Oxygène à haut débit dans l'IRA hypoxémique du patient immunodéprimé

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Quelle sont la question ?

- Les immunodéprimés sont-ils différents ?
- Chez les ID, la stratégie d'oxygénation/ventilation a-t-elle un impact sur le pronostic ?
- Faut-il encore tout faire pour éviter l'intubation dans l'IRA hypoxémique du patient immunodéprimé ?

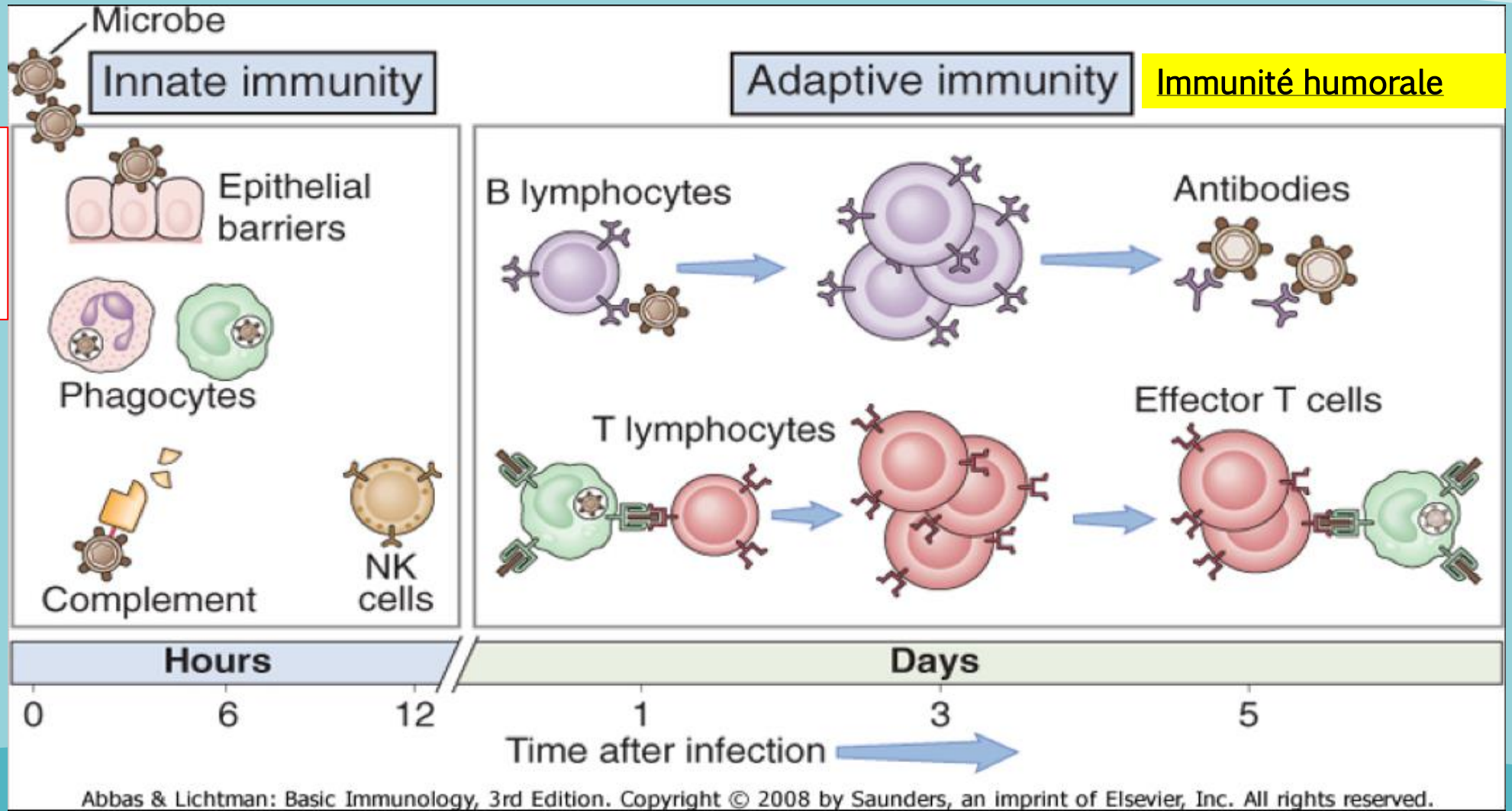
❶ Clarifications

Immunocompromized Patients with ARF: Striking Differences

	Unselected Patients	Immunocompromized patients
Incidence of respiratory events	1-5%	1-50%
Risk for severe hypoxemia	Ref	↑↑
Increased mortality if delayed intubation	Probably	Yes (NIV or HFNO failure)
Complications of MV	Similar	Similar or slightly ↑
Respiratory drive	=	=
VTE under NIV	Similar	Similar
Need for diagnostic strategy	Sometimes	Almost always
Intubation rate (if not intubated at admission)	25-30%	40%
Mortality of patients not intubated at admission	10-15%	25-35%
Reduced mortality over time	Slightly	Yes +++
Conclusive literature	No	No

Système immunitaire

Monocytes/ Macrophages Complément



Immunodéprimés: quo va dis?

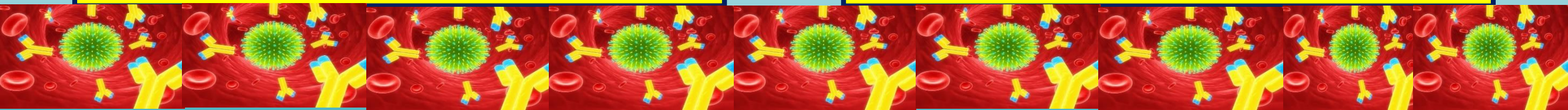
Déficit immunitaire secondaire

- **Immunodépression médicamenteuse**
- **Hémopathies malignes**
- **Tumeurs solides?**
- **Chimiothérapie**
- **Greffe d'organe**
- **SIDA**
- **Dénutrition**
- **Diabète**
- **…**

Déficit immunitaire secondaire

>200 maladies, 5 grands groupes.

- **Les DIP humoraux: DICV les + fréquents.** Déficit en Ig sériques, manque d'Ac
- **Les DIP combinés: DICS: Altération des lymphocytes et des anticorps**
- **Le déficit de la phagocytose**
- **Altérations du système du complément**
- **Les DIP complexes** (mdies génétiques / Sd (Wiskott-Aldrich= eczéma, thrombopénie)



IRA: incidence selon le type d'immunodépression

Allogreffe de moelle, LAM

Neutropénie prolongée

Hémopathie lymphoïde

Greffe pulmonaire

Greffé rénaux, LAL, lymphome

Cancer du poumon, maladies systémiques, greffe cardiaque Tumeurs solides

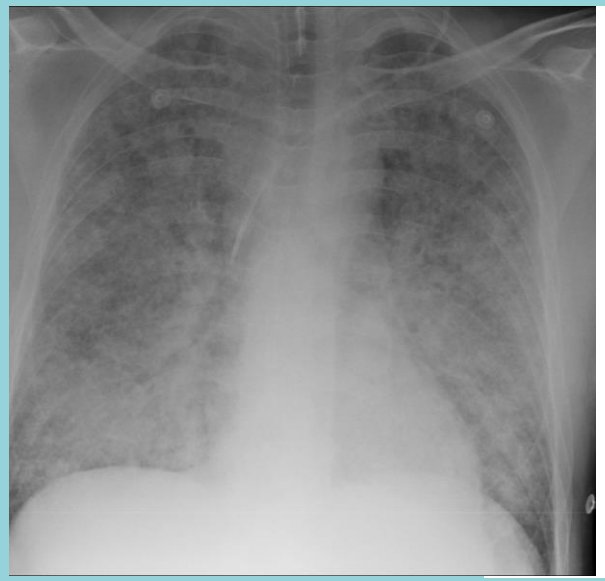
IRA: Intubation et mortalité selon le type d'ID

	IOT	MORTALITE
Allogreffe de moelle	50%	80%
LAM inaugurale	50%	50%
LAM (neutropénie)	40%	40%
Hémopathie lymphoïde	30%	40%
Greffe rénale	30%	30%
Greffe pulmonaire	25-30%	20-25%
LAL	25-40%	40%
Lymphome	25%	40%
Cancer du poumon	50%	60%
Maladies systémiques	25-30%	20%
Greffe cardiaque	10-15%	20%
Tumeurs solides (post-op exclus)	20%	30%

Insuffisance respiratoire aiguë: quo va dis?

1

2



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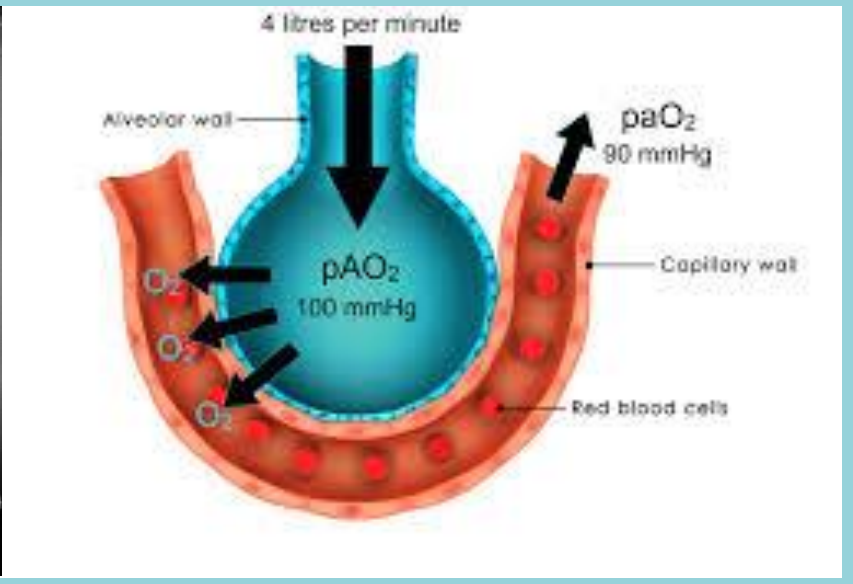
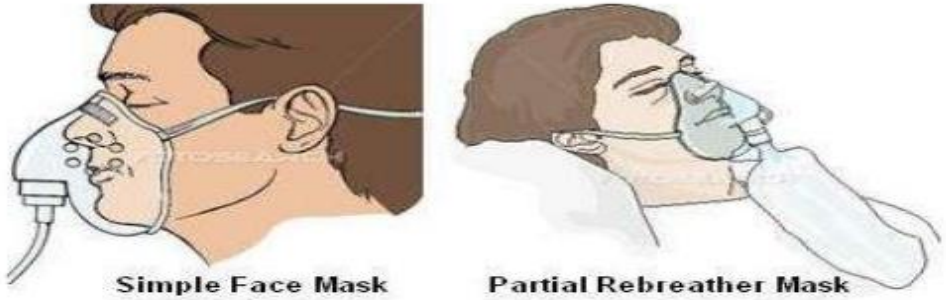
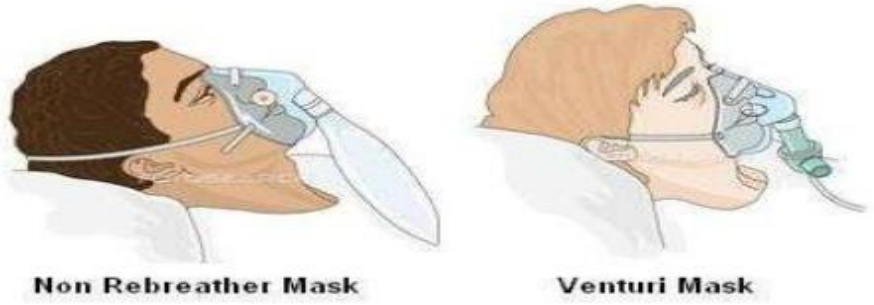
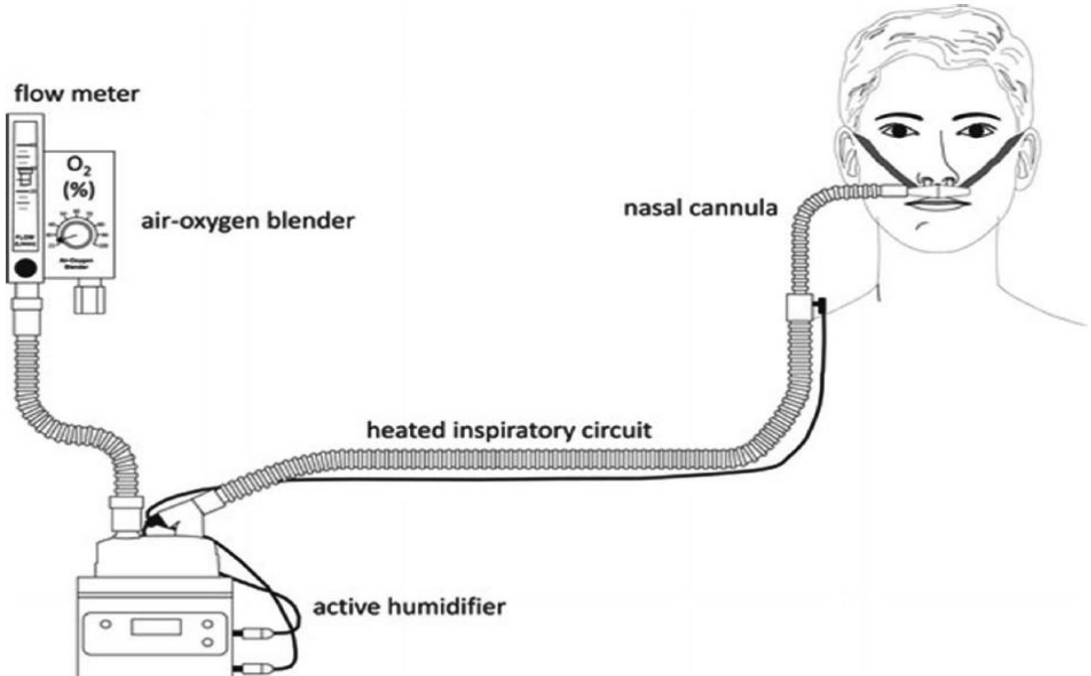
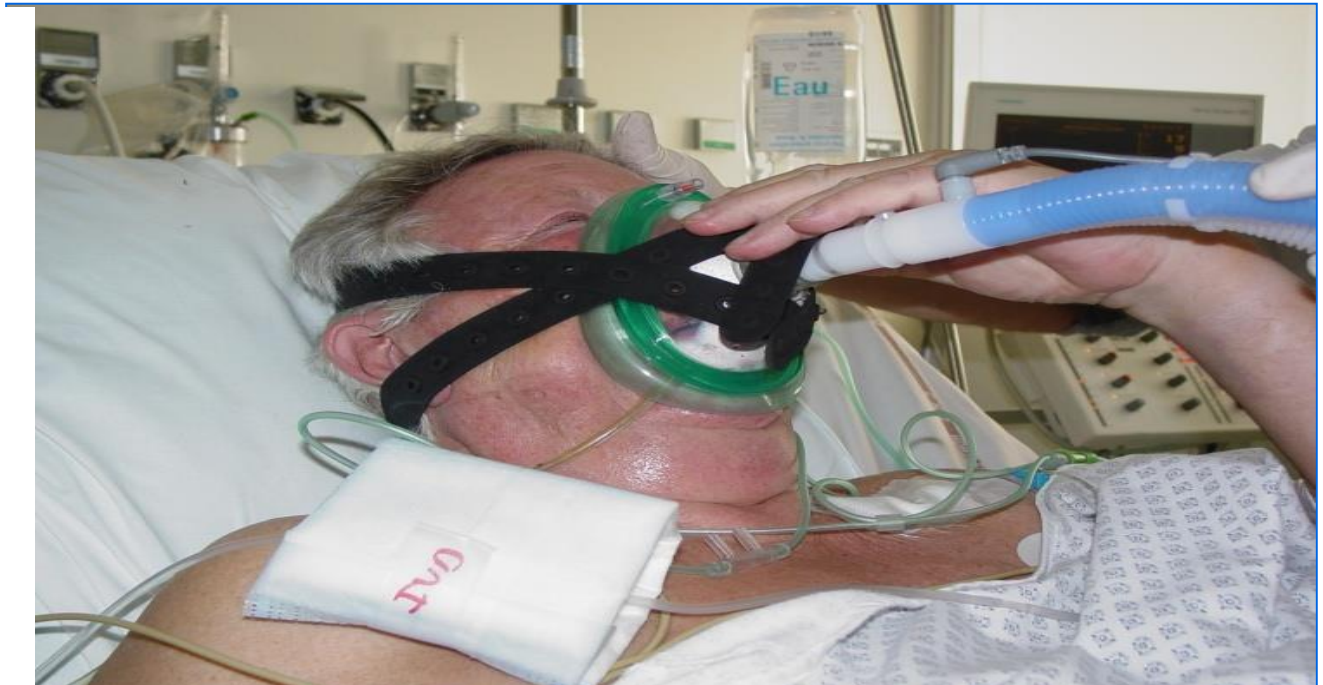
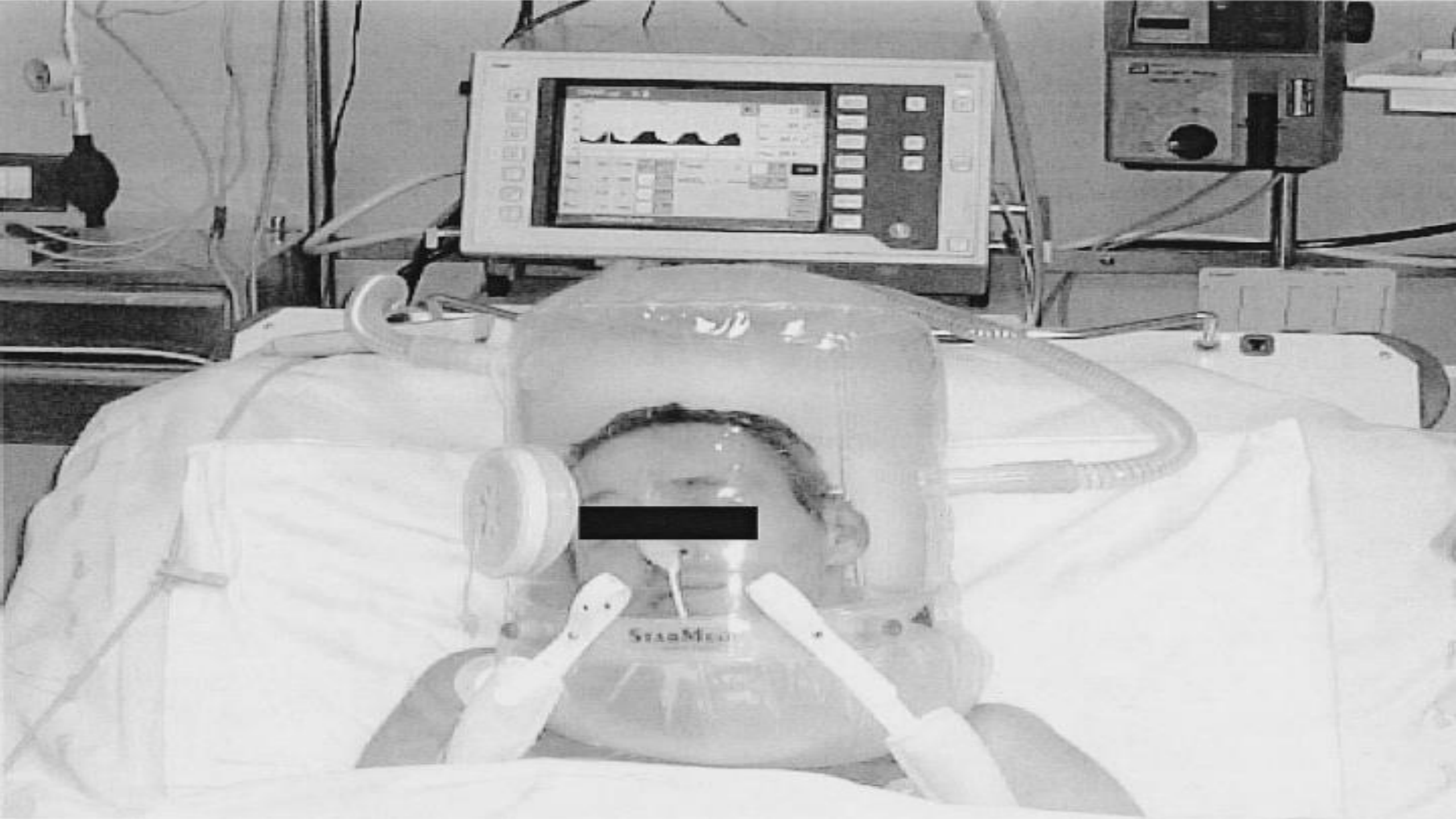



