[1]

Ann Am Thorac Soc Vol 15, No 4, pp 432–439, Apr 2018

- Multicentre study in Japan
- Randomised cross over study of the nocturnal use of HFNC in patients already on LTOT
- Patients used LTOT during the day and then used either usual oxygen or HFNC at night for 6 weeks
- Primary outcome was the change in the St.George's Respiratory Questionnaire

Domiciliary High-Flow Nasal Cannula Oxygen Therapy for Patients with Stable Hypercapnic Chronic Obstructive Pulmonary Disease

A Multicenter Randomized Crossover Trial

Kazuma Nagata[1], Takashi Kikuchi[2], Takeo Horie[3], Akira Shiraki[4], Takamasa Kitajima[5], Toru Kadowaki[6], Fumiaki Tokioka[7], Naohiko Chohnabayashi[8], Akira Watanabe[9], Susumu Sato[10], and Keisuke Tomii[1]

	Adjusted Treatment Effect (95% CI)	*P* Values
SGRQ-C		
Total score	−7.8 (−11.9, −3.7)	<0.01
Symptom score	−10.8 (−15.3, −6.3)	<0.01
Activity score	−4.7 (−8.7, −0.6)	0.03
Impact score	−8.7 (−15, −2.5)	0.01
EQ-5D-5L score	0.05 (−0.01, 0.11)	0.08
EQ-5D-5L VAS	7.9 (2.9, 12.9)	<0.01
mMRC score	−0.15 (−0.46, 0.15)	0.32
Arterial blood gas		
pH	0.02 (0.01, 0.02)	0.01
Pa_{CO_2}, mm Hg	−4.1 (−6.5, −1.7)	<0.01
Pa_{O_2}, mm Hg	−3.4 (−9.5, 2.7)	0.27
Sp_{O_2}, %	0.3 (−0.4, 1)	0.38
Nocturnal Ptc_{CO_2}, mm Hg		
95th percentile	−4.8 (−8.1, −1.5)	<0.01
Median	−5.1 (−8.4, −1.8)	<0.01
Pulmonary function tests (% predicted)		
Vital capacity	−1.4 (−3.6, 0.9)	0.23
FVC	0.17 (−3.15, 3.49)	0.92
FEV_1	−0.31 (−1.73, 1.11)	0.67
FEV_1/FVC	0.48 (−1.73, 2.7)	0.67
Diffusing capacity of the lung for carbon monoxide	0.07 (−4.65, 4.79)	0.98
RV	3.44 (−5.57, 12.45)	0.46
Functional residual capacity	0.72 (−2.18, 3.62)	0.63
TLC	0.28 (−1.73, 2.29)	0.78
6-min walk test		
Distance, m	3.6 (−8.3, 15.5)	0.55
Sp_{O_2} decline, %	−3.4 (−9.5, 2.7)	0.27
Borg scale	−0.27 (−0.93, 0.39)	0.43
Physical activity		
Calorie consumption, kcal/d	−5.1 (−10.5, 0.3)	0.07
Step counts, steps/d	−233 (−483, 16)	0.07
Activity time, min/d	−59.2 (−162.4, 44)	0.26

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CLINICAL TRIAL REPORT

Long-term effects of oxygen-enriched high-flow nasal cannula treatment in COPD patients with chronic hypoxemic respiratory failure

International Journal of COPD 2018:13 1195–1205

- Multicentre centre, randomized trial in Denmark
- Patients with COPD on LTOT, randomised to continue with usual LTOT or to have LTOT with HFNC
- HFNC used for at least 8 hours per day, preferably at night (but this was not a strict instruction).
- HFNC flow rate set at 20 litres/minute
- Follow up over 1 year.

