Chapitre 4 : Le support ventilatoire.

Deuxième question de la conférence de consensus

Quelle assistance ventilatoire [oxygénation à haut débit, ventilation non invasive (VNI), ventilation mécanique invasive (IMV), oxygénation par membrane extra-corporelle (ECMO)] doit être utilisée, pour quelles complications et dans quel environnement ?

1. Oxygénothérapie standard

Pas de littérature vraiment relevante

British Journal of Cancer (2008) 98, 294 – 299

www.bjcancer.com

Clinical Studies

Oxygen for relief of dyspnoea in mildly- or non-hypoxaemic patients with cancer: a systematic review and meta-analysis

HE Uronis[1,2], DC Currow[3], DC McCrory[4,5], GP Samsa[5,6] and AP Abernethy*[,1,3]

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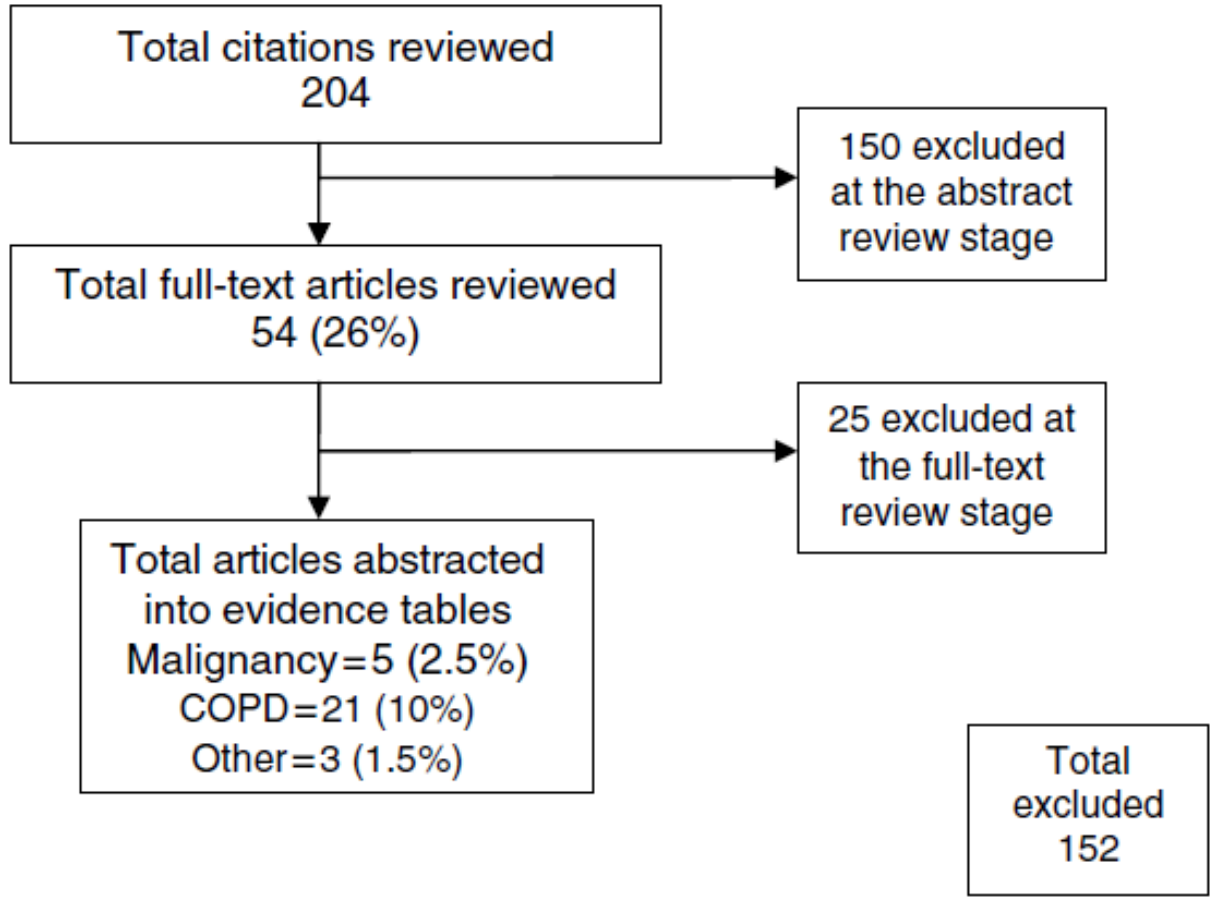

Figure 1 Flowchart of articles reviewed for the systematic analysis of the benefit of palliative oxygen for the relief of dyspnoea in people with cancer who do not qualify for long-term domiciliary oxygen therapy.

Table 1 Characteristics of included studies exploring the role of oxygen therapy in people with refractory dyspnoea who do not qualify for long-term oxygen therapy

Reference	*n*	Population	O_2 saturation <90% included?	Intervention	Outcome measure	Results	Quality[a]
(Philip *et al*, 2006)	51	Cancer of any type, dyspnoea	Yes 17 (33%)	CA *vs* O_2, 4 l min^{-1} at rest	100 mm VAS	No significant difference in dyspnoea with O_2 *vs* CA	2
(Ahmedzai *et al*, 1998, 2004)	12	Lung cancer, dyspnoea on exertion	No	CA *vs* O_2, 8–10 l min^{-1} during 6MWT	Modified Borg and 100 mm VAS	No significant difference in dyspnoea with O_2 *vs* CA	2
(Bruera *et al*, 2003)	33	Advanced cancer of any type, dyspnoea at rest or on mild exertion	No	CA *vs* O_2, 5 l min^{-1} during 6MWT	NRS	No significant difference in dyspnoea with O_2 *vs* CA	5
(Booth *et al*, 1996, 2004)	38	Advanced cancer of any type, dyspnoea at rest	Yes 6 (16%)	CA *vs* O_2, 4 l min^{-1} at rest	Modified Borg and 100 mm VAS	No significant difference in dyspnoea with O_2 *vs* CA	2
(Bruera *et al*, 1993)	14	Advanced cancer of any type, dyspnoea, oxygen saturation < 90%	Yes 14 (100%)	CA *vs* O_2 5 l min^{-1} at rest	NRS	Significant improvement in dyspnoea with O_2 *vs* CA	2

Abbreviations: CA = compressed air; O_2 = oxygen; 6MWT = 6-min walk test; VAS = visual analog scale; NRS = numerical rating scale. [a]Quality as assessed by Jadad score (Jadad *et al*, 1996).

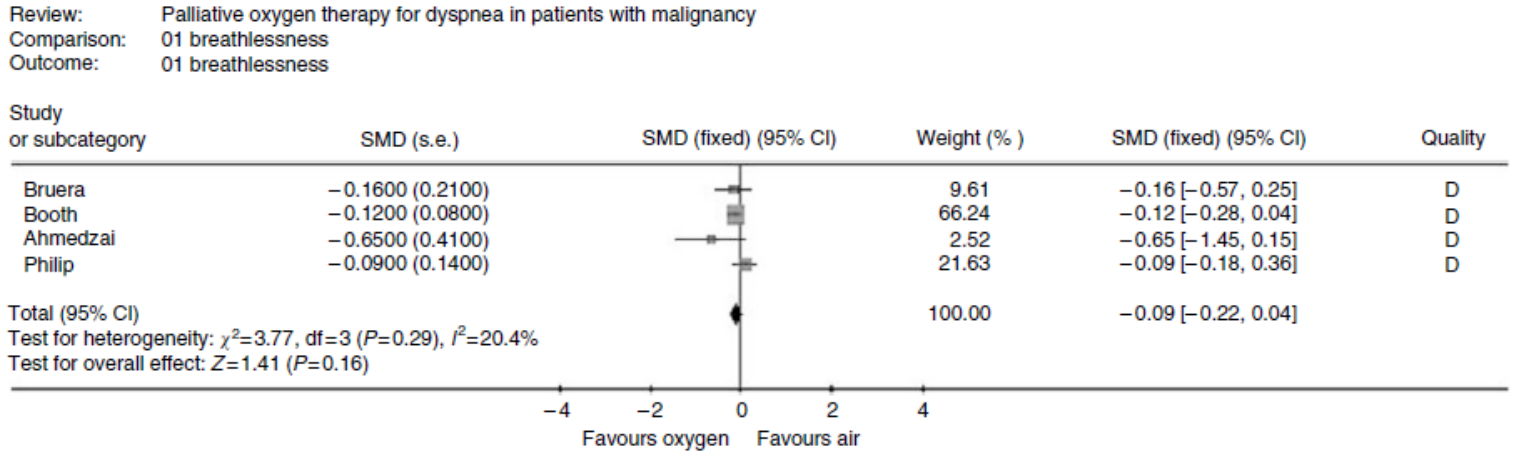

Figure 2 Estimation of efficacy of oxygen in the treatment of dyspnoea in cancer patients who do not qualify for long-term domiciliary oxygen therapy.

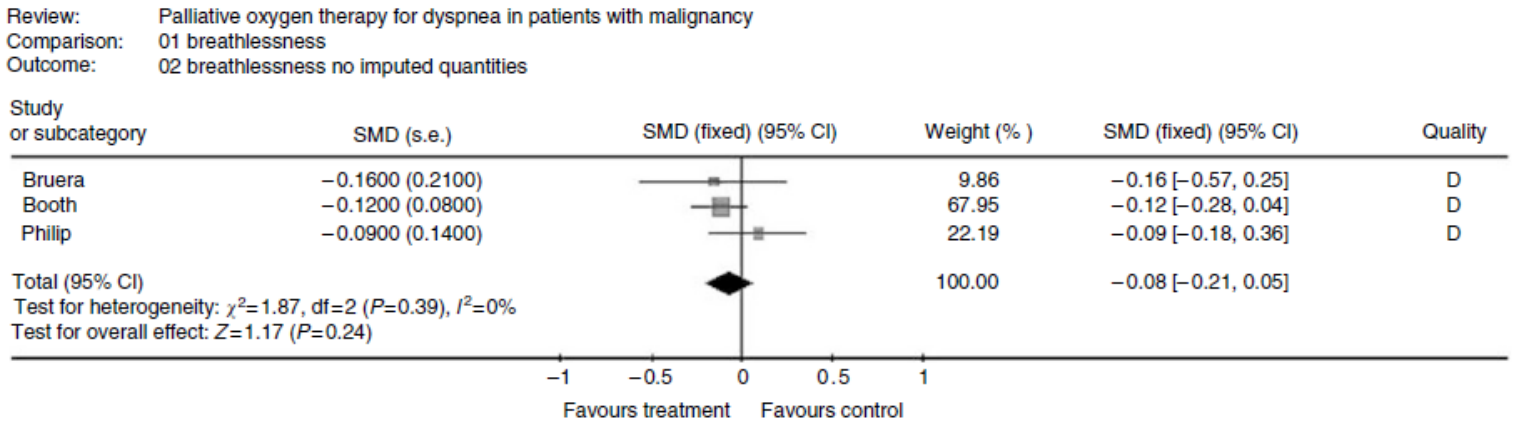

Figure 3 Sensitivity analysis of blinded, randomised controlled trials exploring the symptomatic benefit of oxygen therapy in reducing refractory dyspnoea in a palliative population which does not qualify for domiciliary oxygen – no studies requiring use of imputed quantities.

Recommandations

- L'oxygénothérapie standard ne devrait probablement pas être administrée dans un cadre palliatif avec la seule intention de réduire la dyspnée. (Grade B, forte recommandation)
- Une oxygénothérapie standard doit être administrée aux patients cancéreux admis aux soins intensifs avec une insuffisance respiratoire aiguë pour atteindre une SpO2 > 90 %. (Avis d'expert, recommandation forte)

2. Oxygénation à haut débit (OHD)

- Sept études ont comparé l'OHD à l'oxygénothérapie standard.
- Deux de ces études étaient des essais randomisés et incluaient des patients immunodéprimés avec une grande proportion de tumeurs malignes. Ces études n'ont montré aucune réduction de la mortalité ou du taux d'intubation.
- Les résultats des études rétrospectives sont discordants. Trois n'ont montré aucun avantage en termes de taux de mortalité ou d'intubation. L'une a montré une diminution de la mortalité à 28 jours, mais dans cette étude, les patients ont reçu une OHD et une ventilation non invasive (VNI). La dernière étude a montré une réduction du taux d'intubation, sans toutefois une réduction de la mortalité hospitalière.

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 oxygen by nasal cannula versus Venturi mask in immunocompromised patients with hypoxemic acute respiratory failure: a multicenter randomized trial

Virginie Lemiale[1*], Djamel Mokart[2], Julien Mayaux[3], Jérôme Lambert[4], Antoine Rabbat[5], Alexandre Demoule[3] and Elie Azoulay[1]

Table 2 Primary and secondary endpoints in the two treatment groups

	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

HFNO high-flow nasal oxygen, *VAS* visual analogue scale

[a]Two patients in the HFNO group and one patient in the Venturi mask group received noninvasive ventilation followed by invasive mechanical ventilation

[b]All three VASs ranged from 0 (absence of discomfort, dyspnea, or thirst) to 10 (worst possible discomfort, dyspnea, or thirst)

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Effect of High-Flow Nasal Oxygen vs Standard Oxygen on 28-Day Mortality in Immunocompromised Patients With Acute Respiratory Failure

The HIGH Randomized Clinical Trial

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JAMA. 2018;320(20):2099-2107. doi:10.1001/jama.2018.14282

