CHU
TAHAR SFAR MAHDIA

L'ÉPREUVE DE VENTILATION SPONTANÉE EST ELLE INDISPENSABLE LORS DU SEVRAGE DE LA VENTILATION MÉCANIQUE?

Pr FEKIH HASSEN MOHAMED ENSEIGNEMENT

Service de Reanimation Medical, E.P.S. Taher Sfar Mahdia

Introduction

- Incidence de VM: 270- 314/100000
- Conséquences : cout, Morbidités, mortalité
- → Limiter la durée de VM
- Trois moyens sont utilisés pour le sevrage
  - Extubation directe
  - VS-AI PEP ou pièce en T
  - Trachéotomie précoce

- Faut il réaliser une extubation directe des patients sans passer par une épreuve de ventilation spontanée?

Évidence based Medecine : PICO

AUCUNE ETUDE

Liberation From Mechanical Ventilation in Critically Ill Adults: An Official American College of Chest Physicians/American Thoracic Society Clinical Practice Guideline

Inspiratory Pressure Augmentation During Spontaneous Breathing Trials, Protocols Minimizing Sedation, and Noninvasive Ventilation Immediately After Extubation

Summary of Recommendations

1. For acutely hospitalized patients ventilated more than 24 h, we suggest that the initial SBT be conducted with inspiratory pressure augmentation (5-8 cm H_2O) rather than without (T-piece or CPAP) (Conditional Recommendation, Moderate-Quality Evidence)

CHEST 2017; 151(1):1

Intubation et extubation du patient de réanimation

Hervé Quintard [a,b], Erwan l'Her [c], Julien Pottecher [d], Frédéric Adnet [e,f], Jean-Michel Constantin [g], Audrey Dejong [h], Pierre Diemunsch [d], Rose Fesseau [i], Anne Freynet [j], Christophe Girault [k,l], Christophe Guitton [m], Yan Hamonic [n], Eric Maury [o,p], Armand Mekontso-Dessap [q,r], Fabrice Michel [s], Paul Nolent [t], Sébastien Perbet [u], Gwenaël Prat [v], Antoine Roquilly [w], Karim Tazarourte [x,y], Nicolas Terzi [z,aa], Arnaud W. Thille [ab,ac], Mikael Alves [ad], Etienne Gayat [ae,af], Laurence Donetti [ag]

R5.1 - Il faut réaliser une épreuve de sevrage en VS avant toute extubation chez le patient de réanimation ventilé depuis plus de 48 h afin de réduire le risque d'échec d'extubation.

(Grade 1+) Accord FORT

Anesth Reanim. 2018; 4: 523–

An Official American Thoracic Society/American College of Chest Physicians Clinical Practice Guideline: Liberation from Mechanical Ventilation in Critically Ill Adults

Rehabilitation Protocols, Ventilator Liberation Protocols, and Cuff Leak Tests

Am J Respir Crit Care Med Vol 195, Iss 1, pp 120–133, Jan 1,

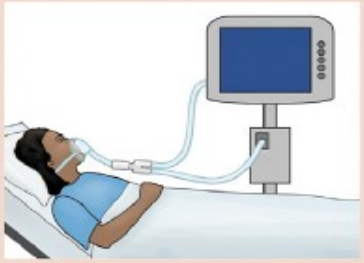
Liberation From Mechanical Ventilation in the Cardiac Intensive Care Unit

(JACC Adv 2023;2:100173)

Andi Shahu, MD, MHS,[a] Soumya Banna, MD,[b] Willard Applefeld, MD,[c] Penelope Rampersad, MD, MSc,[d] Carlos L. Alviar, MD,[e] Tariq Ali, MD, MBA,[f] Adriana Luk, MD, MSc,[g] Elaine Fajardo, MD,[h] Sean van Diepen, MD, MSc,[i] P. Elliott Miller, MD, MHS[a]

CENTRAL ILLUSTRATION Fundamental Elements of Liberation From Mechanical Ventilation

Ventilator Management and Weaning



- Treatment of underlying etiology for respiratory failure
- Titrate ventilator settings to minimal support: PEEP ≤8 cmH_2O and FiO_2 ≤50%
- Protocolized sedation reduction
- Consideration for tracheostomy at day 10-14 of mechanical ventilation

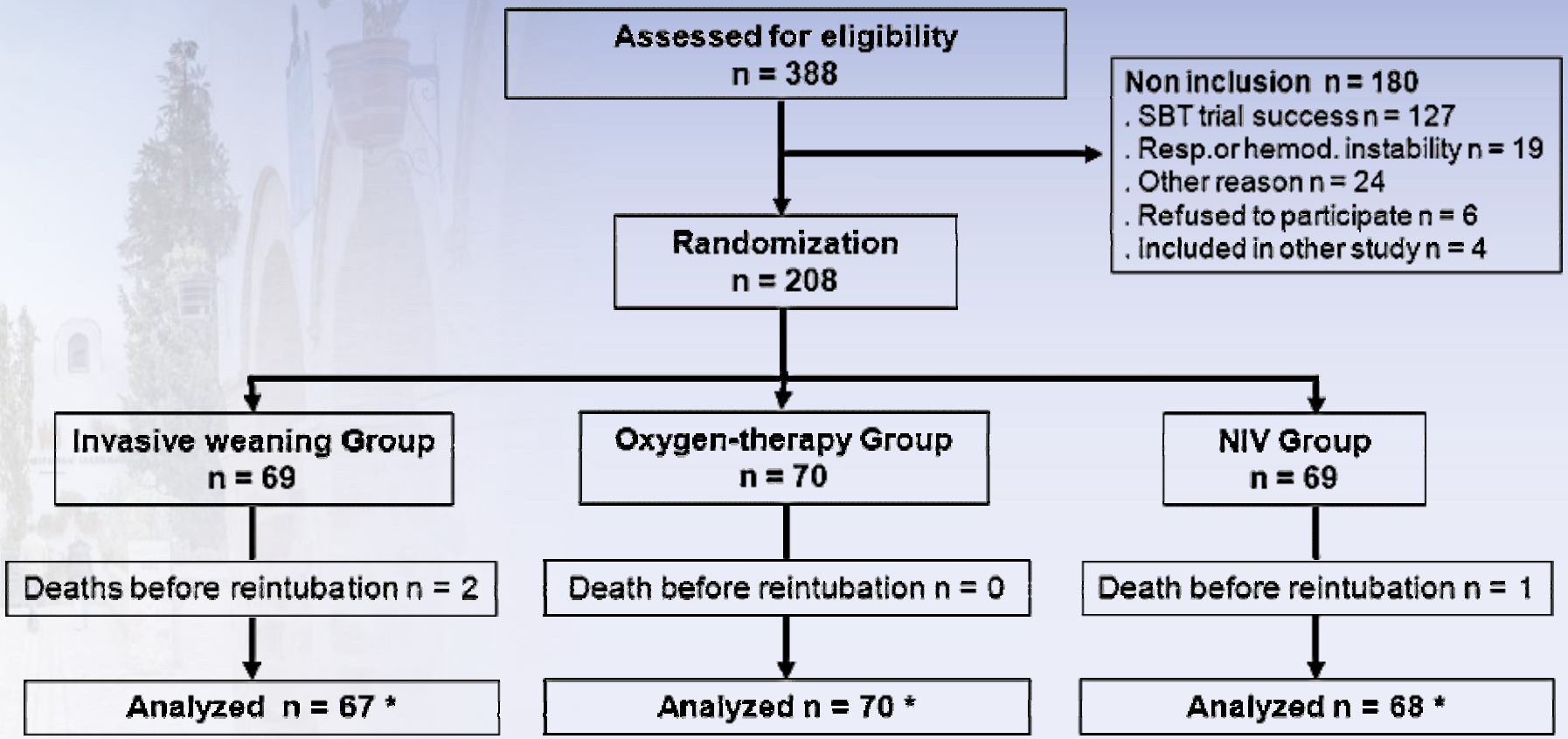
Assessment of Extubation Readiness

- Daily spontaneous breathing trial and awakening trials
  - Pressure support 5 to 8 cmH_2O/5 cmH_2O recommended over CPAP or T-piece
  - Duration of 30 to 120 minutes
- Assess cough and secretions
- Cuff leak test for patients deemed high-risk for postextubation stridor*
- Optimize volume status
- Evaluate mental status and ability to follow commands

ARGUMENTS POUR

Noninvasive Ventilation and Weaning in Patients with Chronic Hypercapnic Respiratory Failure

A Randomized Multicenter Trial



Am J Respir Crit Care Med Vol 184. pp 672–679,

Noninvasive Ventilation and Weaning in Patients with Chronic Hypercapnic Respiratory Failure

A Randomized Multicenter Trial

TABLE 2. WEANING RESULTS ACCORDING TO STUDY GROUP

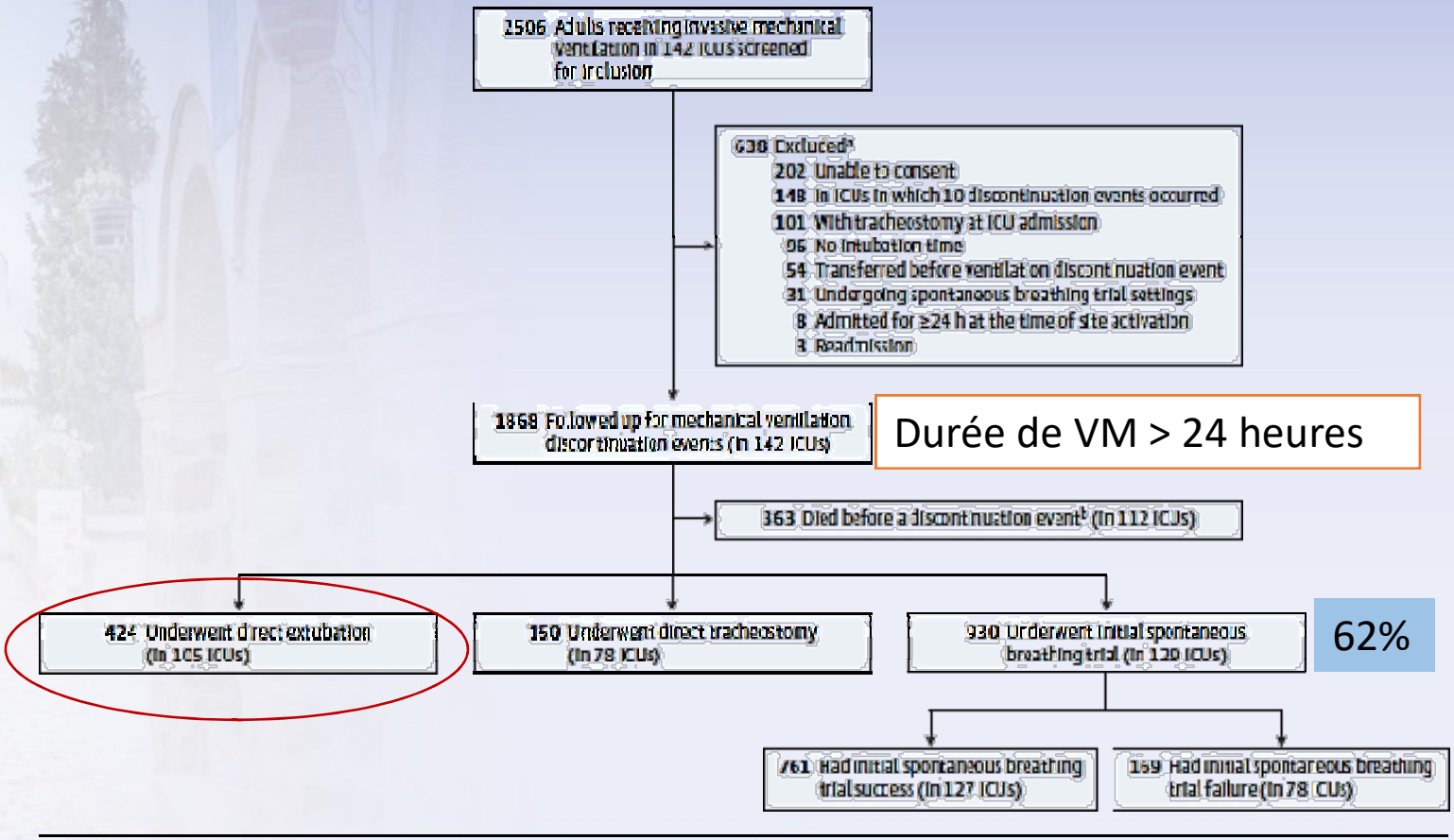
Parameters	Invasive Weaning Group ($n = 69$)	O_2 Group ($n = 70$)	NIV Group ($n = 69$)	P Value
Weaning results				
Reintubation ≤ 7 d	20/67 (30)*	26/70 (37)	22/68 (32)*	0.654
Reintubation or death ≤ 7 d†	22/69 (32)	26/70 (37)	23/69 (33)	0.758
Postextubation ARF or death ≤ 7 d†	32/69 (46)	41/70 (59)	6/69 (9)	<0.001
Postextubation ARF, reintubation, or death ≤ 7 d†	37/69 (54)	50/70 (71)	23/69 (33)	<0.001
Rescue NIV for postextubation ARF	31/69 (45)	40/70 (57)	—	0.176
Success rate (no reintubation or death ≤ 7 d)	14/31 (45)	23/40 (58)	—	0.386
Causes of reintubation‡	n = 20	n = 26	n = 22	
Consciousness deterioration or encephalopathy score ≥ 3	15 (75)	16 (62)	11 (50)	0.239
Persistent severe hypoxemia	8 (40)	15 (58)	10 (45)	0.513
ARF occurrence, persistence, or worsening under NIV	13 (65)	16 (61.5)	15 (68)	0.949
Hypotension/shock	4 (20)	3 (12)	1 (5)	0.323
Arrhythmia	0	2 (8)	0	0.328
Other organ failure	2 (1)	1(4)	0	0.380
Time to reintubation, d	1.5 [0.5–3.5]	0.5 [0.5–3.5]	0.5 [0.5–1.5]	0.141
Time to postextubation NIV, d	0.5 [0.5–1.5]	0.5 [0.5–0.5]	—	0.139
Duration of intubation, d	1.5 [0.5–3.5]	0	0	—
Duration of ventilatory support for weaning, d§	1.5 [0.5–3.5]	—	2.5 [0.5–3.5]	0.033
Weaning results in patients with COPD	n = 50	n = 46	n = 48	
Reintubation ≤ 7 d	12/48 (25)*	17/46 (37)	13/47 (28)*	0.420
Reintubation or death ≤ 7 d†	14/50 (28)	17/46 (37)	14/48 (29)	0.516
Postextubation ARF or death ≤ 7 d†	21/50 (42)	24/46 (52)	4/48 (8)	<0.001
Postextubation ARF, reintubation, or death ≤ 7 d†	24/50 (48)	32/46 (70)	14/48 (29)	<0.001