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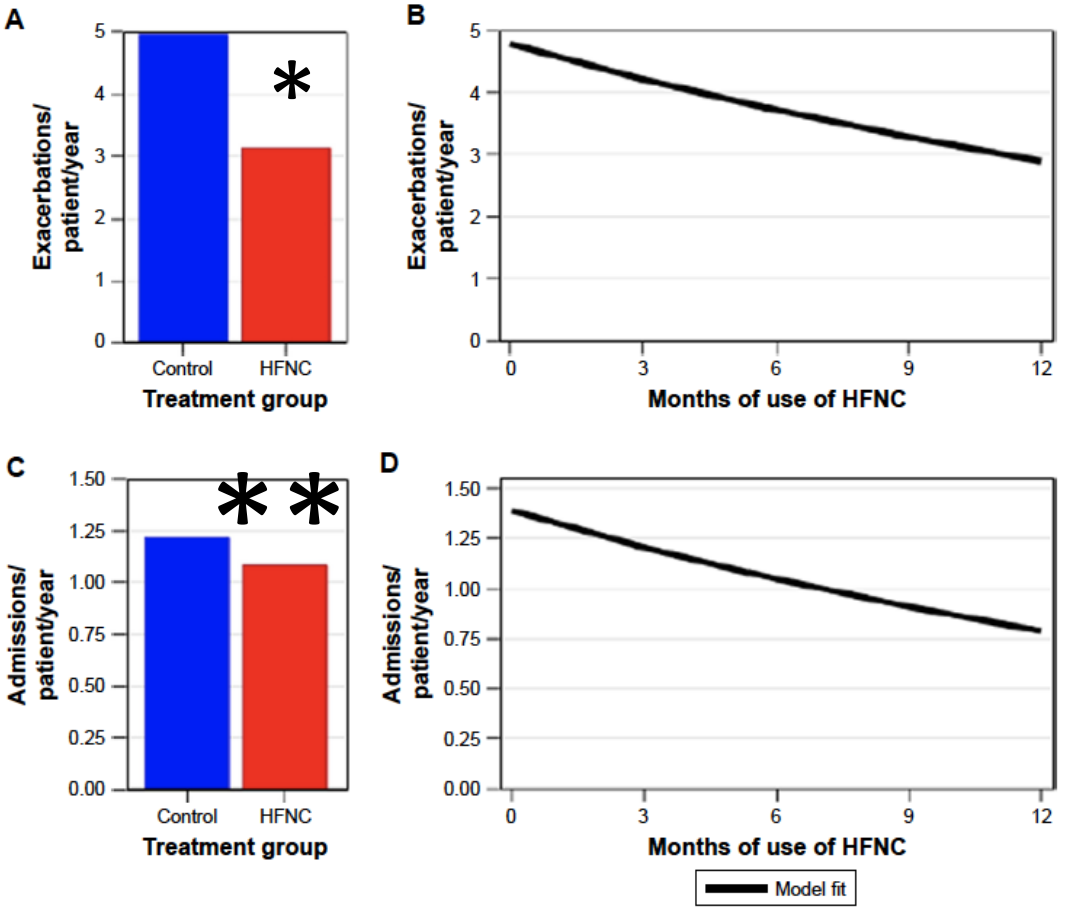
* = statistically significantly difference
** - not statistically significantly different



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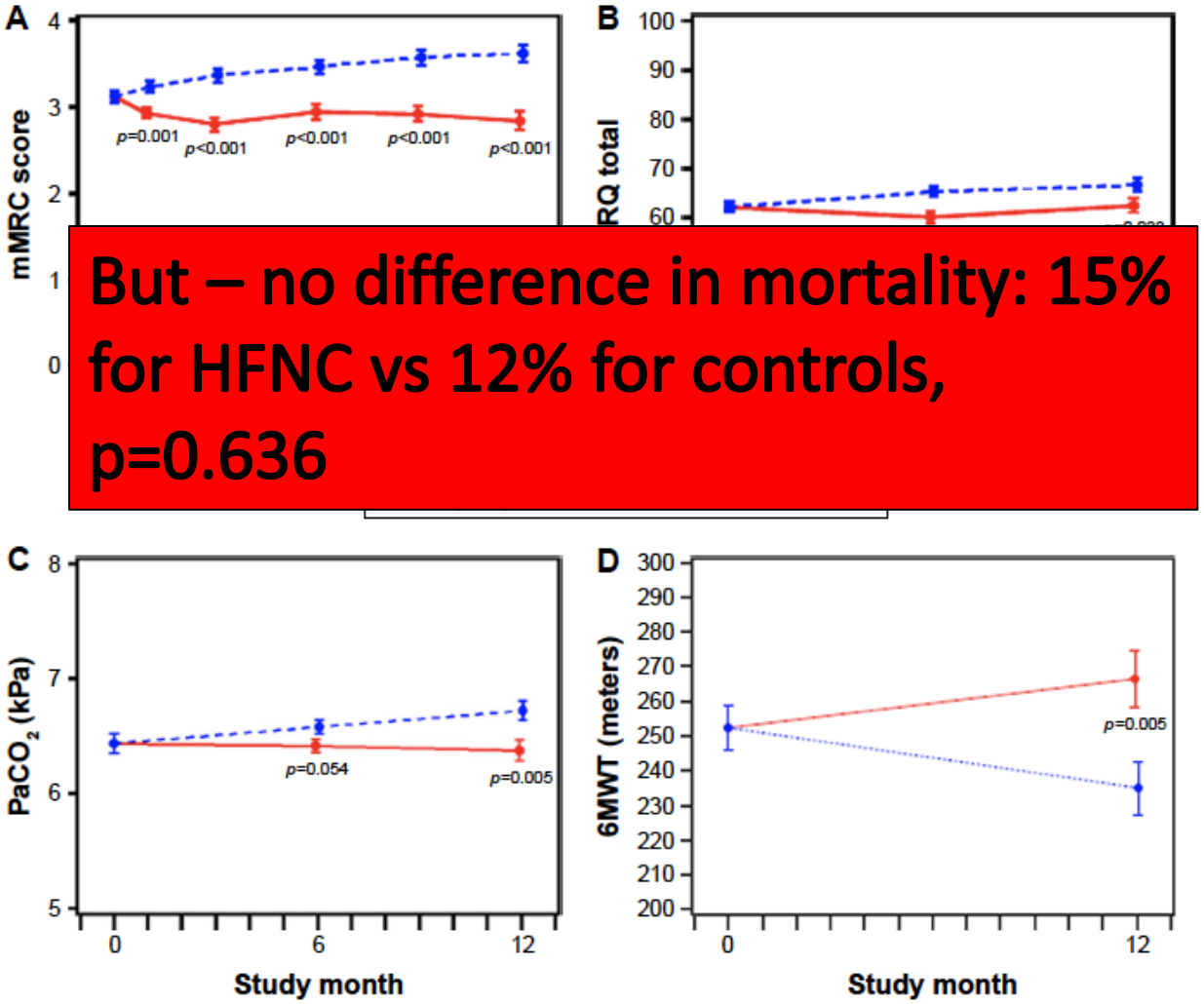