Simple Face Mask
Partial Rebreather Mask


Non Rebreather Mask
Venturi Mask


flow meter
O_2 (%)
air-oxygen blender
nasal cannula
heated inspiratory circuit
active humidifier


Eau
IVG



Oxygenation strategy in hypo ARF in IC: *The menu is the same*

	Strength	Weakness
Standard oxygen	Easy, can be used everywhere	Low FiO2, poor comfort, Lack of monitoring
NIV (PS/CPAP/Helmet)	Has changed the perspective for COPD/CPO…, has been very successful at a time when mortality was high with intubation, allows to monitor VTE, …	Comfort, increased mortality if delayed intubation, workload, Helmet?
High flow oxygen	Easy, high FiO2, humidified and warmed, some positive pressure, comfort, reduces WOB, reduces intubation, reduces mortality vs. NIV	Lack of monitoring Same issues with HFNC failure Reduces intubation rate only in the most hypoxemic
First line intubation	May control PSILI Allows protective ventilation Is not anymore the “end”	Intubated patients always have higher mortality rates. Marker of severity > a decision
A+B+C+D	…	…

FiO_2 values are higher and more stable
Because the delivered flow is higher than the spontaneous inspiratory demand and because the difference between the delivered flow rate and the patient's inspiratory flow rate is smaller
The flow must be set to match the patient's inspiratory demand and/or the severity of the respiratory distress
The anatomical dead space is decreased via washout of the nasopharyngeal space
Consequently, a larger fraction of the minute ventilation participates in gas exchange
Respiratory efforts become more efficient
Thoracoabdominal synchrony improves
The work of breathing is decreased
Because HFNCO mechanically stents the airway
Provides flow rates that match the patient's inspiratory flow, and markedly attenuates the inspiratory resistance associated with the nasopharynx, thereby reducing the work of breathing
The gas delivered is heated and humidified
Warm humid gas reduces the work of breathing and improves mucociliary function, thereby facilitating secretion clearance, decreasing the risk of atelectasis, and improving the ventilation/perfusion ratio and oxygenation
The body is spared the energy cost of warming and humidifying the inspired gas (neonates +++)
Warm humid gas is associated with better conductance and pulmonary compliance compared to dry, cooler gas
HFNCO delivers adequately warmed and humidified gas only when the flow is >40 L/min
Positive airway pressures are increased
The nasal cannula generates continuous positive pressures in the pharynx of up to 8 cmH_2O, depending or flow and mouth opening
The positive pressure distends the lungs, ensuring lung recruitment and decreasing the ventilation–perfusion mismatch in the lungs
End-expiratory lung volume is greater with HFNO than with low-flow oxygen therapy
Minimizing leaks around the cannula prongs is of the utmost importance

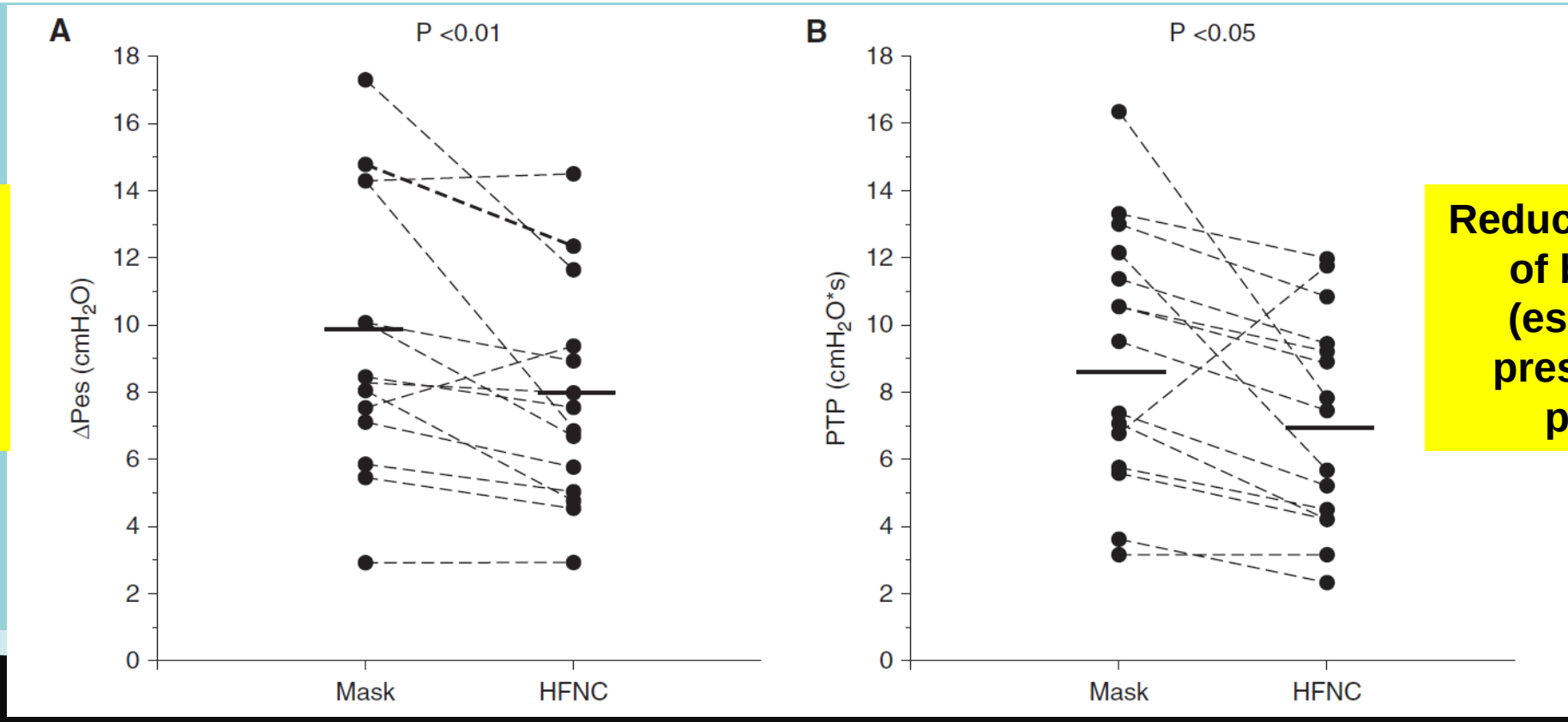
ORIGINAL ARTICLE Am J Respir Crit Care Med Vol 195, Iss 9, pp 1207–1215, May 1, 2017

HFNC delivered at 40 L/min vs. standard nonocclusive facial mask at 12 L/min

Physiologic Effects of High-Flow Nasal Cannula in Acute Hypoxemic Respiratory Failure

Tommaso Mauri[1,2], Cecilia Turrini[1,3], Nilde Eronia[4], Giacomo Grasselli[1], Carlo Alberto Volta[3], Giacomo Bellani[4,5], and Antonio Pesenti[1,2]

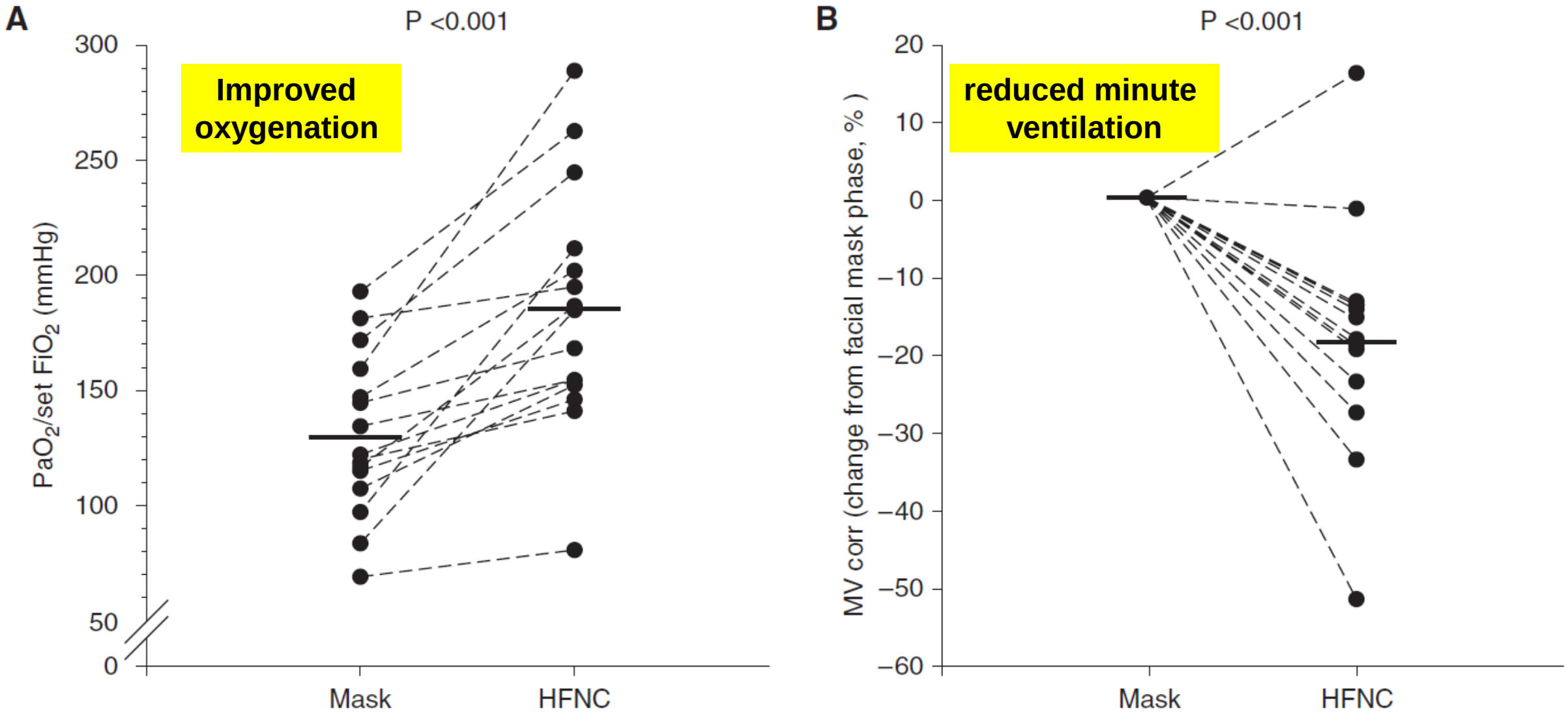
Reduction of inspiratory effort (red negative swings of Es pressure



Reduction of work of breathing (esophageal pressure-time product)

Am J Respir Crit Care Med Vol 195, Iss 9, pp 1207–1215, May 1, 2017

HFNC delivered at 40 L/min vs. standard nonocclusive facial mask at 12 L/min



SEVEN-DAY PROFILE PUBLICATION

Optimum support by high-flow nasal cannula in acute hypoxemic respiratory failure: effects of increasing flow rates