Am J Respir Crit Care Med Vol 184. pp 672–679

Ventilator Weaning and Discontinuation Practices for Critically Ill Patients

Karen E. A. Burns, MD, MSc; Leena Rizvi, BSc; Deborah J. Cook, MD, MSc; Gerald Lebovic, PhD; Peter Dodek, MD, MHSc; Jesús Villar, MD, PhD; Arthur S. Slutsky, MD, MASc; Andrew Jones, MD; Farhad N. Kapadia, MD; David J. Gattas, MB, BS, MMed; Scott K. Epstein, MD; Paolo Pelosi, MD; Kallirroi Kefala, MD; Maureen O. Meade, MD, MSc; for the Canadian Critical Care Trials Group

Figure. Patient Flow in a Study of Ventilator Weaning and Discontinuation Practices for Critically Ill Patients



Characteristic	No. (%)				
	Total (n = 1867 in 142 ICUs)[a, b]	Death before discontinuation attempt (n = 363 in 112 ICUs)[a]	Direct extubation (n = 424 in 105 ICUs)	Direct tracheostomy (n = 150 in 78 ICUs)	Initial spontaneous breathing trial (n = 930 in 129 ICUs)
Sex					
Men	1173 (62.8)	220 (60.6)	272 (64.2)	102 (68.0)	579 (62.3)
Women	694 (37.2)	143 (39.4)	152 (35.8)	48 (32.0)	351 (37.7)
Age at admission, median (IQR), y	61.8 (48.9-73.1)	64.8 (53.1-75.1)	58.7 (46.3-71.3)	57.5 (42.8-68.4)	62.5 (49.3-73.3)
SOFA score at ICU admission, median (IQR)[c]	5 (3-7)	6 (3-8)	5.0 (3-7)	4 (2-7)	5 (3-7)
Type of admission					
Medical	1299 (69.6)	297 (81.8)	261 (61.6)	103 (68.7)	638 (68.6)
Emergency surgical	367 (19.7)	51 (14.0)	97 (22.9)	37 (24.7)	182 (19.6)
Elective surgical	201 (10.8)	15 (4.1)	66 (15.6)	10 (6.7)	110 (11.8)
Reason for intubation[d]					
Decreased level of consciousness	455 (24.4)	100 (27.5)	105 (24.8)	44 (29.3)	206 (22.2)
Operative	415 (22.2)	39 (10.7)	125 (29.5)	22 (14.7)	229 (24.6)
Hypoxemia alone	320 (17.1)	64 (17.6)	61 (14.4)	31 (20.7)	164 (17.6)
Hypercarbia and hypoxemia	183 (9.8)	36 (9.9)	29 (6.8)	16 (10.7)	102 (11.0)
Cardiac arrest	167 (8.9)	88 (24.2)	25 (5.9)	9 (6.0)	45 (4.8)
Airway patency	162 (8.7)	12 (3.3)	50 (11.8)	20 (13.3)	80 (8.6)
Other	89 (4.8)	17 (4.7)[e]	19 (4.5)[f]	2 (1.3)[g]	51 (5.5)[h]
Hypercarbia alone	55 (2.9)	5 (1.4)	10 (2.4)	2 (1.3)	38 (4.1)
Secretions	21 (1.1)	2 (0.6)	0	4 (2.7)	15 (1.6)

Characteristic	No. (%)				
	Total (n = 1867 in 142 ICUs)[a, b]	Death before discontinuation attempt (n = 363 in 112 ICUs)[a]	Direct extubation (n = 424 in 105 ICUs)	Direct tracheostomy (n = 150 in 78 ICUs)	Initial spontaneous breathing trial (n = 930 in 129 ICUs)
Primary diagnosis for receiving invasive mechanical ventilation[d]					
Acute respiratory failure	852 (45.6)	209 (57.6)	159 (37.5)	65 (43.3)	419 (45.1)
Neurologic/coma (nonsurgical)	407 (21.8)	87 (24.0)	94 (22.2)	45 (30.0)	181 (19.5)
Postoperative (elective or emergent) admission	387 (20.7)	34 (9.4)	121 (28.5)	26 (17.3)	206 (22.2)
Acute on chronic respiratory failure	112 (6.0)	18 (5.0)	21 (5.0)	8 (5.3)	65 (7.0)
Other	92 (4.9)	14 (3.9)	28 (6.6)	3 (2.0)	47 (5.1)
Neuromuscular disorder	17 (0.9)	1 (0.3)	1 (0.2)	3 (2.0)	12 (1.3)
Ventilator support at ICU admission					
Invasive ventilation	1093 (58.5)	199 (54.8)	296 (69.8)	72 (48.0)	526 (56.6)
No invasive or noninvasive support	670 (35.9)	146 (40.2)	106 (25.0)	65 (43.3)	353 (38.0)
Bilevel noninvasive ventilation	81 (4.3)	13 (3.6)	16 (3.8)	8 (5.3)	44 (4.7)
Continuous positive airway pressure	20 (1.1)	5 (1.4)	6 (1.4)	5 (3.3)	4 (0.4)
Other[l]	3 (0.2)	0	0	0	3 (0.3)
Home use of noninvasive ventilation	46 (2.5)	8 (2.2)	12 (2.8)	0	26 (2.8)

Table 3. Initial Mechanical Ventilation Discontinuation Strategy and Clinical Outcomes Among Critically Ill Patients

Clinical outcome	No. (%)			
	Total (n = 1504 in 142 ICUs)	Direct extubation (n = 424 in 105 ICUs)	Direct tracheostomy (n = 150 in 78 ICUs)	Initial spontaneous breathing trial (n = 930 in 129 ICUs)
Total duration of mechanical ventilation, median (IQR), d[a]	4.1 (2.1-7.9)	2.9 (1.8-5.8)	13.2 (7.3-21.8)	4.1 (2.1-7.5)
Patients who did not die during hospitalization	3.6 (2.0-6.9)	2.9 (1.7-5.3)	12.9 (7.2-20.5)	3.7 (2.0-6.8)
Patients who died during hospitalization	8.9 (5.0-15.8)	7.3 (5.6-14.3)	16.9 (10.7-23.1)	7.6 (4.3-13.1)
ICU mortality	139 (9.2)	20 (4.7)	23 (15.3)	96 (10.3)
Hospital mortality (deaths after ICU discharge)	88 (5.9)	27 (6.4)	6 (4.0)	55 (5.9)
Mechanical ventilation at day 28[b]	99/1476 (6.7)	11/420 (2.6)	38/142 (26.8)	50/914 (5.5)
In ICU at day 28[b]	163/1477 (11.0)	26/417 (6.2)	51/143 (35.7)	86/917 (9.4)
ICU length of stay, median (IQR), d	8.1 (4.8-14.9)	6.7 (3.7-10.9)	19.6 (11.1-32.7)	8.1 (5.0-14.7)kl
Patients who did not die before ICU discharge	7.7 (4.6-14.0)	6.2 (3.6-9.8)	18.9 (10.6-30.8)	7.8 (4.8-14.0)
Patients who died before ICU discharge	14.3 (9.1-22.2)	17.5 (14.2-21.6)	22.2 (13.2-41.5)	11.2 (7.9-19.7)
Hospital length of stay, median (IQR), d	18.9 (10.9-34.0)[c]	16.9 (11.0-31.0)	35.4 (20.7-62.9)	18.0 (10.6-32.1)[c]
Patients who did not die during hospitalization	18.6 (10.8-33.3)[c]	16.3 (10.3-29.5)	35.9 (21.1-66.0)	17.9 (10.5-31.8)[c]
Patients who died before hospital discharge[d]	20.9 (12.4-39.5)	23.2 (15.2-47.1)	33.1 (19.0-51.5)	18.1 (11.1-32.2)
Readmitted to ICU before hospital discharge	79 (5.3)	24 (5.7)	7 (4.7)	48 (5.2)
Reintubated before successful extubation	136 (9.0)	39 (9.2)		97 (10.4)

Analyse multivariée: facteurs prédictifs d'utilisation d'une épreuve de sevrage vs extubation directe

