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Societat Catalana  
de Medicina  
Intensiva i Crítica  
**28 de març de 2019** a "El Seminari" • Tarragona

**XXXVI**  
Jornades  
Catalanes  
Infermeria  
Intensiva i Crítica

**SOC\_MIC**  
Societat Catalana de  
Medicina Intensiva i Crítica



# Weaning

Carles Subirà, MD

Althaia Xarxa Assistencial Unversitària de Manresa

# Introducció

- Què és el weaning? Com ha canviat els últims anys?
- Quan i com comencem el weaning.
- La prova de respiració espontània.
- Profilaxi i tractament del fracàs respiratori postextubació.

# Què és el weaning?

El weaning és el procés de retirada de la VM:

Identificar + SBT + profilaxis del fracàs + tractament del fracàs

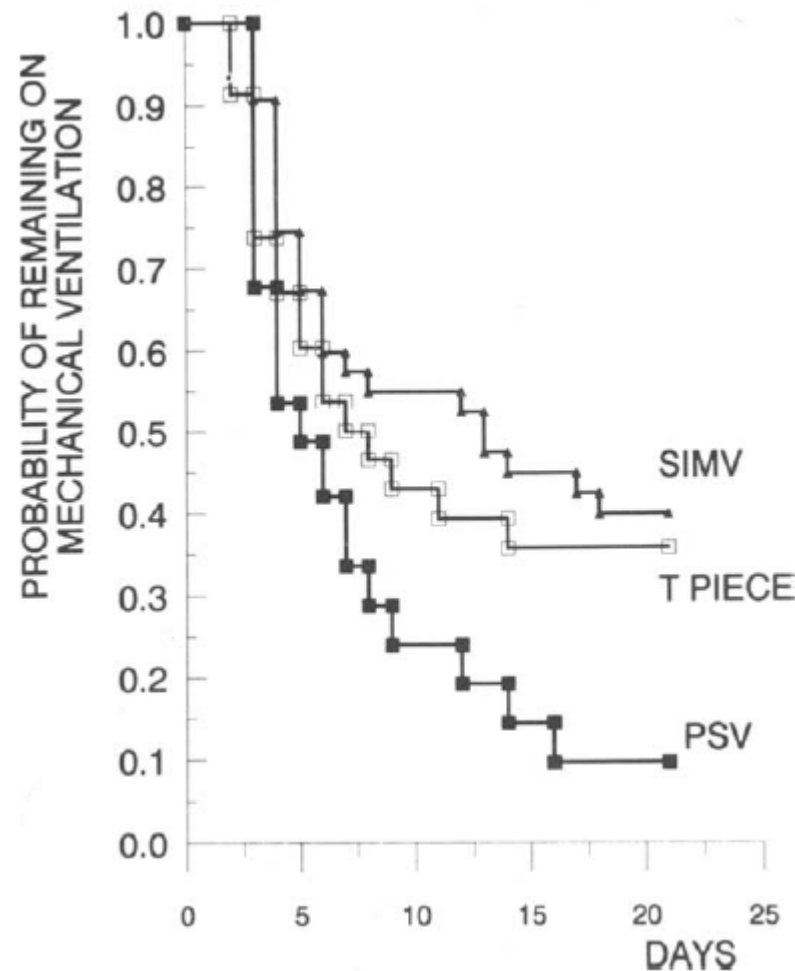
Weaning: Passat i present

# Comparison of Three Methods of Gradual Withdrawal from Ventilatory Support during Weaning from Mechanical Ventilation

Am J Respir Crit Care Med Vol 150. pp 896-903, 1994

LAURENT BROCHARD, ALAIN RAUSS, SALVADOR BENITO, GIORGIO CONTI, JORDI MANCEBO, NOURREDINE REKIK, ALESSANDRO GASPARETTO, and FRANÇOIS LEMAIRE

Medical Intensive Care Unit, Hôpital Henri Mondor, Créteil, France; Medical Intensive Care Unit, Hospital Santa Creu i Sant Pau, Barcelona, Spain; and Intensive Care Unit, Università la Sapienza, Roma, Italy



# A COMPARISON OF FOUR METHODS OF WEANING PATIENTS FROM MECHANICAL VENTILATION

ANDRÉS ESTEBAN, M.D., PH.D., FERNANDO FRUTOS, M.D., MARTIN J. TOBIN, M.D., INMACULADA ALÍA, M.D.,  
 JOSÉ F. SOLSONA, M.D., INMACULADA VALVERDÚ, M.D., RAFAEL FERNÁNDEZ, M.D.,  
 MIGUEL A. DE LA CAL, M.D., SALVADOR BENITO, M.D., PH.D., ROSER TOMÁS, M.D.,  
 DEMETRIO CARRIEDO, M.D., SANTIAGO MACÍAS, M.D., AND JESÚS BLANCO, M.D.,  
 FOR THE SPANISH LUNG FAILURE COLLABORATIVE GROUP\*

The New England  
**Journal of Medicine**

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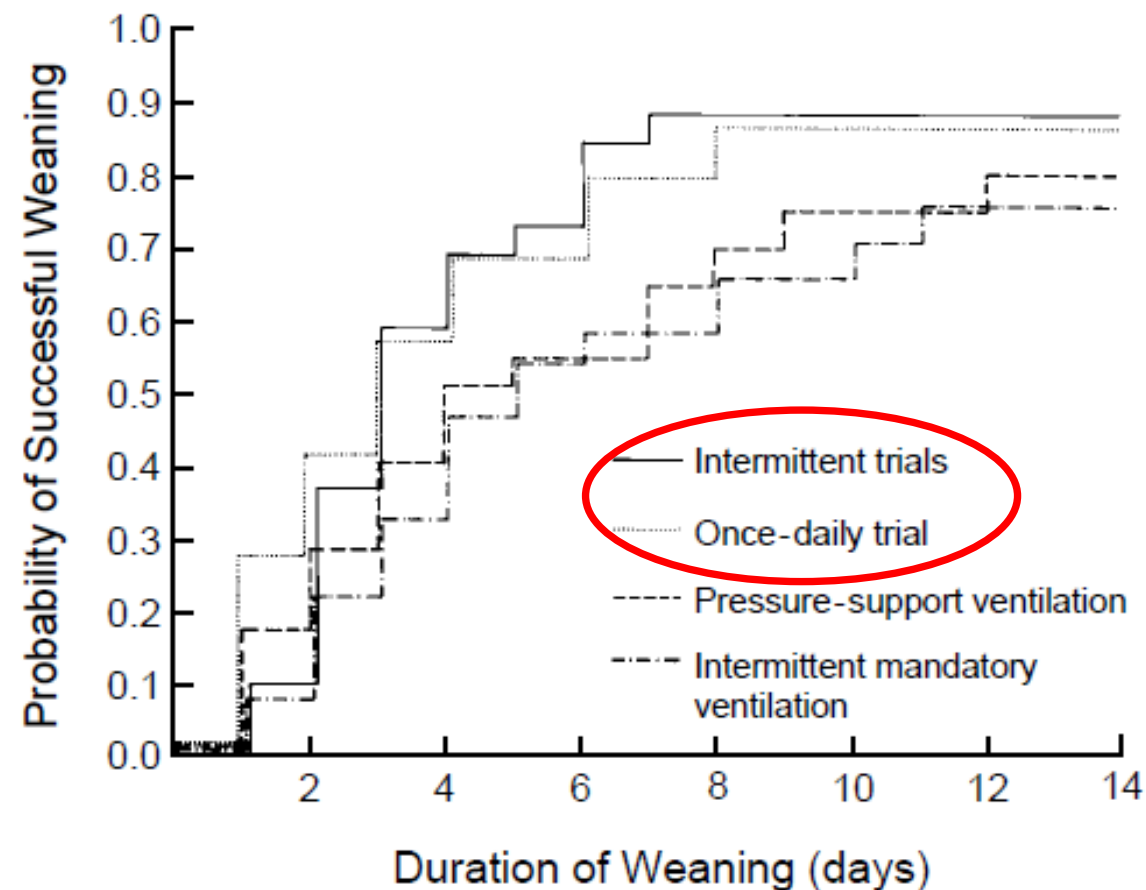
Volume 332

FEBRUARY 9, 1995

Number 6

Table 2. The Length of Time from the Initiation of Weaning to Successful Extubation in the Four Groups.