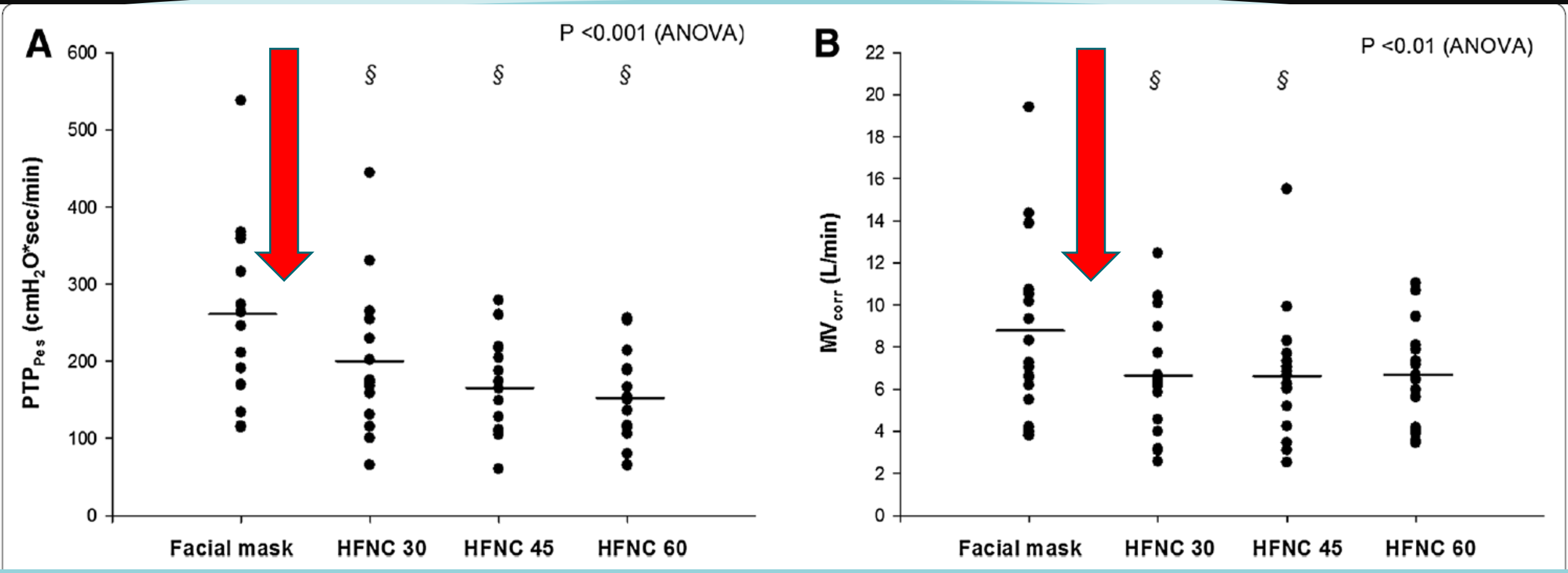
Tommaso Mauri[1,2], Laura Alban[3], Cecilia Turrini[3], Barbara Cambiaghi[4], Eleonora Carlesso[1], Paolo Taccone[2], Nicola Bottino[2], Alfredo Lissoni[2], Savino Spadaro[3], Carlo Alberto Volta[3], Luciano Gattinoni[5], Antonio Pesenti[1,2*] and Giacomo Grasselli[2]

Intensive Care Med (2017) 43:1453–1463

Prospective randomized cross-over study, 17 AHRF, PAFI≤300 mmHg.

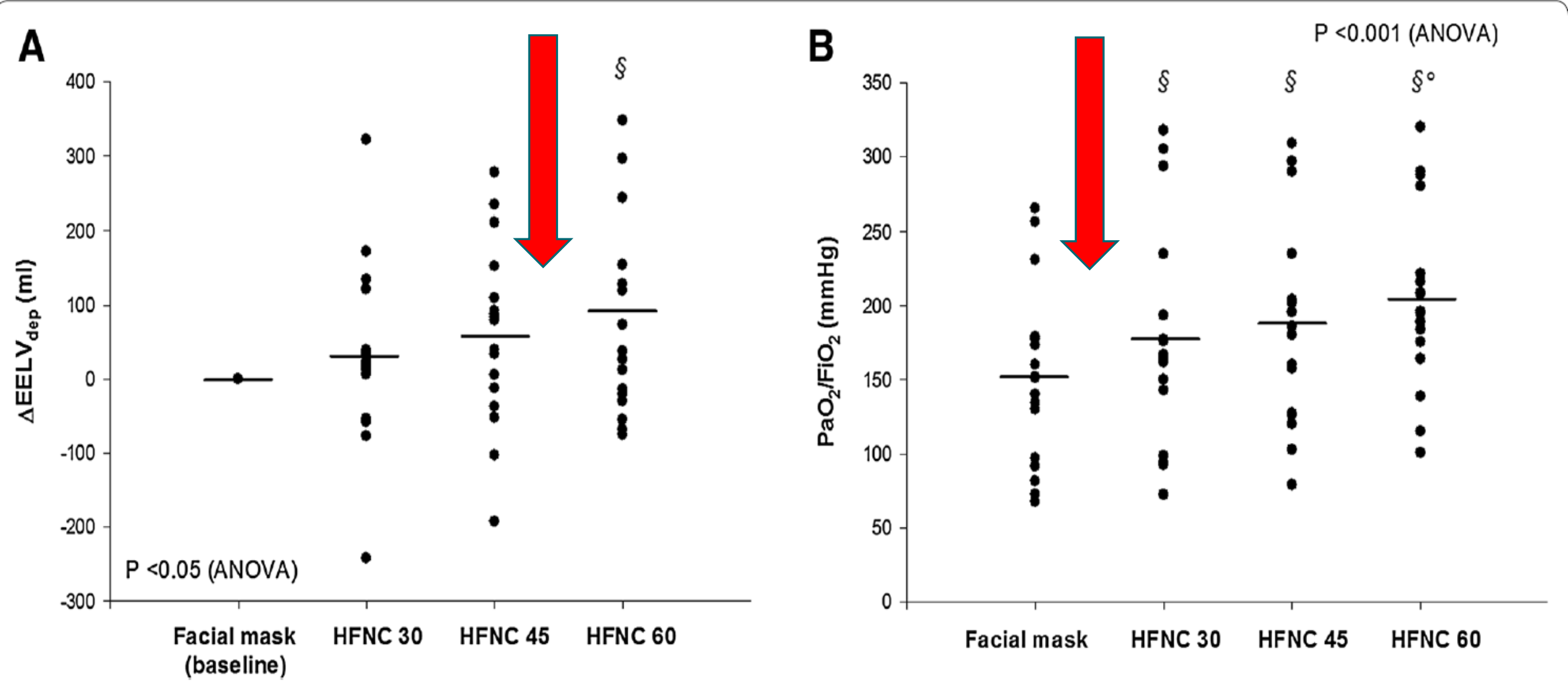
HFNC at flow rates of 30, 45 and 60 l/min randomly applied, constant FiO2

At the end of each phase, ABG, we measured arterial blood gases, inspiratory effort (ΔPes) and on the esophageal pressure–time product (PTPPes), and lung volume, by electrical impedance tomography.



inspiratory effort

CO2 « clearance »



Changes in lung aeration

PaO2 / Fi02

Targeted physiologic variable	Optimum flow rate[a]		« OPTIMAL »
	HFNC 30 l/min	HFNC 45 l/min	HFNC 60 l/min
ΔPes	×	×	✓
PTP_{Pe}			
ΔEEL			
ΔEEL			
MV			
MVco			
$V_{T, gl}$			
RR	×	×	✓
PaO_2/FiO_2	×	×	✓

Most of the effect on inspiratory workload and CO2 clearance was already obtained at the lowest flow rate.

Increasing HFNC flow rate progressively decreased inspiratory effort and improved lung aeration, dynamic compliance and oxygenation.

Lemiale *et al. Critical Care* (2015) 19:380
DOI 10.1186/s13054-015-1097-0

CRITICAL CARE

RESEARCH Open Access

The effects of a 2-h trial of high-flow

	HFNO group (n = 52)	Venturi mask group (n = 48)	*P* value
Primary endpoint			
Number (%) of patients requiring mechanical ventilation	8 (15 %)	4 (8 %)	0.36
Noninvasive mechanical ventilation	6[a]	3[a]	
Invasive mechanical ventilation	4	2	
Secondary endpoints, median [25th–75th percentile]			
Discomfort VAS score[b] at 120 min	3 [1–5]	3 [0–5]	0.88
Dyspnea VAS score[b] at 120 min	3 [2 – 6]	3 [1–6]	0.87
Thirst VAS score[b] at 120 min	6 [3–8]	6 [5 – 9]	0.40
Respiratory rate at 120 min, breaths/min	25 [22–29]	25 [21–31]	
Heart rate at 120 min, beats/min	98 [90–110]	99 [83–112]	0.43

Quel comparateur?

- **Ventilation non invasive**
  - Essai iVNIctus négatif: pas de bénéfice de la VNI
  - Essai FLORALI post hoc: plus d'intubation et surmortalité avec la VNI
  - Cohorte Efraim: pas de bénéfice de la VNI
  - Chez les patients les plus hypoxémiques, les VTe expliquent en partie l'échec de la VNI
  - La VNI ça suffit? Et la c.CPAP?
- **Oxygène standard**
  - Essai iVNIctus – analyse post hoc : pas de différence entre HFNO et O2
  - Essai FLORALI – analyse post hoc: pas de différence entre HFNO et O2
  - Cohorte Efraim: Réduction de l'intubation avec HFNO, mortalité idem
  - Besoin d'essais randomisés

(encore) Une place pour la VNI ?

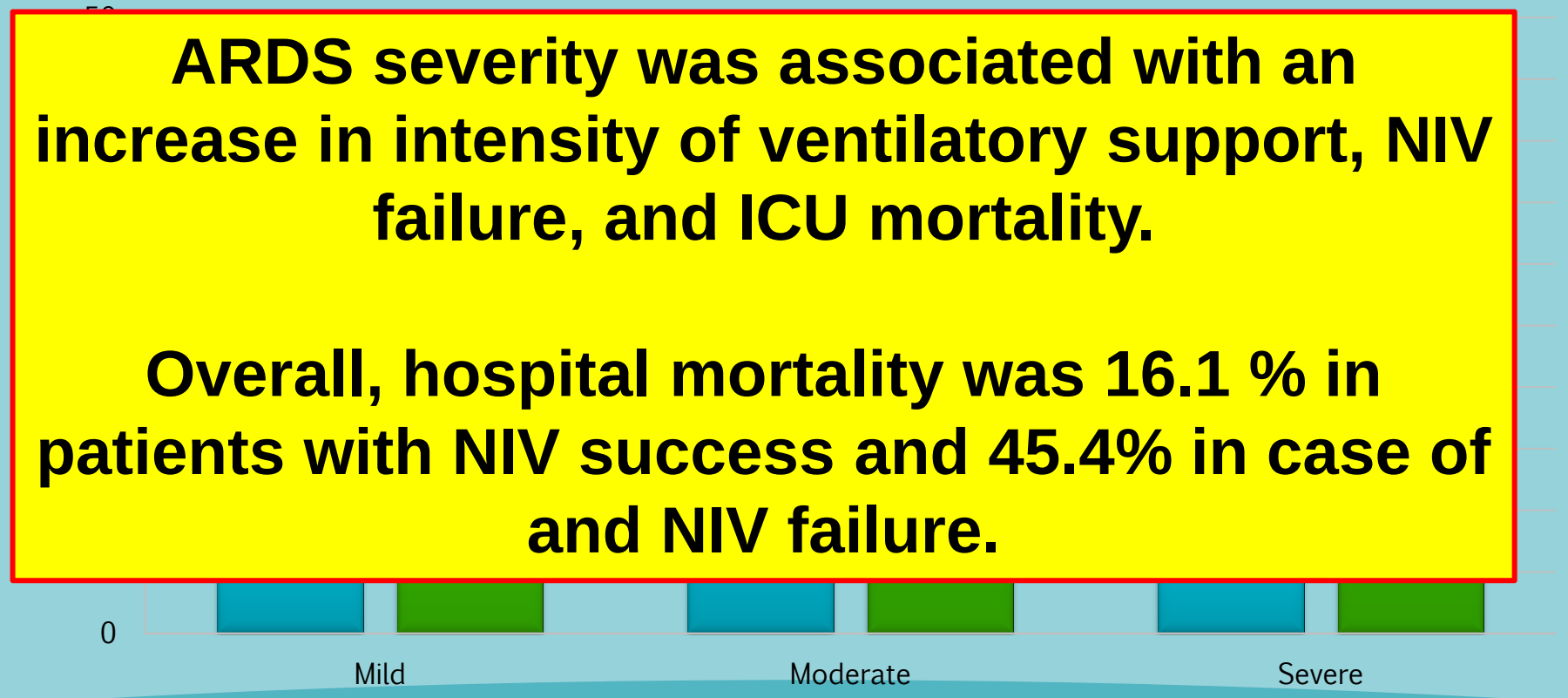
	iVNIctus JAMA 2015-CCM2017	Florali NEJM2015-LRM 2016	Efraim ICM 2017
	RCT N=374	RCT N=300 (82 ID)	Cohorte N=1611 (915 non intubés)
O2 Standard	NS par rapport HFNC	NS par rapport HFNC	NS par rapport à la VNI
VNI	Aucun bénéfice Aucun effet nocif Effet Vte?	Plus d'intubation Plus de mortalité Effet VTe	NS par rapport à O2 Aucun effet nocif Effet VTe
HFNC	NS par rapport O2	NS par rapport O2	Presque supériorité par rapport à l'O2 sur l'IOT mais NS sur la mortalité

VNI : nég ou nocive, surtout si PAFI bas, FR élevée et hauts Vte : on arrête? Helmet?
O2 vs. HFNO: peut-être un effet sur l'IOT, à confirmer. Rien sur la mortalité
Et toujours le prix à payer de l'intubation retardée

NIV in patients with hypoxemic ARF: three RCTs

Study	Antonelli, NEJM 1998	Delclaux, JAMA 2000	Ferrer, AJRCCM
Patients	64 patients, 1 ICU hypoxemic acute resp. with criteria for MV Intubation vs. NPPV PAFI: 116 vs. 124	123 patients 6 ICUs hypoxemic acute resp. Oxygen vs. CPAP PAFI 148 vs. 140	105 patients 1 ICU hypoxemic acute resp. Oxygen vs. BiPAP PAFI 102 vs. 103
Endpoints	No S Improved oxygenation 31% intubation 53% vs. 72% (NIV) survival Complications: higher Lengths of …: increased	Improved oxygenation 33% vs. 39% intubation 75% vs. 79% survival Complications NS Lengths: NS	/ 25% vs. 52% intubation 72% vs. 61% survival 10% vs. 24% NS
Comments	Pulmonary edema included	Pulmonary edema included	Pulmonary edema included

NIV use and failure in ARDS patients (LUNG SAFE)