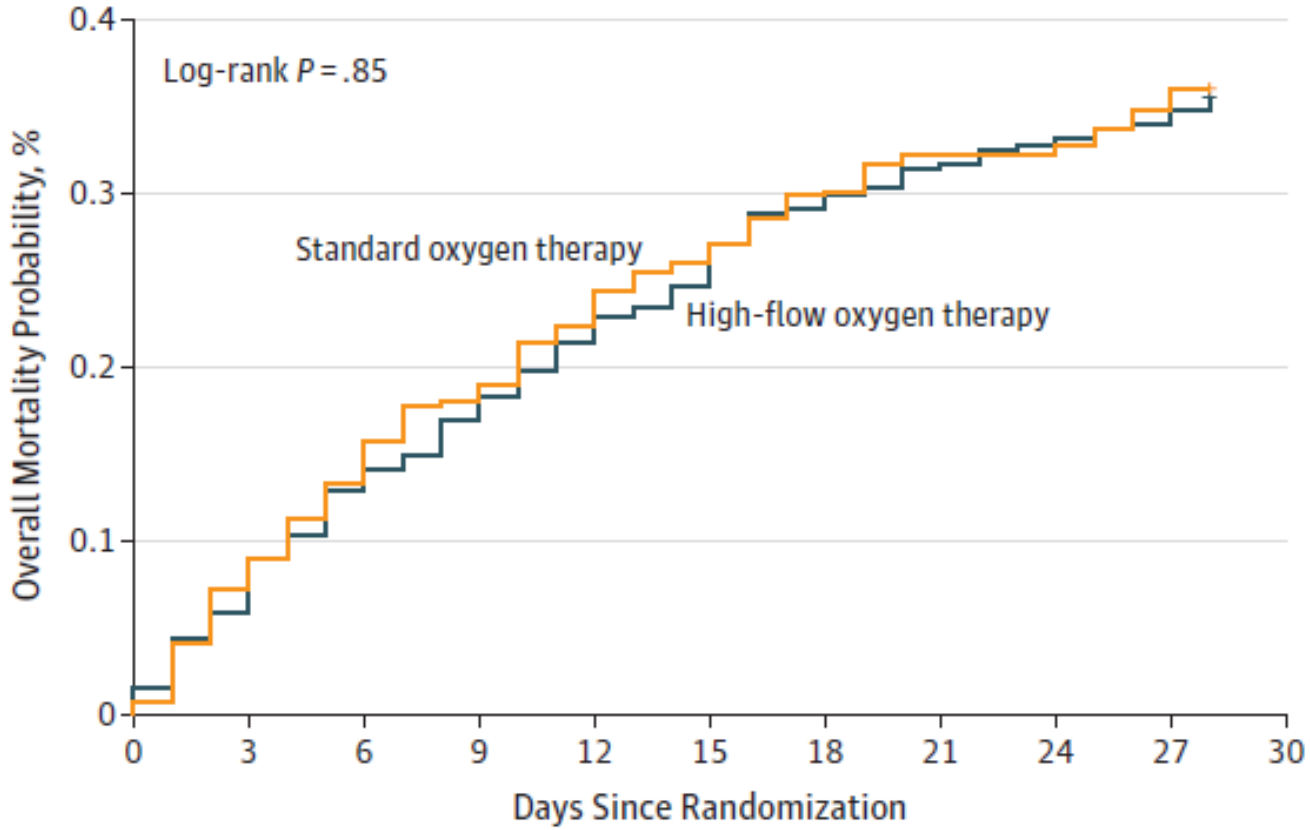
Table 1. Patient Characteristics at Randomization

Characteristic	No. (%)	
	High-Flow Oxygen Therapy (n = 388)	Standard Oxygen Therapy (n = 388)
Demographics		
Age, median (IQR), y	64 (55-70)	63 (56-71)
Sex		
Men	270 (69.6)	247 (63.6)
Women	118 (30.4)	141 (36.4)
Comorbidities		
Chronic		
Respiratory[a]	115 (29.6)	127 (32.7)
Heart failure	23 (5.9)	27 (6.9)
Liver	45 (13.3)	56 (14.4)
Kidney disease	73 (18.8)	69 (20.4)
Charlson Comorbidity Index[b]	5 (4-7)	5 (3-7)
Underlying conditions[c]		
Cancer	294 (75.8)	319 (82.2)
Hematologic malignancies	167 (43.0)	181 (46.6)
Solid tumors	127 (32.7)	138 (35.6)
Immunosuppressive drugs	133 (34.3)	135 (34.8)
Non-transplant-related reasons	89 (22.9)	98 (25.2)
After solid organ transplantation	44 (11.3)	37 (9.5)
Time since diagnosis of underlying condition, median (IQR), mo	6.4 (1-29)	7.0 (0.8-40.0)
Chemotherapy at ICU admission	221/294 (75.2)	228/319 (71.5)
Autologous stem cell transplantation	26/167 (15.6)	22/181 (12.1)
Allogeneic stem cell transplantation	28/167 (16.8)	33/181 (18.2)
Poor performance status (3 or 4)[d]	61 (15.7)	54 (13.9)

Table 2. Primary and Secondary End Points[a]

End Points	No. (%)		Mean Difference, % (95% CI)[b]	Relative Difference (95% CI)	*P* Value
	High-Flow Oxygen Therapy (n = 388)	Standard Oxygen Therapy (n = 388)			
Primary					
All-cause day-28 mortality	138 (35.6)	140 (36.1)	−0.5 (−7.3 to 6.3)	HR, 0.98 (0.77 to 1.24)	.94
Secondary					
Invasive mechanical ventilation[c]	150 (38.7)	170 (43.8)	−5.1 (−12.3 to 2.0)	HR, 0.85 (0.68 to 1.06)[d]	.17
ICU-acquired infection	39 (10.0)	41 (10.6)	−0.6 (−4.6 to 4.1)	HR, 1.01 (0.96 to 1.06)[d]	.91
ICU mortality	123 (31.7)	122 (31.4)	0.3 (−6.3 to 6.8)	RR, 1.01 (0.82 to 1.24)	.64
Hospital mortality	160 (41.2)	162 (41.7)	−0.5 (−7.5 to 6.4)	RR, 0.99 (0.84 to 1.17)	.77
Length of stay, median (IQR), d					
ICU	8 (4-14)	6 (4-13)	0.6 (−1.0 to 2.2)	NA[e]	.07
Hospital	24 (14-40)	27 (15-42)	−2 (−7.3 to 3.3)	NA[e]	.60

Figure 2. Probability of Day-28 Mortality in Immunocompromised Patients With Acute Respiratory Failure Receiving High-Flow Oxygen Therapy or Standard Oxygen Therapy



No. at risk											
High-flow oxygen therapy	388	365	338	322	305	292	275	266	261	256	0
Standard oxygen therapy	388	360	336	318	301	287	272	263	263	253	0

Conclusion

Parmi les patients immunodéprimés gravement malades souffrant d'insuffisance respiratoire aiguë, l'oxygénothérapie à haut débit n'a pas diminué de manière significative la mortalité au jour 28 par rapport à l'oxygénothérapie standard.

Recommandations

- L’OHD ne devrait probablement pas être administrée systématiquement à la place de l'oxygénothérapie standard chez les patients cancéreux admis en réanimation avec insuffisance respiratoire aiguë (Grade A, forte recommandation).
- Si l’OHD est utilisée, elle doit être limitée aux patients sans altération de conscience et sans dysfonctionnement d'organe autre que l’insuffisance respiratoire. L’OHD doit être délivrée pour une durée limitée. Une surveillance étroite en réanimation permet une réévaluation précoce de son efficacité (Avis d'expert, recommandation forte).

3. Ventilation non invasive (VNI)

Les données relatives aux bienfaits de la VNI sont contradictoires. Il y a vingt ans, Hilbert et al. ont comparé la VNI à la thérapie standard à l'O_2 dans un essai randomisé qui comprenait 54 patients immunodéprimés souffrant de fièvre, d'infiltrats pulmonaires et d'insuffisance respiratoire aiguë. Les patients recevant la VNI avaient une diminution du taux d'intubation et de la mortalité.

Ces résultats n'ont pas pu être confirmés dans un grand essai contrôlé plus récent. Cela peut s'expliquer par une amélioration significative des soins de soutien aux patients oncologiques gravement malades au cours des dernières décennies, avec une réduction de la mortalité en conséquence. Néanmoins, il est important de noter que l'échec de la VNI dans les études observationnelles est associé à une mortalité plus élevée que l'intubation précoce.

NONINVASIVE VENTILATION IN IMMUNOSUPPRESSED PATIENTS WITH PULMONARY INFILTRATES, FEVER, AND ACUTE RESPIRATORY FAILURE

GILLES HILBERT, M.D., DIDIER GRUSON, M.D., FRÉDERIC VARGAS, M.D., RUDDY VALENTINO, M.D., GEORGES GBIKPI-BENISSAN, M.D., MICHEL DUPON, M.D., JOSY REIFFERS, M.D., AND JEAN P. CARDINAUD, M.D.

le recours à la VNI permet de réduire le recours à la ventilation invasive et la mortalité par rapport aux soins standards incluant l'oxygénothérapie.

(N Engl J Med 2001;344:481-7.)

TABLE 1. BASE-LINE CHARACTERISTICS OF THE PATIENTS.*

CHARACTERISTIC	NONINVASIVE-VENTILATION GROUP (N=26)	STANDARD-TREATMENT GROUP (N=26)
Age — yr	48±14	50±12
Male sex — no. (%)	18 (69)	19 (73)
SAPS II†	45±10	42±9
Respiratory rate — breaths/min	35±3	36±3
Heart rate — beats/min	108±16	111±14
Systolic blood pressure — mm Hg	127±19	123±17
Body temperature — °C	38.3±0.6	38.5±0.6
Microbiologic diagnosis of pneumonia — no. (%)‡	13 (50)	11 (42)
PaO_2:FiO_2	141±24	136±23
$PaCO_2$ — mm Hg	37±4	38±5
Arterial pH	7.45±0.04	7.43±0.04
White-cell count — cells/mm^3		
Patients with immunosuppression from hematologic cancer and neutropenia	264±163	241±147
Patients with other types of immunosuppression	9980±5290	10,590±5730
Types of immunosuppression — no. (%)		
Hematologic cancer and neutropenia	15 (58)	15 (58)
Bone marrow transplantation	8 (31)	9 (35)
High-dose chemotherapy	7 (27)	6 (23)
Drug-induced immunosuppression	9 (35)	9 (35)
Organ transplantation	3 (12)	4 (15)
Corticosteroid therapy	4 (15)	3 (12)
Other	2 (8)	2 (8)
Acquired immunodeficiency syndrome	2 (8)	2 (8)

TABLE 2. OUTCOMES OF TREATMENT.*

OUTCOME	NONINVASIVE-VENTILATION GROUP (N=26)	STANDARD-TREATMENT GROUP (N=26)	P VALUE	RELATIVE RISK (95% CI)
Intubation — no./total no. (%)	12/26 (46)	20/26 (77)	0.03	0.60 (0.38–0.96)
Immunosuppression from hematologic cancer and neutropenia	8/15 (53)	14/15 (93)	0.02	0.57 (0.35–0.93)
Drug-induced immunosuppression	3/9 (33)	5/9 (56)	0.32	0.60 (0.20–1.79)
Immunosuppression from the acquired immunodeficiency syndrome	1/2 (50)	1/2 (50)	0.83	1.00 (0.14–7.10)
Initial improvement in PaO_2:FiO_2 — no. (%)	12 (46)	4 (15)	0.02	
Sustained improvement in PaO_2:FiO_2 without intubation — no. (%)	13 (50)	5 (19)	0.02	
Death in the ICU — no./total no. (%)†	10/26 (38)	18/26 (69)	0.03	0.56 (0.32–0.96)
Immunosuppression from hematologic cancer and neutropenia	7/15 (47)	13/15 (87)	0.02	0.54 (0.30–0.96)
Drug-induced immunosuppression	3/9 (33)	4/9 (44)	0.50	0.75 (0.23–2.44)
Immunosuppression from the acquired immunodeficiency syndrome	0/2	1/2 (50)	0.50	0.50 (0.13–2.00)
Total duration of any ventilatory assistance — days				
Among all patients	6±3	6±5	0.59	
Among survivors	5±2	3±5	0.12	
Length of ICU stay — days				
Among all patients	7±3	9±4	0.11	
Among survivors	7±3	10±4	0.06	
Death in the hospital — no./total no. (%)	13/26 (50)	21/26 (81)	0.02	0.62 (0.40–0.95)
Immunosuppression from hematologic cancer and neutropenia	8/15 (53)	14/15 (93)	0.02	0.57 (0.35–0.93)
Drug-induced immunosuppression	4/9 (44)	6/9 (67)	0.32	0.67 (0.28–1.58)
Immunosuppression from the acquired immunodeficiency syndrome	1/2 (50)	1/2 (50)	0.83	1.00 (0.14–7.10)

Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

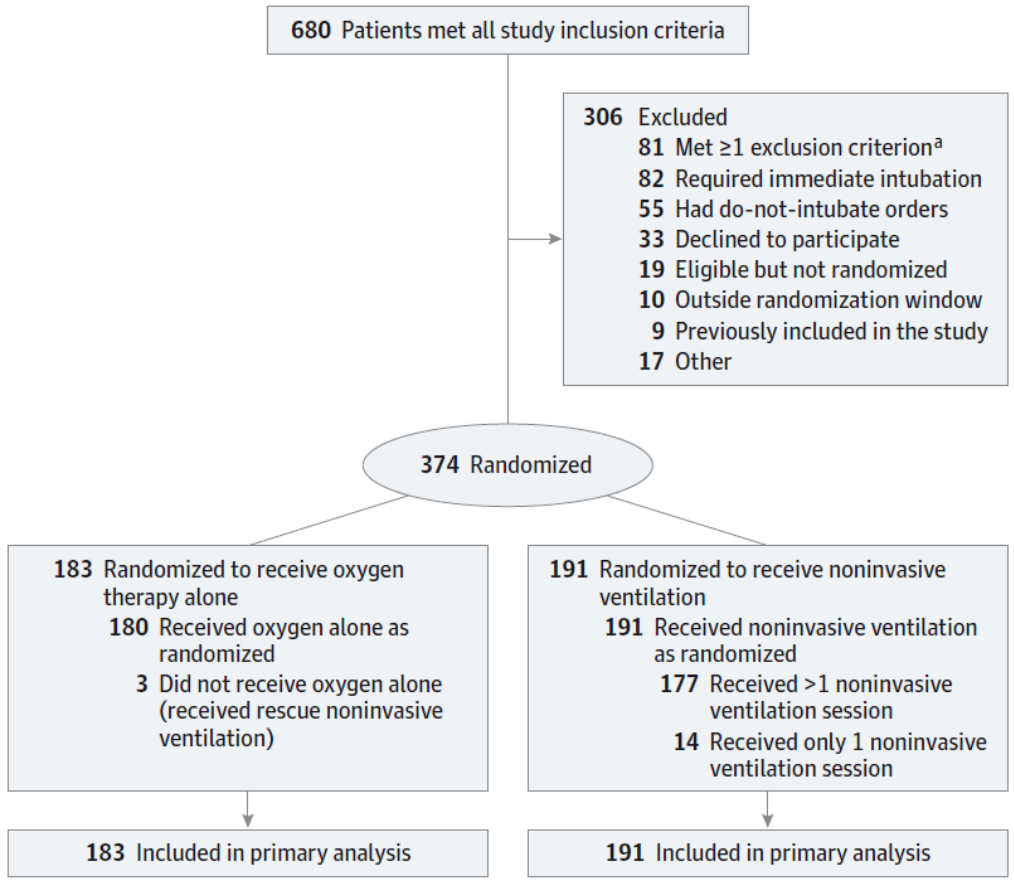
Effect of Noninvasive Ventilation vs Oxygen Therapy on Mortality Among Immunocompromised Patients With Acute Respiratory Failure

A Randomized Clinical Trial

Virginie Lemiale, MD; Djamel Mokart, MD; Matthieu Resche-Rigon, MD, PhD; Frédéric Pène, MD, PhD; Julien Mayaux, MD; Etienne Faucher, MD; Martine Nyunga, MD; Christophe Girault, MD, PhD; Pierre Perez, MD; Christophe Guitton, MD, PhD; Kenneth Ekpe, MD; Achille Kouatchet, MD; Igor Théodose, MS; Dominique Benoit, MD, PhD; Emmanuel Canet, MD; François Barbier, MD, PhD; Antoine Rabbat, MD; Fabrice Bruneel, MD; Francois Vincent, MD; Kada Klouche, MD, PhD; Kontar Loay, MD; Eric Mariotte, MD; Lila Bouadma, MD, PhD; Anne-Sophie Moreau, MD; Amélie Seguin, MD; Anne-Pascale Meert, MD, PhD; Jean Reignier, MD, PhD; Laurent Papazian, MD, PhD; Ilham Mehzari, MD; Yves Cohen, MD, PhD; Maleka Schenck, MD; Rebecca Hamidfar, MD; Michael Darmon, MD, PhD; Alexandre Demoule, MD, PhD; Sylvie Chevret, MD, PhD; Elie Azoulay, MD, PhD; for the Groupe de Recherche en Réanimation Respiratoire du patient d'Onco-Hématologie (GRRR-OH)

JAMA. 2015;314(16):1711-1719. doi:10.1001/jama.2015.12402

Figure 1. Flow of Participants Through Study



In both groups, oxygenation modalities and the use of high-flow nasal oxygen were at the clinician's discretion. Noninvasive ventilation was not allowed for patients allocated to the oxygen group except, if needed, for preoxygenation before intubation or for up 2 hours to improve the safety of bronchoscopy and bronchoalveolar lavage.