WEANING TECHNIQUE	MEDIAN	FIRST QUARTILE	THIRD QUARTILE
	<i>days</i>		
Intermittent mandatory ventilation	5	3	11
Pressure-support ventilation	4	2	12
Intermittent trials of spontaneous breathing	3	2	6
Once-daily trial of spontaneous breathing	3	1	6



I com es fa avui el weaning?

# Characteristics and Outcomes in Adult Patients Receiving Mechanical Ventilation

A 28-Day International Study

JAMA, January 16, 2002—Vol 287, No. 3 345

- 5199 proves de weaning:

- 2833 prova diària
- 510 múltiples proves diàries

64,3% SBT →

- 1725 SBT-tub en T
- 943 SBT-PSV
- 643 SBT-CPAP

- 793 reducció progressiva de la SIMV + PSV
- 752 reducció progressiva de la PSV
- 311 reducció progressiva de la SIMV

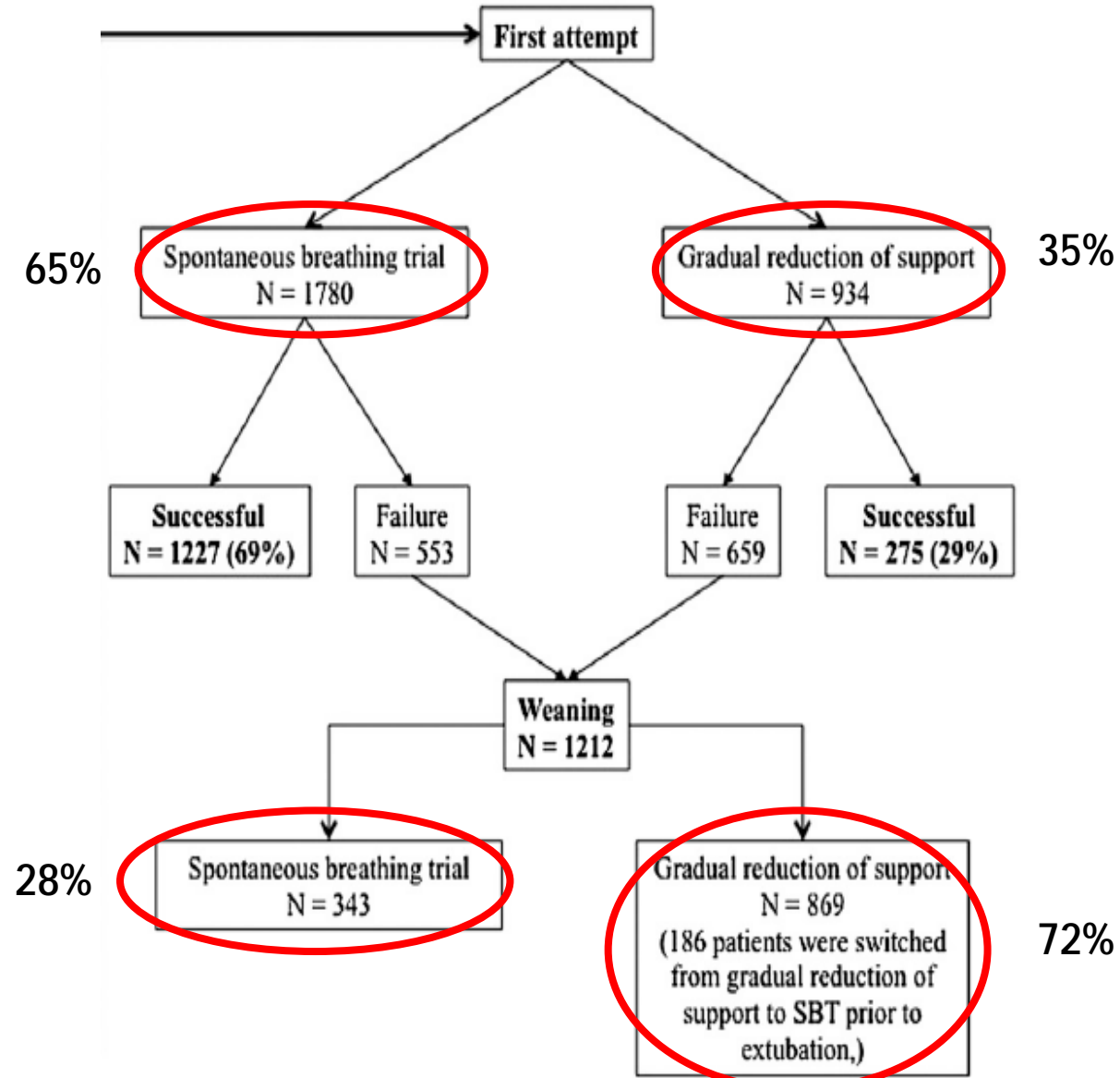
35,6% disminució progressiva del suport



# Characteristics and Outcomes of Ventilated Patients According to Time to Liberation from Mechanical Ventilation

AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE VOL 184 2011

Oscar Peñuelas<sup>1,2</sup>, Fernando Frutos-Vivar<sup>1,2</sup>, Cristina Fernández<sup>3</sup>, Antonio Anzueto<sup>4</sup>, Scott K. Epstein<sup>6</sup>, Carlos Apezteguia<sup>7</sup>, Marco González<sup>8</sup>, Nicolas Nin<sup>1,2</sup>, Konstantinos Raymondos<sup>9</sup>, Vinko Tomcic<sup>10</sup>, Pablo Desmery<sup>11</sup>, Yaseen Arabi<sup>12</sup>, Paolo Pelosi<sup>13</sup>, Michael Kuiper<sup>14</sup>, Manuel Jibaja<sup>15</sup>, Dimitros Matamis<sup>16</sup>, Niall D. Ferguson<sup>5</sup>, and Andrés Esteban<sup>1,2</sup> for the Ventila Group\*



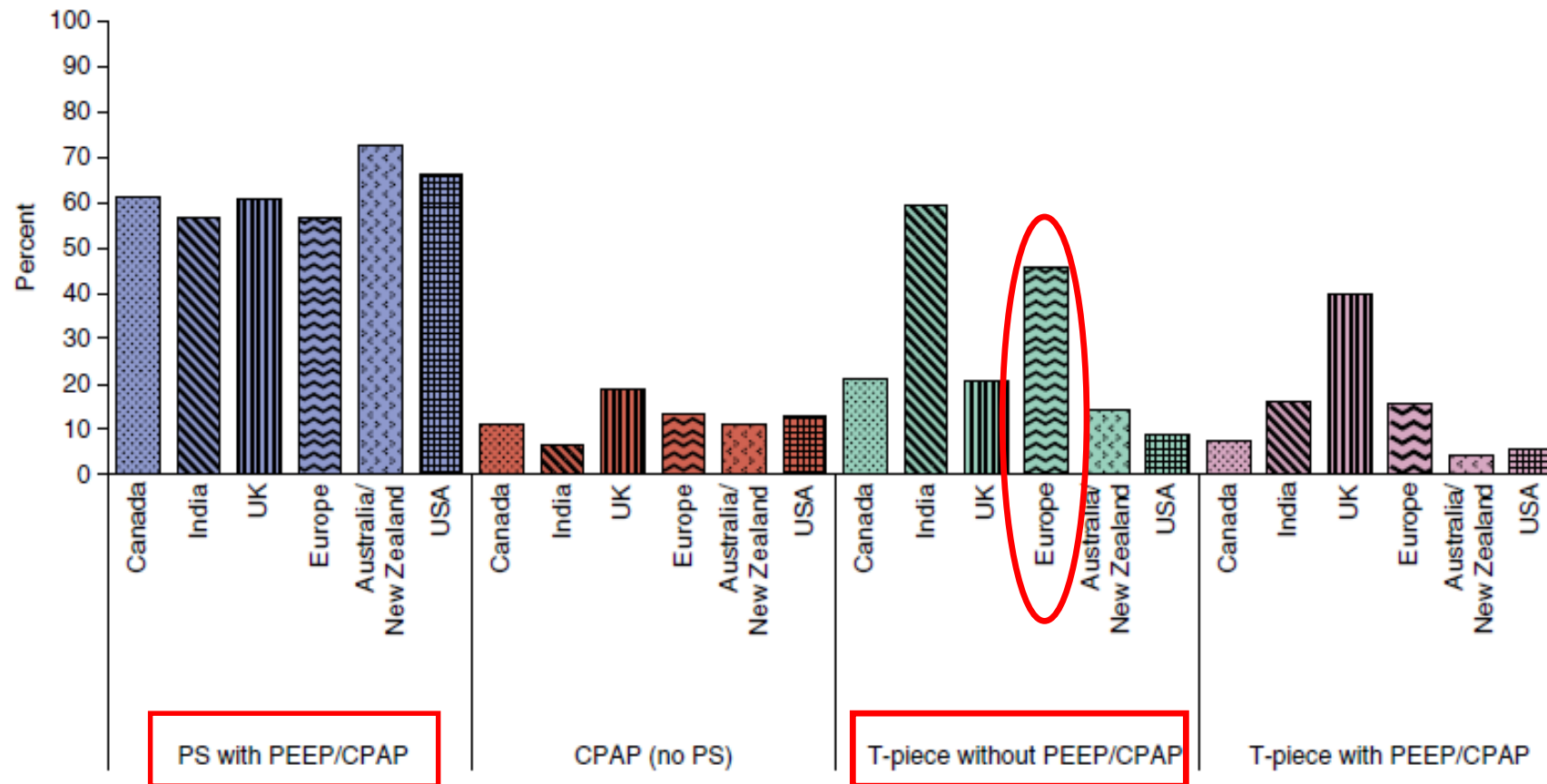
**TABLE 2. METHODS OF WITHDRAWAL FROM MECHANICAL VENTILATION USED IN EACH GROUP**