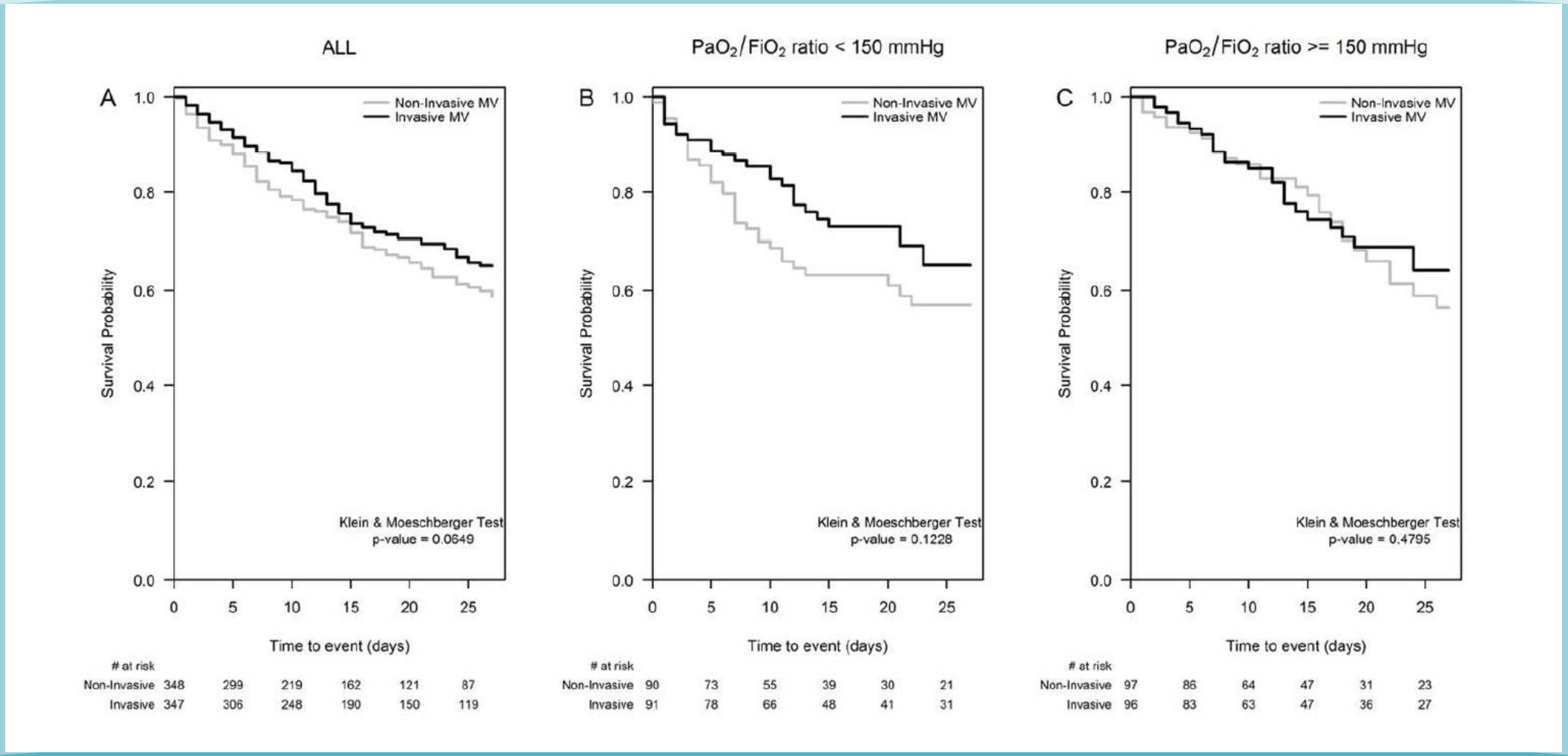


ARDS severity was associated with an increase in intensity of ventilatory support, NIV failure, and ICU mortality.

Overall, hospital mortality was 16.1 % in patients with NIV success and 45.4% in case of and NIV failure.

Bellani G. & al. *AJRCCM 2016*

Data from LUNG SAFE: 436/2813 (15%) NIV use



Bellani G. & al. *AJRCCM 2016*

Alexandre Demoule
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Matthieu Schmidt
David Schnell
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Claude Guérin
Hugues Georges
Benjamin Zuber
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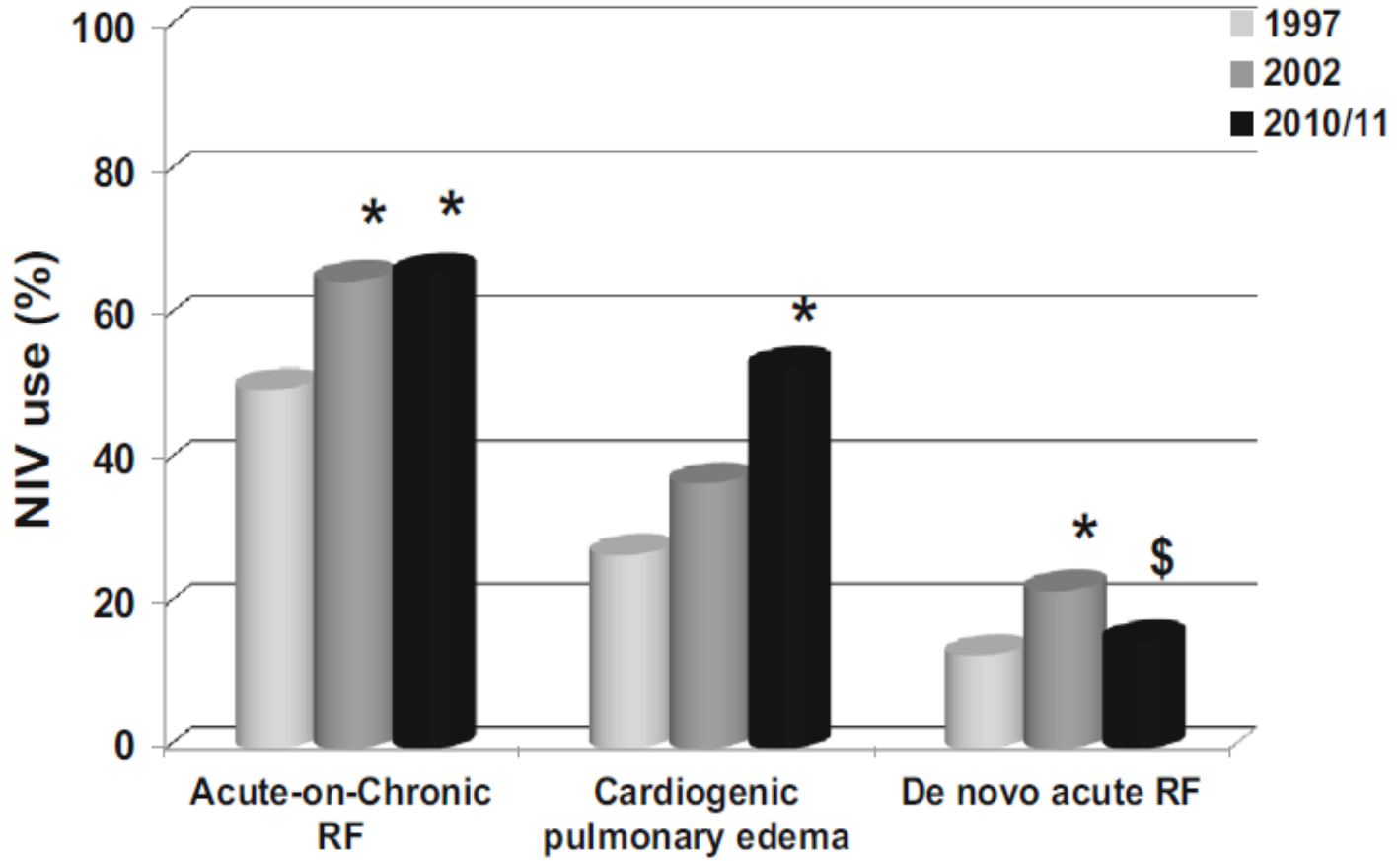
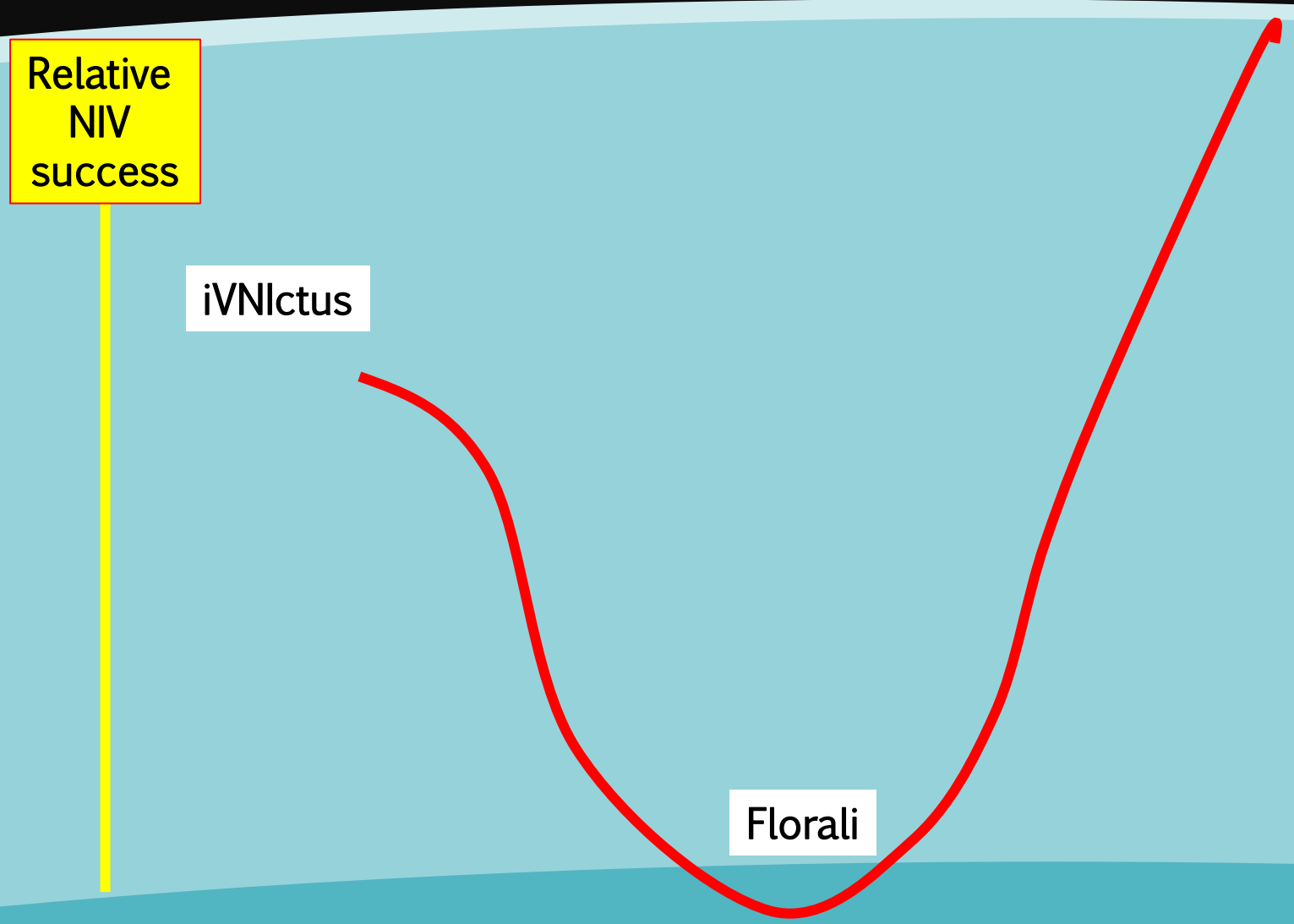
Vincent Das
Joël Cousson
Didier Perez
Laurent Brochard
Elie Azoulay

Changing use of noninvasive ventilation in critically ill patients: trends over 15 years in francophone countries

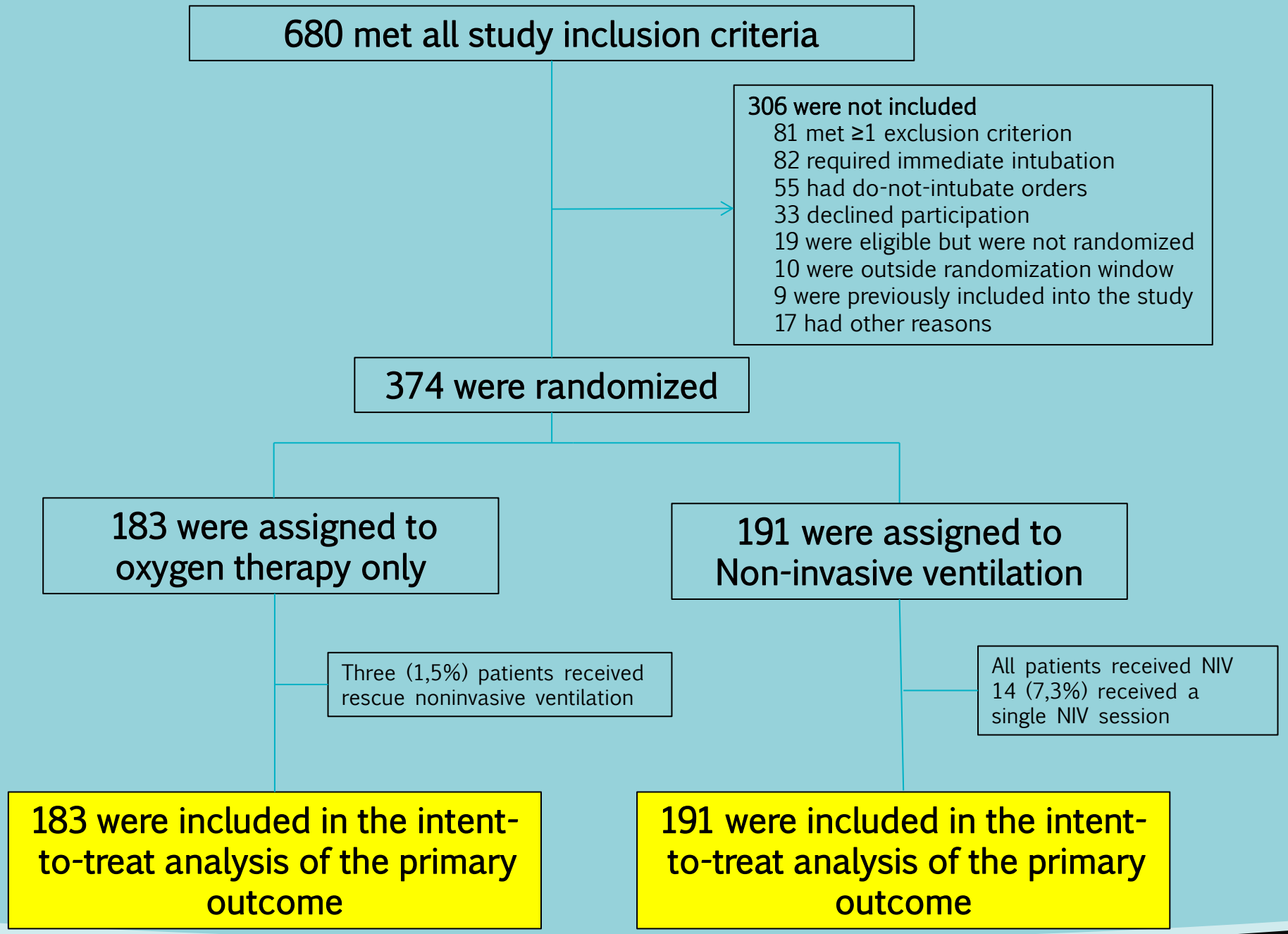


Demoule A. & al. *Intensive Care Med. 2016*

A U shape paradoxical effect of NIV in hypoxemic ARF?