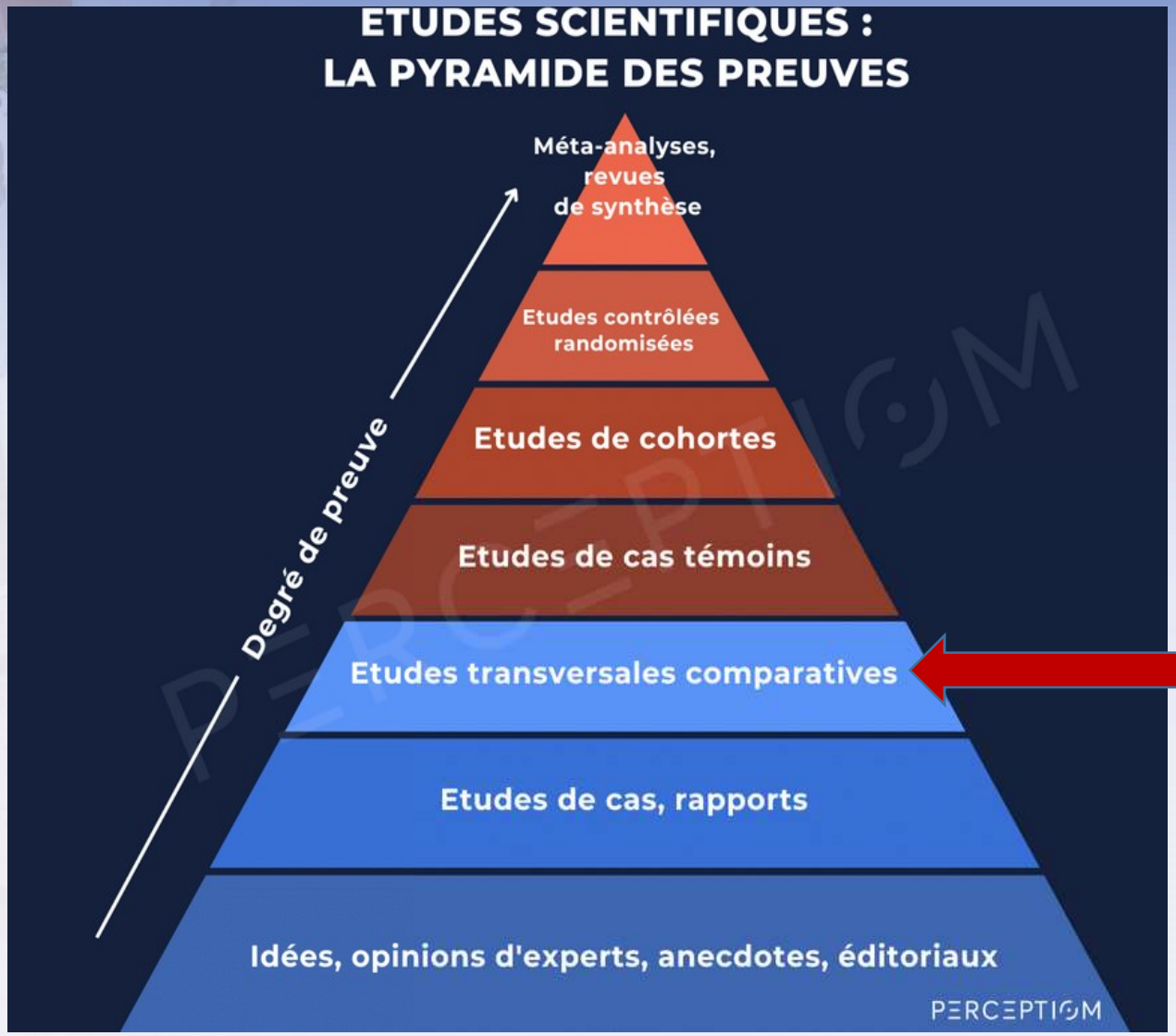
	OR	IC 95%	p
Age	1,1	[1.0- 1,3]	0.02
Néoplasie	2.6	[1.2-5.2]	0.01
HTA	1.6	[1.0- 2,3]	0.03

Comparaison entre US et autres pays

Utilisation significative des extubations directes comparée aux a

pays

	OR	IC 95%	p
Australie/new zealand	0.01	[0.000- 0.05,3]	<0.001
Canada	0.03	[0.01-0.17]	<0.001
Europe	0.03	[0.01- 0,18]	<0.001
Royaume-Uni	0.04	0.01-0.23	<0.001


ETUDES SCIENTIFIQUES :
LA PYRAMIDE DES PREUVES
Méta-analyses, revues de synthèse
Etudes contrôlées randomisées
Etudes de cohortes
Etudes de cas témoins
Etudes transversales comparatives
Etudes de cas, rapports
Idées, opinions d'experts, anecdotes, éditoriaux
Degré de preuve
PERCEPTIOM

Point 2

CRITICAL CARE

Risk factors and outcomes after unplanned extubations on the ICU: a case-control study

Robin I de Groot[1*], Olaf M Dekkers[2,3], Ingeborg HF Herold[4], Evert de Jonge[1], M Sesmu Arbous[1]

Table 3 Clinical outcomes comparing patients who underwent UE with mechanically ventilated controls[a]

Outcome	Patients (n = 74)	Controls (n = 296)	Mean difference (95% CI)	P value
Mean ICU-LOS at index time[b], days	10	14	4 (0.68-8.34)	0.021
Mean ICU-LOS after UE, days	14	16	2 (3.20-7.36)	0.436
Mean length of total intubation time, days	23	29	6 (6.44-13.75)	0.074
Mean LOS ICU, days	24	30	6 (1.15-13.78)	0.097
Mean LOS hospital, days	43	48	5 (6.19-14.97)	0.413
ICU mortality, n (%)	13 (18)	80 (27)	-	0.096
Hospital mortality, n (%)	14 (19)	95 (32)	-	0.028

[a]UE, unplanned extubation; ICU, intensive care unit; LOS, length of stay; [b]Index time, sampling time for controls and time of UE for cases.

Critical Care 2011,

Effect of Noninvasive Ventilation After Unplanned Extubation

Agathe Kudela, Maude Millereux, Corentin Gouezel, Dominique Prat, Frédéric Jacobs, Olfa Hamzaoui, Nadège Demars, Guy Moneger, Anne Sylvie Dumenil, Pierre Trouiller, and Benjamin Sztrymf

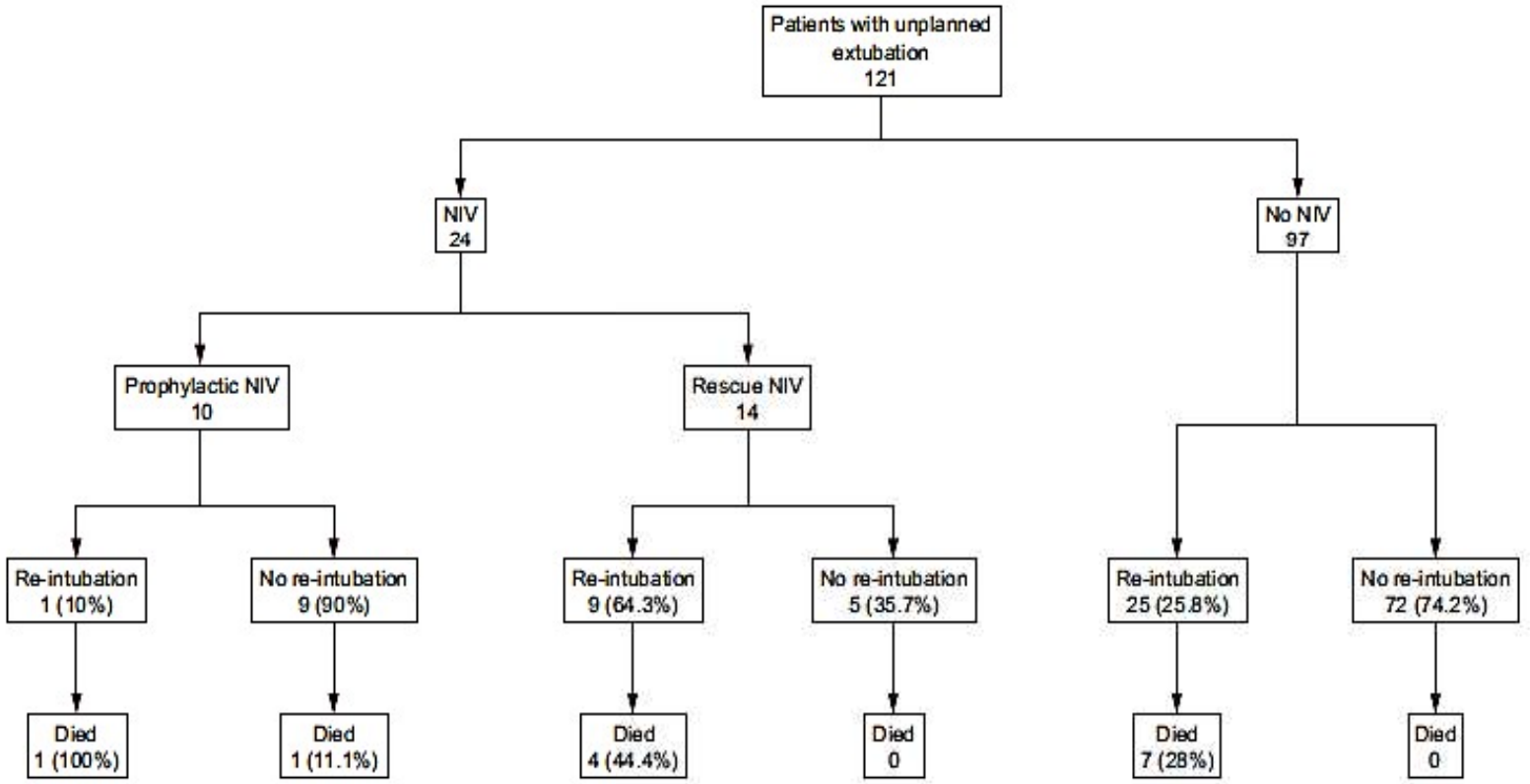


Fig. 1. Flow chart. NIV = noninvasive ventilation.

[Respir Care 2019;64(3):248–254.

	VNI prophylactique N=10	VNI thérapeutique N=14	Pas de VNI N=24	p
Réintubation	64.3%	10%	25.8%	0.13
Durée de séjour	6.5(4-10)	18.5(14-29)	6(3-14)	0.004
Survie	80	71.4	92.8	0.86

POINT 3

L'épreuve de sevrage n'étant pas suffisante pour dépister tous les patients à risque d'échec d'extubation

- L'obstruction ou l'augmentation des résistances des VAS
- Défaut de protection des voies aériennes inférieures
- L'efficacité de la toux
- Le drainage des sécrétions trachéo-bronchiques
- Les troubles de déglutition
- Les troubles de conscience

→ Taux d'échec: 10 à 30%

Oui pour une extubation directe
Mais POUR quel patient?

RECHERCHER LES FACTEURS DE RISQUE D'ECHEC D'EXTUBATION

Prediction of extubation outcome in critically ill patients: a systematic review and meta-analysis

Flavia Torrini[1,2†], Ségolène Gendreau[1,2†], Johanna Morel[1,2], Guillaume Carteaux[1,2,3], Arnaud W. Thille[4,5], Massimo Antonelli[6] and Armand Mekontso Dessap[1,2,3*]

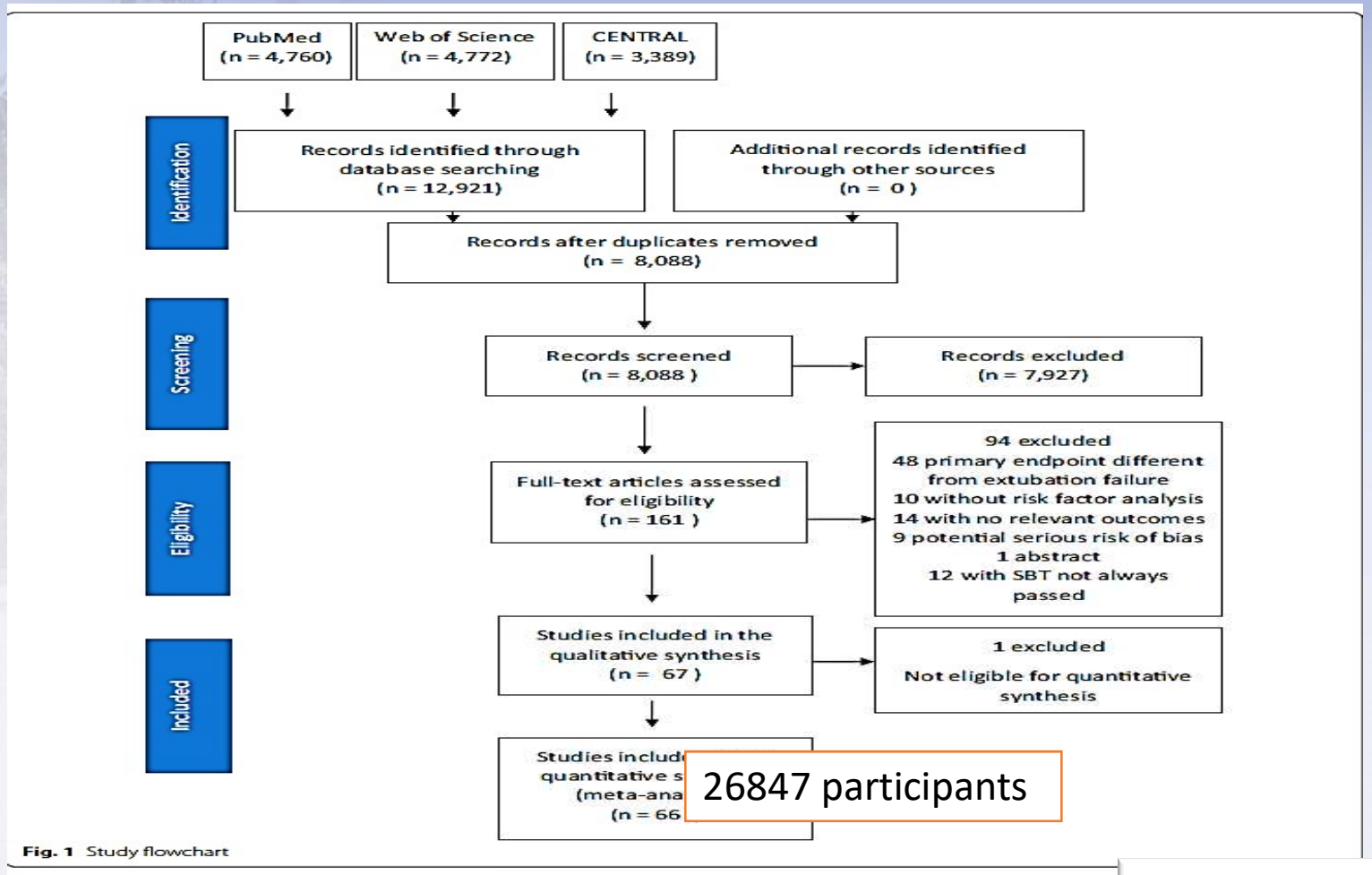


Fig. 1 Study flowchart

Torrini et al. Critical Care (2021) 25:391
https://doi.org/10.1186/s13054-021-03802-3