	First Attempt			P Value	Weaning		P Value
	Simple Weaning (N = 1,502)	Difficult Weaning (N = 1,058)	Prolonged Weaning (N = 154)		Difficult Weaning (N = 1,058)	Prolonged Weaning (N = 154)	
Spontaneous breathing trial, n (%)	1,227 (82)	495 (47)	58 (38)	<0.001	312 (29.5)	31 (20)	0.02
T-piece	49	36	38		41	45	
CPAP	27	38	33		36	35.5	
Pressure support < 8 cm H <sub>2</sub> O	22	24	29		21.5	19	
Other	2	2	—		2	—	
Gradual reduction of support, n (%)	275 (18)	563 (53)	96 (62)	<0.001	746 (70.5)	123 (80)	0.02
Pressure support	62	67	71		67	72	
SIMV-PS	24	24	25		24	24	
SIMV	2	5	1		5	1	
Other	12	4	3		4	2	

# International Practice Variation in Weaning Critically Ill Adults from Invasive Mechanical Ventilation

Karen E. A. Burns<sup>1</sup>, Stavroula Raptis<sup>2</sup>, Rosane Nisenbaum<sup>2</sup>, Leena Rizvi<sup>1</sup>, Andrew Jones<sup>3</sup>, Jyoti Bakshi<sup>2</sup>, Wylie Tan<sup>2</sup>, Aleksander Meret<sup>4</sup>, Deborah J. Cook<sup>5</sup>, Francois Lellouche<sup>6</sup>, Scott K. Epstein<sup>7</sup>, David Gattas<sup>8</sup>, Farhad N. Kapadia<sup>9</sup>, Jesús Villar<sup>2,10</sup>, Laurent Brochard<sup>1,2</sup>, Martin R. Lessard<sup>11</sup>, and Maureen O. Meade<sup>5</sup>

AnnalsATS Volume 15 Number 4 | April 2018



**Figure 3.** Spontaneous breathing trial conduct across regions. CPAP = continuous positive airway pressure; PEEP = positive end-expiratory pressure; PS = pressure support.

# Criteria de weaning-Screening

- Resolució de la patologia.
- Estabilitat hemodinàmica.
- Correcta oxigenació.
- Bon nivell de consciència.



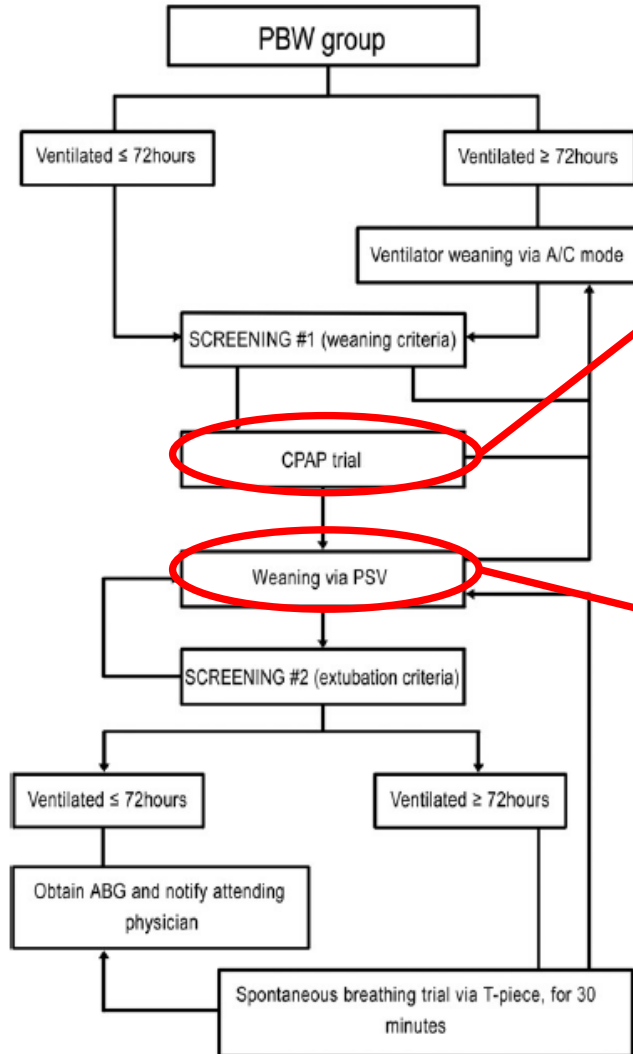
Infermeria

# Protocols de weaning

# A weaning protocol administered by critical care nurses for the weaning of patients from mechanical ventilation<sup>☆</sup>