- Baseline PaO2/FiO2
- NIV duration
- NIV settings
- Criteria for NIV WH
- Criteria for intubation



Lemiale et al. GRRR-OH. JAMA 2015

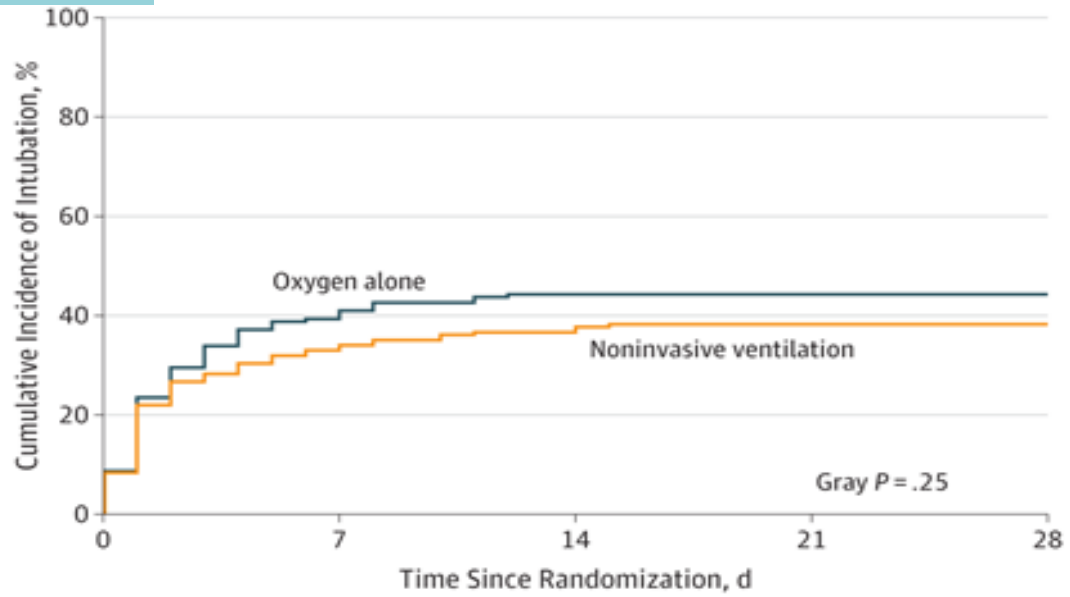
JAMA.
October 07, 2015

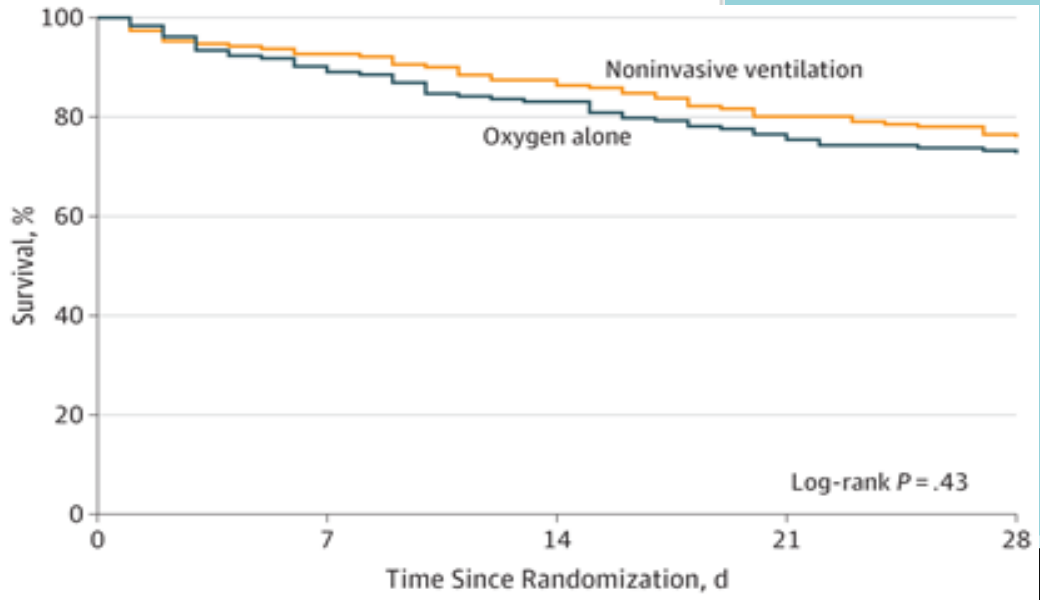
Effect of Noninvasive Ventilation vs Oxygen Therapy on Mortality Among Immunocompromised Patients With Acute Respiratory Failure

A Randomized Clinical Trial

FREE ONLINE FIRST

Virginie Lemiale, MD[1]; Djamel Mokart, MD[2]; Matthieu Resche-Rigon, MD, PhD[3]; Frédéric Pène, MD, PhD[3]; Julien Mayaux, MD[4]; Etienne Faucher, MD[5]; Martine Nyunga, MD[6]; Christophe Girault, MD, PhD[7]; Pierre Perez, MD[8]; Christophe Guitton, MD, PhD[9]; Kenneth Ekpe, MD[10]; Achille Kouatchet, MD[11]; Igor Théodose, MS[3]; Dominique Benoit, MD, PhD[12]; Emmanuel Canet, MD[3]; François Barbier, MD, PhD[13]; Antoine Rabbat, MD[3]; Fabrice Bruneel, MD[14]; Francois Vincent, MD[15]; Kada Klouche, MD, PhD[16]; Kontar Loay, MD[17]; Eric Mariotte, MD[3]; Lila Bouadma, MD, PhD[3]; Anne-Sophie Moreau, MD[18]; Amélie Seguin, MD[19]; Anne-Pascale Meert, MD, PhD[20]; Jean Reignier, MD, PhD[21]; Laurent Papazian, MD, PhD[22]; Ilham Mehzari, MD[23]; Yves Cohen, MD, PhD[15]; Maleka Schenck, MD[24]; Rebecca Hamidfar, MD[25]; Michael Darmon, MD, PhD[26]; Alexandre Demoule, MD, PhD[3]; Sylvie Chevret, MD, PhD[1]; Elie Azoulay, MD, PhD[1]; for the Groupe de Recherche en Réanimation Respiratoire du patient d'Onco-Hématologie (GRRR-OH)





No. at risk

Noninvasive ventilation	191	125	118	112	111
Oxygen alone	183	107	95	92	91

risk

nvasive ventilation	191	177	167	153	146
en alone	183	165	152	140	134

High-Flow Nasal Cannula Oxygenation in Immunocompromised Patients With Acute Hypoxemic Respiratory Failure: A Groupe de Recherche Respiratoire en Réanimation Onco-Hématologique Study

Critical Care Medicine, online

TABLE 2. Primary and Secondary Outcomes According to Oxygenation Strategy in the Matched Population

	High-Flow Nasal Oxygen Group ($n = 90$)	O_2 Group ($n = 90$)	Hazard Ratio 95% CI	p
Primary endpoint				
All cause 28-d mortality	21 (23.3%)	23 (25.5%)	0.80 (0.45–1.43)	0.45
Secondary endpoints				
Need for invasive mechanical ventilation	40 (44.4%)	48 (53.3%)	0.42 (0.11–1.61)	0.20
Duration of mechanical ventilation	13 [4–46]	16 [8–33]		0.32
ICU-acquired infection	21 (23.3%)	28 (31.1%)	0.80 (0.39–1.66)	0.55
Length of ICU stay	8 [5–16]	8 [3–29]		0.59
Length of hospital stay	24 [14–51]	32 [19–52]		0.25

Effect of non-invasive oxygenation strategies in immunocompromised patients with severe acute respiratory failure: a post-hoc analysis of a randomised trial

Jean-Pierre Frat, Stéphanie Ragot, Christophe Girault, Sébastien Perbet, Gwénael Prat, Thierry Boulain, Alexandre Demoule, Jean-Damien Ricard, Rémi Coudroy, René Robert, Alain Mercat, Laurent Brochard, Arnaud W Thille, for the REVA network

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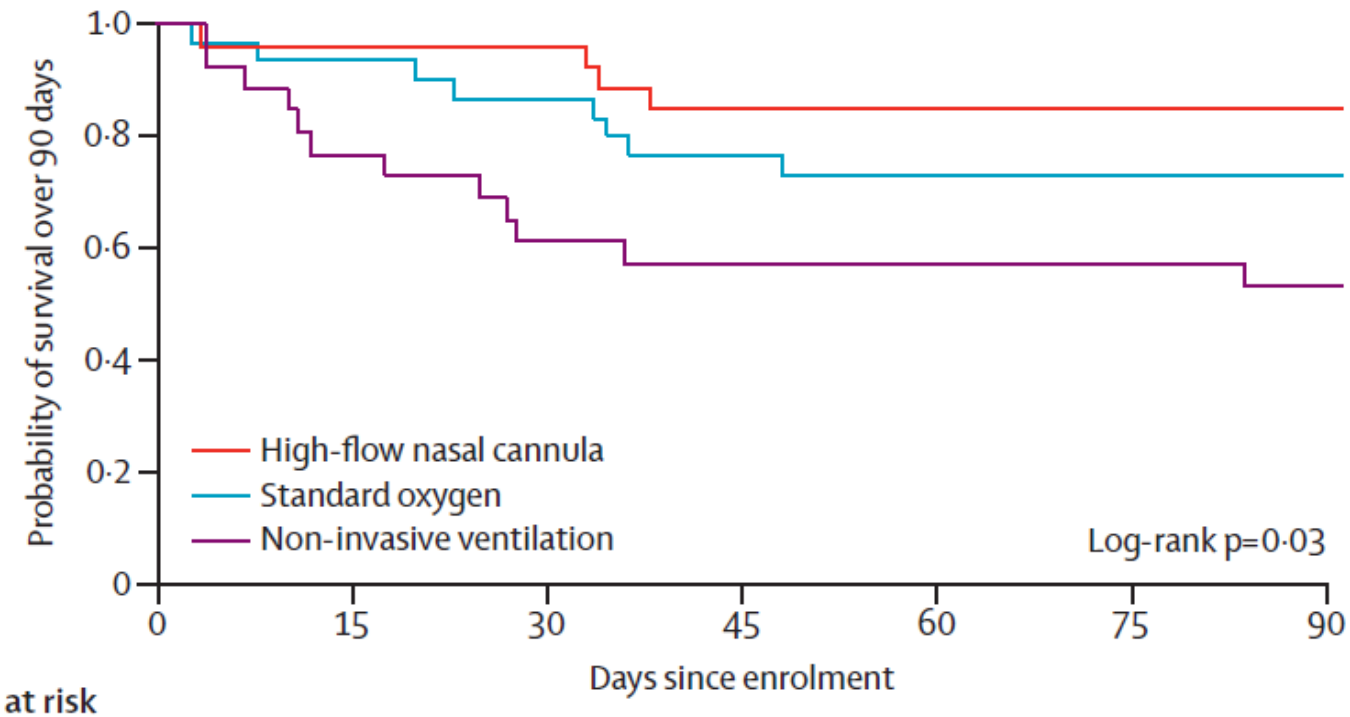
int **e therapy.**



Number at risk							
High-flow nasal cannula group	26	25	25	22	22	22	22
Standard oxygen group	30	28	26	23	22	22	22
Non-invasive ventilation group	26	20	16	15	14	14	13

Intensive Care Med (2015) 41:2008–2010
DOI 10.1007/s00134-015-3994-8

High-flow oxygen therapy in cancer patients with acute respiratory failure

Djamel Mokart
Cyrille Geay
Laurent Chow-Chine
Jean-Paul Brun
Marion Faucher
Jean-Louis Blache
Magali Bisbal
Antoine Sannini

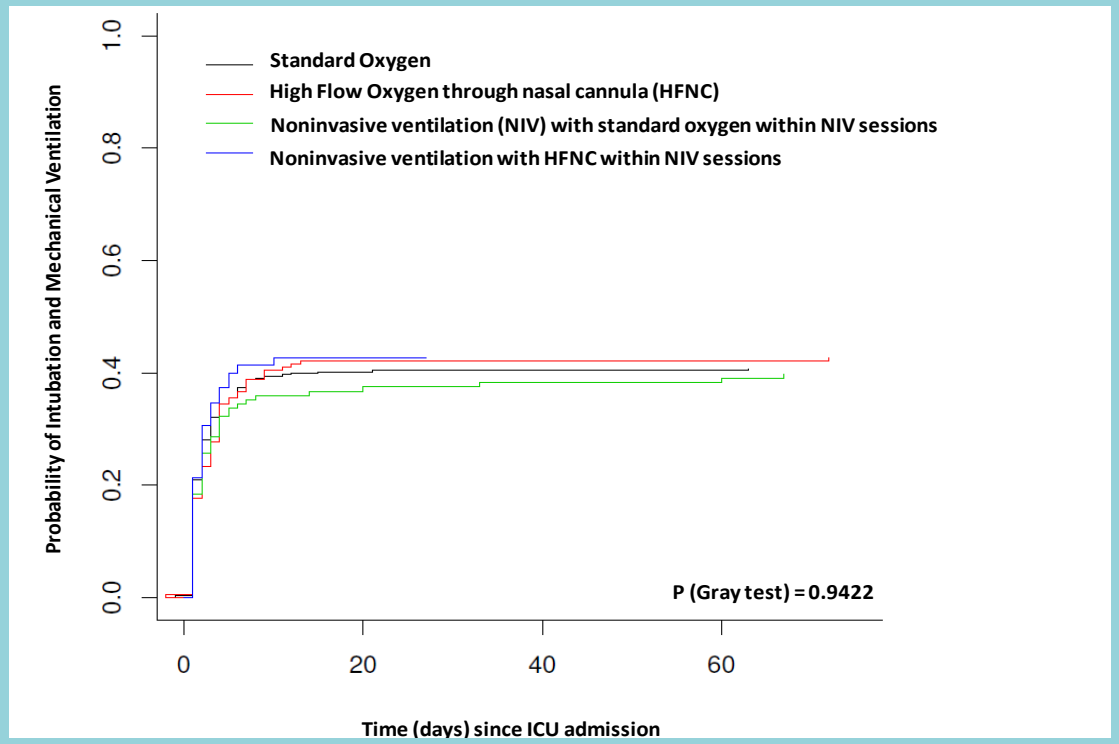
	HFNC + NIV N=69	OTHER N=69	P VALUE
SOFA	6 (4-9)	6 (4-8)	0.73
PaO2/FiO2<200	46%	51%	0.39
D-28 MORTALITY	36%	54%	0.01
MORTALITY IF VENTILATED	52%	72%	0.07

SEVEN-DAY PROFILE PUBLICATION

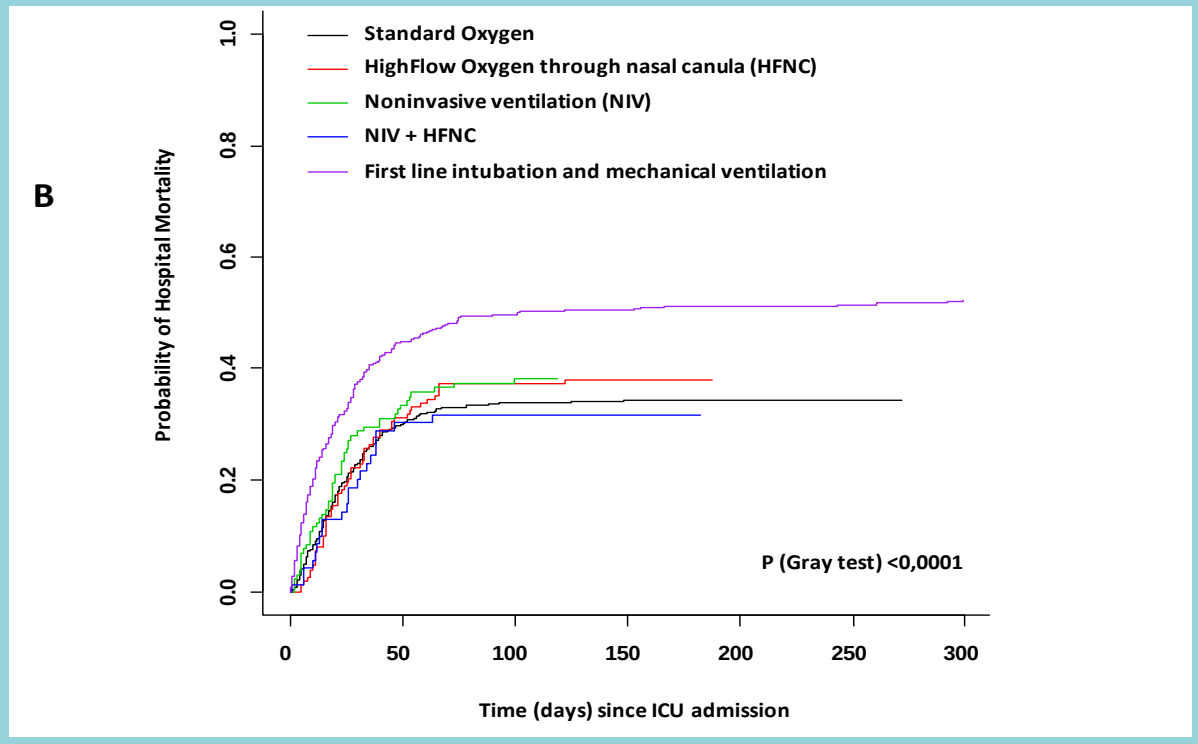
Acute hypoxemic respiratory failure in immunocompromised patients: the Efraim multinational prospective cohort study