Table 1. Patient Characteristics at Randomization

Characteristic	No. (%)	
	Oxygen Alone (n = 183)	Noninvasive Ventilation (n = 191)
Age, median (IQR), y	64 (53-72)	61 (52-70)
Men	105 (57.4)	117 (61.3)
Underlying conditions	155 (84.7)	162 (84.8)
Cancer		
Hematologic malignancies	113 (61.7)	125 (65.4)
Solid tumors	42 (23.0)	37 (19.4)
Immunosuppressive drugs	28 (15.3)	29 (15.2)
For non-transplant-related reasons	17 (9.3)	16 (8.4)
After solid organ transplantation	11 (6.0)	13 (6.8)
Chemotherapy at admission	84/155 (54.2)	86/162 (53.1)
Chronic hematologic malignancy	35/155 (22.6)	39/162 (24.1)
Allogeneic stem cell transplantation	29/155 (18.7)	26/162 (16.1)
Remission of the malignancy	19/155 (12.3)	18/162 (11.1)

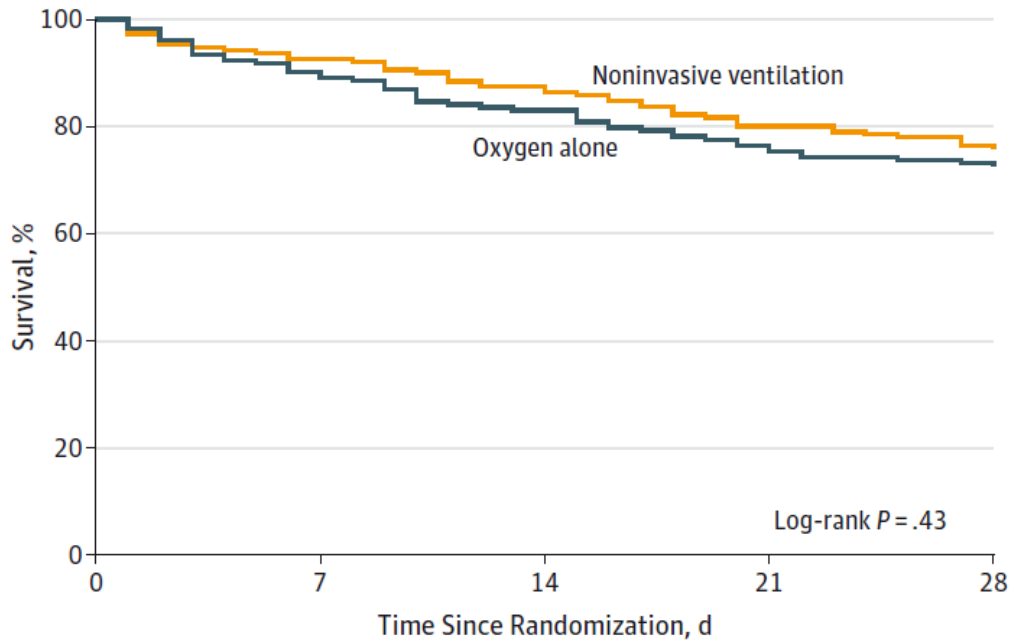
Table 2. Diagnostic Strategies and Identified Causes of Acute Respiratory Failure

	No. (%)	
	Oxygen Alone (n = 183)	Noninvasive Ventilation (n = 191)
Noninvasive diagnostic tests	163 (89.1)	163 (85.3)
Bronchoscopy and bronchoalveolar lavage	78 (42.6)	64 (33.9)
Causes[a]		
Bacterial pneumonia[b]	83 (45.6)	87 (45.5)
Pneumocystis jirovecii pneumonia	21 (11.5)	22 (11.5)
Viral pneumonia	15 (8.2)	19 (9.9)
Lung involvement by the underlying disease	15 (8.2)	21 (11)
Drug-related pulmonary toxicity	9 (4.9)	10 (5.2)
Invasive pulmonary aspergillosis	4 (2.2)	6 (3.1)
Cardiogenic pulmonary edema	2 (1.1)	7 (3.6)
ARDS (extrapulmonary causes)	12 (6.6)	11 (5.6)
Diffuse intra-alveolar hemorrhage	2 (1.1)	0 (0)
Other identified causes[c]	9 (4.9)	2 (2.1)
No identified cause	11 (6)	6 (4.2)

Table 3. Primary and Secondary End Points

	Oxygen Alone (n = 183)	Noninvasive Ventilation (n = 191)	Absolute Difference (95% CI)	*P* Value
Primary End Point				
All cause 28-d mortality, No. (%)	50 (27.3)	46 (24.1)	−3.2 (−12.1 to 5.6)	.47
Secondary End Points				
Need for invasive mechanical ventilation, No. (%)	82 (44.8)	73 (38.2)	−6.6 (−16.6 to 3.4)	.20
SOFA on day 3, median (IQR)	4 (2-6)	4 (2-5)	−0.5 (−1.2 to 0.3)	.17
ICU-acquired infection, No. (%)	46 (25.1)	48 (25.1)	0 (−8.8 to 8.8)	.99
Length of ICU stay, median (IQR), d	7 (3-16)	6 (3-16)	−0.3 (−3.2 to 2.6)	.55
Duration of mechanical ventilation, median (IQR), d	14 (6-33)	17 (6-38)	0.3 (−5.7 to 6.3)	.70
Length of hospital stay, median (IQR), d	22 (14-42)	24 (12-43)	0.3 (−5 to 5.5)	.99
Mortality at 6 mo, No. (%)[a]	82/181 (45.3)	72/182 (39.6)	−5.7 (−16.4 to 3.9)	.23
Good performance status in 6-mo survivors, No. (%)[b]	70/75 (93.3)	85/91 (93.4)	−0.1 (−7.7 to 7.5)	.98

Figure 2. Probability of Survival at Day 28



No. at risk					
Noninvasive ventilation	191	177	167	153	146
Oxygen alone	183	165	152	140	134

Probability of survival and subgroup analyses of the risk of day-28 mortality Kaplan-Meier estimates of the probability of day-28 mortality in immunocompromised patients with acute respiratory failure receiving either early noninvasive ventilation or oxygen only. Statistical test used the log-rank test.

Dans notre expérience

Tableau 3

Résultats des études réalisées sur les techniques de support vital.

Technique	Années de recrutement et référence	N patients	Survie hospitalière	Facteurs prédictifs survie hospitalière
Réanimation cardiorespiratoire	1985-1992[7]	49	10 %	
Ventilation mécanique invasive (VMI)	1985-1997[8]	168	17 %	IGS II Leucopénie
Ventilation non invasive (VNI)	2000-2001[9]	40	42,5 %	
VMI à l'ère VNI	2000-2007[11]	164	24 %	VMI après échec VNI Leucopénie Bilirubinémie
Epuration extra-rénale (1)	1997-2002[15]	32	47 %	Nombre organes défaillants
Epuration extra-rénale (2)	2003-2012[16]	103	37 %	Nombre organes défaillants Hypoalbuminémie

IGS II : indice de gravité simplifié II ; VMI : ventilation mécanique invasive ; VNI : ventilation non invasive

Meert, 2005 (2 x 47 patients pairés)

Résultats	Bras		*p*
	VNI	VMI	
Durée ventilation (jour) -médiane (intervalle)	3 (1-26)	10 (0-47)	0,001
Durée hospitalisation USI (jours) -médiane (intervalle)	9 (1-42)	16 (1-91)	0,01
Sortie USI	26 (55,3%)	13 (27,6%)	0,01
Sortie hôpital	23 (48,9%)	11 (23,4%)	0,08

Sous-groupe	Bras				*p*
	VNI		VMI		
	N pts	% sorties	N pts	% sorties	
Tumeurs solides	29	69	28	28,6	0,02
Hémopathies malignes	18	33,3	19	26,3	0,63
Patients leucopéniques	10	10,0	10	20,0	1
Patients non leucopéniques	37	67,5	37	29,7	0,004
Allo-greffés	9	22,2	9	22,2	1
Non allo-greffés	38	63,1	38	28,9	0,004
IRA hypoxémiques	34	47,0	34	20,6	0,02
IRA hypercapniques	10	90	10	40,0	0,13
OPH	3	66,6	3	66,6	NA
Pairés avec contrôles avant 1996	26	61,5	26	11,5	0,004
Pairés avec contrôles après 1996	21	47,6	21	47,9	1

Journal of BUON **16:** 160-165, 2011

ORIGINAL ARTICLE

Invasive mechanical ventilation in cancer patients. Prior non invasive ventilation is a poor prognostic factor

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Table 5. Multivariate analysis of variables predicting hospital discharge

Variable		*OR (95% CI)*	*p-value*
NIV before IMV vs. immediate IMV	Yes vs. no	0.30 (0.09-0.95)	0.04
Leukopenia	Yes vs. no	0.21 (0.06-0.77)	0.02
Serum bilirubin	≥ 1.1 vs. <1.1 mg/dl	0.38 (0.16-0.94)	0.04

Recommandations

- Bien qu'il n'y ait pas de données spécifiques disponibles sur les patients cancéreux, la VNI doit être administrée aux patients cancéreux présentant un œdème pulmonaire cardiaque ou une exacerbation d'une maladie pulmonaire obstructive chronique (avec acidose respiratoire) (Grade B, forte recommandation).
- La VNI ne doit probablement pas être initiée chez les patients cancéreux admis en réanimation avec insuffisance respiratoire aiguë (sauf exacerbation d'une maladie pulmonaire obstructive chronique ou d'un œdème cardiaque pulmonaire). C'est plus particulièrement le cas chez les patients présentant une insuffisance respiratoire sévère (polypnée, syndrome de détresse respiratoire aiguë (SDRA), hypoxie sévère), un choc septique, une insuffisance respiratoire associée à d'autres défaillances d'organes (altération du niveau de conscience, besoin de vasopresseurs, thérapie d'épuration rénale) et une admission retardée aux soins intensifs (Grade B, forte recommandation).
- Cependant, si la VNI est démarrée, le patient doit être admis aux soins intensifs pour permettre une surveillance étroite et des réévaluations fréquentes de son efficacité. L'intubation ne doit pas être retardée en l'absence d'amélioration rapide (Avis d'expert, recommandation forte).

4. Ventilation mécanique invasive (VMI)

La VMI apparaissant comme la dernière option thérapeutique en cas d'aggravation clinique sévère, il est difficile d'évaluer sa pertinence pour des raisons éthiques évidentes.

Cependant, il semble que l'intubation retardée (après VNI d'échec d'OHD) soit associée à de moins bons résultats. L'absence de diagnostic de l'insuffisance respiratoire aiguë est également associée au pire résultat.

Le bénéfice d'une intubation plus précoce des patients avec un diagnostic inconnu pour effectuer la procédure de diagnostic la plus complète (y compris un accès facile à la tomodensitométrie et au lavage bronchoalvéolaire) reste à déterminer.

Tableau 3

Résultats des études réalisées sur les techniques de support vital.

Technique	Années de recrutement et référence	N patients	Survie hospitalière	Facteurs prédictifs survie hospitalière
Réanimation cardiorespiratoire	1985-1992[7]	49	10 %	
Ventilation mécanique invasive (VMI)	1985-1997[8]	168	17 %	IGS II Leucopénie
Ventilation non invasive (VNI)	2000-2001[9]	40	42,5 %	
VMI à l'ère VNI	2000-2007[11]	164	24 %	VMI après échec VNI Leucopénie Bilirubinémie
Epuration extra-rénale (1)	1997-2002[15]	32	47 %	Nombre organes défaillants
Epuration extra-rénale (2)	2003-2012[16]	103	37 %	Nombre organes défaillants Hypoalbuminémie

IGS II : indice de gravité simplifié II ; VMI : ventilation mécanique invasive ; VNI : ventilation non invasive

Les résultats avant l'ère de la VNI

Sculier JP et al :
La ventilation artificielle chez les patients atteints de cancer.
Rev Mal Respir 2001; 18(2):137-154.