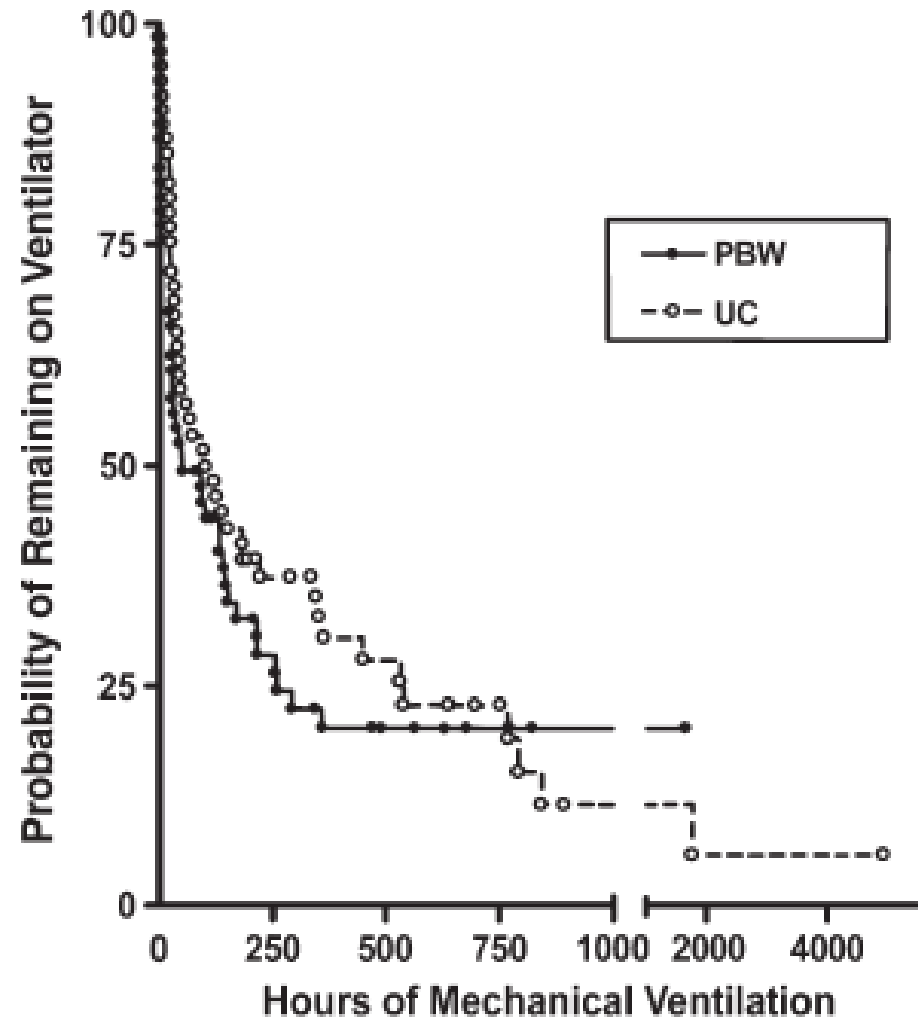
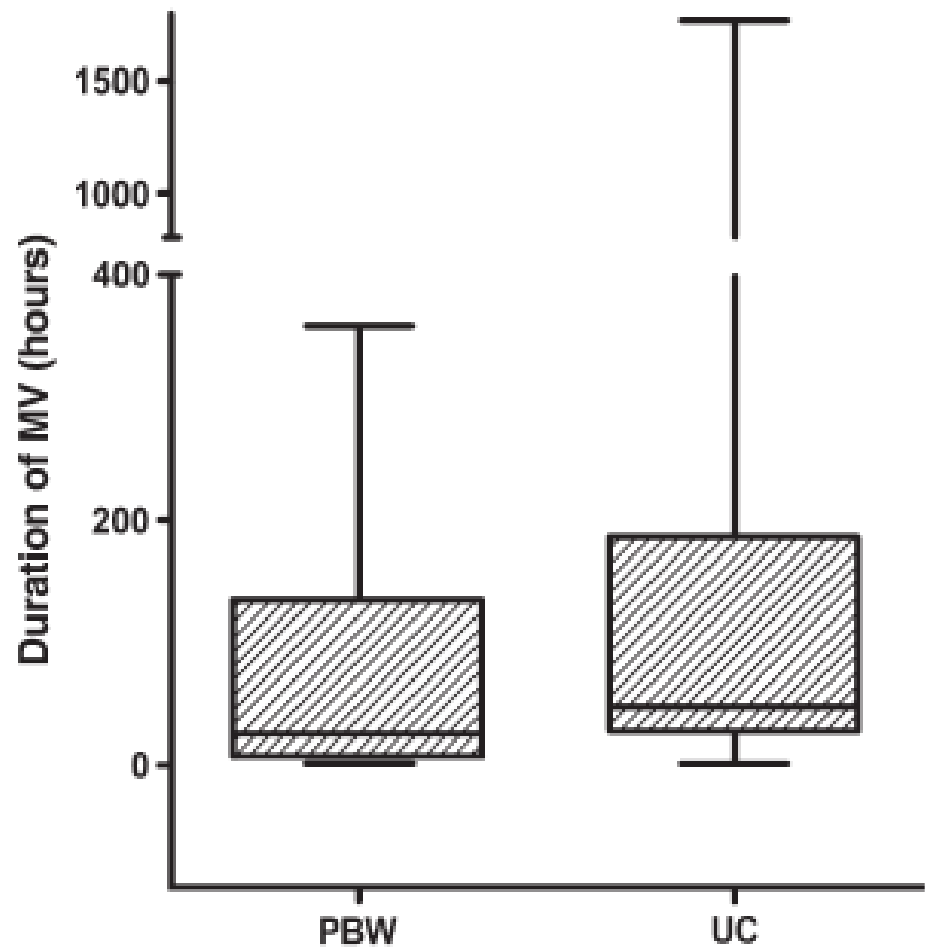
Jae Hyung Roh MD, Ara Synn RN, Chae-Man Lim MD, FCCM, Hee Jung Suh RN, Sang-Bum Hong MD, Jin Won Huh MD, Younsuck Koh MD, FCCM\*

Journal of Critical Care (2012) 27, 549–555



5 minuts CPAP 5 cmH2O:  
Si FR > 35x' à Passar a AC  
Si FR < 25x' sense treball à PSV 5  
Si FR < 25x' amb treball à PSV 20  
Si 35x' < FR < 25x' à PSV 20

Disminuir en 5 la PSV cada 2 hores  
Si a PSV 10, signes de treball à passar a AC  
Si PSV 5 ben tolerada, següent pas.



# Protocol Weaning of Mechanical Ventilation in Medical and Surgical Patients by Respiratory Care Practitioners and Nurses\*

## Effect on Weaning Time and Incidence of Ventilator-Associated Pneumonia

CHEST / 118 / 2 / AUGUST, 2000

*Gregory P. Marelich, MD, FCCP; Susan Murin, MD, FCCP; Felix Battistella, MD; John Inciardi, PharmD; Terry Vierra, RRT, RCP; and Marc Roby, RN, MSN*

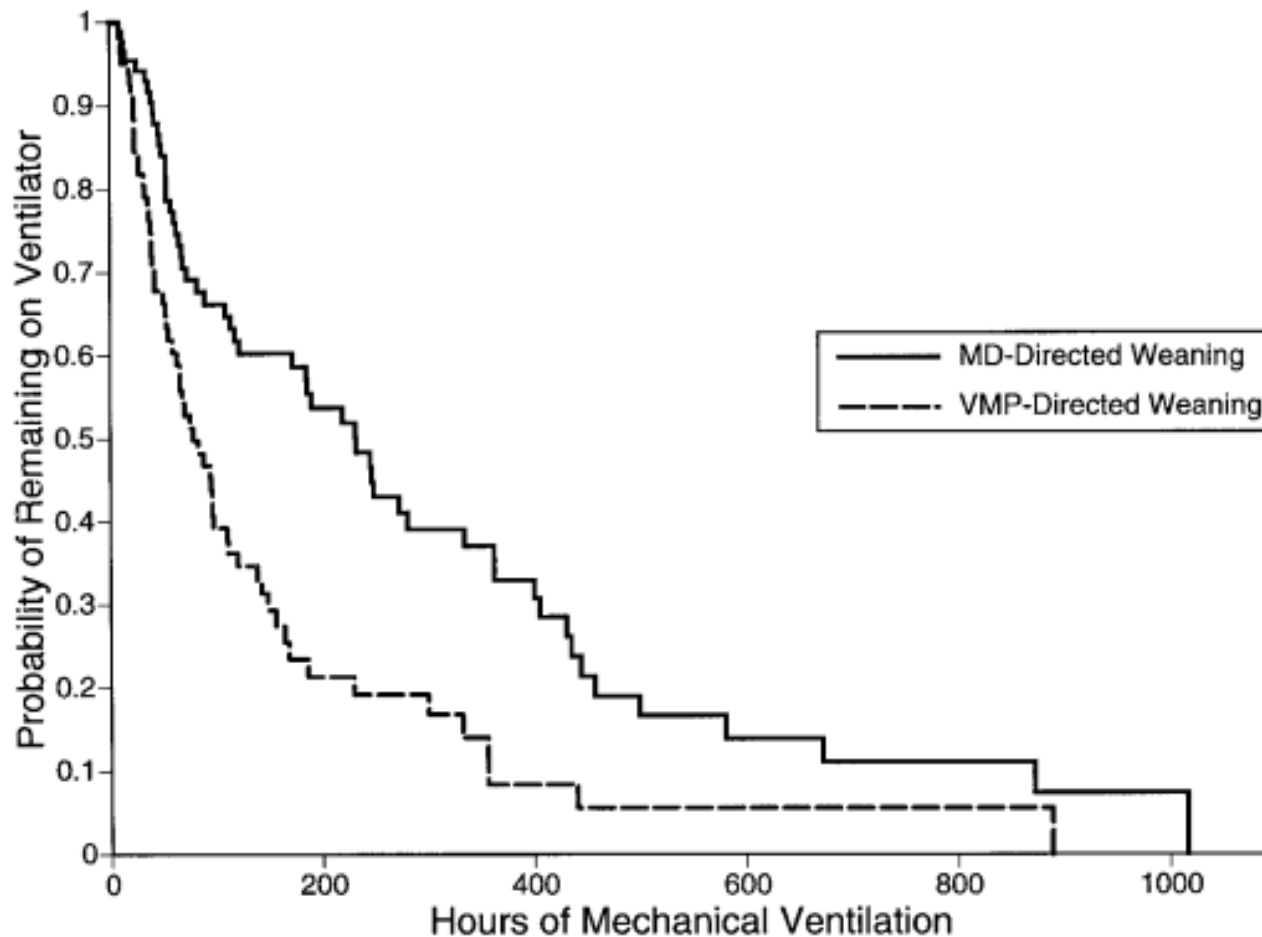


FIGURE 3. Probability of continued ventilatory support in MICU patients.



# Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients

Blackwood, B., Burns, K. E. A., Cardwell, C. R., O'Halloran, P., & Cochrane Anaesthesia Group (2014). Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients. The Cochrane database of systematic reviews, (11), CD006904. <https://doi.org/10.1002/14651858.CD006904.pub3> We included 17 trials (with 2434 patients)

## SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients					
<b>Patient or population:</b> mechanically ventilated adult patients <b>Settings:</b> intensive care units <b>Intervention:</b> protocolized weaning <b>Comparison:</b> non-protocolized weaning					
Outcomes	Illustrative comparative risks* (95% CI)		Effect Estimates (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)
	Assumed risk <del>non-protocolized weaning</del>	Corresponding risk <del>protocolized weaning</del>			
Total duration of mechanical ventilation (hours)	Mean 96 hours <sup>1</sup>	Mean 71 hours (60.5 to 83.5 hours)	Geometric mean difference -26% (-37% to -13%)	2205 [14 studies]	++ +O moderate <sup>2</sup>
Weaning duration (hours)	Mean 24 hours <sup>1</sup>	Mean 7 hours (2.8 to 17.5 hours)	Geometric mean difference -70% (-88% to -27%)	989 [8 studies]	++ OO low <sup>3</sup>
ICU length of stay (days)	Mean 8 days <sup>1</sup>	Mean 7 days (6.5 to 7.8 days)	Geometric mean difference -11% (-19% to -3%)	1378 [9 studies]	++ OO low <sup>4</sup>
ICU mortality	31% <sup>1</sup>	30% (20% to 42%)	OR 0.97 (0.57 to 1.63)	651 [6 studies]	++ +O moderate <sup>5</sup>
Reintubation	10% <sup>1</sup> <i>(following deliberate extubation)</i>	8% (5% to 12%)	OR 0.74 (0.44 to 1.23)	1487 [11 studies]	++ OO moderate <sup>6</sup>

\*The basis for the assumed risk (e.g. the mean control group risk) is provided in footnotes. The corresponding risk (and its 95% confidence interval) is based on the assumed risk in the comparison group and the effect estimate of the intervention (and its 95% CI).

CI: Confidence interval; ICU: intensive care unit; OR: Odds Ratio

# **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

Timothy D. Girard, Waleed Alhazzani, John P. Kress, Daniel R. Ouellette, Gregory A. Schmidt, Jonathon D. Truwit, Suzanne M. Burns, Scott K. Epstein, Andres Esteban, Eddy Fan, Miguel Ferrer, Gilles L. Fraser, Michelle Ng Gong, Catherine L. Hough, Sangeeta Mehta, Rahul Nanchal, Sheena Patel, Amy J. Pawlik, William D. Schweickert, Curtis N. Sessler, Thomas Strøm, Kevin C. Wilson, and Peter E. Morris; on behalf of the ATS/CHEST *Ad Hoc* Committee on Liberation from Mechanical Ventilation in Adults

American Journal of Respiratory and Critical Care Medicine Volume 195 Number 1 | January 1 2017

**Question 2: Should Acutely Hospitalized Adults Who Have Been Mechanically Ventilated for More Than 24 Hours Be Managed with a Ventilator Liberation Protocol or No Protocol?**

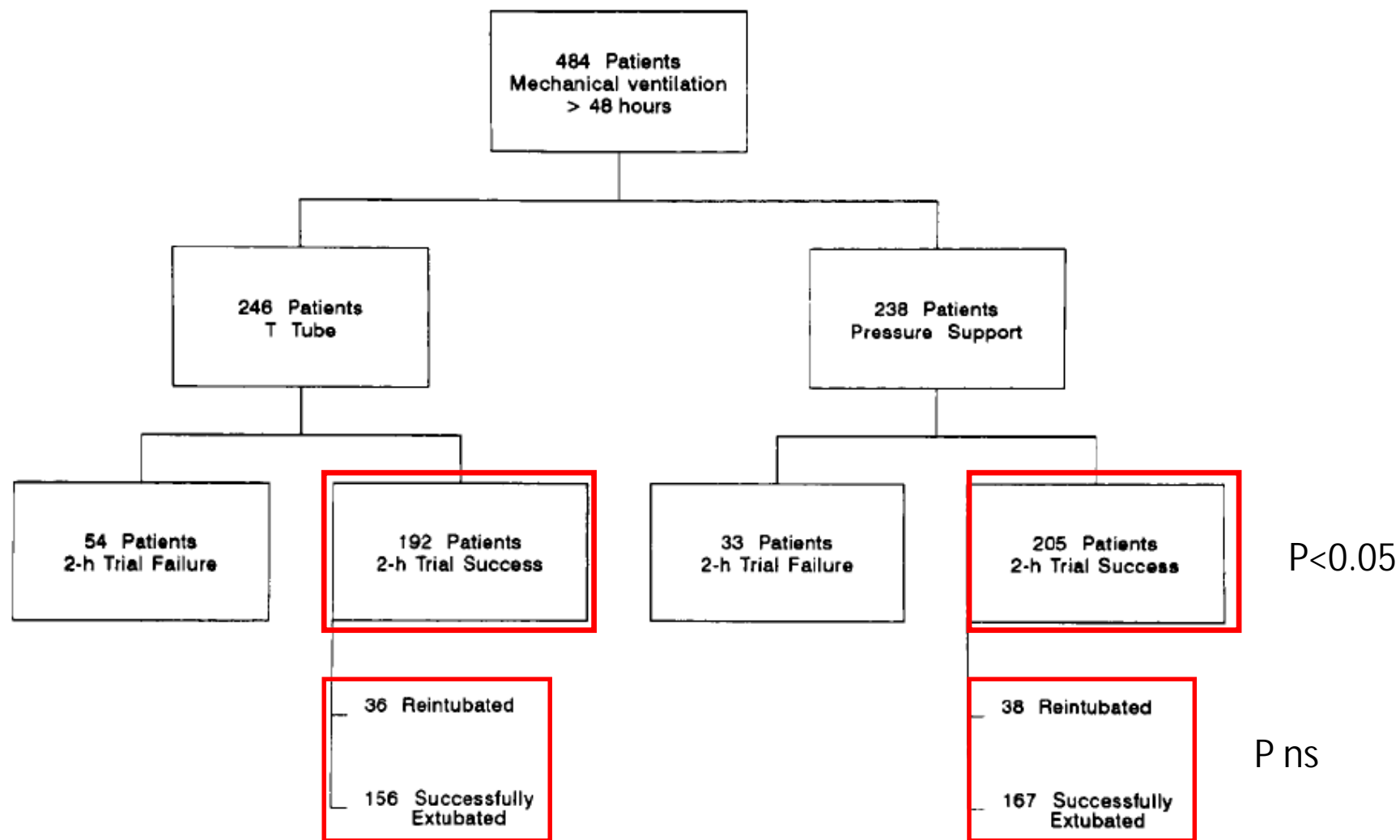
*ATS/CHEST recommendation.* We suggest managing acutely hospitalized adults who have been mechanically ventilated for more than 24 hours with a ventilator liberation protocol (conditional recommendation, low certainty in the evidence).