Elie Azoulay[1*], Peter Pickkers[2], Marcio Soares[3], Anders Perner[4], Jordi Rello[5], Philippe R. Bauer[6], Andry van de Louw[7], Pleun Hemelaar[2], Virginie Lemiale[1], Fabio Silvio Taccone[8], Ignacio Martin Loeches[9,10], Tine Sylvest Meyhoff[4], Jorge Salluh[3], Peter Schellongowski[11], Katerina Rusinova[12], Nicolas Terzi[13], Sangeeta Mehta[14], Massimo Antonelli[15], Achille Kouatchet[16], Andreas Barratt-Due[17], Miia Valkonen[18], Precious Pearl Landburg[19], Fabrice Bruneel[20], Ramin Brandt Bukan[21], Frédéric Pène[22], Victoria Metaxa[23], Anne Sophie Moreau[24], Virginie Souppart[1], Gaston Burghi[25], Christophe Girault[26], Ulysses V. A. Silva[27], Luca Montini[15], François Barbier[28], Lene B. Nielsen[29,30], Benjamin Gaborit[31], Djamel Mokart[32] and Sylvie Chevret[33] for the Efraim investigators and the Nine-I study group

Probability of Intubation



Probability of Mortality



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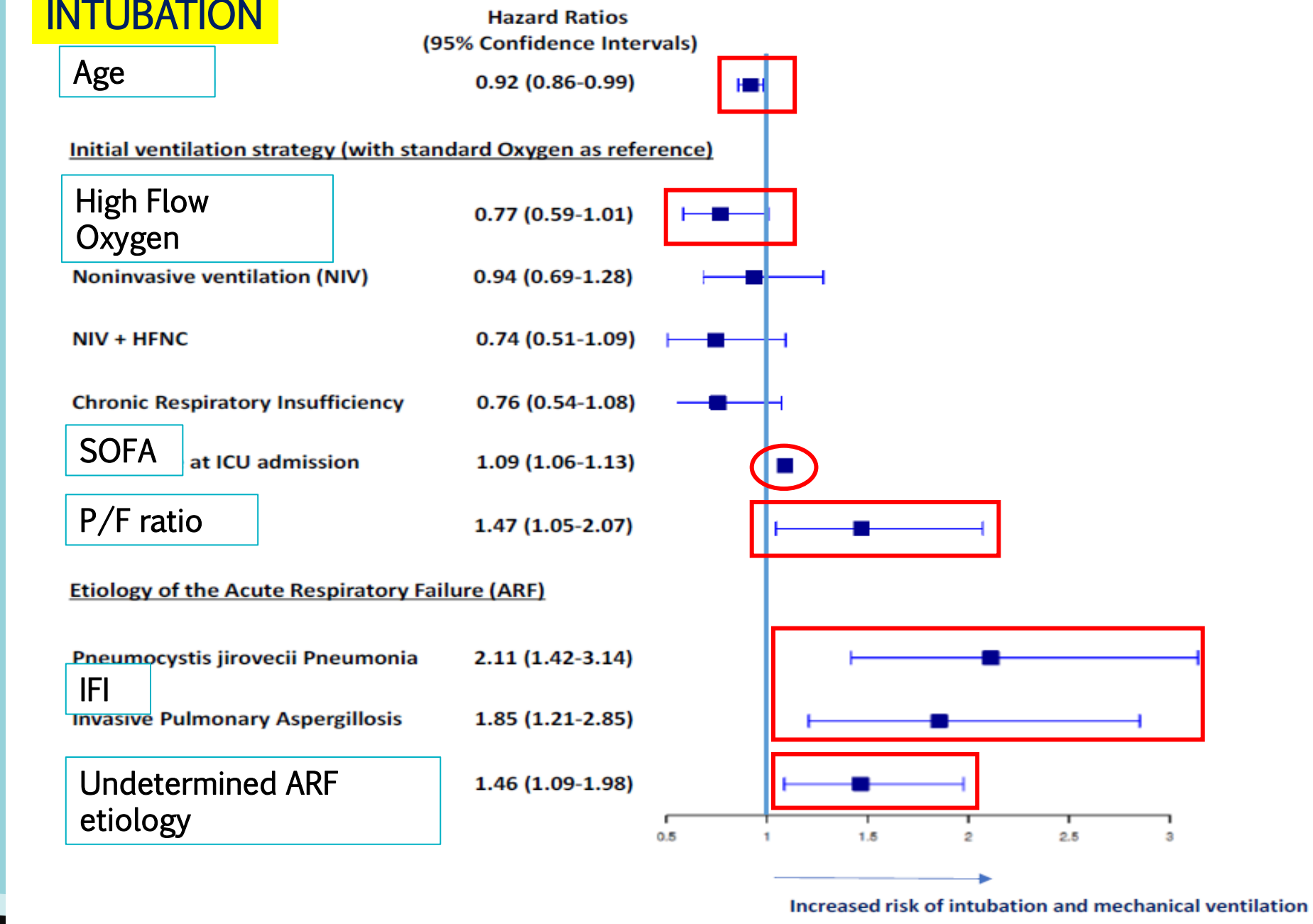
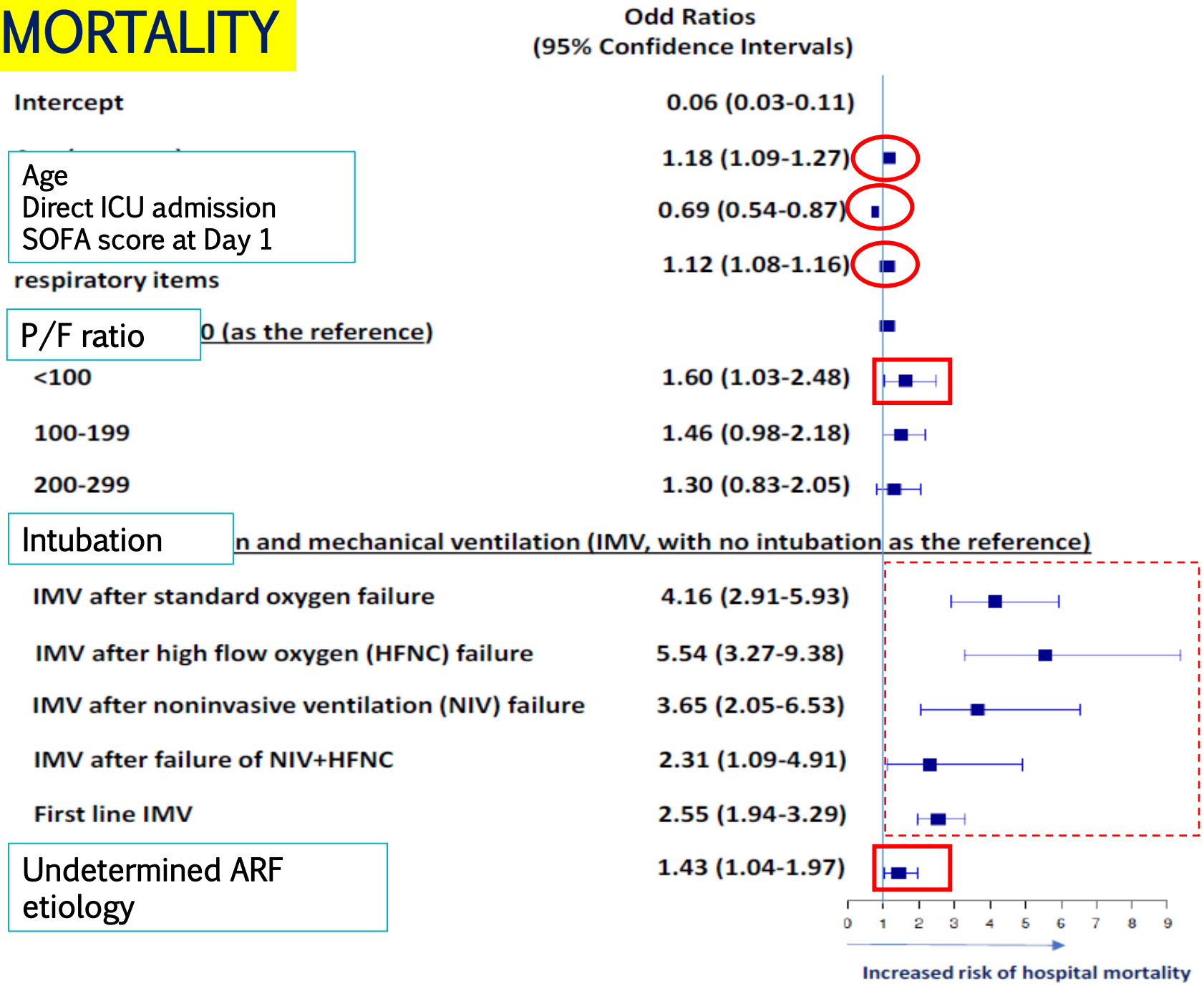
INTUBATION


Hazard Ratios
(95% Confidence Intervals)
Age
0.92 (0.86-0.99)
Initial ventilation strategy (with standard Oxygen as reference)
High Flow Oxygen
0.77 (0.59-1.01)
Noninvasive ventilation (NIV)
0.94 (0.69-1.28)
NIV + HFNC
0.74 (0.51-1.09)
Chronic Respiratory Insufficiency
0.76 (0.54-1.08)
SOFA
at ICU admission
1.09 (1.06-1.13)
P/F ratio
1.47 (1.05-2.07)
Etiology of the Acute Respiratory Failure (ARF)
Pneumocystis jirovecii Pneumonia
2.11 (1.42-3.14)
IFI
Invasive Pulmonary Aspergillosis
1.85 (1.21-2.85)
Undetermined ARF etiology
1.46 (1.09-1.98)
0.5
1
1.5
2
2.5
3
Increased risk of intubation and mechanical ventilation

MORTALITY

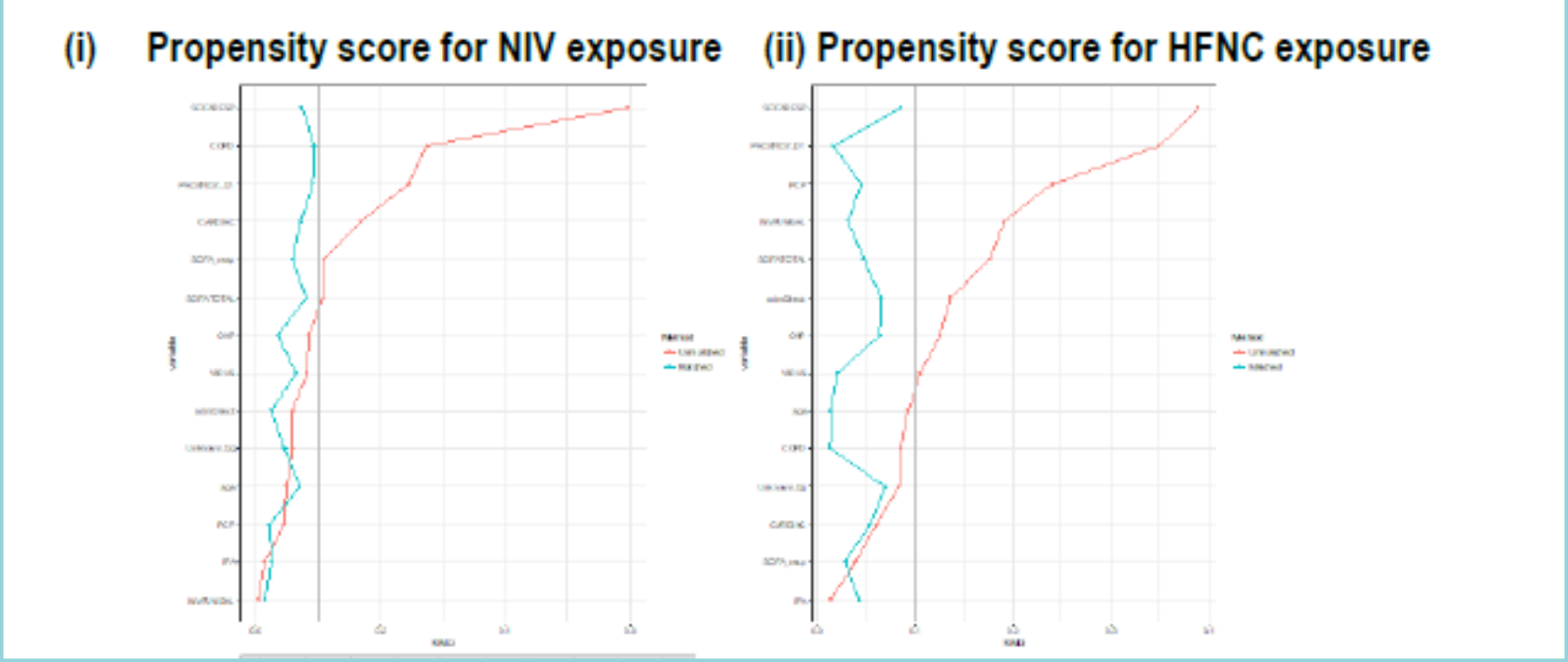

Odd Ratios
(95% Confidence Intervals)
Intercept
0.06 (0.03-0.11)
Age
1.18 (1.09-1.27)
Direct ICU admission
0.69 (0.54-0.87)
SOFA score at Day 1
1.12 (1.08-1.16)
respiratory items
P/F ratio
0 (as the reference)
<100
1.60 (1.03-2.48)
100-199
1.46 (0.98-2.18)
200-299
1.30 (0.83-2.05)
Intubation
n and mechanical ventilation (IMV, with no intubation as the reference)
IMV after standard oxygen failure
4.16 (2.91-5.93)
IMV after high flow oxygen (HFNC) failure
5.54 (3.27-9.38)
IMV after noninvasive ventilation (NIV) failure
3.65 (2.05-6.53)
IMV after failure of NIV+HFNC
2.31 (1.09-4.91)
First line IMV
2.55 (1.94-3.29)
Undetermined ARF etiology
1.43 (1.04-1.97)
0 1 2 3 4 5 6 7 8 9
Increased risk of hospital mortality

Propensity Analysis

Initial oxygenation strategy has an impact on intubation

- *High flow oxygen (P=0.05) , NIV not significant*

Initial oxygenation strategy has NO impact on mortality



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Effect of high-flow nasal cannula oxygen therapy in adults with acute hypoxemic respiratory failure: a meta-analysis of randomized controlled trials