Le pronostic en résumé

Type de population	*Nombre d'études*	*Nombre de patients ventilés*	*Taux de succès (médiane)*
Tout cancéreux	15	10 – 782	4 – 71% (18%)
Tumeurs solides	7	22 – 627	25 – 93% (31%)
Hémopathies malignes	7	17 – 67	8 – 35% (27%)
Greffes de moelle	11	16 - 60	4 – 19% (9%)

L'expérience de l'Institut Bordet (avant la VNI)

Support Care Cancer (2003) 11:236–241
DOI 10.1007/s00520-002-0436-2

ORIGINAL ARTICLE

F. Vallot
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T. Berghmans
J. P. Sculier

Leucopenia is an independent predictor in cancer patients requiring invasive mechanical ventilation: a prognostic factor analysis in a series of 168 patients

Table 1 Patients characteristics

Variable		*n*	%
Total number of patients		168	–
Demographic variables			
Age	Median (years)	56	–
	Range	21–86	–
Sex	Male	82	49
	Female	86	51
Cancer-related variables			
Type of tumour	Solid	104	62
	Haematological	64	38
Cancer status	Complete response	7	4
	Partial response	19	11
	Stable disease	14	8
	Progression	93	55
	Induction treatment	35	21
Cancer phase	Diagnosis	5	3
	Curative	56	33
	Control	87	52
	Pivotal	19	11
	Palliative	1	0.5
Cancer evolution duration	Median (months)	14.5	–
	Range	(0–244)	–
Bone marrow graft	No	146	87
	Autologous	12	7
	Allogeneic	10	6
Complications-related variables			
APACHE II score	Median	20	–
	Range	3–43	–
SAPS II score	Median	43	–
	Range	16–93	–
Admission for	Mechanical ventilation	98	58
	Other reason	70	42
Renal failure	Yes	102	61
	No	66	39
Shock	Yes	95	60
	No	73	40
Leukocyte count	<1000/mm^3	44	26
	>1000/mm^3	124	74
Platelet count	<50,000/mm^3	58	35
	>50,000/mm^3	110	65

Table 2 Outcomes results

Duration of mechanical ventilation	
Median Range	111–183
Weaning from mechanical ventilation	43 (26%)
Discharge from ICU	37 (22%)
Duration of ICU stay	
Median	16
Range	1–244
Discharge from hospital	29 (17%)

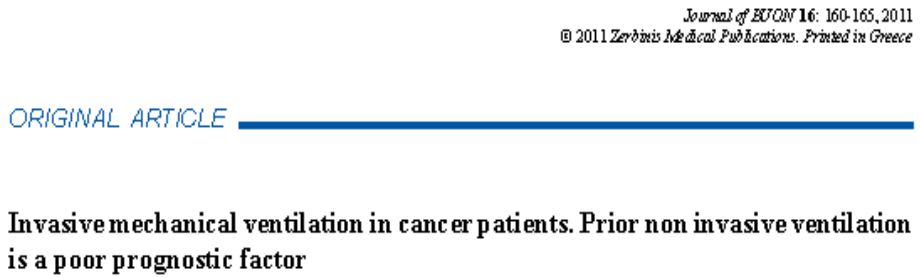
Table 3 Univariate prognostic factors analyses for weaning, ICU mortality and hospital mortality

Variables		Weaning		ICU mortality		Hospital mortality	
		%	*P*	%	*P*	%	*P*
Sex	Male	23	0.60	80	0.56	82	1
	Female	28		76		82	
Age (years)	<60	26	0.94	76	0.62	80	0.55
	>60	25		80		85	
Cancer duration (months)	<14.5	21	0.29	83	0.14	88	0.1
	>14.5	30		73		77	
Bone marrow graft	Yes	27	0.60	77	0.79	82%	0.86
	No	18		82		86	
SAPS II score	<43	31	0.11	73	0.19	79	0.28
	>43	19		83		86	
APACHE II score	<20	32	0.08	74	0.25	79	0.35
	>20	19		82		86	
Leucopenia	Yes	14	0.04	89	0.06	93	0.06
	No	30		74		79	
Thrombopenia	Yes	17	0.09	83	0.37	87	0.28
	No	30		75		80	
Shock	Yes	19	0.11	85	0.06	78	0.20
	No	31		73		87	
Renal failure	Yes	21	0.39	83	0.25	81	0.71
	No	28		74		84	
Cancer phase	Diagnosis-curative	28	0.74	77	0.98	80	0.68
	Other	24		78		84	
Cancer status	Remission	31	0.76	73	0.61	76	0.60
	Other	26		78		83	
Admission cause	Mechanical ventilation	23	0.41	80	0.48	83	0.92
	Other	30		75		86	
Tumour type	Solid	26	1	80	0.59	85	0.30
	Haematological	25		75		78	

Table 4 Multivariate analyses of prognostic factor for weaning, ICU mortality and hospital mortality (n=159)

Variables	Weaning[a]			ICU mortality[b]			Hospital mortality[c]		
	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
Leucopenia (ref=no)	0.35	0.14–0.89	0.03	0.42	0.15–1.20	0.09	0.23	0.06–0.83	0.03
Shock (ref=yes)	–	–	–	2.04	0.90–4.63	0.08	–	–	–
Cancer evolution duration (ref=>14.5 months)	–	–	–	0.49	0.22–1.07	0.07	0.46	0.19–1.12	0.09
Type of tumour (ref=haemalogical malignancies)	–	–	–	–	–	–	0.45	0.19–1.07	0.07

La VMI à l'ère de la VNI



Journal of BUON **16**: 160-165, 2011

ORIGINAL ARTICLE

Invasive mechanical ventilation in cancer patients. Prior non invasive ventilation is a poor prognostic factor

- IJB : janvier 2000 à décembre 2007
- 164 patients :
  - VMI d'emblée : 123
  - VMI puis VNI : 41

Table 1. Patient characteristics on admission

Characteristics	*Whole group*	*NIV followed by IMV*	*IMV alone*	*p-value*
Number of patients	164	41	123	
Median age, years (range)	57 (19-81)	49 (23-78)	59 (20-81)	0.008
Gender				0.86
Male, n	95	23	72	
Female, n	69	18	51	
Median SAPS II score (range)	53 (23-94)	56 (23-83)	47 (30-94)	0.002
Type of malignancy, n (%)				<0.001
Solid tumor	106 (64.6)	16 (39.0)	90 (73.2)	
Haematological malignancy	58 (35.4)	25 (61.0)	33 (26.8)	
Bone marrow /Peripheral blood stem cell transplantation, n (%)	37 (63.8)	19 (76.0)	18 (54.5)	<0.001
Cancer phase* (1,2 vs. 3,4), n (%)				0.006
Phase 1	5 (3.0)	1 (2.4)	4 (3.2)	
Phase 2	60 (36.6)	23 (56.1)	37 (30.1)	
Phase 3	89 (54.3)	17 (41.5)	72 (58.5)	
Phase 4	10 (6.1)	0 (0.0)	10 (8.1)	
Leukopenia at admission, n (%)	40 (24.4)	13 (31.7)	27 (21.9)	0.22
Median PaO_2/FiO_2 ratio (range)	215 (46-590)	183 (52-407)	230 (46-590)	0.02

*Cancer phase: 1= diagnostic, 2= curative, 3= controllable but no longer curable, 4= pivotal. IMV= invasive mechanical ventilation, NIV= non invasive ventilation

Table 2. Reasons for admission to the intensive care unit

Reasons for admission	*Whole group (n=164) %*	*NIV followed by IMV (n=41) %*	*IMV alone (n=123) %*
Respiratory failure	35.3	63.4	26.0
Sepsis/shock	21.3	14.6	23.5
Neurologic disease	12.1	4.8	14.6
Abdominal pathology	10.3	12.1	9.7
Heart disease	7.9	2.4	9.7
Cardiopulmonary resuscitation	7.3	0.0	9.7
Acute renal failure	4.8	2.4	5.7
Other	0.6	0.0	0.8

Table 3. Complications leading to ventilation

Complications	*Whole group (n=164) %*	*NIV followed by IMV (n=41) %*	*IMV alone (n=123) %*
Sepsis/shock	34.7	34.1	34.9
Respiratory failure	33.5	56.1	24.3
Cardiopulmonary resuscitation	15.8	–	21.0
Neurologic disease	10.3	4.8	12.1
Heart disease	3.6	–	4.8
Other	1.8	–	2.4

Résultats

	Total	*VMI après VNI*	*VMI d'emblée*
Sevrage VM	35%	**21,9%**	**39,8%**
Sortie USI	28%	**11,1%**	**31,7%**
Sortie hôpital	24%	**9,8%**	**27,6%**

p = 0,02

Table 5. Multivariate analysis of variables predicting hospital discharge

Variable		*OR (95% CI)*	*p-value*
NIV before IMV vs. immediate IMV	Yes vs. no	0.30 (0.09-0.95)	0.04
Leukopenia	Yes vs. no	0.21 (0.06-0.77)	0.02
Serum bilirubin	≥ 1.1 vs. <1.1 mg/dl	0.38 (0.16-0.94)	0.04

L'intubation retardée (après VNI d'échec d'OHD) est associée à de moins bons résultats

Journal of Critical Care 38 (2017) 295–299

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Noninvasive ventilation during acute respiratory distress syndrome in patients with cancer: Trends in use and outcome

A. Neuschwander, MD [a], V. Lemiale, MD [a], M. Darmon, PhD [b], F. Pène, PhD [c], A. Kouatchet, MD [d], P. Perez, MD [e], F. Vincent, MD [f], J. Mayaux, MD [g], D. Benoit, PhD [h], F. Bruneel, MD [i], A.P. Meert, PhD [j], M. Nyunga, MD [k], A. Rabbat, MD [l], D. Mokart, PhD [m], E. Azoulay, PhD [a,*],
A Groupe de Recherche en Réanimation Respiratoire en Onco-Hématologie (GRRR-OH) study:

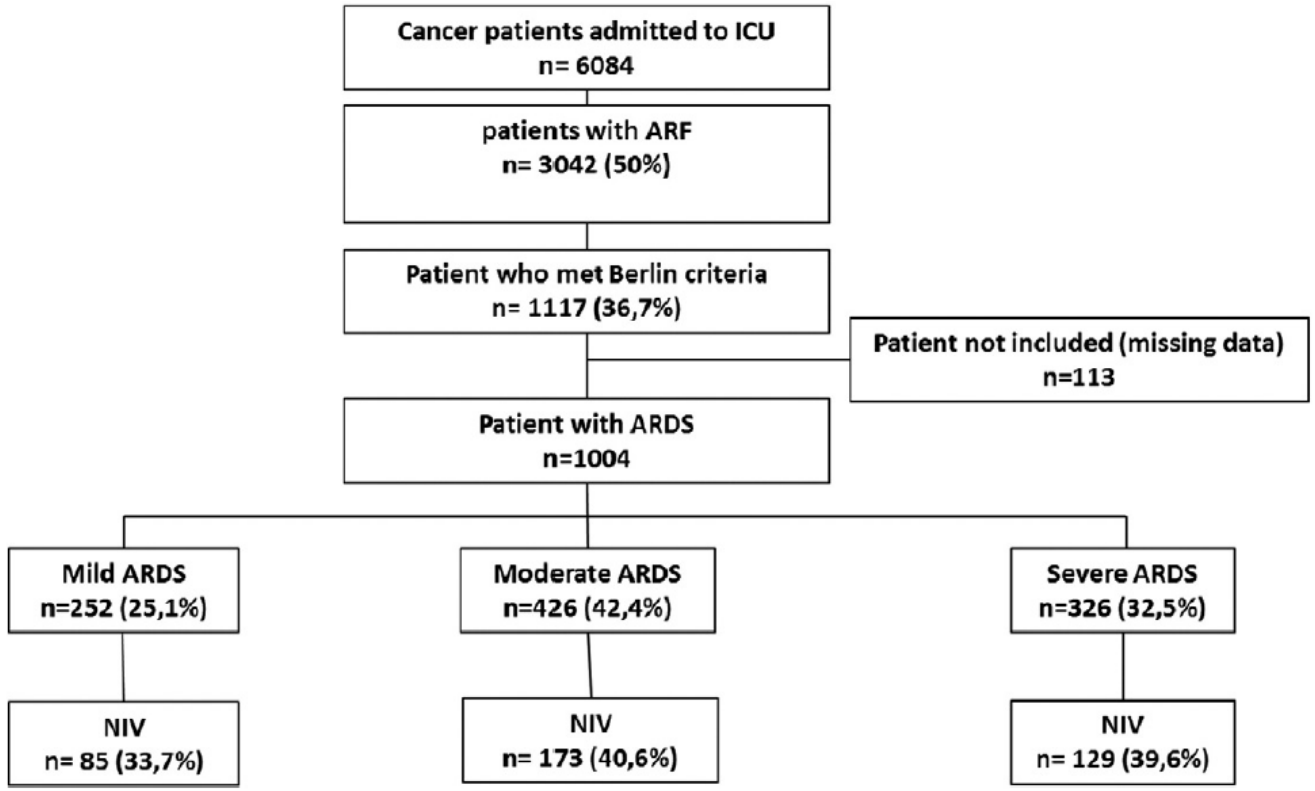


Fig. 2. Flowchart.

1004 cas en 20 ans

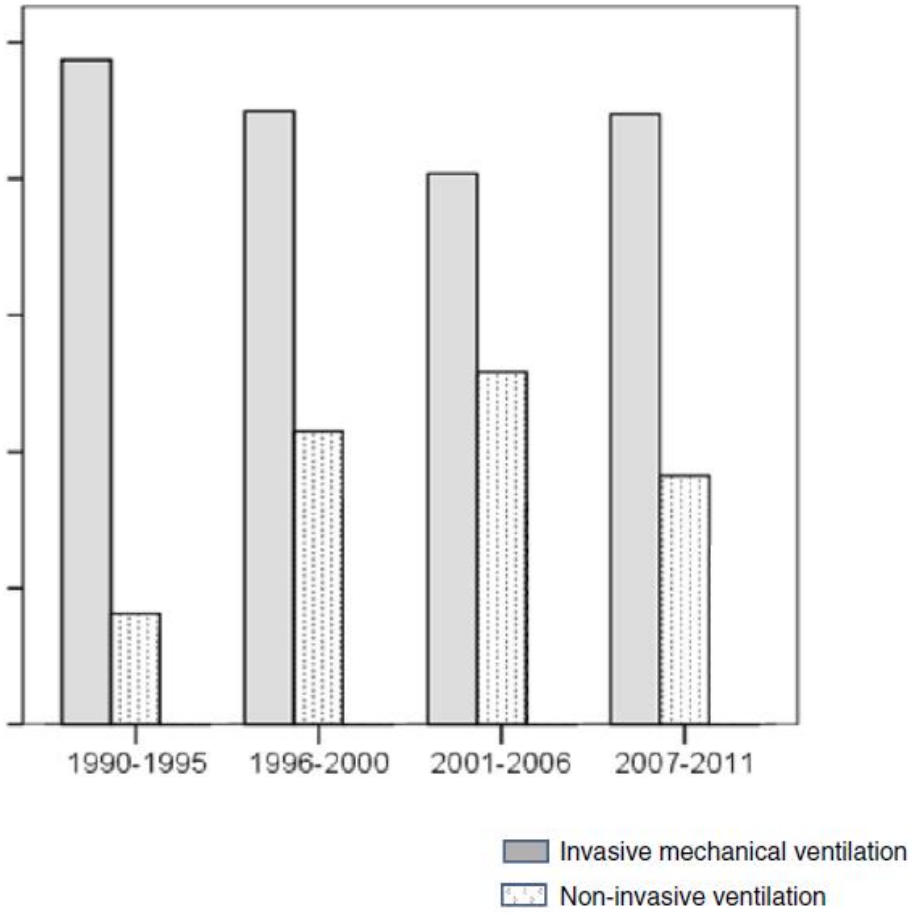


Fig. 1. Noninvasive ventilation use over time.