La prova de respiració  
espontània: SBT

# Extubation Outcome after Spontaneous Breathing Trials with T-Tube or Pressure Support Ventilation

ANDRÉS ESTEBAN, INMACULADA ALÍA, FEDERICO GORDO, RAFAEL FERNÁNDEZ, JOSÉ F. SOLSONA, INMACULADA VALLVERDÚ, SANTIAGO MACÍAS, JOSÉ M. ALLEGUE, JESÚS BLANCO, DEMETRIO CARRIEDO, MIGUEL LEÓN, MIGUEL A. de la CAL, FRANCISCO TABOADA, JUAN GONZALEZ de VELASCO, EUGENIO PALAZÓN, FRANCISCO CARRIZOSA, ROSER TOMÁS, JOSÉ SUAREZ, and ROSANNE S. GOLDWASSER for the Spanish Lung Failure Collaborative Group

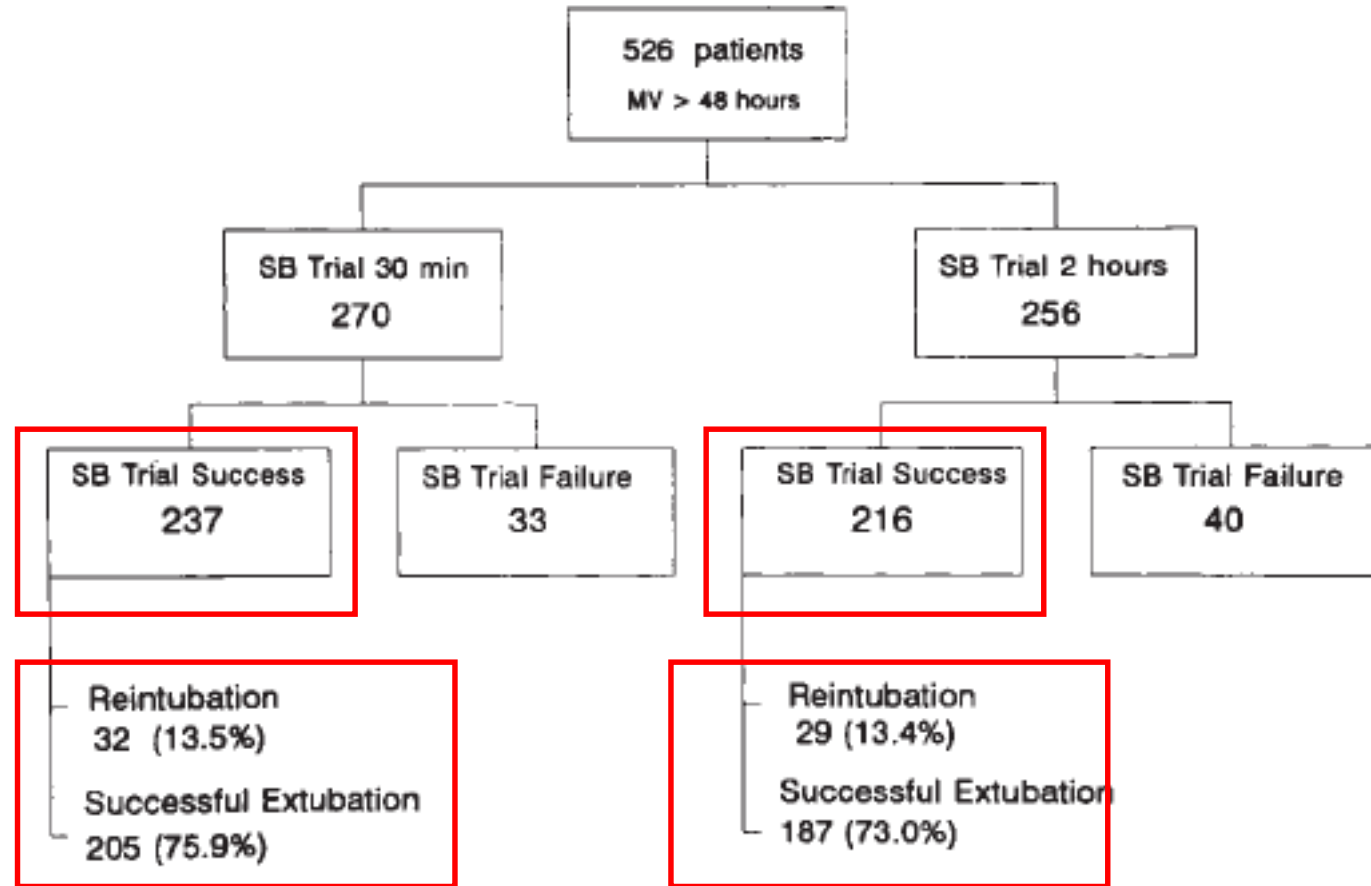
AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE VOL. 156 1997



# Effect of Spontaneous Breathing Trial Duration on Outcome of Attempts to Discontinue Mechanical Ventilation

AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE VOL 159 1999

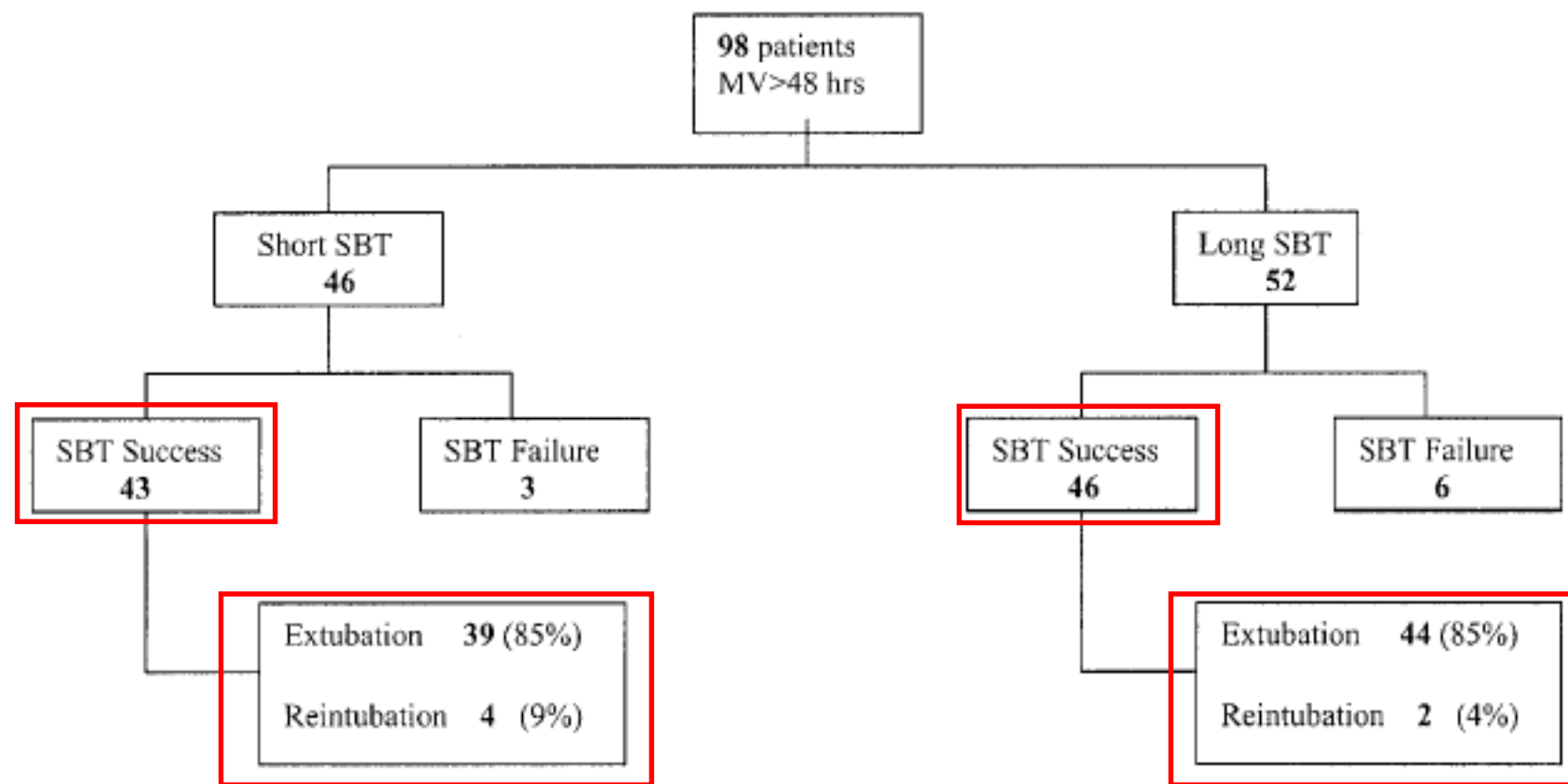
ANDRÉS ESTEBAN, INMACULADA ALÍA, MARTIN J. TOBIN, ANSELMO GIL, FEDERICO GORDO, INMACULADA VALLVERDÚ, LLUIS BLANCH, ALFONSO BONET, ANTONIA VÁZQUEZ, RAUL de PABLO, ANTONIO TORRES, MIGUEL A. de la CAL, and SANTIAGO MACÍAS for the Spanish Lung Failure Collaborative Group\*



# Protocol-directed weaning from mechanical ventilation: clinical outcome in patients randomized for a 30-min or 120-min trial with pressure support ventilation