Prediction of extubation outcome in critically ill patients: a systematic review and meta-analysis

Flavia Torrini[1,2†], Ségolène Gendreau[1,2†], Johanna Morel[1,2], Guillaume Carteaux[1,2,3], Arnaud W. Thille[4,5], Massimo Antonelli[6] and Armand Mekontso Dessap[1,2,3*]

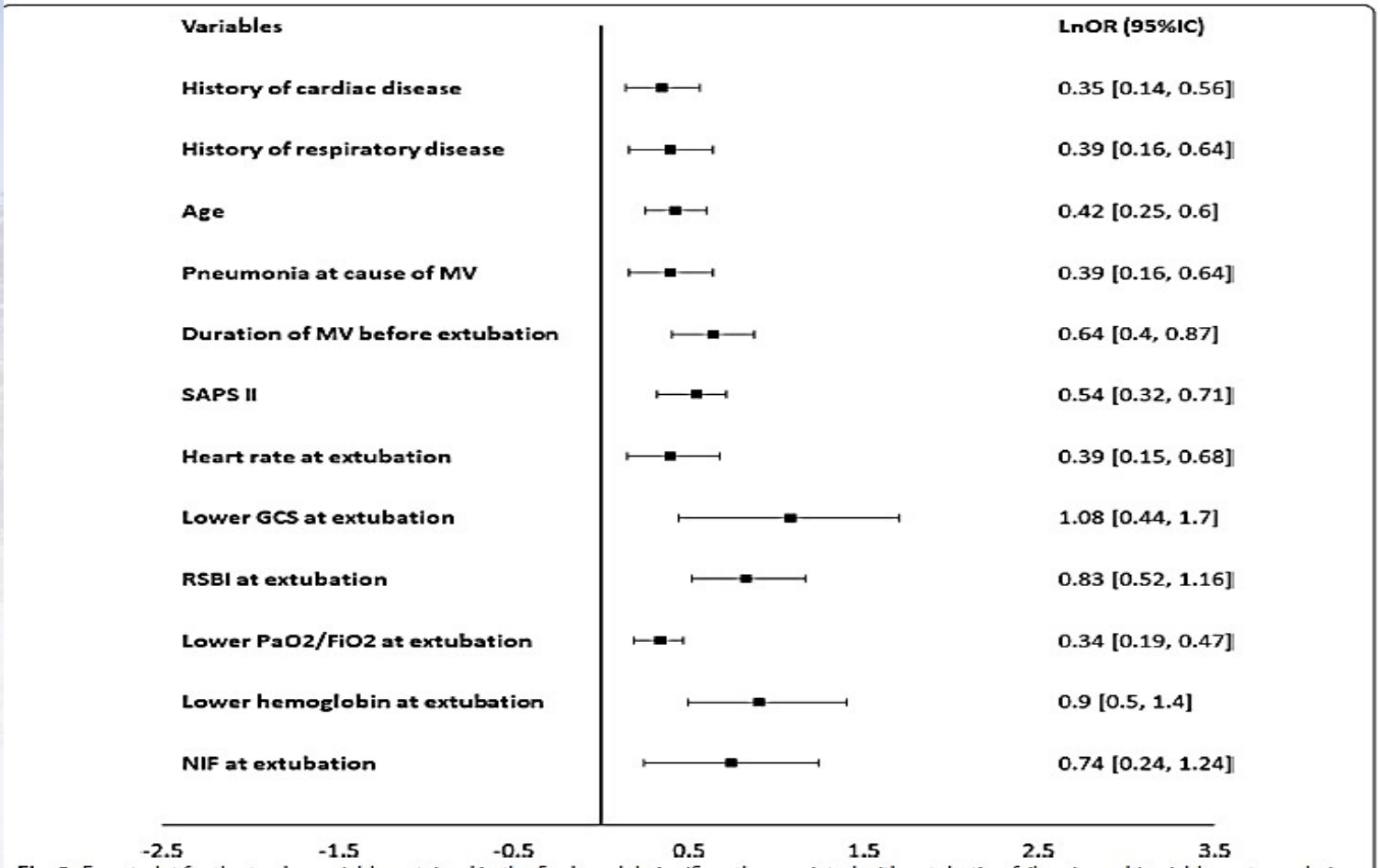


Fig. 3 Forest plot for the twelve variables retained in the final model, significantly associated with extubation failure in multivariable meta-analysis. Effects are reported in natural log transformation of odd ratios (lnOR) derived from crude OR with 95% confidence interval margins (CI). NIF: negative inspiratory force; SAPSII: simplified acute physiology score; RSBI: rapid shallow breathing index; MV: mechanical ventilation

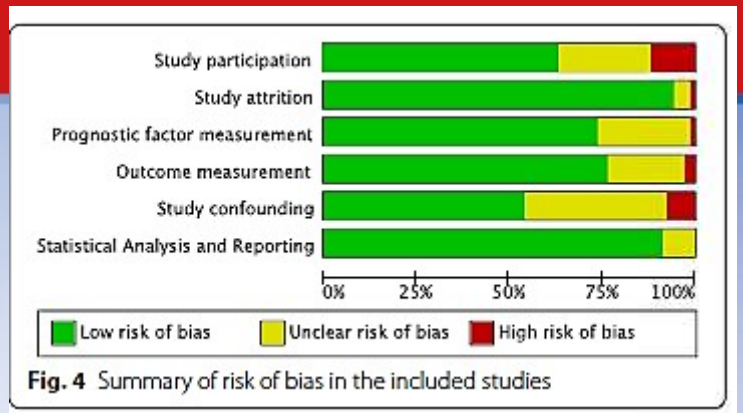


Fig. 4 Summary of risk of bias in the included studies

Torrini *et al. Critical Care* (2021) 25:391
https://doi.org/10.1186/s13054-021-03802-3

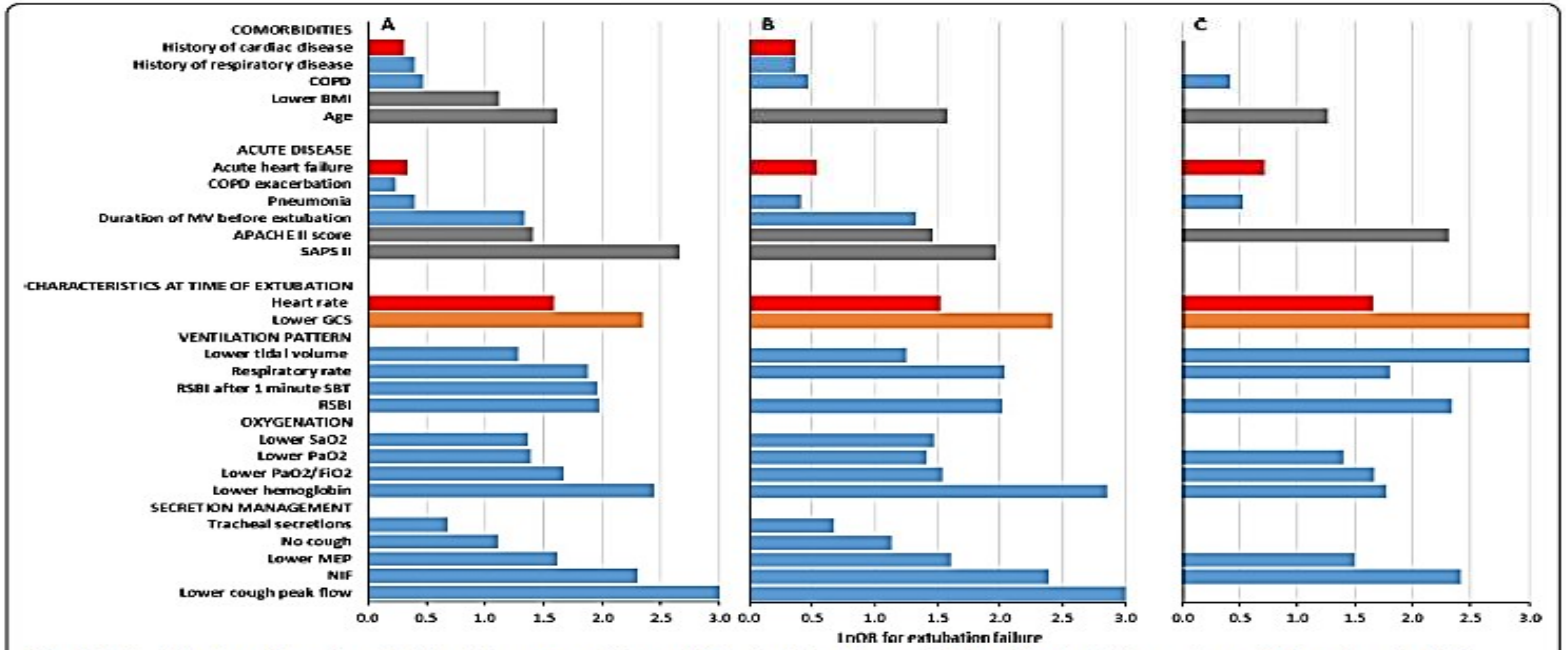


Fig. 2 Natural log transformation of odd ratios summarizing variables significantly associated with extubation outcome. **A** Overall analysis; **B** Sensitivity analysis focusing on studies defining extubation failure as death or reintubation, whatever the delay; **C** Sensitivity analysis focusing on studies defining extubation failure at 48 h. Natural log transformation of odd ratios (lnOR) were derived from crude OR (for binary variables) and from standardized mean differences (for continuous variables) to summarize the effect of 26 variables significantly associated with extubation outcome, involving three main functions [respiratory (blue bars), circulatory (red bars), neurological (orange bars) and scores/physiological data (grey bars)]. COPD: chronic obstructive pulmonary disease; BMI: body mass index; GCS: Glasgow coma scale; NIF: negative inspiratory force; SAPSII: simplified acute physiology score; RSBI: rapid shallow breathing index; SBT: spontaneous breathing trial; MEP: maximal expiratory pressure; MV: mechanical ventilation

A PROSPECTIVE STUDY OF INDEXES PREDICTING THE OUTCOME OF TRIALS OF WEANING FROM MECHANICAL VENTILATION

KARL L. YANG, M.D., AND MARTIN J. TOBIN, M.D.