Table 1
Patients characteristics according to ventilation strategy

Variables	Patients who never receive NIV (n = 617)	Patient who receive NIV (n = 387)	*P*
Baseline characteristics			
Age (y), median [IQR]	58 [48-67]	57 [46-67]	.31
Sex, male	393 (63.7)	249 (64.3)	.88
Underlying disease			<.001
Hematologic malignancy	495 (80.2)	364 (94)	
Acute leukemia	171 (27.7)	127 (32.8)	
Non–Hodgkin lymphoma	189 (30.6)	129 (33.3)	
Myeloma	76 (12.3	37 (9.6)	
Solid tumor	122 (19.7)	23 (5.9)	
Allogenic stem cell transplantation	55 (8.9)	60 (15.5)	.002
ARDS etiology			
Pulmonary Infection	379 (61.4)	283 (73.1)	.002
Extrapulmonary infection	170 (27.5)	55 (14.2)	<.001
Fungus	195 (31.6)	98 (25.3)	.005
Pneumocystis	16 (2.6)	48 (12.4)	<.001
Undetermined	15 (2.4)	26 (6.7)	.003
Neutropenia recovery	288 (46.7)	156 (40.3)	.056
SOFAc J1	9 [7-11]	7 [4-9]	<.001
Shock	502 (81.4)	229 (59.1)	<.001
Acute kidney failure	219 (35.5)	87 (22.5)	<.001
Severity of ARDS			
Mild	167 (27)	85 (21.9)	.18
Moderate	253 (41)	173 (44.7)	
Severe	197 (31.9)	129 (33.3)	
Outcome			
ICU mortality	394 (63.8)	171 (44.1)	<.001
Hospital mortality	427 (69.2)	213 (55.0)	<.001

SOFAc indicates SOFA score without respiratory parameter.

Table 2
Patients characteristics according to NIV failure

Variables	NIV success (n = 111)	NIV failure (n = 276)	*P*
Baseline characteristics			
Age (y), median (IQR)	56 [46-65]	57 [46-67]	.40
Sex, male	46 (41.4)	92 (33.3)	.17
Underlying disease			.32
Hematologic malignancy	107 (96.9)	257 (93.1)	
Solid tumor	4 (3.6)	19 (6.8)	
Allogenic stem cell transplantation	22 (19.8)	38 (13.8)	.18
ARDS etiology			
Pulmonary Infection	74 (66.6)	209 (75.7)	.09
Extrapulmonary infection	20 (18.1)	35 (12.7)	.20
Fungus	19 (17.1)	79 (28.6)	.02
Pneumocystis	23 (20.7)	25 (9.1)	.003
Undetermined	11 (0.09)	15 (0.05)	.11
Neutropenia recovery	34 (30.6)	122 (44.2)	.019
SOFAc J1, median (IQR)	7 [3-8]	8 [5-10]	<.001
Shock	21 (18.9)	208 (75.4)	<.001
Acute kidney failure	2 (1.8)	85 (30.8)	<.001
Severity of ARDS			
Mild	31 (27.9)	54 (19.6)	.13
Moderate	53 (47.8)	120 (43.4)	
Severe	27 (24.3)	102 (36.9)	

SOFAc indicates SOFA score without respiratory parameter.

Table 3
Factors associated with NIV failure

	OR (95% CI)	*P*
Sex, male	0.66 (0.41-1.07)	.053
Mild ARDS	1	Reference
Moderate ARDS	1.28 (0.73-2.28)	.28
Severe ARDS	2.08 (1.10-3.93)	.02
SOFAc	1.15 (1.08-1.23)	<.001
Pulmonary infection–related ARDS	1.77 (1.06-2.98)	.03
Fungal infection	1.90 (1.06-3.41)	.03

SOFAc indicated SOFA score without respiratory parameter.

Table 4
Factors associated with hospital mortality

	OR (95% CI)	*P*
Solid tumor (vs hematologic malignancy)	0.45 (0.19-1.09)	.08
Mild ARDS	1	
Moderate ARDS	0.92 (0.53-1.60)	.77
Severe ARDS	1.99 (1.09-4.28)	.02
SOFAc	1.11 (1.04-1.19)	.001
NIV failure	2.63 (1.63-4.28)	<.001
Extrapulmonary infection	1.78 (0.94-3.37)	.08

SOFAc indicates SOFA score without respiratory parameter.

Conclusion

L'échec de ventilation non invasive chez les patients atteints de SDRA avec une tumeur maligne est fréquent et lié à la gravité du SDRA, au score SOFA et au SDRA lié à une infection pulmonaire.

L'échec de la ventilation non invasive est associé à la mortalité hospitalière.

L'absence de diagnostic de l'insuffisance respiratoire aiguë est également associée à de moins bons résultats

Intensive Care Med (2017) 43:1808–1819
DOI 10.1007/s00134-017-4947-1

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

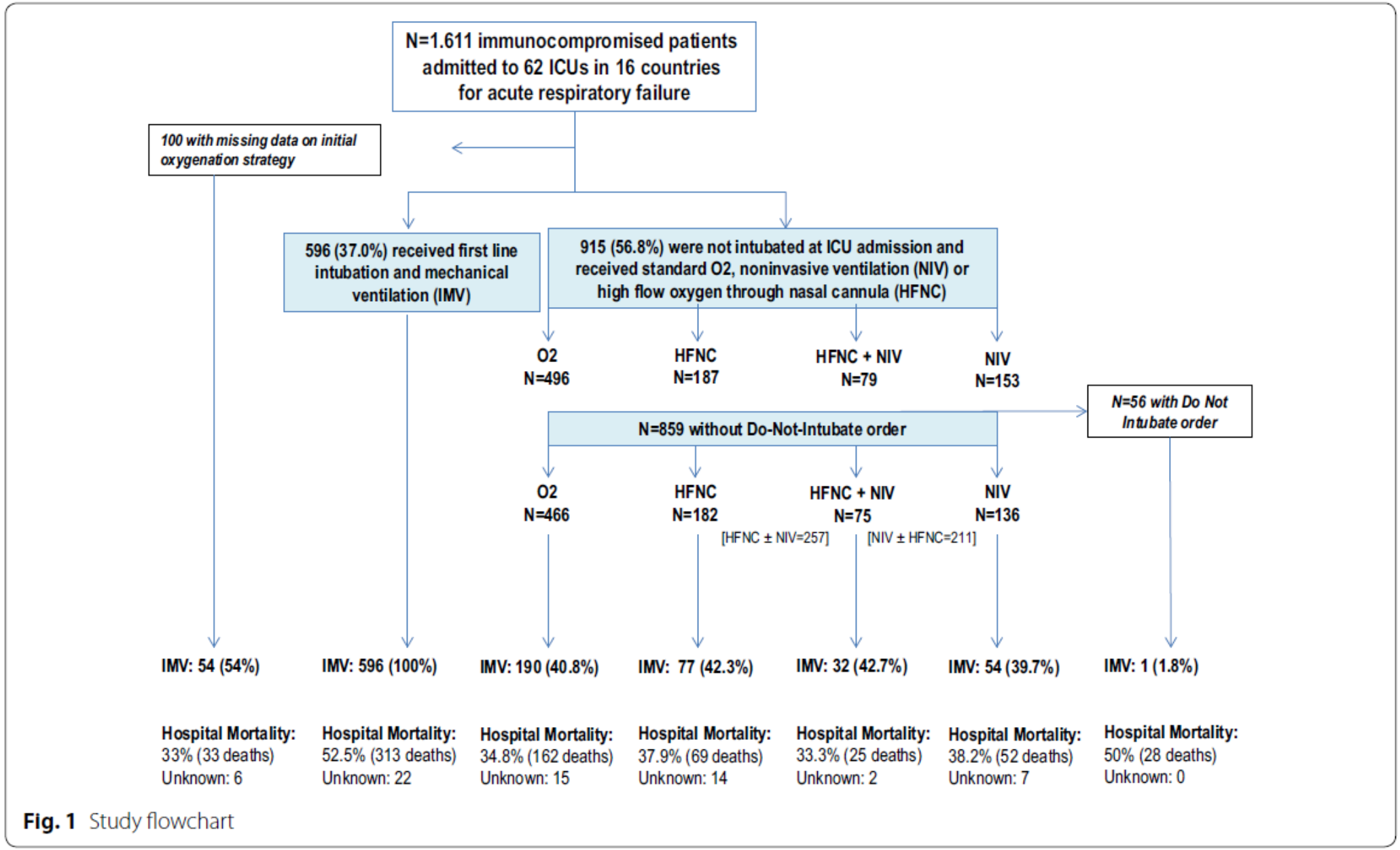
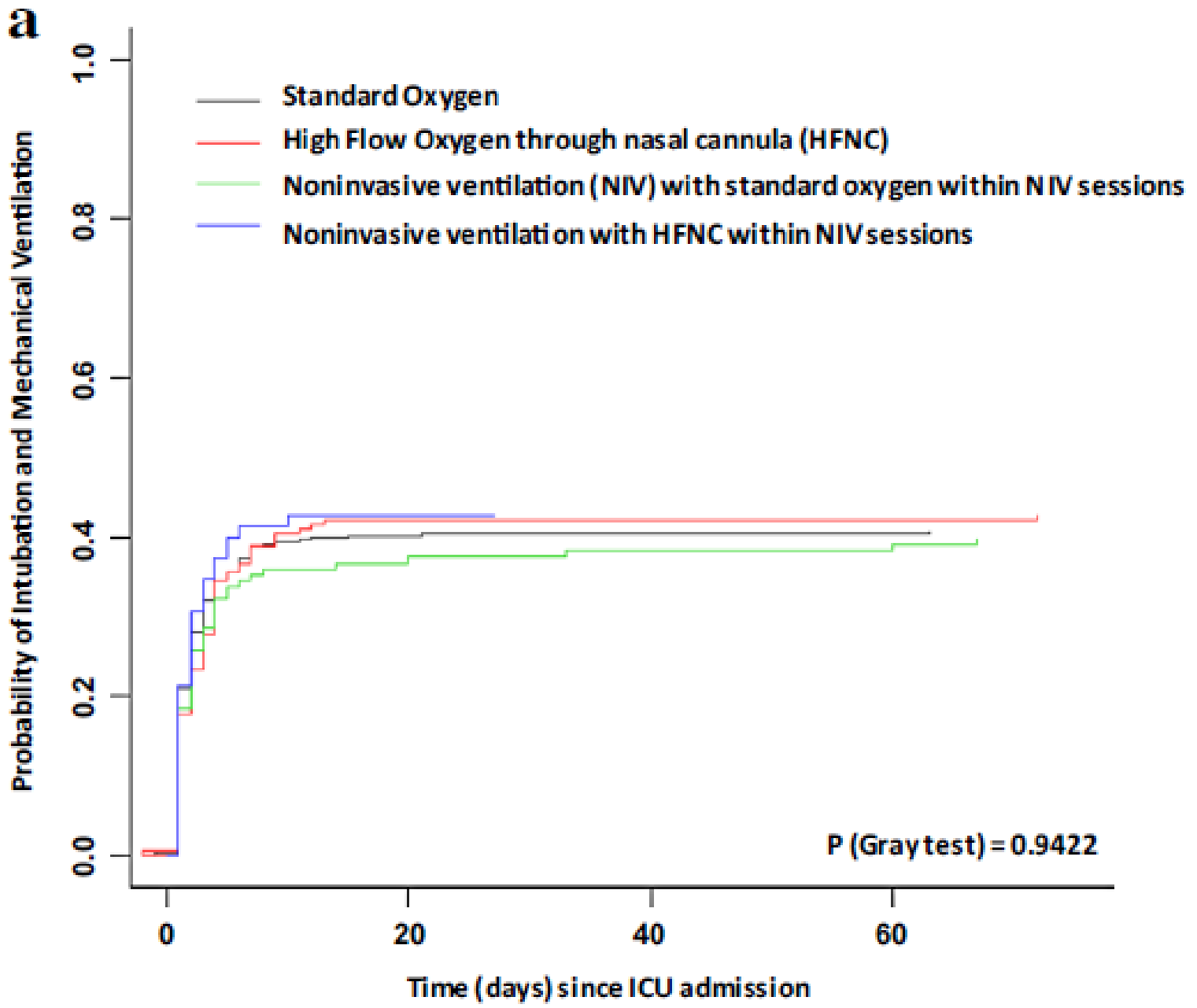
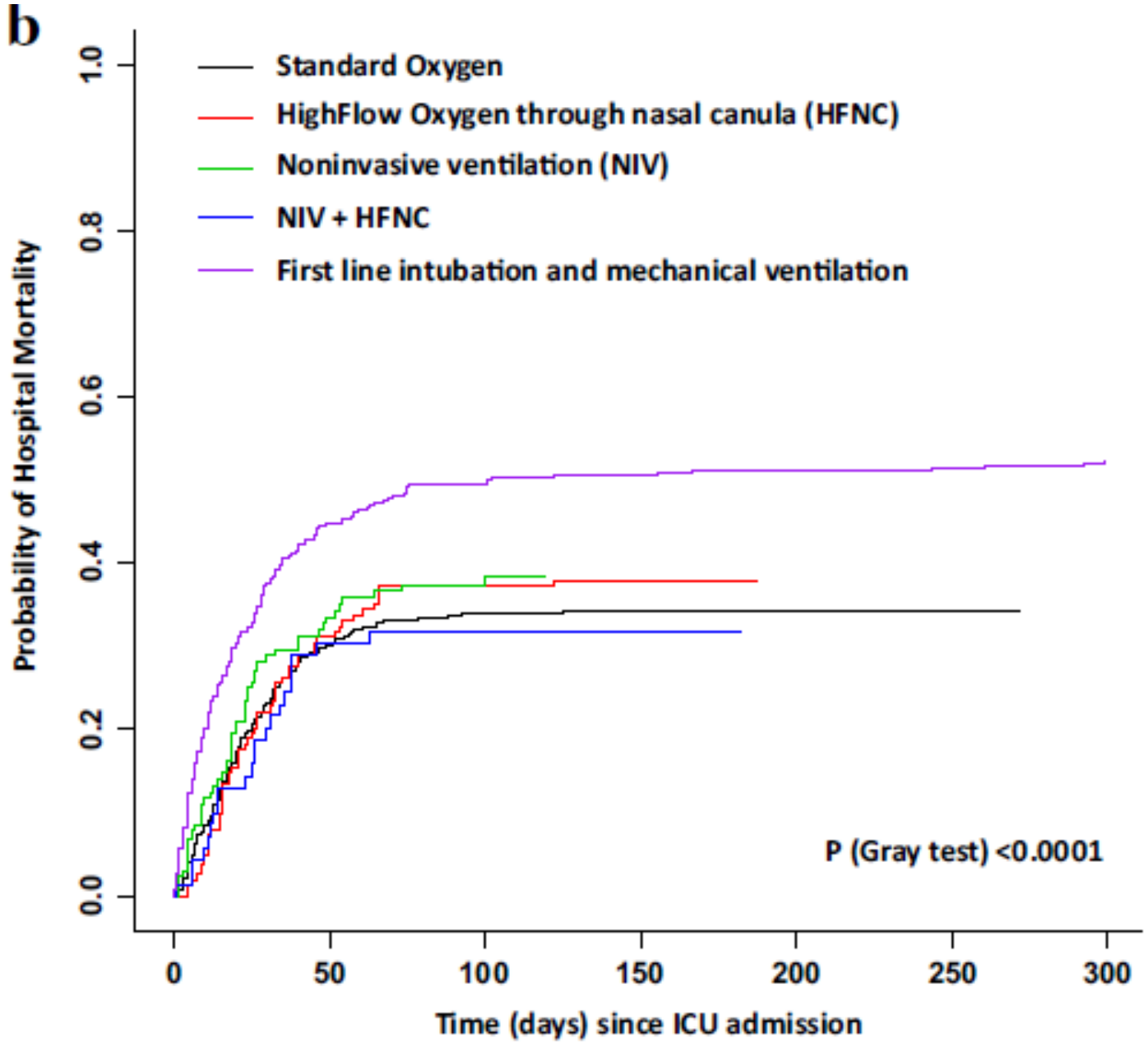