6 RCTs (*n* = 1892).

Xiaofeng Ou MD PhD, Yusi Hua MD MSc, Jin Liu MD PhD, Cansheng Gong MD PhD, Wenling Zhao MD MSc

- **Compared with standard oxygen, HFNC oxygen therapy was associated with a lower intubation rate (risk ratio [RR] 0.60, 95% confidence interval [CI] 0.38 to 0.94; *I*2 = 49%).**
- **No significant difference in the rate between HFNC oxygen therapy and noninvasive ventilation (RR 0.86, 95% CI 0.68 to 1.09; *I*2 = 2%).**
- **No difference in mortality**

Intensive Care Med
DOI 10.1007/s00134-015-3693-5

ORIGINAL

Early HFNC failure group compared with the late HFNC failure group

Byung Ju Kang
Younsuck Koh
Chae-Man Lim
Jin Won Huh
Seunghee Baek
Myongja Han
Hyun-Suk Seo
Hee Jung Suh
Ga Jin Seo
Eun Young Kim
Sang-Bum Hong

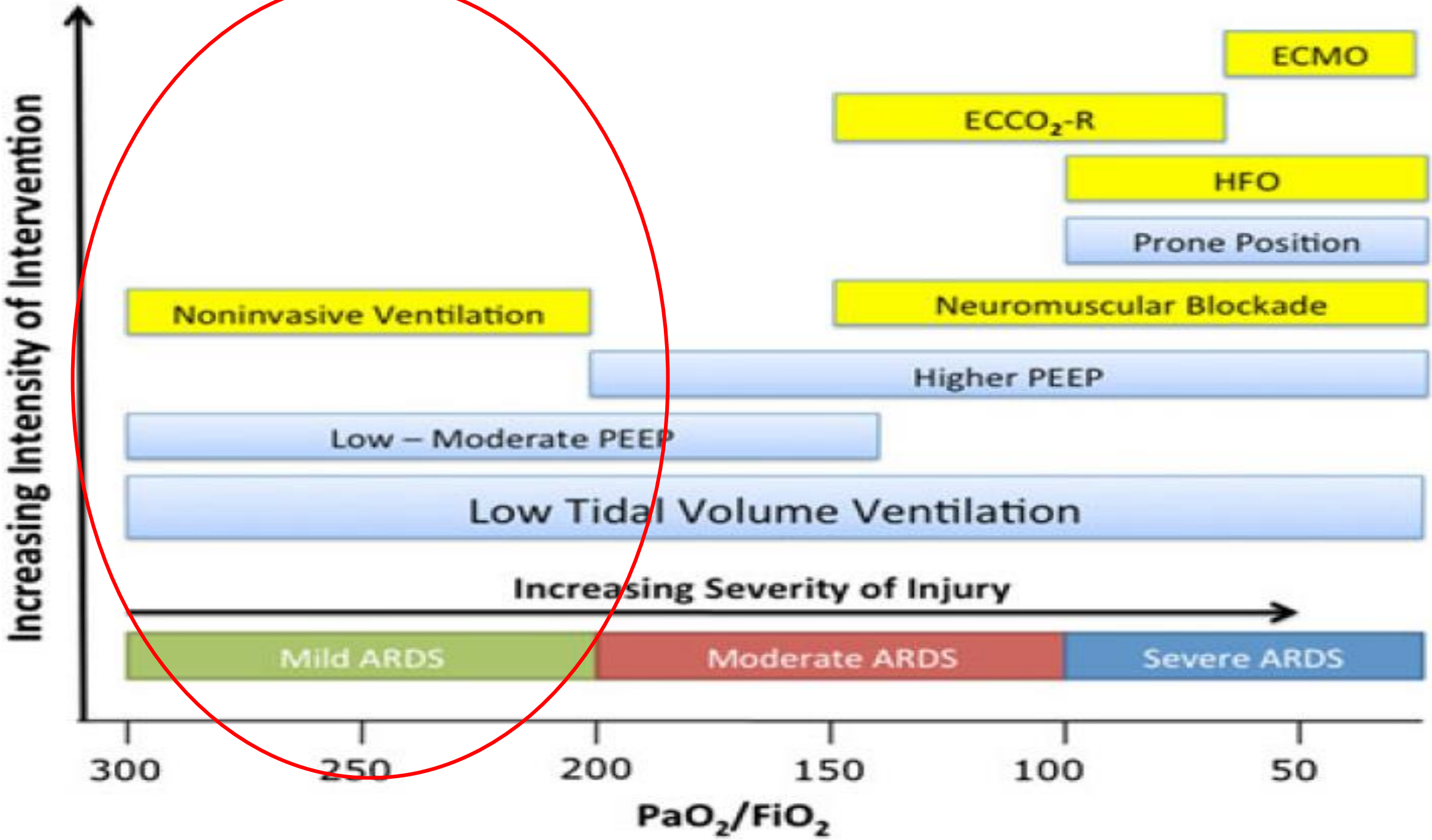
Failure of high-flow nasal cannula therapy may delay intubation and increase mortality

Variables	Crude		Propensity-adjusted[a]		Propensity-matched[b]	
	Odds ratio (95 % CI)	*P* value[c]	Odds ratio (95 % CI)	*P* value[c]	Odds ratio (95 % CI)	*P* value[c]
Primary outcome						
Overall ICU mortality	0.323 (0.158–0.658)	0.002	0.317 (0.143–0.700)	0.005	0.369 (0.139–0.984)	0.046
Secondary outcomes						
Extubation success	3.284 (1.361–7.923)	0.008	3.091 (1.193–8.013)	0.020	2.057 (0.746–5.672)	0.163
Ventilator-weaning	3.056 (1.470–6.351)	0.003	3.380 (1.492–7.656)	0.004	2.495 (1.039–5.991)	0.041
Ventilator-free days to day 28	0.542 (0.383–0.768)[d]	0.001[e]	0.516 (0.349–0.763)[d]	0.001[e]	0.639 (0.431–0.946)[d]	0.026[e]
14-Day mortality from HFNC application	0.949 (0.455–1.977)	0.888	0.712 (0.312–1.622)	0.418	0.608 (0.231–1.606)	0.316
14-Day mortality from intubation	0.653 (0.325–1.311)	0.231	0.482 (0.218–1.067)	0.072	0.447 (0.168–1.184)	0.105
28-Day mortality from HFNC application	0.820 (0.416–1.616)	0.566	0.680 (0.318–1.457)	0.322	0.896 (0.440–1.824)	0.763
28-Day mortality from intubation	0.571 (0.287–1.138)	0.111	0.557 (0.258–1.198)	0.134	0.802 (0.380–1.692)	0.563
Length of ICU stay	0.827 (0.586–1.169)[f]	0.282[g]	0.830 (0.552–0.800)[f]	0.372[g]	1.329 (0.598–2.952)[f]	0.485[g]

❸ Éviter l’intubation ?

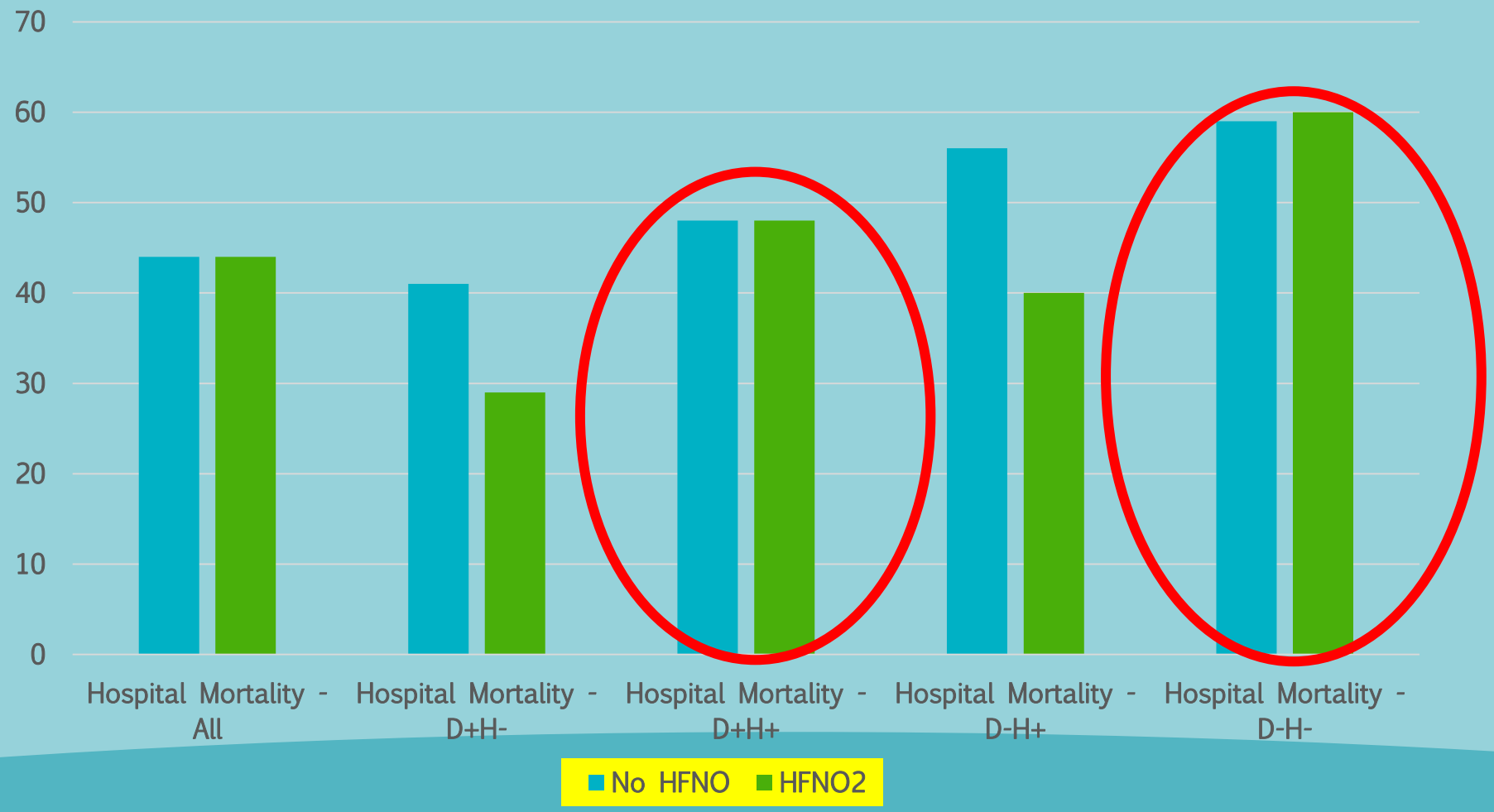
Quelle sont les questions?

- Un *standard of care* pour les patients immunodéprimés en réanimation
- L'intubation chez les malades immunodéprimés?
- Prévenir l'intubation: bonne médecine vs. bon oxygène?
- Intubation précoce vs. Intubation tardive
- Ressusciter Helmet?


ECMO
ECCO2-R
HFO
Prone Position
Neuromuscular Blockade
Noninvasive Ventilation
Higher PEEP
Low – Moderate PEEP
Low Tidal Volume Ventilation
Increasing Intensity of Intervention
Increasing Severity of Injury
Mild ARDS
Moderate ARDS
Severe ARDS
300
250
200
150
100
50
PaO2/FiO2

High Flow Oxygen: a size for all?

Efraim



Outcome for Cancer Patients Requiring Mechanical Ventilation

By Jeffrey S. Groeger, Peter White Jr, David M. Nierman, Jill Glassman, Weiji Shi, David Horak, and Kristen Price

Journal of Clinical Oncology, Vol 17, No 3 (March), 1999: pp 991-997

Table 3. Results From Stepwise Logistic Regression Procedure

Variable	Parameter Estimate	Odds Ratio	95% Confidence Interval	*P*
Intubated after 24 hours	0.7331	2.08	1.41-3.08	< .001
Tumor group leukemia	0.6462	1.91	1.22-2.98	.005
Disease progression/re-currence	0.7042	2.02	1.40-2.91	< .001
Allogeneic BMT	0.8202	2.27	1.22-4.22	.01
Prior surgery with curative intent	−0.7093	0.49	0.33-0.74	< .001
Cardiac arrhythmias	0.7924	2.21	1.18-4.12	.01
DIC	1.3564	3.88	1.16-12.95	.03
Vasopressor therapy	0.6721	1.96	1.27-3.01	.002
Intercept	−0.1466			

Outcome in Noninvasively and Invasively Ventilated Hematologic Patients With Acute Respiratory Failure*

Pieter O. Depuydt, MD; Dominique D. Benoit, MD;

Variable	Parameter Estimate	OR	95% CI	p Value
Female sex	−1.01	0.36	0.16–0.82	0.014
Intubation < 24 h	−1.25	0.29	0.11–0.78	0.015
Bacteremia < 48 h	−1.52	0.22	0.08–0.61	0.003
AML	1.004	2.73	1.05–7.11	0.04
SAPS II	0.08	1.07	1.04–1.11	< 0.001

Chest 2002

Patient-self inflicted lung injury (P-SILI)

- Spontaneously breathing patients with ARF have a high respiratory drive and breathe with large tidal volumes and potentially injurious transpulmonary pressures.
- In patients with existing lung injury, regional forces generated by inspiratory muscles may lead to injurious effects on a regional scale.
- The increase in transpulmonary pressure swings caused by inspiratory effort may
- These patients may develop lung injury similar to VILI.
- Would the application of a lung protective ventilation, with sedation and intubation, might be considered a prophylactic therapy, rather than just a supportive therapy?

is MV able to Minimize Progression of Lung Injury in Acute Respiratory Failure.

Brochard, Slutsky, Pesenti. Am J Respir Crit Care Med. 2016 Sep 14.