Table 2. Accuracy of the Indexes Used to Predict Weaning Outcome.*

INDEX	SENSITIVITY	SPECIFICITY	POSITIVE PREDICTIVE VALUE	NEGATIVE PREDICTIVE VALUE
Minute ventilation	0.78	0.18	0.55	0.38
Respiratory frequency	0.92	0.36	0.65	0.77
Tidal volume	0.97	0.54	0.73	0.94
Tidal volume/patient's weight	0.94	0.39	0.67	0.85
Maximal inspiratory pressure	1.00	0.11	0.59	1.00
Dynamic compliance	0.72	0.50	0.65	0.58
Static compliance	0.75	0.36	0.60	0.53
PaO_2/PAO_2 ratio	0.81	0.29	0.59	0.53
Frequency/tidal volume ratio	0.97	0.64	0.78	0.95
CROP index	0.81	0.57	0.71	0.70

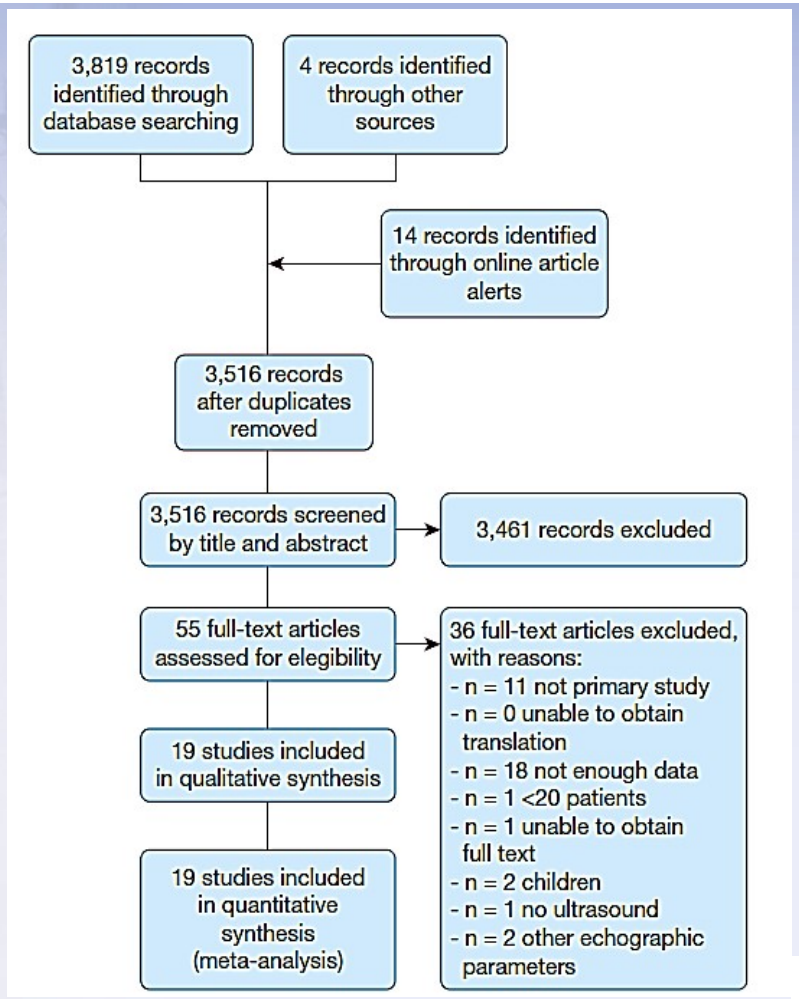
Nejm : 1991;324:1445-

Rechercher un dysfonctionnement diaphragmatique

Diaphragm and Lung Ultrasound to Predict Weaning Outcome

Systematic Review and Meta-Analysis

Ana M. Llamas-Álvarez, MD; Eva M. Tenza-Lozano, MD, PhD; and Jaime Latour-Pérez, MD, PhD



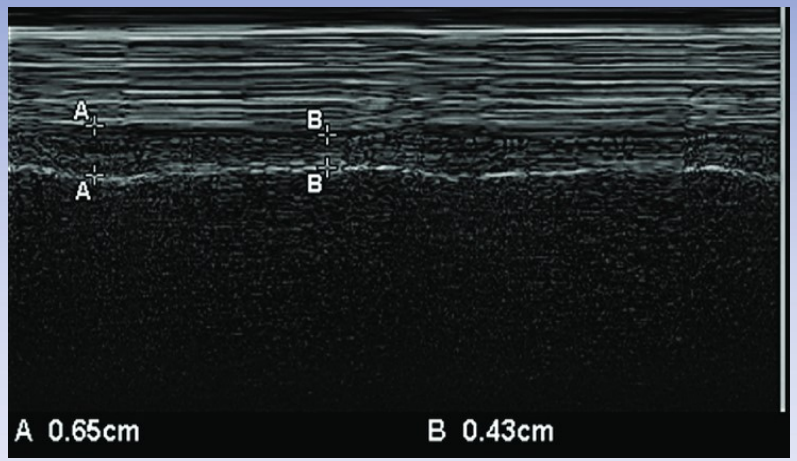
CHEST 2017; 152(6):1140-1150

Diaphragm and Lung Ultrasound to Predict Weaning Outcome

Systematic Review and Meta-Analysis

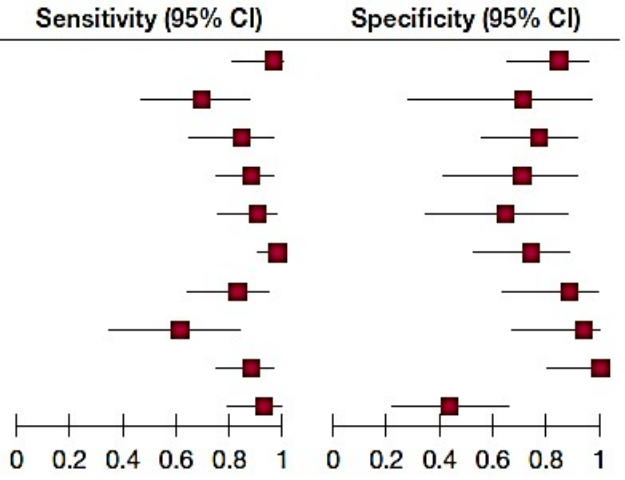
Ana M. Llamas-Álvarez, MD; Eva M. Tenza-Lozano, MD, PhD; and Jaime Latour-Pérez, MD, PhD

Diaphragm thickness fraction

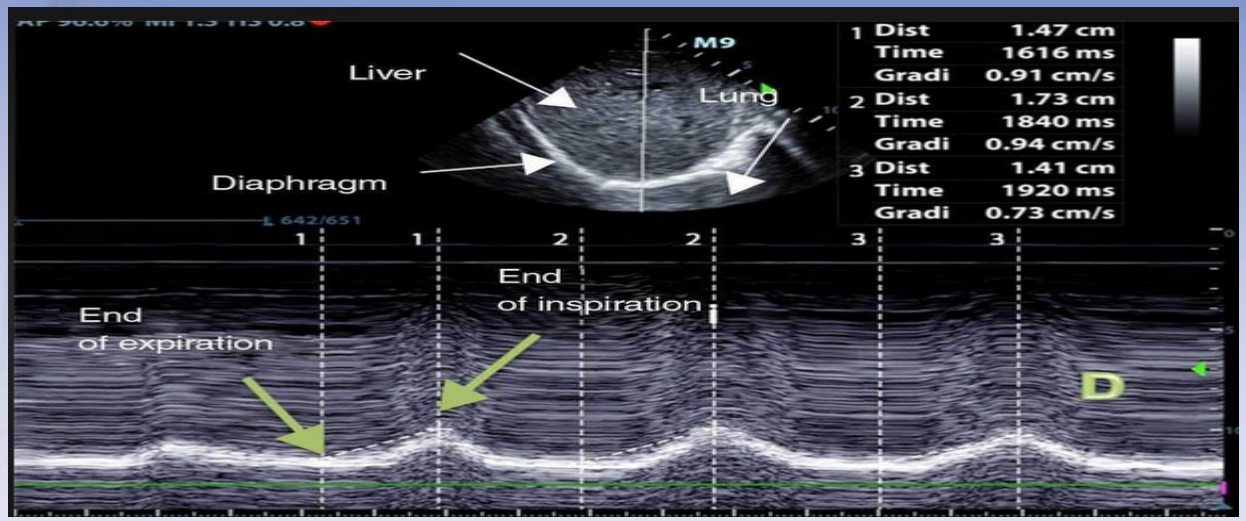


A

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Ali 2016	27	4	1	22	0.96 [0.82-1.00]	0.85 [0.65-0.96]
Baess 2016	16	2	7	5	0.70 [0.47-0.87]	0.71 [0.29-0.96]
Blumhof 2016	22	6	4	20	0.85 [0.65-0.96]	0.77 [0.56-0.91]
Dinino 2014	43	4	6	10	0.88 [0.75-0.95]	0.71 [0.42-0.92]
Farghaly 2016	36	5	4	9	0.90 [0.76-0.97]	0.64 [0.35-0.87]
Fayed 2016	80	8	2	22	0.98 [0.91-1.00]	0.73 [0.54-0.88]
Ferrari 2014	24	2	5	15	0.83 [0.64-0.94]	0.88 [0.64-0.99]
Jung 2016	11	1	7	14	0.61 [0.36-0.83]	0.93 [0.68-1.00]
Osman 2017	44	0	6	18	0.88 [0.76-0.95]	1.00 [0.81-1.00]
Tenza-Lozano, unpublished data, 2017	37	13	3	10	0.93 [0.80-0.98]	0.43 [0.23-0.66]

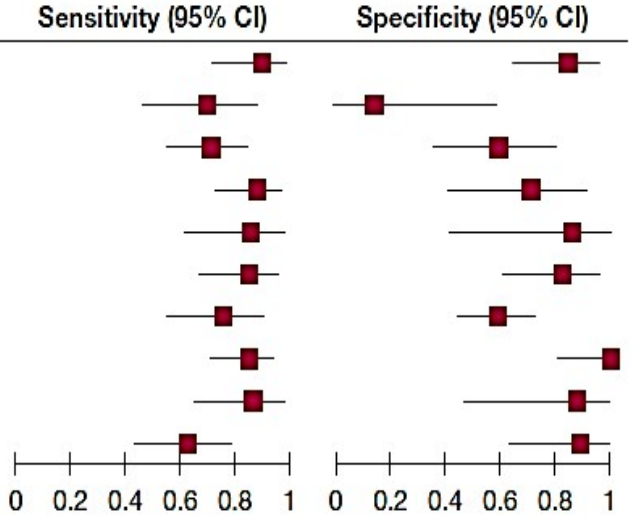


Diaphragme excursion

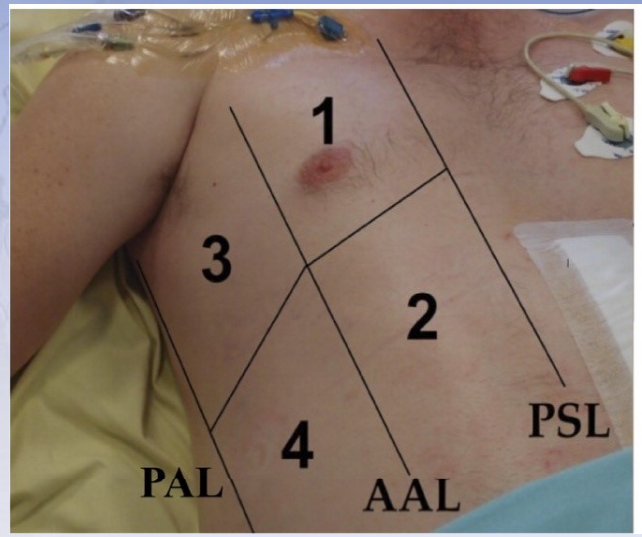


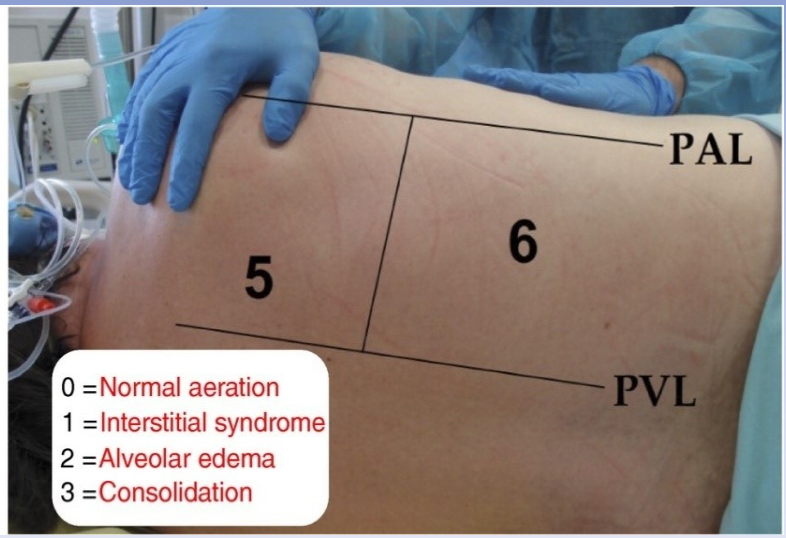
B

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Ali 2016	25	4	3	22	0.89 [0.72-0.98]	0.85 [0.65-0.96]
Baess 2016	16	6	7	1	0.70 [0.47-0.87]	0.14 [0.00-0.58]
Carrie 2017	32	9	13	13	0.71 [0.56-0.84]	0.59 [0.36-0.79]
Farghaly 2016	35	4	5	10	0.88 [0.73-0.96]	0.71 [0.42-0.92]
Flevari 2016	17	1	3	6	0.85 [0.62-0.97]	0.86 [0.42-1.00]
Jiang 2004	27	4	5	19	0.84 [0.67-0.95]	0.83 [0.61-0.95]
Kim 2011	21	22	7	32	0.75 [0.55-0.89]	0.59 [0.45-0.72]
Osman 2017	42	0	8	18	0.84 [0.71-0.93]	1.00 [0.81-1.00]
Saeed 2016	19	1	3	7	0.86 [0.65-0.97]	0.88 [0.47-1.00]
Spadaro 2016	21	2	13	15	0.62 [0.44-0.78]	0.88 [0.64-0.99]