Fig. 1 Study flowchart


a
Probability of Intubation and Mechanical Ventilation
0.0
0.2
0.4
0.6
0.8
1.0
Standard Oxygen
High Flow Oxygen through nasal cannula (HFNC)
Noninvasive ventilation (NIV) with standard oxygen within NIV sessions
Noninvasive ventilation with HFNC within NIV sessions
P (Gray test) = 0.9422
0
20
40
60
Time (days) since ICU admission


b
Standard Oxygen
HighFlow Oxygen through nasal canula (HFNC)
Noninvasive ventilation (NIV)
NIV + HFNC
First line intubation and mechanical ventilation
Probability of Hospital Mortality
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
Time (days) since ICU admission
P (Gray test) <0.0001

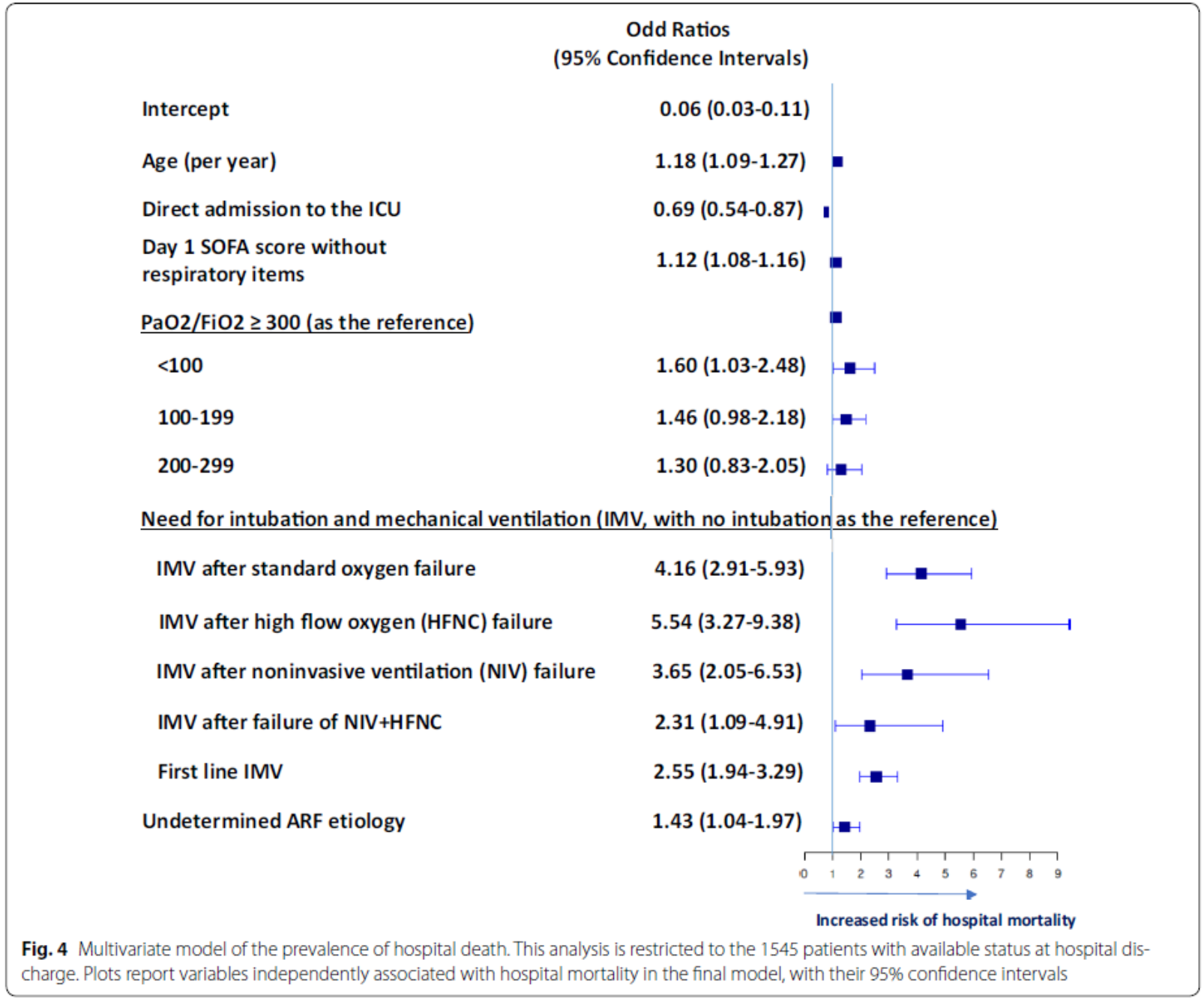


Fig. 4 Multivariate model of the prevalence of hospital death. This analysis is restricted to the 1545 patients with available status at hospital discharge. Plots report variables independently associated with hospital mortality in the final model, with their 95% confidence intervals

Table 3 Association between acute respiratory failure etiologies and hospital mortality

Numbers (%) or median (IQR)	Patients discharged alive from the hospital, *N* = 863 (55.8%)	Patients who died before hospital discharge, *N* = 682 (44.2%)	*P* value
Bacterial infection			0.27
Clinically documented	125 (14.5%)	84 (12.3%)	
Microbiologically documented	129 (14.9%)	118 (17.3%)	
Viral infection			
Influenza	86 (10.0%)	66 (9.7%)	0.92
Other viruses	138 (16.0%)	106 (15.5%)	0.87
Septic shock from extrathoracic source	81 (9.4%)	68 (10.0%)	0.76
Invasive fungal infection (IFI)			
Proven or probable invasive pulmonary aspergillosis (IPA)	30 (3.5%)	31 (4.5%)	0.35
Pneumocystis jirovecii pneumonia	34 (3.9%)	35 (5.1%)	0.32
Candidemia with septic shock	15 (1.7)	21 (3.1%)	0.12
All IFI cases including other fungi and possible cases of IPA	105 (12.2%)	121 (17.7%)	0.003
Aspiration pneumonia	38 (4.4%)	31 (4.5%)	0.99
Airway-related disorders	38 (4.4%)	16 (2.3%)	0.04
Drug-related pulmonary toxicity	34 (3.9%)	19 (2.8%)	0.27
Disease-related infiltrates	69 (8.0%)	73 (10.7%)	0.08
Cardiogenic pulmonary edema	66 (7.6%)	33 (4.8%)	0.03
Undetermined	94 (10.9%)	105 (15.4%)	0.01
More than one ARF etiology	125 (14.5%)	105 (15.4%)	0.67

Conclusion

L’oxygénothérapie a un effet sur l'intubation mais pas sur les taux de mortalité.

L'incapacité à identifier l'étiologie de l’IRespA est associée à des taux plus élevés d'intubation et de mortalité.

Cela suggère qu'en plus de sélectionner le dispositif d'oxygénation approprié, les cliniciens devraient s'efforcer d'identifier l'étiologie de l’IRespA.

Le bénéfice d'une intubation plus précoce des patients avec un diagnostic inconnu pour effectuer la procédure de diagnostic la plus complète reste à déterminer

CrossMark

Diagnosis and outcome of acute respiratory failure in immunocompromised patients after bronchoscopy

Philippe R. Bauer[1], Sylvie Chevret[2], Hemang Yadav[1], Sangeeta Mehta[3], Peter Pickkers[4], Ramin B. Bukan[5], Jordi Rello[6], Andry van de Louw[7], Kada Klouche[8], Anne-Pascale Meert[9], Ignacio Martin-Loeches[10,11], Brian Marsh[12], Lorenzo Socias Crespi[13], Gabriel Moreno-Gonzalez[14], Nina Buchtele[15], Karin Amrein[16], Martin Balik[17], Massimo Antonelli[18], Martine Nyunga[19], Andreas Barratt-Due[20], Dennis C.J.J. Bergmans[21], Angélique M.E. Spoelstra-de Man[22], Anne Kuitunen[23], Florent Wallet[24], Amelie Seguin[25], Victoria Metaxa[26], Virginie Lemiale[27], Gaston Burghi[28], Alexandre Demoule[29], Thomas Karvunidis[30], Antonella Cotoia[31], Pål Klepstad[32], Ann M. Møller[33], Djamel Mokart[34] and Elie Azoulay[27] for the Efraim investigators and the Nine-I study group[35]

@ERSpublications
In a pre-planned analysis of immunocompromised critically ill patients with acute respiratory failure, bronchoscopy was associated with better diagnosis and management but worse outcome. The decision to perform bronchoscopy should be individualised. http://bit.ly/2Dusahh

Cite this article as: Bauer PR, Chevret S, Yadav H, *et al.* Diagnosis and outcome of acute respiratory failure in immunocompromised patients after bronchoscopy. *Eur Respir J* 2019; 54: 1802442 [https://doi.org/10.1183/13993003.02442-2018].

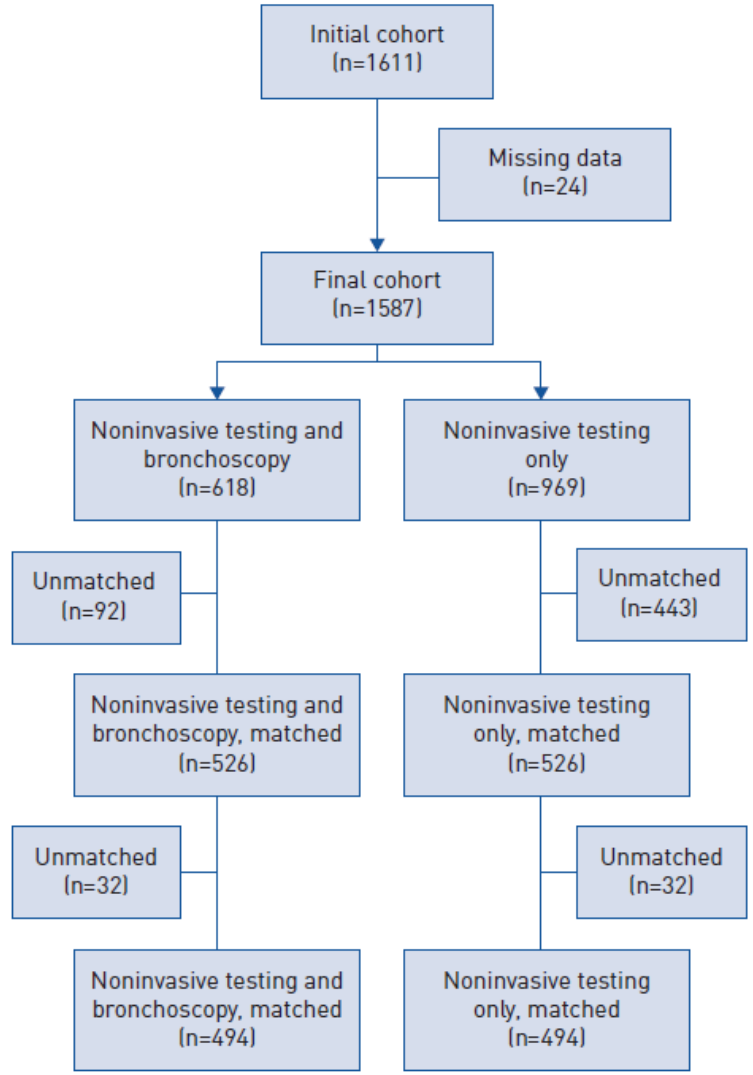


FIGURE 1 Study flowchart with initial matching (n=526) and subsequent matching (n=494) adding the variables "bronchoscopy prior to intensive care unit admission", "goal of care discussion" and "disease stage status".

TABLE 1 Characteristics of patients according to diagnostic group

	NIT-FOB		NIT		p-value
	n	Statistics	n	Statistics	
Subjects	618		969		
Sex					
Male	356	58.3	583	60.4	0.43
Female	255	41.7	382	39.6	
Age years	587	62.3 (53.3–69.9)	927	64.7 (55.2–72.4)	0.0009
Height cm	588	170 (162–175)	889	170 (163–177)	0.073
Weight kg	610	73 (62–84)	922	72 (62–85)	0.63
Duration of symptoms days	586	2 (0–6)	936	1 (0–3)	<0.0001
Location before ICU					
Emergency room	93	16.3	251	27.5	<0.0001
Ward	347	61.0	505	55.3	
Other	129	22.7	157	17.2	
Same day ICU admission	160	26.4	355	37.0	<0.0001
SOFA score on admission	615	8 (4–10.5)	960	7 (4–10)	0.0009
Duration of disease days	344	166 (21–593)	595	113 (11–728)	0.34
Haematological malignancy any	346	56.0	482	49.7	0.017
Haematopoietic stem cell transplant					
Autologous	44	7.1	56	5.8	<0.0001
Allogeneic	82	13.3	69	7.1	
Systemic disease	124	20.1	153	15.8	0.034
Solid organ tumour	168	27.2	382	39.4	<0.0001
Solid organ transplant	78	14.1	63	7.3	<0.0001
Corticosteroid use	495	0 (0–22)	802	0 (0–15)	0.006
Neutropenia	95	16.4	154	16.4	1.00

Data are presented as % or median (interquartile range), unless otherwise stated. NIT-FOB: noninvasive testing coupled with fibreoptic bronchoscopy; NIT: noninvasive testing only; ICU: intensive care unit; SOFA: Sequential Organ Failure Assessment.

TABLE 2 Causes and diagnosis yield of acute respiratory failure according to diagnostic group

	Total	NIT-FOB	NIT	p-value
Subjects	1587	618	969	
Infectious	938 (59)	421 (68)	517 (53)	<0.0001
Pneumocystis jirovecii	69 (4)	48 (8)	21 (2)	<0.0001
Noninfectious[#]	440 (28)	112 (18)	328 (34)	<0.0001
Diagnosis				
Identified on admission	825 (52)	263 (43)	562 (58)	<0.0001
Identified with noninvasive testing	318 (20)	135 (22)	283 (29)	0.0125
Identified with bronchoscopy alone	167 (11)	167 (27)		
Unidentified	209 (13)	85 (14)	124 (13)	0.595

Data are presented as n or n (%), unless otherwise stated. NIT-FOB: noninvasive testing coupled with fibreoptic bronchoscopy; NIT: noninvasive testing only. [#]: excluding those with unknown diagnosis.