Intensive Care Med
DOI 10.1007/s00134-016-4645-4

EDITORIAL

Ventilation-induced lung injury exists in spontaneously breathing patients with acute respiratory failure: Yes

Laurent Brochard[1,2*]

Intensive Care Med
DOI 10.1007/s00134-016-4488-z

EDITORIAL

Ventilation-induced lung injury exists in spontaneously breathing patients with acute respiratory failure: No

Massimo Antonelli*

Intensive Care Med
DOI 10.1007/s00134-016-4483-4

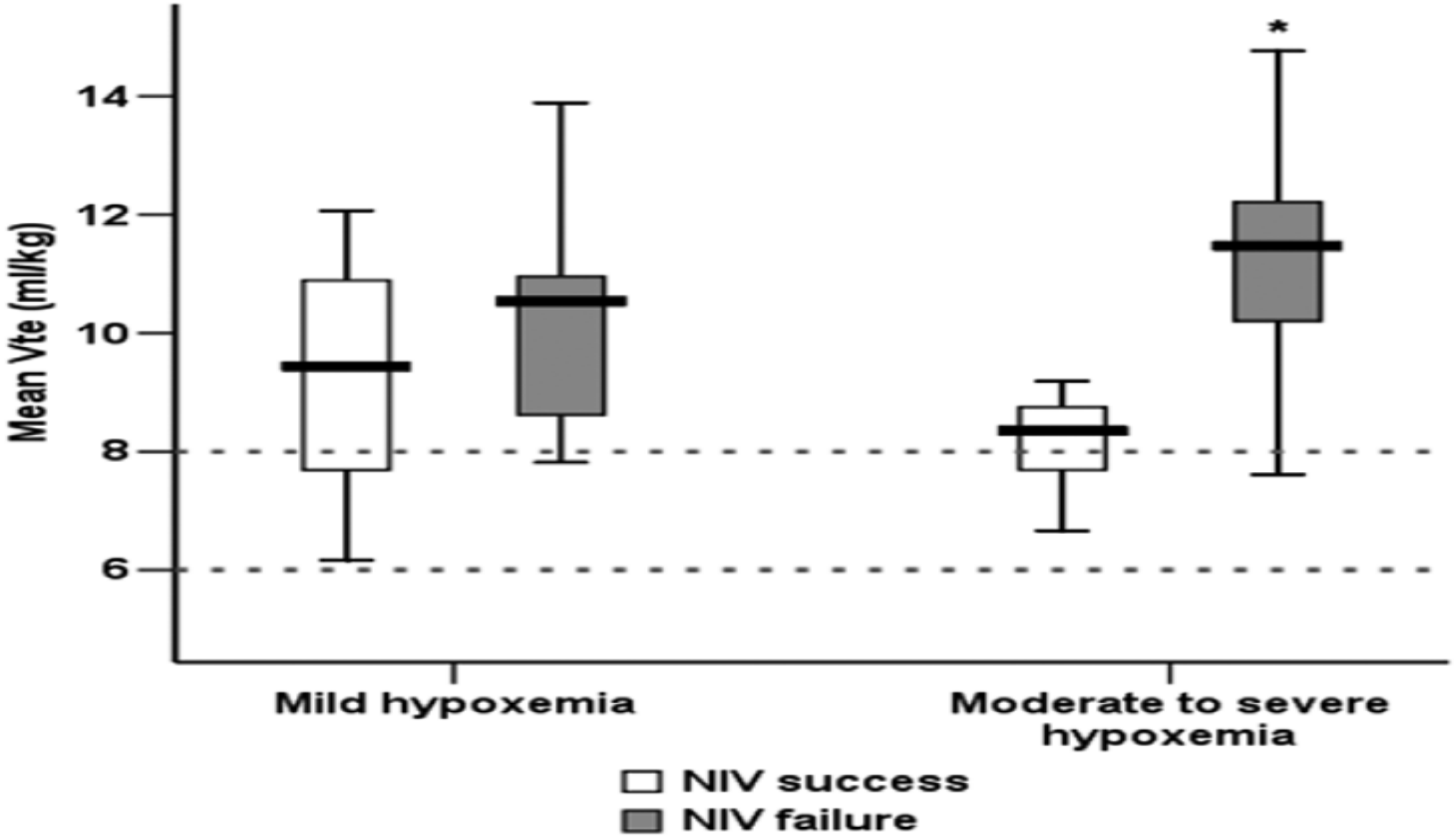
EDITORIAL

Ventilation-induced lung injury exists in spontaneously breathing patients with acute respiratory failure: We are not sure

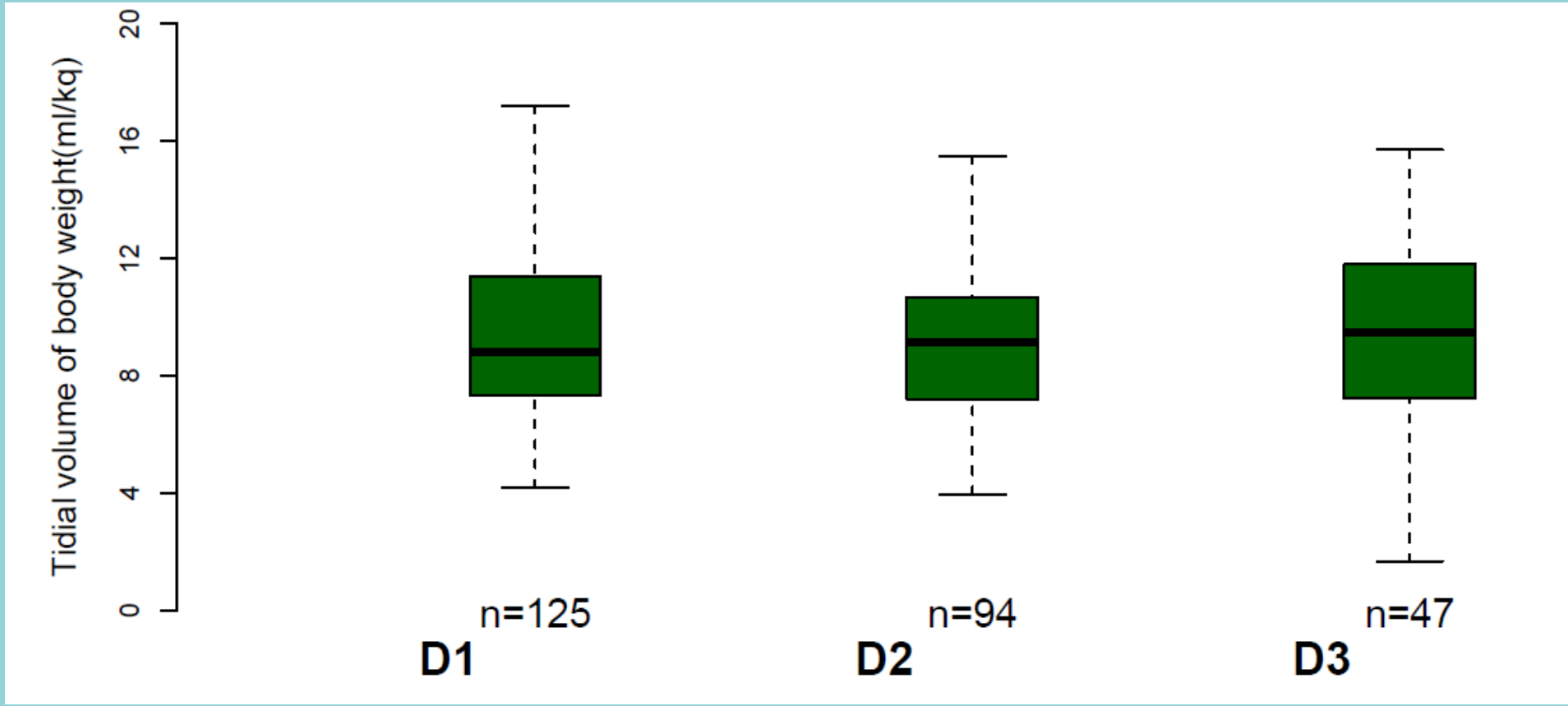
Luciano Gattinoni*

ESICM EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE
ICM INTENSIVE CARE MEDICINE
espnic European Society of Paediatric and Neonatal Intensive Care
OFFICIAL JOURNAL OF THE EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE AND THE EUROPEAN SOCIETY OF PAEDIATRIC & NEONATAL INTENSIVE CARE

In the LUNG SAFE study, a propensity matched analysis, ICU mortality was higher in NIV than invasively ventilated patients with a PaO_2/FiO_2 lower than 150 mmHg.


Mean Vte (ml/kg)
14
12
10
8
6
*
Mild hypoxemia
Moderate to severe hypoxemia
NIV success
NIV failure

Reserve: Tidal volume in NIV group



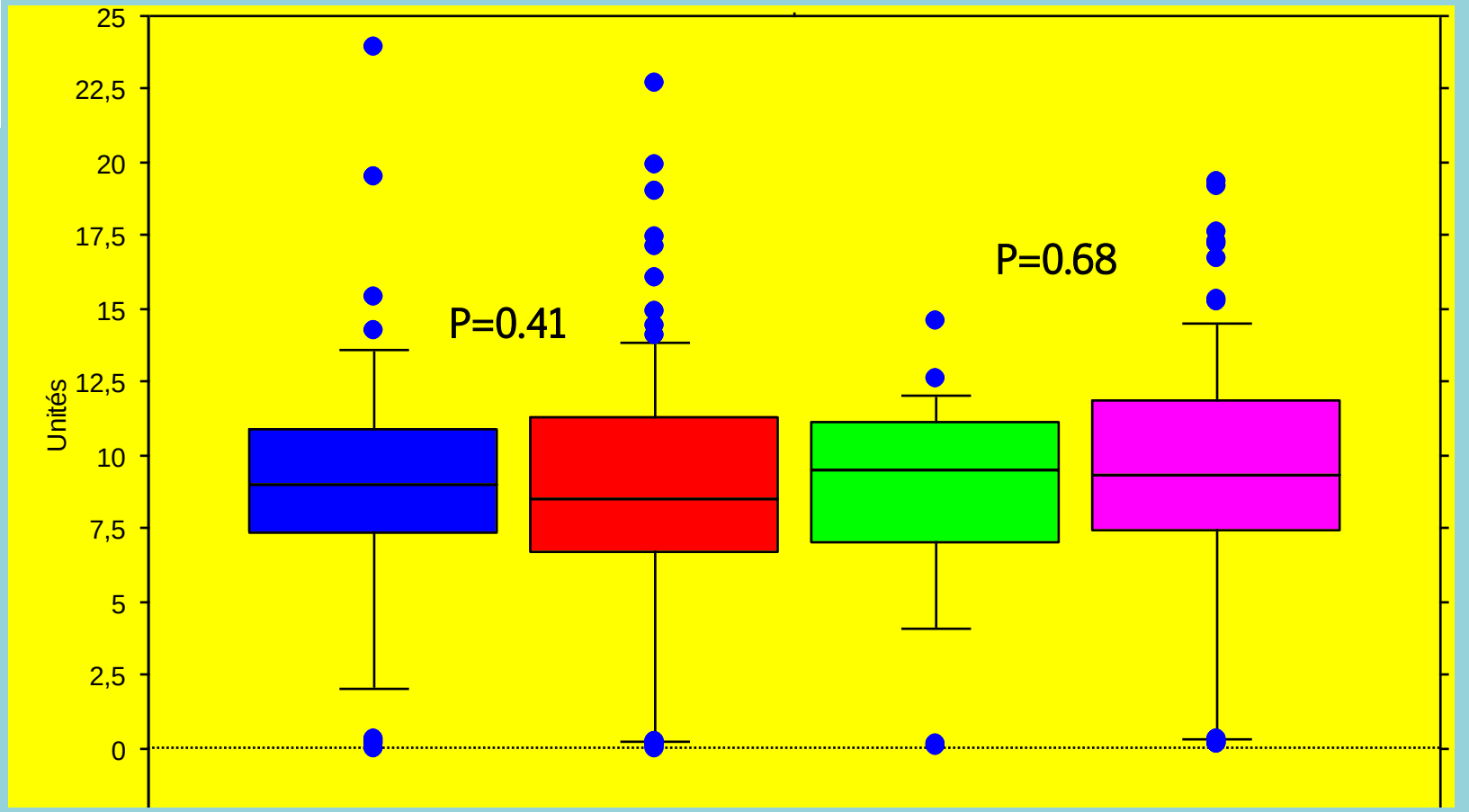
Lemiale et al. GRRR-OH. JAMA 2015

SEVEN-DAY PROFILE PUBLICATION

Acute hypoxemic respiratory failure in immunocompromised patients: the Efraim multinational prospective cohort study

Elie Azoulay[1*], Peter Pickkers[2], Marcio Soares[3], Anders Perner[4], Jordi Rello[5], Philippe R. Bauer[6], Andry van de Louw[7], Pleun Hemelaar[2], Virginie Lemiale[1], Fabio Silvio Taccone[8], Ignacio Martin Loeches[9,10], Tine Sylvest Meyhoff[4], Jorge Salluh[3], Peter Schellongowski[11], Katerina Rusinova[12], Nicolas Terzi[13], Sangeeta Mehta[14], Massimo Antonelli[15], Achille Kouatchet[16], Andreas Barratt-Due[17], Miia Valkonen[18], Precious Pearl Landburg[19], Fabrice Bruneel[20], Ramin Brandt Bukan[21], Frédéric Pène[22], Victoria Metaxa[23], Anne Sophie Moreau[24], Virginie Souppart[1], Gaston Burghi[25], Christophe Girault[26], Ulysses V. A. Silva[27], Luca Montini[15], François Barbier[28], Lene B. Nielsen[29,30], Benjamin Gaborit[31], Djamel Mokart[32] and Sylvie Chevret[33] for the Efraim investigators and the Nine-I study group

Efraim: ETV D1 (ml/kg ibw)



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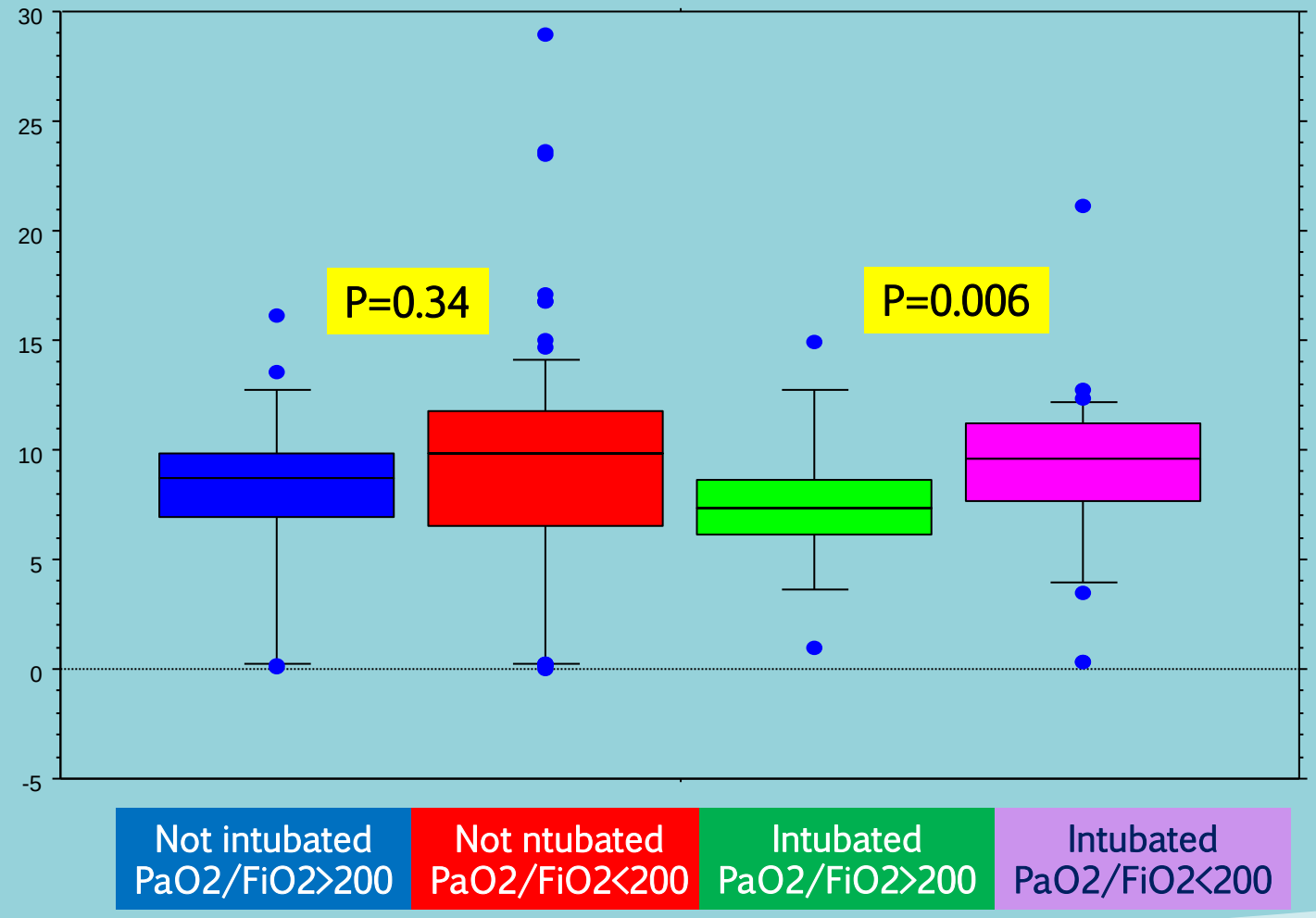
Efraim: ETV D2 (ml/kg ibw)



Conclusion

Faut-il tout faire pour éviter l'intubation dans l'IRA hypoxémique du patient immunodéprimés?

Ou bien … faut-il le protéger? identifier la cause de l'IRA?

Thank you for your attention