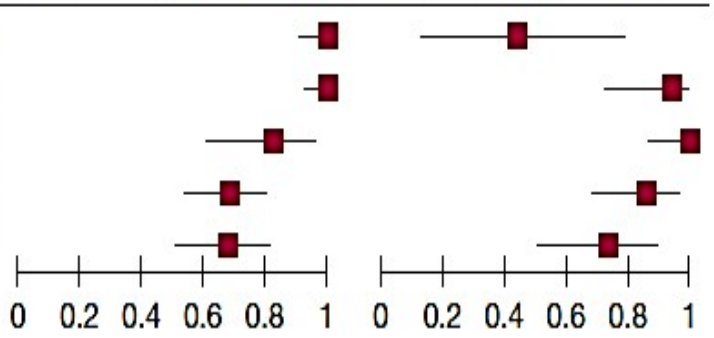
lung ultrasound score





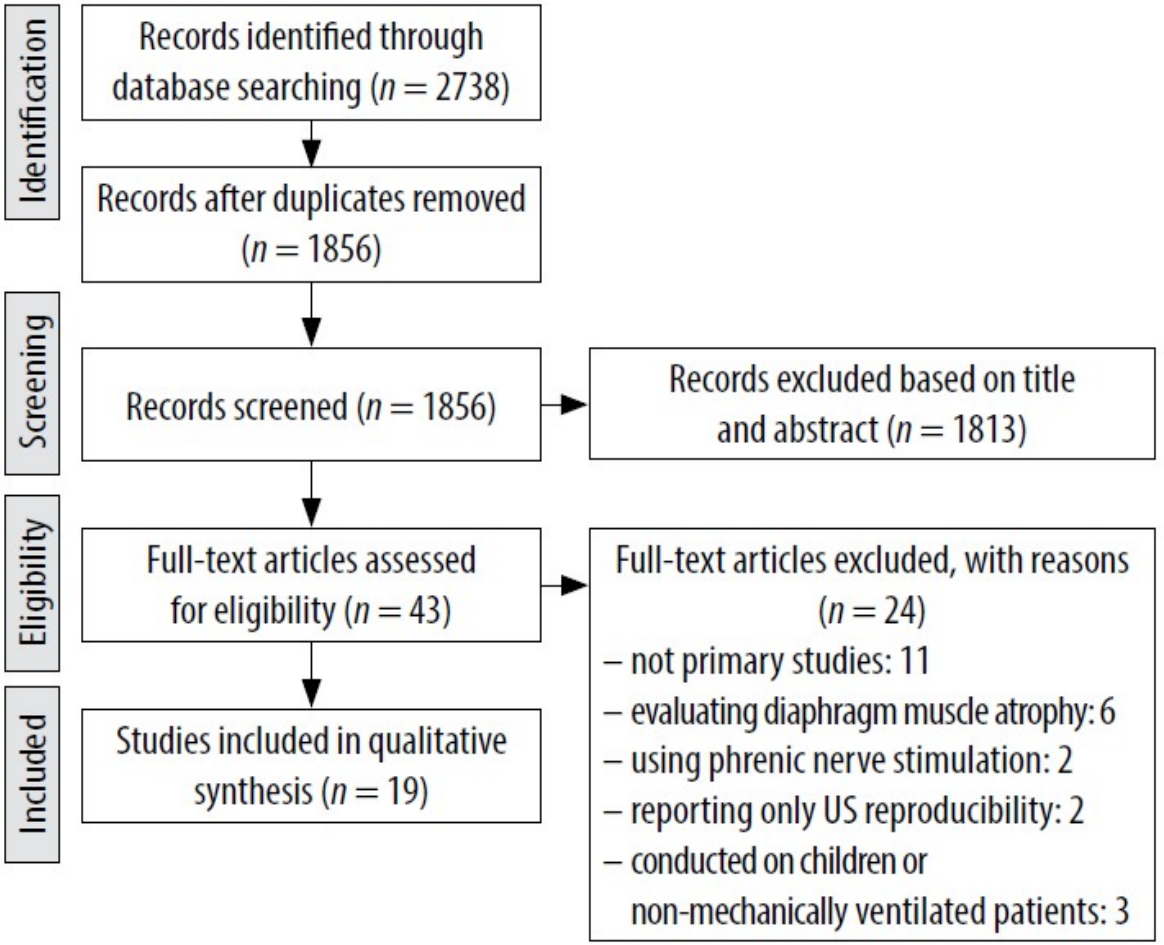
C

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Binet 2014	39	5	0	4	1.00 [0.91-1.00]	0.44 [0.14-0.79]
Osman 2017	50	1	0	17	1.00 [0.93-1.00]	0.94 [0.73-1.00]
Shoaeir 2016	19	0	4	27	0.83 [0.61-0.95]	1.00 [0.87-1.00]
Soummer 2012	39	4	18	25	0.68 [0.55-0.80]	0.86 [0.68-0.96]
Tenza-Lozano, unpublished data, 2017	27	6	13	17	0.68 [0.51-0.81]	0.74 [0.52-0.90]



Diaphragm ultrasound to predict weaning outcome: systematic review and meta-analysis

Ata Mahmoodpoor[1], Shahnaz Fouladi[2], Ali Ramouz[3], Kamran Shadvar[1], Zohreh Ostadi[1], Hassan Soleimanpour[4]



Diaphragm ultrasound to predict weaning outcome: systematic review and meta-analysis

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- **Diaphragm thickness fraction**

	Sensibilité	spécificité	AUR
	89%	81%	0.93
VS-AI PEP	84%	77%	
Piéce –T	92%	78%	

- **Diaphragmatic excursion: 701 patients**

	Sensibilité	spécificité
Diaphragmatic excursion	79.9%	69%

- Réaliser un test de fuite chez les patients de réanimation ayant au moins un facteur de risque de dyspnée laryngée afin de réduire les échec d'extubation en rapport avec l'œdème laryngé.

- Prescrire une VNI ou OXYGENOTHERAPIE A HAUT DEB
  préventive

Effect of Protocolized Weaning With Early Extubation to Noninvasive Ventilation vs Invasive Weaning on Time to Liberation From Mechanical Ventilation Among Patients With Respiratory Failure

The Breathe Randomized Clinical Trial

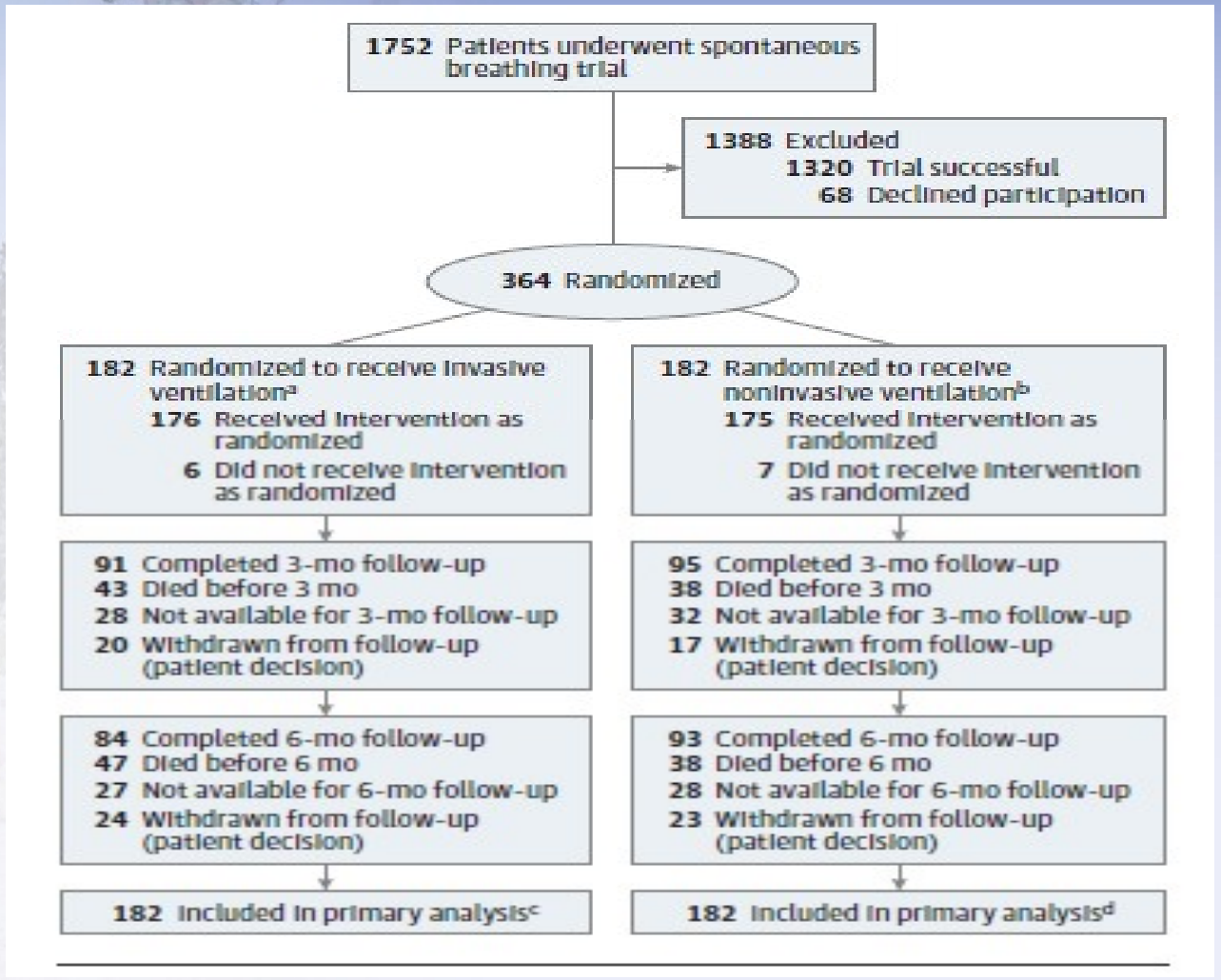
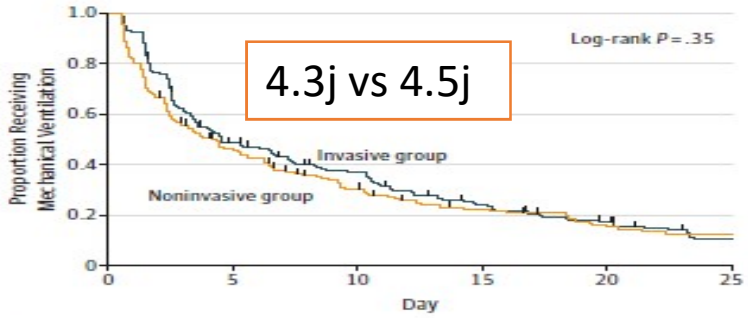


Figure 2. Time to Liberation From Mechanical Ventilation by Treatment Group

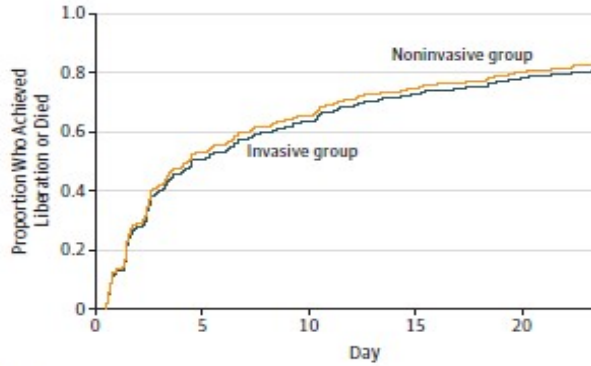


No. at risk

Invasive group	182	86	61	37	24	12
Noninvasive group	182	79	48	32	21	17

Hash marks indicate each censoring time. Median time to liberation from ventilation was 4.5 days (95% CI, 3.46-7.25 days) in the invasive group and 4.3 days (95% CI, 2.63-5.58 days) in the noninvasive group.