Andreas Perren  
Guido Domenighetti  
Simonetta Mauri  
Franco Genini  
Nicoletta Vizzardi

Intensive Care Med (2002) 28:1058–1063  
DOI 10.1007/s00134-002-1353-z

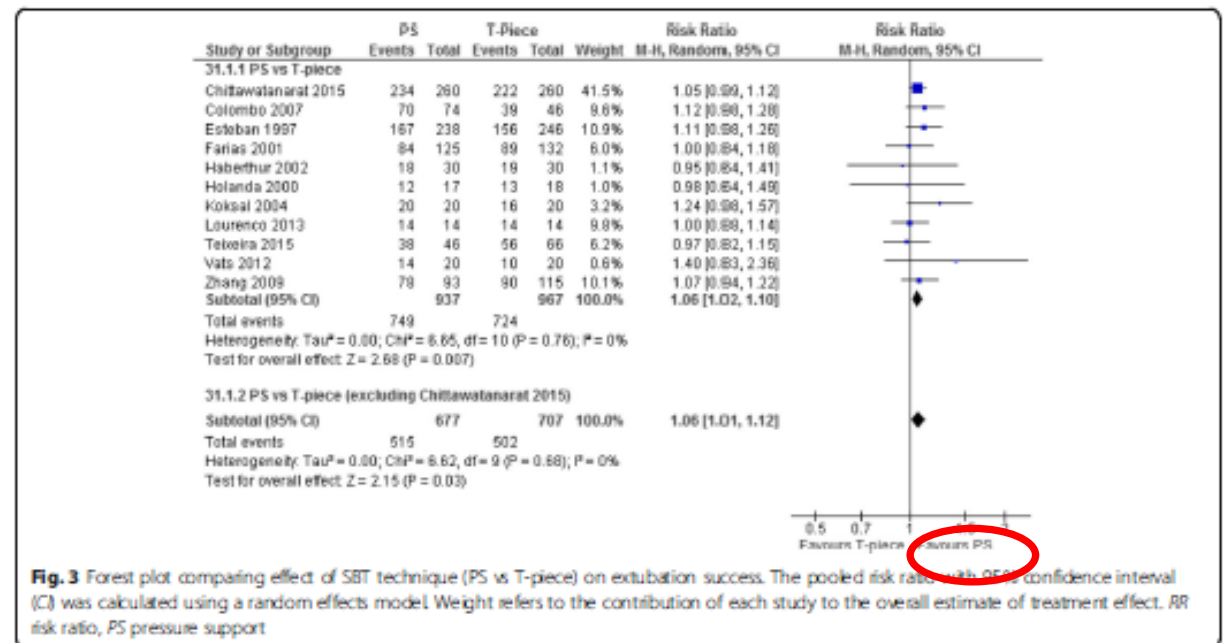
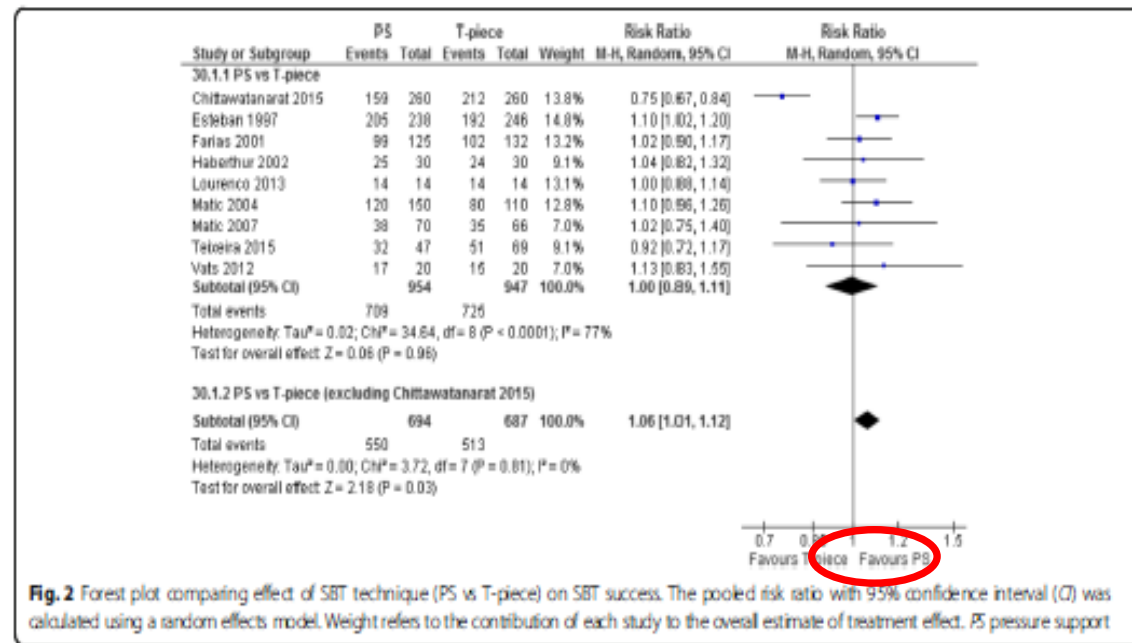


# Trials directly comparing alternative spontaneous breathing trial techniques: a systematic review and meta-analysis



Burns *et al. Critical Care* (2017) 21:127  
DOI 10.1186/s13054-017-1698-x

Karen E. A. Burns<sup>1,2,3</sup>, Ibrahim Soliman<sup>1,2</sup>, Neill K. J. Adhikari<sup>2,4</sup>, Amer Zweir<sup>1,2</sup>, Jessica T. Y. Wong<sup>5</sup>, Carolina Gomez-Builes<sup>1,2</sup>, Jose Augusto Pellegrini<sup>6,7</sup>, Lu Chen<sup>1,2</sup>, Nuttapol Rittayamai<sup>1,2</sup>, Michael Sklar<sup>1,2</sup>, Laurent J. Brochard<sup>1,2</sup> and Jan O. Friedrich<sup>1,2\*</sup>



**Fig. 2** Forest plot comparing effect of SBT technique (PS vs T-piece) on SBT success. The pooled risk ratio with 95% confidence interval (CI) was calculated using a random effects model. Weight refers to the contribution of each study to the overall estimate of treatment effect. PS pressure support

**Fig. 3** Forest plot comparing effect of SBT technique (PS vs T-piece) on extubation success. The pooled risk ratio with 95% confidence interval (CI) was calculated using a random effects model. Weight refers to the contribution of each study to the overall estimate of treatment effect. RR risk ratio, PS pressure support



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



CHEST 2017; 151(1):166-180

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

*Question 1: In acutely hospitalized patients ventilated more than 24 h, should the SBT be conducted with or without inspiratory pressure augmentation?*

**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<sub>2</sub>O) rather than without (T-piece or CPAP) (Conditional Recommendation, Moderate-Quality Evidence)**

**Effect of pressure support vs T-piece ventilation strategies during spontaneous breathing trials on successful extubation among patients receiving mechanical ventilation: a randomized clinical trial.**

Subirà C. MD<sup>1</sup>, Hernández G. MD PhD<sup>2</sup>, Vázquez A. MD<sup>3</sup>, Rodríguez-García R. MD<sup>4</sup>, González-Castro A. MD<sup>5</sup>, García C. MD<sup>6</sup>, Rubio O. MD PhD<sup>1,7</sup>, Ventura L. MD<sup>1</sup>, López A. MD<sup>8</sup>, de la Torre MC. MD<sup>9</sup>, Keough E. MD<sup>10</sup>, Arauzo V. MD<sup>11</sup>, Hermosa C. MD<sup>12</sup>, Sánchez C. MD<sup>13</sup>, Tizón A. MD<sup>14</sup>, Tenza E. MD PhD<sup>15</sup>, Laborda C. MD<sup>16</sup>, Cabañes S. MD<sup>17</sup>, Lacueva V. MD<sup>18</sup>, Fernández MM. MD PhD<sup>19</sup>, Arnau A. Msc PhD<sup>1</sup>, Fernández R. MD PhD<sup>1,7,20</sup>.