But – no difference in mortality: 15% for HFNC vs 12% for controls, p=0.636

Bronchoscopy

HFNC for Bronchoscopy

- Several publications, including two for use during EBUS and standard outpatient bronchoscopy: no difference in outcomes compared to using standard oxygen therapy
- HFNC during sedation bronchoscopy for patients with severe respiratory failure in the ICU

Respir Investig. 2014 Sep;52(5):310-4. doi: 10.1016/j.resinv.2014.06.006. Epub 2014 Jul 25.
Implementation of bronchoalveolar lavage using a high-flow nasal cannula in five cases of acute respiratory failure.
Miyagi K, Haranaga S, Higa F, Tateyama M, Fujita J.

Simon et al. Critical Care (2014) 18:712
DOI 10.1186/s13054-014-0712-9

CRITICAL CARE

RESEARCH Open Access

High-flow nasal cannula oxygen versus non-invasive ventilation in patients with acute hypoxaemic respiratory failure undergoing flexible bronchoscopy - a prospective randomised trial

Marcel Simon[1], Stephan Braune[1], Daniel Frings[1], Ann-Kathrin Wiontzek[1], Hans Klose[2] and Stefan Kluge[1*]

- Adult patients admitted to ICU for any cause requiring therapeutic or diagnostic bronchoscopy
- Hypoxia: PO_2 /FiO_2 ratio below 300 mmHg
- Randomised to bronchoscopy with NIV or HFNC
- Primary Outcome: lowest SpO_2 during the procedure,
- Other outcomes: intubation rate 8 hours after procedure, PCO_2
- 40 patients completed the study

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Physiological parameters at baseline	NIV	HFNC	P value
Heart rate (beats/min)	95 ± 14	101 ± 15	0.27
Mean arterial pressure (mm Hg)	85 ± 11	82 ± 14	0.56
Respiratory rate (breaths/min)	30 ± 8	30 ± 9	0.86
PaO_2/FIO_2 (mm Hg)	163 ± 64	138 ± 69	0.25
$PaCO_2$ (mm Hg)	43 ± 13	34 ± 6	0.01
pH	7.43 ± 0.11	7.46 ± 0.07	0.21

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- No difference in lowest SpO_2: 95± 5% in NIV group vs 92±7% on the HFNC group (p=0.07)
- No difference in need for intubation at 8 hours: but only one patient required intubation (in HFNC group) at 8 hours
- At 24 hours: 3 patients ventilated in NIV group and 1 in the HFNC group.
- Average time of Bronchoscopy: 5 minutes

Thank you for you attention.
Any questions?