Figure 3. Cumulative Incidence of Liberation From Ventilation or Dea by Treatment Group



No. at risk

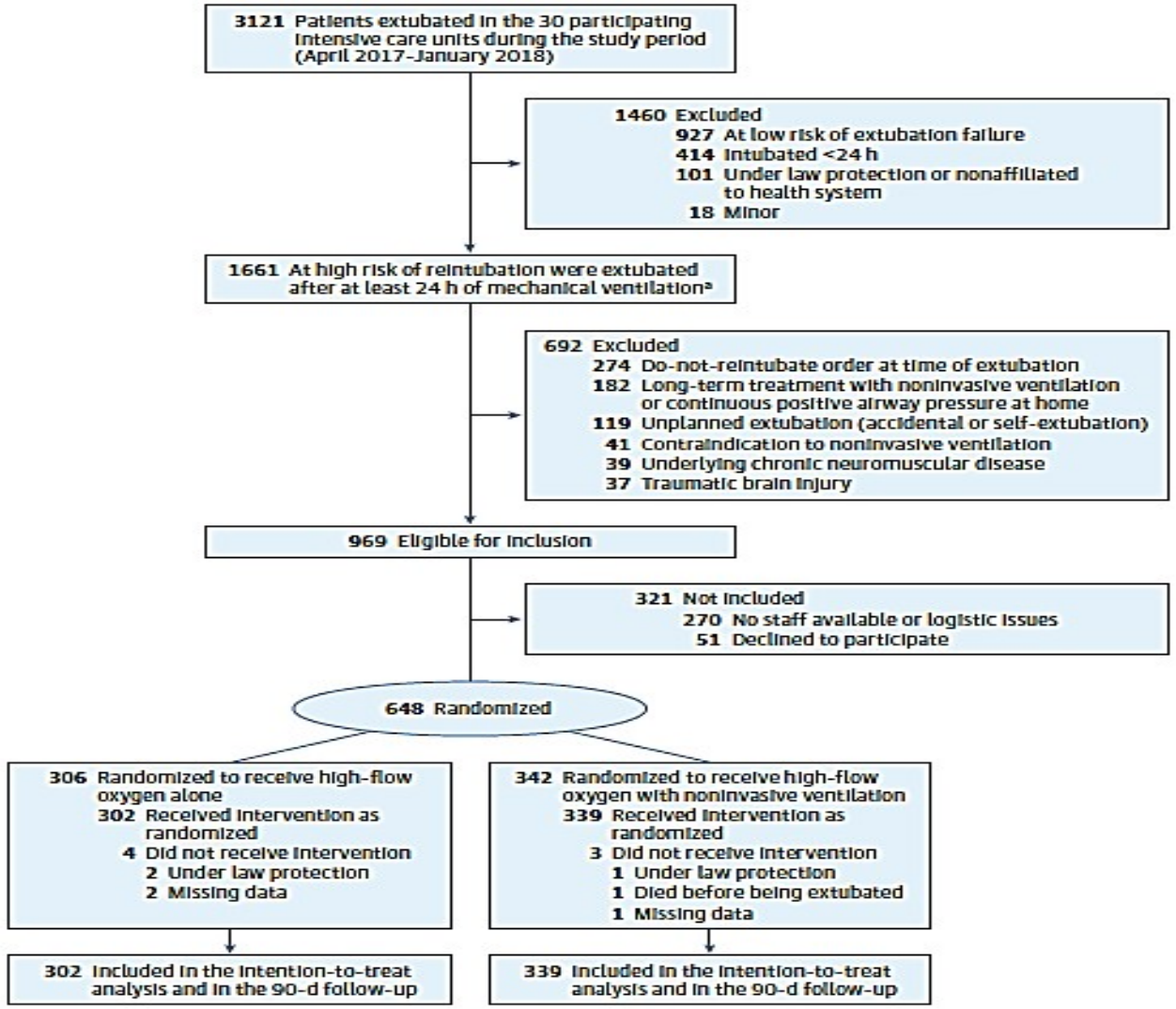
Invasive group	182	86	61	37	24
Noninvasive group	182	79	48	32	21

Table 2. Adverse Events

Adverse Events	No. (%) of Participants		
	Invasive Weaning (n=182)	Noninvasive Weaning (n=182)	Unadjusted Absolute Difference, % (95% CI)
Antibiotics for presumed respiratory infection	128 (70.3)	110 (60.4)	9.9 (0.2 to 19.6)
Reintubation	41 (28.7)(n=143)	67 (37.0)(n=181)	8.3 (−1.9 to 18.6)
Tracheostomy	55 (30.2)	43 (23.6)	6.6 (−2.5 to 15.7)
Death before intensive care unit discharge	25 (13.7)	22 (12.1)	1.6 (−5.2 to 8.5)
Dysrhythmias	22 (12.1)	14 (7.7)	4.4 (−1.7 to 10.5)
Nasal/skin/mouth sores or irritation	14 (7.7)	19 (10.4)	2.7 (−3.2 to 8.6)
Nonrespiratory infection	12 (6.6)	11 (6.0)	0.5 (−4.5 to 5.6)
Vomiting	8 (4.4)	14 (7.7)	3.3 (−1.6 to 8.2)
Gastric distension	6 (3.3)	7 (3.9)	0.5 (−3.3 to 4.4)
Barotrauma (eg, pneumothorax)	3 (1.7)	3 (1.7)	0 (−2.6 to 2.6)

Effect of Postextubation High-Flow Nasal Oxygen With Noninvasive Ventilation vs High-Flow Nasal Oxygen Alone on Reintubation Among Patients at High Risk of Extubation Failure

A Randomized Clinical Trial



- Age > 65 ans
- Co-morbidités: respiratoire ou car

JAMA. 2019;322(15):1465-1475. doi:10.1001/jama.20

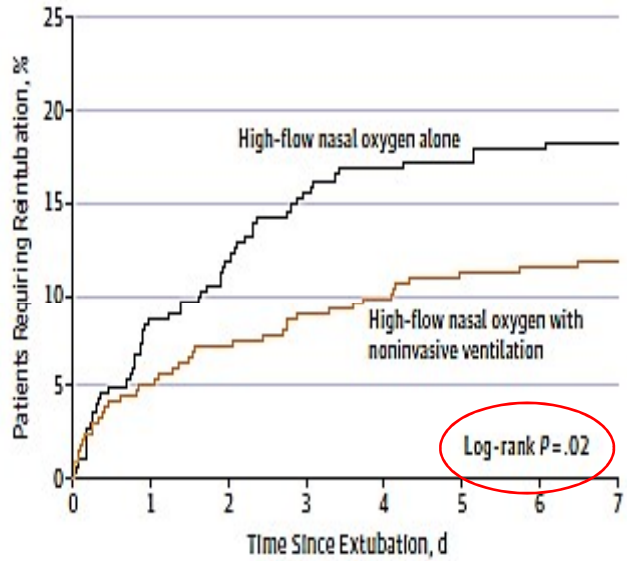
Effect of Postextubation High-Flow Nasal Oxygen With Noninvasive Ventilation vs High-Flow Nasal Oxygen Alone on Reintubation Among Patients at High Risk of Extubation Failure

A Randomized Clinical Trial

Table 2. Primary, Secondary, and Exploratory Outcomes

	No. (%)			
	High-Flow Nasal Oxygen Alone (n = 302)	High-Flow Nasal Oxygen With NIV (n = 339)	Absolute Difference, % (95% CI)	*P* Value
Primary Outcome				
Reintubation at day 7	55 (18)	40 (12)	−6.4 (−12.0 to −0.9)	.02
Secondary Outcomes				
Postextubation respiratory failure at day 7	88 (29)	70 (21)	−8.5 (−15.2 to −1.8)	.01
Reintubation				
At 48 h	36 (12)	24 (7)	−4.8 (−9.6 to −0.3)	.04
At 72 h	47 (16)	30 (9)	−6.7 (−11.9 to −1.7)	.009
Up until ICU discharge	59 (20)	41 (12)	−7.4 (−13.2 to −1.8)	.009
Length of stay, median (IQR), days				
In ICU	11 (7 to 19)	12 (7 to 19)	0.5 (−1.6 to 2.6)	.55
In hospital	23 (15 to 39)	25 (15 to 42)	2.3 (−1.4 to 6.1)	.31
Mortality				
In ICU	26 (9)	21 (6)	−2.4 (−6.7 to 1.7)	.25
In hospital	46 (15)	54 (16)	0.7 (−5.0 to 6.3)	.80
At day 28	33 (11)	39 (12)	0.6 (−4.4 to 5.5)	.82
At day 90	65 (21)	62 (18)	−3.2 (−9.5 to 2.9)	.30
Exploratory Outcomes				
Patients meeting reintubation criteria during ICU stay	65 (22)	49 (14)	−7.1 (−13.1 to −1.1)	.02
Mortality or reintubation in ICU	64 (21)	51 (15)	−6.2 (−12.2 to −0.2)	.04
Mortality of reintubated patients	21/59 (36)	11/41 (27)	−8.8 (−25.7 to 9.9)	.35

Figure 2. Kaplan-Meier Analysis of Time From Extubation to Reintubation for the Overall Study Population

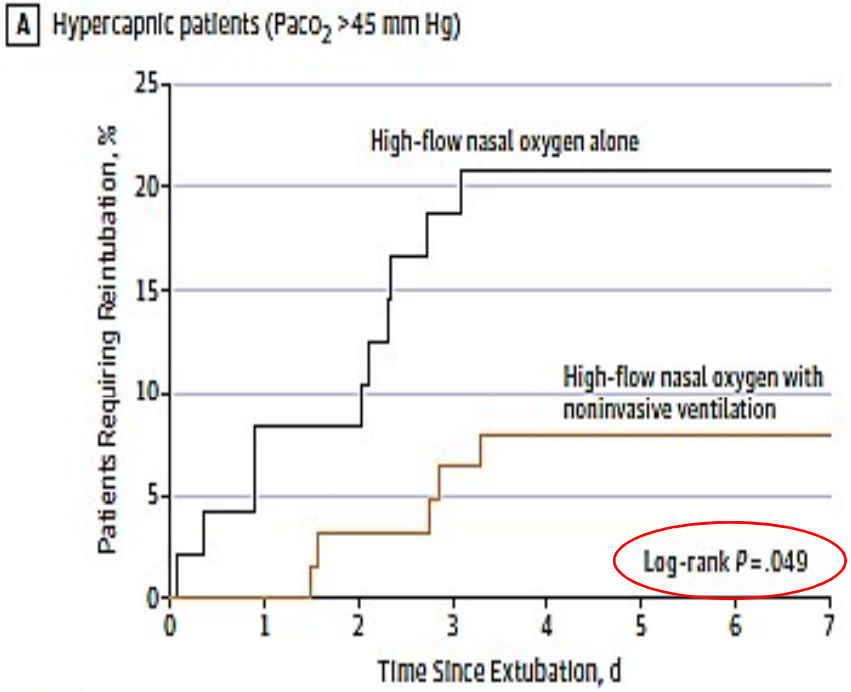


No. at risk

High-flow nasal oxygen								
Alone	302	276	265	253	248	246	244	243
With noninvasive ventilation	339	321	314	308	305	294	292	291

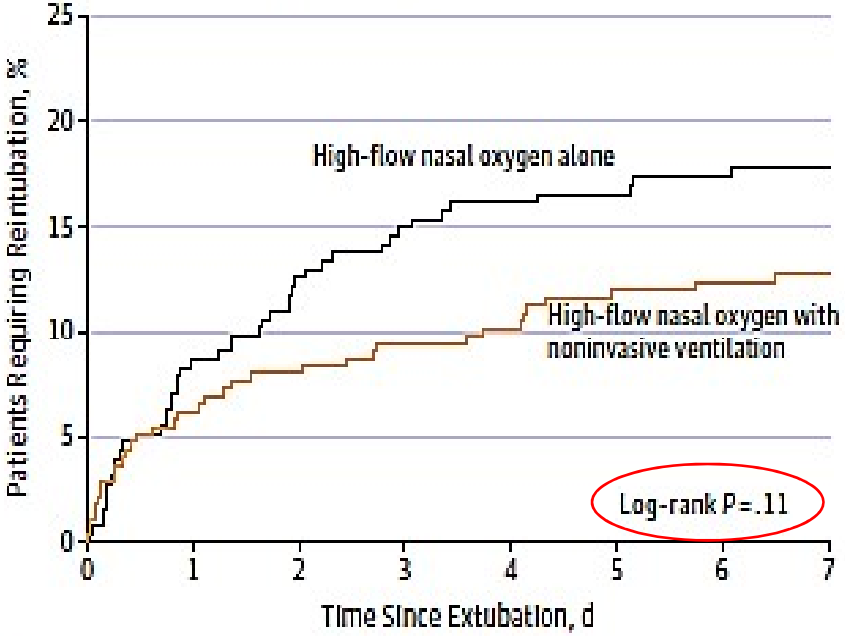
The median observation time was 7 days (interquartile range, 7-7) in both treatment groups.