TABLE 3 Outcome according to diagnostic group

	NIT-FOB		NIT		p-value
	n	Statistics	n	Statistics	
Subjects	618		969		
Intubation	533	86.3	446	46.0	<0.0001
Timing of intubation					
0–48 h	410	66.3	370	38.2	<0.0001
>48 h	123	19.9	76	7.8	
Length of ventilation days	351	7 (3–12)	304	3 (1–8)	<0.0001
Goal of care on admission					
Full code	522	84.5	723	74.6	<0.0001
ICU trial	20	3.2	49	5.1	
Early ICU	11	1.8	17	1.8	
DNI	3	0.5	55	5.7	
DNR	10	1.6	44	4.5	
None/unknown	52	8.4	81	8.4	
Fluids expansion on day 1 mL	554	1500 (500–3000)	873	1170 (300–2500)	0.0007
Vasopressors days 1–7	455	73.6	467	48.2	<0.0001
Low-dose steroids days 1–7	221	39.0	287	33.0	0.023
High-dose steroids days 1–7	162	28.2	169	19.0	<0.0001
Septic shock days 1–7	329	53.2	349	36.0	<0.0001
Dialysis days 1–7	142	23.0	153	15.8	0.0004
End-of-life decision					
None	421	68.1	731	75.4	0.0004
No escalation	60	9.7	79	8.2	
Withholding	33	5.3	62	6.4	
Withdrawing	104	16.8	97	10.0	
ICU length of stay days	598	11 (6–19)	955	5 (2–9)	<0.0001
Hospital length of stay days	511	28 (16–49)	835	18 (9–34)	<0.0001
ICU mortality	248	40.1	267	27.6	<0.0001
Hospital mortality	294	49	378	41	0.003
90-day mortality	325	60.5	436	53.7	0.016

Data are presented as % or median (interquartile range), unless otherwise stated. NIT-FOB: noninvasive testing coupled with fibreoptic bronchoscopy; NIT: noninvasive testing only; ICU: intensive care unit; DNI: do not intubate; DNR: do not resuscitate.

Score de propensité

Après l'appariement des scores de propension, la bronchoscopie restait associée à un risque accru de mortalité hospitalière (OR 1,41, IC à 95 % 1,08-1,81).

Recommandations

- La VMI étant initiée en cas d'échec d'autres techniques de ventilation moins invasives, il est impossible de formuler une recommandation sur l'initiation de la VMI (Avis d'expert, recommandation forte).
- L'intubation et la VMI ne doivent pas être retardées en l'absence d'amélioration clinique rapide avec l'OHD ou la VNI ou pour réaliser des actes diagnostiques si nécessaire (Grade C, recommandation forte).

5. Oxygénation Membranaire Extra-Corporelle (ECMO)

La conférence de consensus a identifié six études rétrospectives avec des échantillons de petite taille ayant évalué la ECMO veino-veineuse chez des patients cancéreux. Ces études ont montré une mortalité élevée à court terme qui dépassait la mortalité rapportée chez les patients sans cancer. Les patients atteints d'hémopathies malignes semblaient avoir de moins bons résultats.

ORIGINAL ARTICLE

Six-Month Outcome of Immunocompromised Patients with Severe Acute Respiratory Distress Syndrome Rescued by Extracorporeal Membrane Oxygenation

An International Multicenter Retrospective Study

Matthieu Schmidt[1,2], Peter Schellongowski[3], Nicolò Patroniti[4], Fabio Silvio Taccone[5], Dinis Reis Miranda[6], Jean Reuter[7], Helène Prodanovic[8], Marc Pierrot[9], Amandine Dorget[2], Sunghoon Park[10], Martin Balik[11], Alexandre Demoule[8], Ilaria Alice Crippa[5], Alain Mercat[9], Philipp Wohlfarth[3], Romain Sonneville[7], and Alain Combes[1,2]; for the International ECMO Network (ECMONet), the REVA Research Network, and the IDEA Study Group

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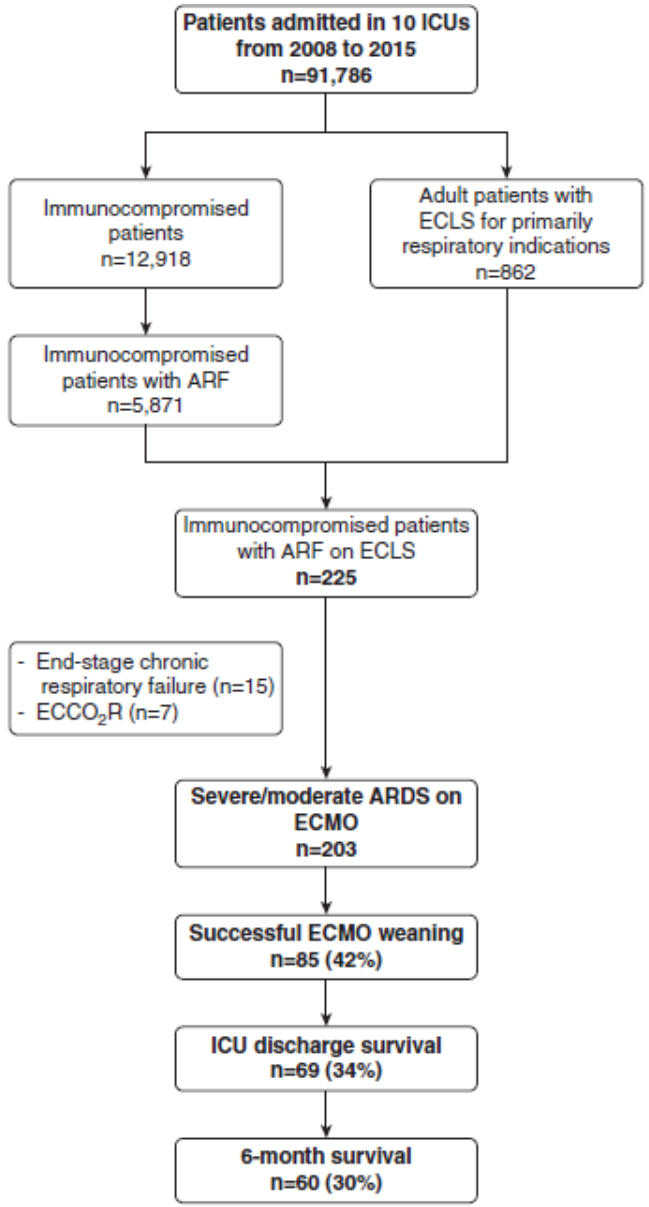
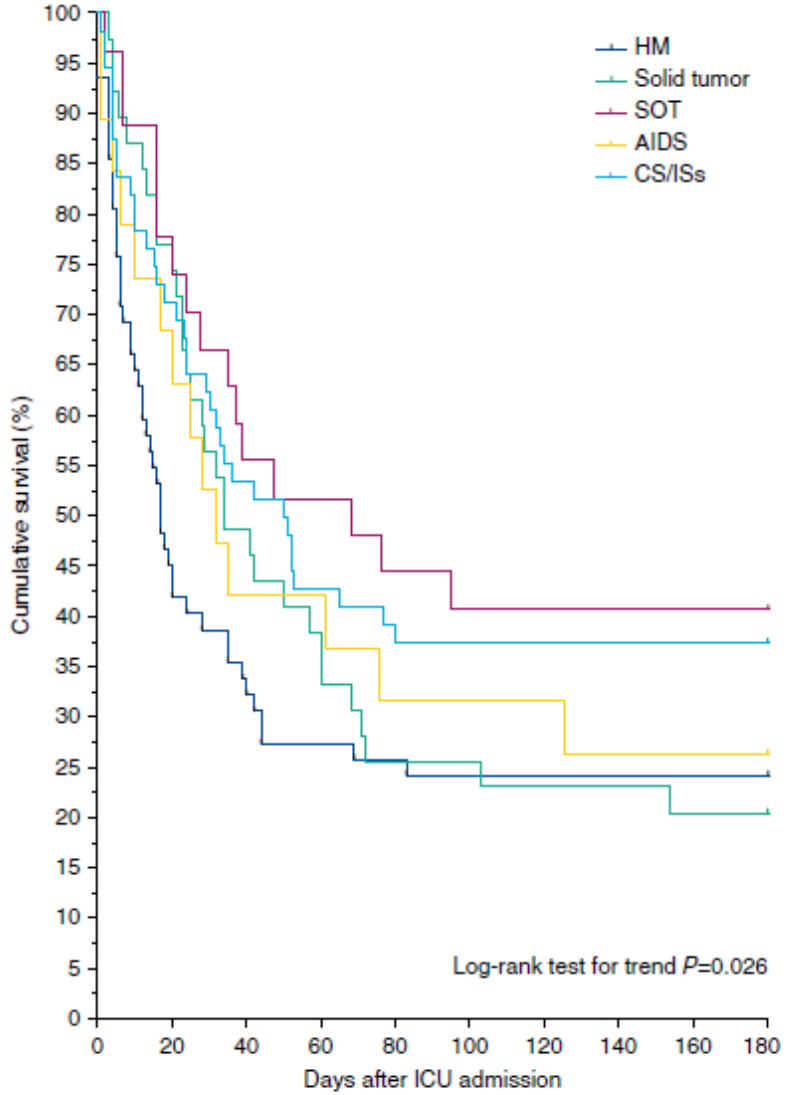


Figure 1. Flow chart of the study. ARDS = acute respiratory distress syndrome; ARF = acute respiratory failure; $ECCO_2R$ = extracorporeal CO_2 removal; ECLS = extracorporeal life support; ECMO = extracorporeal membrane oxygenation.

Table 1. Baseline Characteristics of Patients according to 6-Month Survival Status

Characteristics	All Patients (*N* = *203*)	Status 6 Months after ICU Admission		*P* Value
		Survivors (*n* = *60*)	Nonsurvivors (*n* = *143*)	
Male sex	127 (63)	33 (55)	94 (66)	0.15
Age, yr	51 (38–59)	49 (33–59)	52 (40–59)	0.10
APACHE II score	28 (20–33)	28 (22–33)	28 (19–33)	0.54
SOFA score at ICU admission	12 (8–15)	12 (8–16)	11 (7–15)	0.41
Body mass index, kg/m^2	24.7 (21.7–28.2)	24.9 (21.5–28.1)	24.7 (22.0–28.1)	0.64
Charlson comorbidity score	3 (2–4)	3 (1–4)	3 (2–4)	0.54
Recently diagnosed immunodeficiency*	51 (25)	26 (43)	25 (17)	0.0002
Hematological malignancies	62 (30)	15 (25)	47 (33)	0.27
AML/ALL/MDS	15 (7)	2 (3)	13 (9)	0.26
NHL/Hodgkin's/myeloma	38 (19)	10 (17)	28 (20)	0.62
CML/others	9 (4)	3 (5)	6 (4)	0.48
Recently diagnosed <30 d	14 (7)	7 (12)	7 (5)	0.08
Allogeneic HSCT†	14 (7)	1 (2)	13 (9)	0.05
Solid tumor	39 (19)	8 (13)	31 (22)	0.17
Lung cancer	18 (9)	3 (5)	15 (10)	0.21
Recently diagnosed (<30 d)	14 (7)	6 (10)	8 (6)	0.26
Solid-organ transplant	27 (13)	11 (18)	16 (11)	0.17
Lung	13 (6)	6 (10)	7 (5)	0.17
Kidney	7 (3)	3 (5)	4 (3)	0.24
Heart/liver	7 (3)	2 (3)	5 (3)	0.32
<30 d	6 (3)	4 (7)	2 (1)	0.19
AIDS	19 (9)	5 (8)	14 (10)	0.74
Diagnosed at ICU admission	4 (2)	0 (0)	4 (3)	0.19
AIDS opportunistic infection	6 (3)	2 (3)	4 (3)	0.57
CD4 lymphocyte count, cells/mm^3	130 (29–362)	130 (83–226)	109 (22–400)	0.83
Long-term CS/IS	56 (28)	21 (35)	35 (24)	0.12
Recently diagnosed <30 d	13 (6)	9 (15)	4 (3)	0.001
Connective tissue disease	27 (13)	11 (18)	16 (11)	0.22
NSIP	8 (4)	0 (0)	8 (6)	0.09
Vasculitis	7 (3)	4 (7)	3 (2)	0.21
Crohn's/ulcerative colitis	5 (2)	3 (5)	2 (1)	0.37
Others	9 (4)	3 (5)	6 (4)	0.62



HM	62	26	20	17	16	15	15	15	15	15
Solid tumor	39	29	19	13	10	10	09	09	08	08
SOT	27	20	15	14	12	11	11	11	11	11
AIDS	19	12	08	08	06	06	06	05	05	05
CS/ISs	56	40	30	24	21	21	21	21	21	21

Figure 2. Kaplan-Meier estimates during the 180 days after ICU admission, depending on patients' underlying immunodeficiency. CS = corticosteroids; HM = hematological malignancies; IS = immunosuppressant use; SOT = solid-organ transplant.