JAMA. 2019;322(15):1465-1475. doi:10.1001/jama.2



A Hypercapnic patients ($Paco_2$ >45 mm Hg)

No. at risk								
High-flow nasal oxygen Alone	48	44	44	39	38	37	37	37
With noninvasive ventilation	63	63	61	59	58	58	58	58



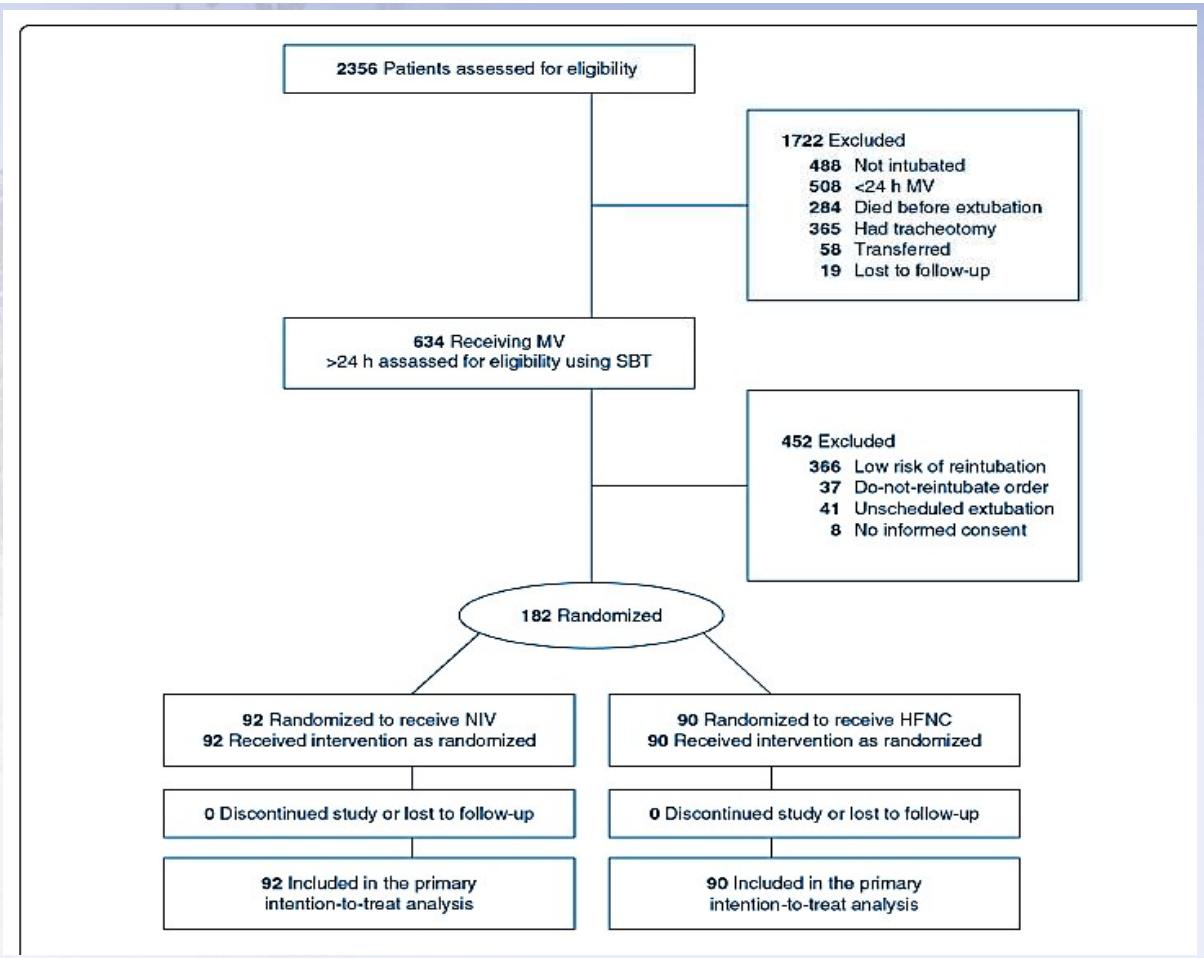
B Nonhypercapnic patients ($Paco_2$ ≤45 mm Hg)

No. at risk								
High-flow nasal oxygen Alone	254	232	221	214	210	209	207	206
With noninvasive ventilation	276	258	253	249	247	236	234	233

Effect of postextubation noninvasive ventilation with active humidification vs high-flow nasal cannula on reintubation in patients at very high risk for extubation failure: a randomized trial

Gonzalo Hernández[1,8*], Irene Paredes[1], Francisco Moran[1], Marcos Buj[1,2], Laura Colinas[1], María Luisa Rodríguez[1], Alfonso Velasco[1], Patricia Rodríguez[1], María José Pérez-Pedrero[1], Fernando Suarez-Sipmann[3], Alfonso Canabal[3,5], Rafael Cuena[4], Lluis Blanch[6,7] and Oriol Roca[6,7]

Intensive Care Med (2022) 48:1751–1759



- Age> 65
- IC
- BPCO
- Apachii >12
- BMI>30
- Risque d' œdème laryn
- Toux diminuée
- VM prolongée
- VM>7J
- 2 Co-morbidités
- Paco2>45

Table 2 Primary and secondary outcomes

	NIV ($n=92$)	HFNC ($n=90$)	Difference between groups (95%CI), p
Primary outcome, n (%)			
All-cause reintubation	21 (22.8)	35 (38.9)	−16.0 (−29.2 to −0.3), $p=0.019$
Secondary outcomes			
Postextubation respiratory failure, *n* (%)	40 (43.5)	40 (44.4)	−0.9 (−15.4–13.5), $p=0.896$
Ventilator-associated tracheobronchitis, *n* (%)	0 (0)	1 (1.1)	−1.1 (−3.3–1.1), $p=0.495$
Ventilator-associated pneumonia, *n* (%)	4 (4.3)	7 (7.8)	−3.4 (−10.4–3.5), $p=0.369$
Other infections, *n* (%)	1 (1.1)	2 (2.2)	−1.1 (−4.8–2.6), $p=0.619$
Sepsis, *n* (%)	4 (4.3)	3 (3.3)	1 (−5.5–7.6), $p=1.000$
Multiorgan failure, *n* (%)	3 (3.3)	2 (2.2)	1 (−4.5–6.6), $p=1.000$
Hospital LOS, median (IQR), d	20 (12–36.7)	26.5 (15–45)	6.5 (0.5–21.1), $p=0.068$
ICU LOS, median (IQR), d	9.5 (4–15)	12.5 (6.7–19)	3 (−0.6–5.6), $p=0.047$
ICU mortality, *n* (%)	12 (13)	4 (4.4)	9.7 (−1.1–18.7), $p=0.356$
Hospital mortality, n (%)	14 (15.2)	6 (6.7)	8.5 (−0.7–18), $p=0.475$
Time to reintubation, median (IQR), h	27 (6–47)	27 (8–48)	0 (−25–25), $p=0.582$
Intolerance to therapy, *n* (%)	19 (20.7)	8 (8.9)	11.7 (1.6–21.9), $p=0.026$
Nasal discomfort, *n* (%)	18 (19.6)	6 (6.7)	12.9 (3.3–22.5), $p=0.010$
Facial skin ulcer, *n* (%)	4 (4.3)	0 (0)	4.3 (0.1–8.5), $p=0.045$
Exploratory outcomes			
Time on therapy 0–24 h, median (IQR), h	22.5 (19.25–24)	24 (24–24)	<0.001
Time on therapy 24–48 h, median (IQR), h	18 (10.5–22)	20 (8–24)	0.060
Temperature, median (IQR), °C	29 (29–29)	37 (37–37)	<0.001
Reintubation rate at 5 d, *n* (%)	21 (23.3)	26 (28.8)	0.321
Time to reintubation at 5 d, median (IQR), h	27 (6–47)	10 (6.5–28)	0.029
FiO_2 after 48 h, median (IQR), %	31.3 (9)	31.8 (8)	0.645

HFNC high-flow nasal cannula; *ICU* intensive care unit; *IQR* interquartile range; *LOS* length of stay; *NIV* noninvasive ventilation

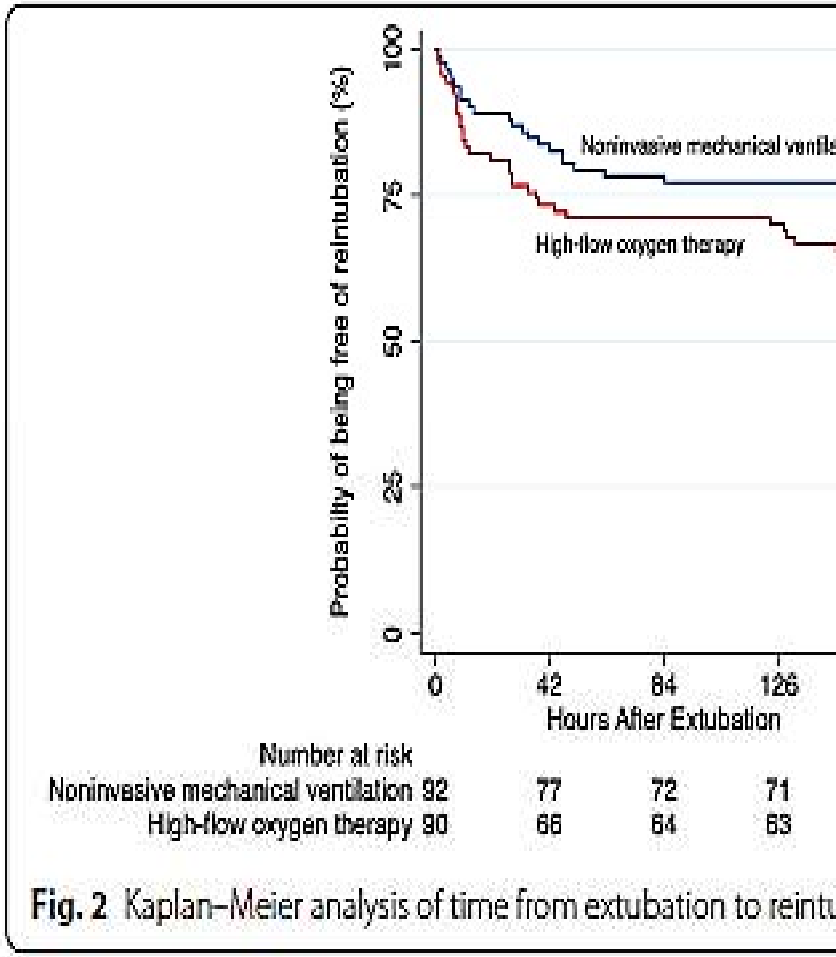


Fig. 2 Kaplan–Meier analysis of time from extubation to reintu

Intensive Care Med (2022) 48:1751–1759

Conclusion

Extubation directe oui mais

- Rechercher les patients à haut risque d'échec d'extubation
- Utiliser un protocole de sevrage
  - Gestion de la sédation
  - Test de fuit
  - Mobilisation précoce
- Appliquer une VNI systématiquement
- Ne jamais retarder l'intubation
- Place de l'intilligence artificielle dans le sevrage?