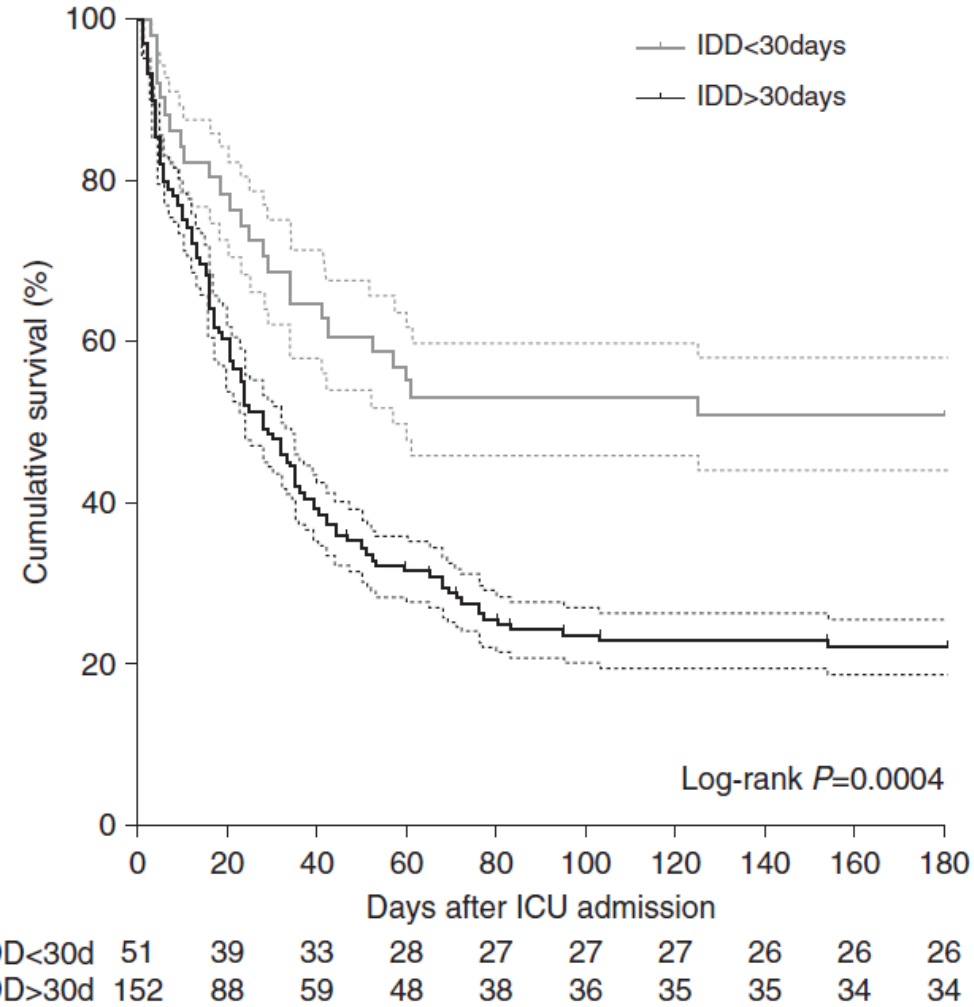


Figure 3. Kaplan-Meier survival estimates for immunocompromised patients with refractory acute respiratory distress syndrome on extracorporeal membrane oxygenation 180 days after ICU admission, according to the time of immunodeficiency diagnosis (IDD) (<30 or >30 d) (log-rank test; $P = 0.0004$). The dashed lines represent the 95% confidence interval.

Table 4. Pre-ECMO Predictors of 6-Month Mortality of Immunocompromised Patients with ARDS Rescued by ECMO

Variable*	OR (95% CI)	*P* Value
Recently diagnosed immunodeficiency†	0.364 (0.148–0.899)	0.028
Platelet count	0.996 (0.992–0.999)	0.008
Pco_2	1.031 (1.005–1.058)	0.019
Age	1.032 (1.002–1.062)	0.035
Driving pressure	1.079 (1.001–1.164)	0.047

Definition of abbreviations: ARDS = acute respiratory distress syndrome; CI = confidence interval; ECMO = extracorporeal membrane oxygenation; OR = odds ratio.

*Obtained for 134 patients with complete data.

†A recently diagnosed immunocompromised status was defined as confirmed fewer than 30 days before ICU admission.

Recommandations

L’ECMO ne doit être envisagée que chez les patients cancéreux ayant un excellent état de santé (indice de performance OMS < 2) et un bon pronostic attendu à long terme. L'indication doit être discutée au cas par cas entre réanimateurs spécialisés dans le traitement des patients atteints de SDRA sévère et des hémato-oncologues (Avis d'expert, faible recommandation).

Nouvelle publication (étude germano-autrichienne)

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ORIGINAL

Veno-venous extracorporeal membrane oxygenation (vv-ECMO) for severe respiratory failure in adult cancer patients: a retrospective multicenter analysis

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Table 1 Baseline Characteristics and comparison between patients with hematologic malignancies and solid tumors

	Overall	Hematologic malignancies	Solid tumors	*p*-value
No. of patients (%)	297	138 (46.4)	159 (53.5)	
Age (median [IQR])	56 [44–65]	48 [35.2–58.7]	59 [52.5–67]	< 0.001
Sex, male (%)	214 (72.1)	99 (71.7)	115 (72.3)	
Leading cause for ICU admission				
Respiratory failure	203 (68.4)	110 (79.7)	93 (58.5)	< 0.001
Surgery	41 (13.8)	2 (1.4)	39 (24.5)	
Non-pulmonary infection	25 (8.4)	12 (8.7)	13 (8.2)	
Cardiac event	2 (0.7)	0 (0)	2 (1.3)	
Other	26 (8.8)	14 (10.1)	12 (7.5)	
Reason for vv-ECMO (%)				
Respiratory failure	284 (95.6)	138 (100)	146 (91.9)	0.003
ECMO-facilitated surgery	13 (4.4)	0 (0)	13 (8.1)	

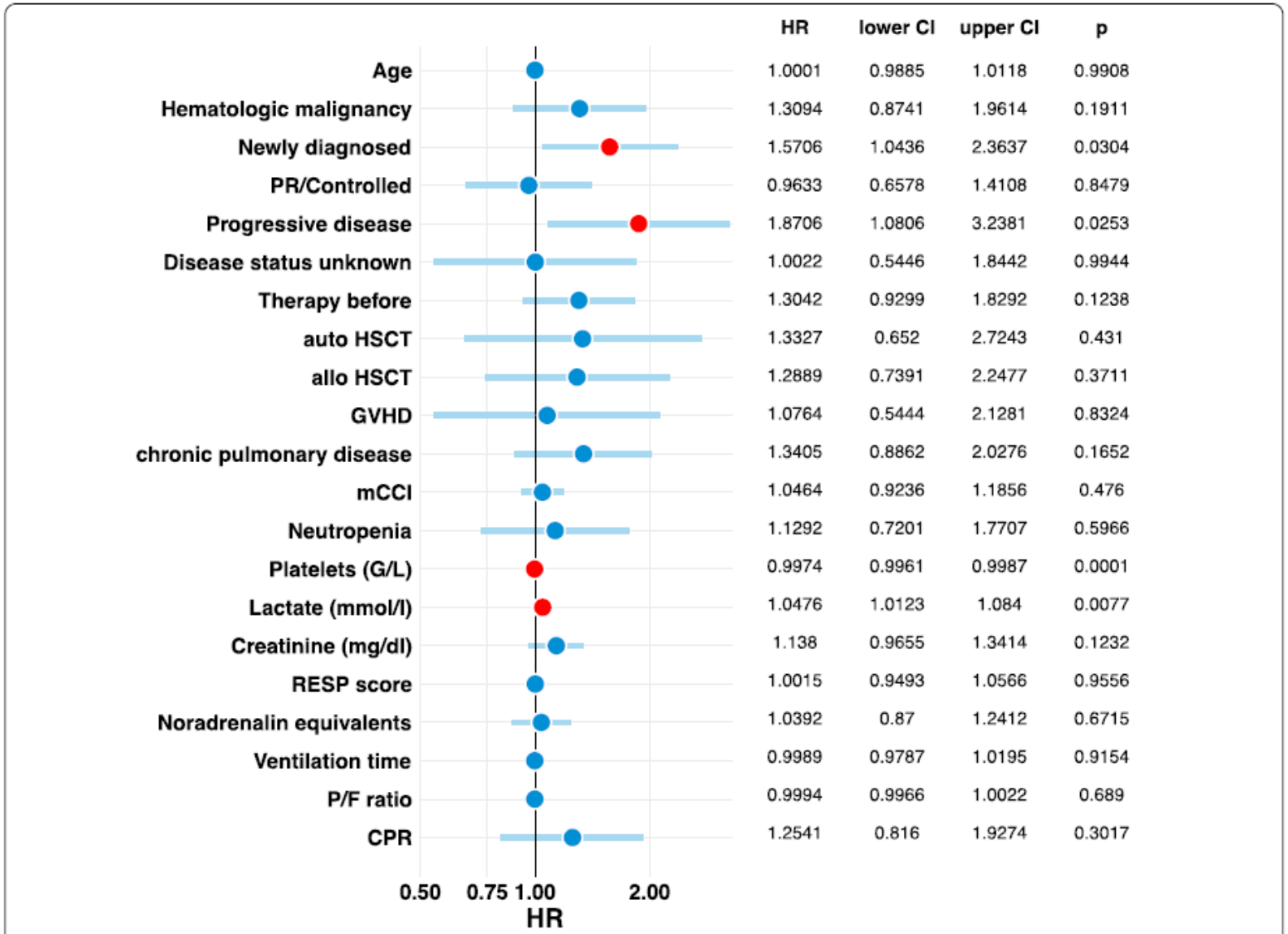

Fig. 1 Forest plots summarizing the results of the multivariate analysis for all patients. Shown are the adjusted hazard ratios for overall survival and 95% confidence intervals. (Abbreviations: mCCI modified Charlson Comorbidity Index (CCI) (excluded age and cancer diagnosis); GVHD Graft versus host disease; HSCT hematopoietic stem cell transplantation; RESP Score Respiratory ECMO Survival Prediction Score; CPR Cardiopulmonary Resuscitation)

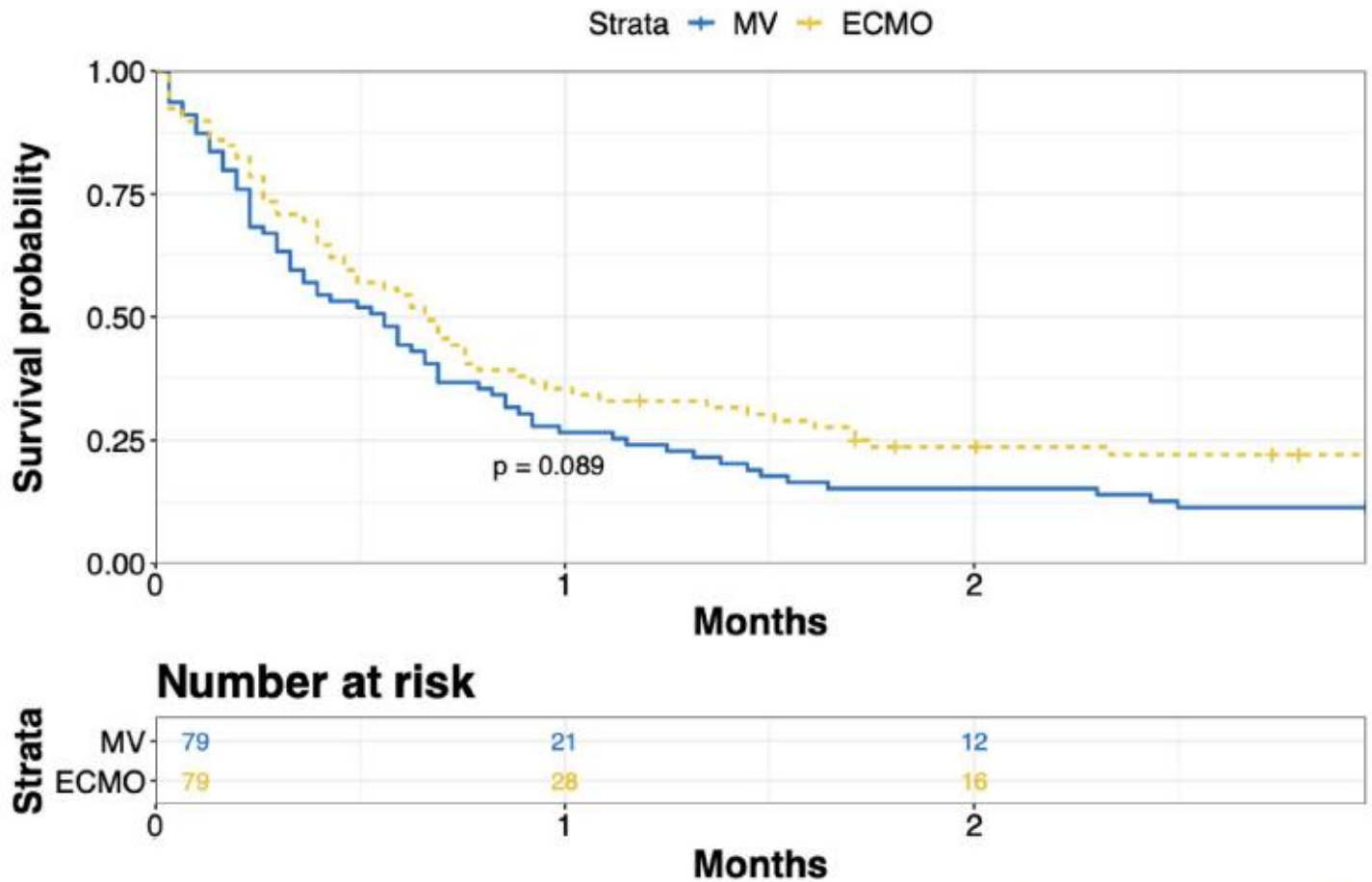

Fig. 2 Propensity score-matching patients receiving ECMO and those managed with mechanical ventilation (MV) only of the EFRAIM study [24]

Table 2 Major vv-ECMO-related complications or complications during vv-ECMO

	Overall	Hematologic malignancies	Solid tumors	*p*-value
No. of patients (%)	297	138 (46.4)	159 (53.5)	< 0.001
Packed red blood cells units (%)				0.974
0	16 (5.4)	8 (5.8)	8 (5)	
1–5	69 (23.2)	31 (22.5)	38 (23.9)	
5–10	56 (18.9)	27 (19.6)	29 (18.2)	
> 10	156 (52.5)	72 (52.2)	84 (52.8)	
Platelet units (%)				< 0.001
0	110 (37)	28 (20.3)	82 (51.6)	
1–5	81 (27.3)	40 (29)	41 (25.8)	
5–10	37 (12.5)	16 (11.6)	21 (13.2)	
> 10	69 (23.2)	54 (39.1)	15 (9.4)	
Severe bleeding (%)	113 (38)	61 (44.2)	52 (32.7)	0.055
Ischemic stroke (%)	11 (3.7)	4 (2.9)	7 (4.4)	0.707
vv-ECMO system changed (%)	46 (15.5)	15 (10.9)	31 (19.5)	0.059
Number of vv-ECMO system changes (%)				0.109
0	251 (84.5)	123 (89.1)	128 (80.5)	
1	33 (11.1)	9 (6.5)	24 (15.1)	
2	11 (3.7)	5 (3.6)	6 (3.8)	
3	1 (0.3)	1 (0.7)	0 (0)	
5	1 (0.3)	0 (0)	1 (0.6)	
Accidental decannulation (%)	0	0 (0)	0 (0)	NA
Cardiac arrest during vv-ECMO (%)	30 (10.1)	18 (13)	12 (7.5)	0.169
Ventilator associated pneumothorax (%)	33 (11.1)	13 (9.4)	20 (12.6)	0.497

Conclusion

- La survie globale des patients cancéreux qui nécessitent une ECMO est médiocre et, par conséquent, l'ECMO ne devrait être proposée qu'à des patients sélectionnés.
- L'état de la maladie, une faible numération plaquettaire et des taux élevés de lactate identifiés comme indicateurs de mauvais pronostic devraient être pris en compte dans la décision de pratiquer une ECMO.