	2-h T-piece (n = 578)	30-min PSV (n = 575)	Mean difference <sup>b</sup> , 30-min PSV minus 2-h T-piece (95% CI)	P Value
<b>Primary outcome</b>				
Successful extubation <sup>c</sup> , No. (%)	428 (74.0)	473 (82.3)	8.2 (3.4 – 13.0)	0.001
<b>Secondary outcomes</b>				
Extubated after first SBT, No. (%)	486 (84.1)	532 (92.5)	8.4 (4.7 – 12.1)	<0.001
Reintubation within 72 h, No. (%) <sup>d</sup>	58 (11.9)	59 (11.1)	-0.8 (-4.8 – 3.1)	0.63
ICU length of stay, median (IQR), d	10 (5-17)	9 (5-17)	-0.3 (-1.7 – 1.1)	0.69
Hospital length of stay, median (IQR), d	24 (15-39)	24 (15-40)	1.3 (-2.2 – 4.9)	0.45
ICU mortality, No. (%)	38 (6.6)	29 (5.0)	-1.5 (-4.2 – 1.1)	0.26
Hospital mortality, No. (%)	86 (14.9)	60 (10.4)	-4.4 (-8.3 – -0.6)	0.02
90-day mortality, No. (%) <sup>e</sup>	100 (17.3)	76 (13.2)	-4.1 (-8.2 – 0.01)	0.04
<b>Exploratory outcomes</b>				
Tracheostomy, No. (%)	50 (8.7)	41 (7.1)	-1.5 (-4.6 – 1.6)	0.38

# Effort to Breathe with Various Spontaneous Breathing Trial Techniques

## A Physiologic Meta-analysis

Michael C. Sklar<sup>1,2</sup>, Karen Burns<sup>2,3</sup>, Nuttapol Rittayamai<sup>4</sup>, Ashley Lanys<sup>2</sup>, Michela Rauseo<sup>2,5</sup>, Lu Chen<sup>2</sup>, Martin Dres<sup>2,6</sup>,  
Guang-Qiang Chen<sup>2,7</sup>, Ewan C. Goligher<sup>3,8</sup>, Neill K. J. Adhikari<sup>3,9</sup>, Laurent Brochard<sup>2,3</sup>, and Jan O. Friedrich<sup>2,3</sup>

American Journal of Respiratory and Critical Care Medicine Volume 195 Number 11 | June 1 2017

**Conclusions:** Pressure support reduces respiratory effort compared with T-piece. Continuous positive airway pressure of 0 cm H<sub>2</sub>O and T-piece more accurately reflect the physiologic conditions after extubation.

La millor SBT és encara tema de debat:

- La PSV aconsegueix un major tolerància a la SBT i un major éxit de l'extubació.
- El tub en T és la SBT que millor mimetitza la situació després de l'extubació. D'aquí que alguns autors la considerin la SBT més adient.
- La durada de la SBT ha de ser entre 30 minuts i 2 hores. Sembla que 30 minuts podrien ser suficients.

Fracàs del weaning

# Per què ens preocupa el fracàs de l'extubació?

**TABLE 2. Factors Associated With Extubation Failure Defined as Reintubation Within the 7 Days Following Extubation and Associated Outcomes**

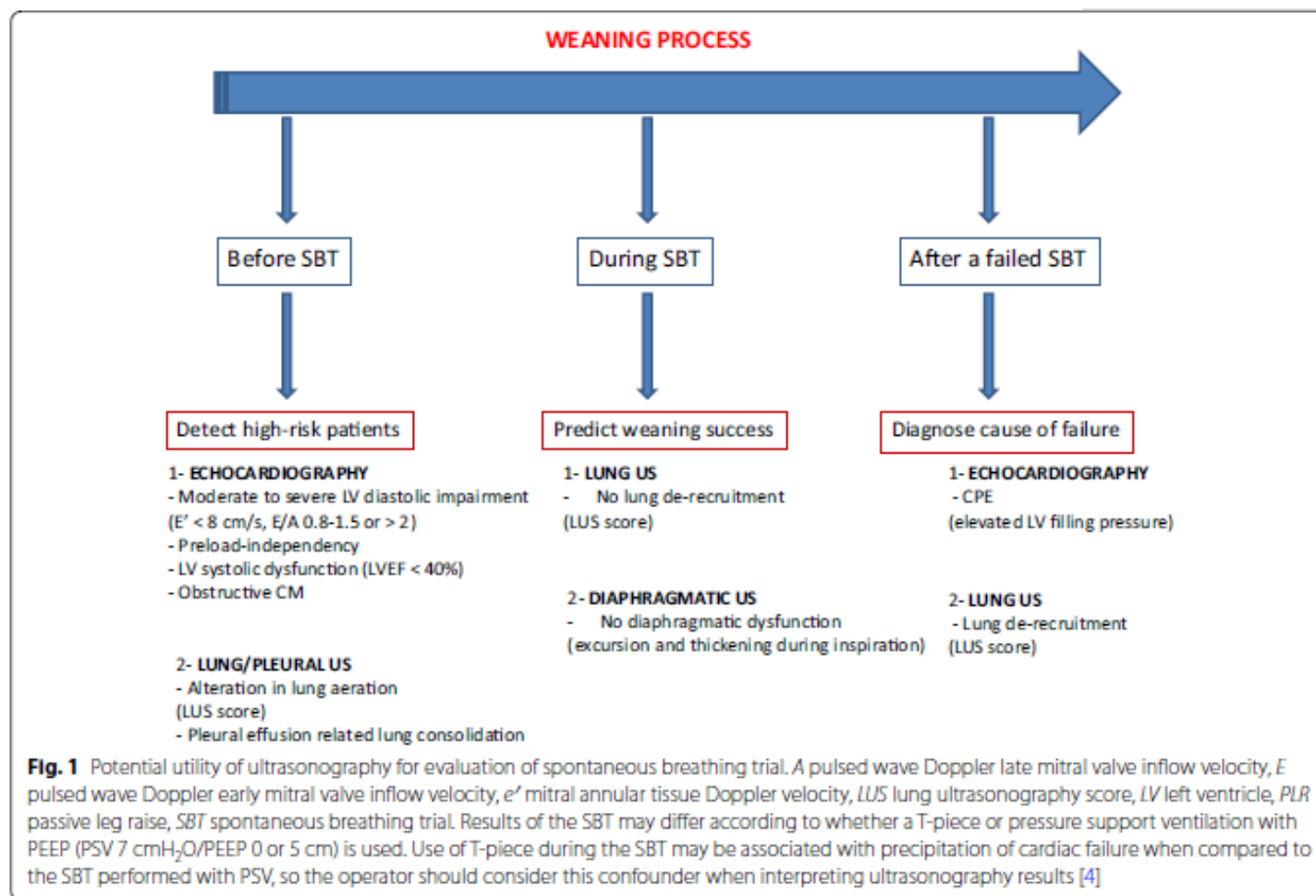
Variable	Success (n = 194)	Failure (n = 31)	p
Patients outcomes			
Total duration of invasive MV, median (IQR), d	5.0 (3.0–10.0)	21.0 (15.5–36.0)	< 0.001
Length of ICU stay, median (IQR), d	10.0 (7.0–16.0)	26.0 (20.0–59.5)	< 0.001
In-ICU mortality, n (%)	0 (0)	17 (53)	< 0.001

**TABLE 3. Factors Independently Associated With Extubation Failure, Defined as Reintubation Within the First 72 Hours or Within 7 Days Following Extubation, After Multivariate Logistic Regression**

Variables Associated With Extubation Failure	Reintubation ≤ 72 Hr		Reintubation ≤ 7 D	
	Adjusted Odds Ratio <sup>a</sup> (95% CI)	p	Adjusted Odds Ratio <sup>a</sup> (95% CI)	p
Abundant secretions	3.32 (1.21–9.13)	0.020		NS
Ineffective cough	5.03 (1.80–14.1)	0.002	5.09 (1.88–13.8)	0.001
Duration of mechanical ventilation before extubation > 7 d	2.87 (1.11–7.41)	0.030	3.66 (1.54–8.69)	0.003
Severe systolic left ventricular dysfunction (left ventricular ejection fraction ≤ 30%)		NS	5.23 (1.65–16.6)	0.005

# Ultrasonography evaluation during the weaning process: the heart, the diaphragm, the pleura and the lung

P. Mayo<sup>1\*</sup>, G. Volpicelli<sup>2</sup>, N. Lerolle<sup>3</sup>, A. Schreiber<sup>4</sup>, P. Doelken<sup>5</sup> and A. Vieillard-Baron<sup>6,7,8</sup>



# La profilaxi del fracàs



# Fisioteràpia



Figure 1. Bedside cycle ergometer (MOTOmed Letto 2, RECK, Betzenweiler, Germany).

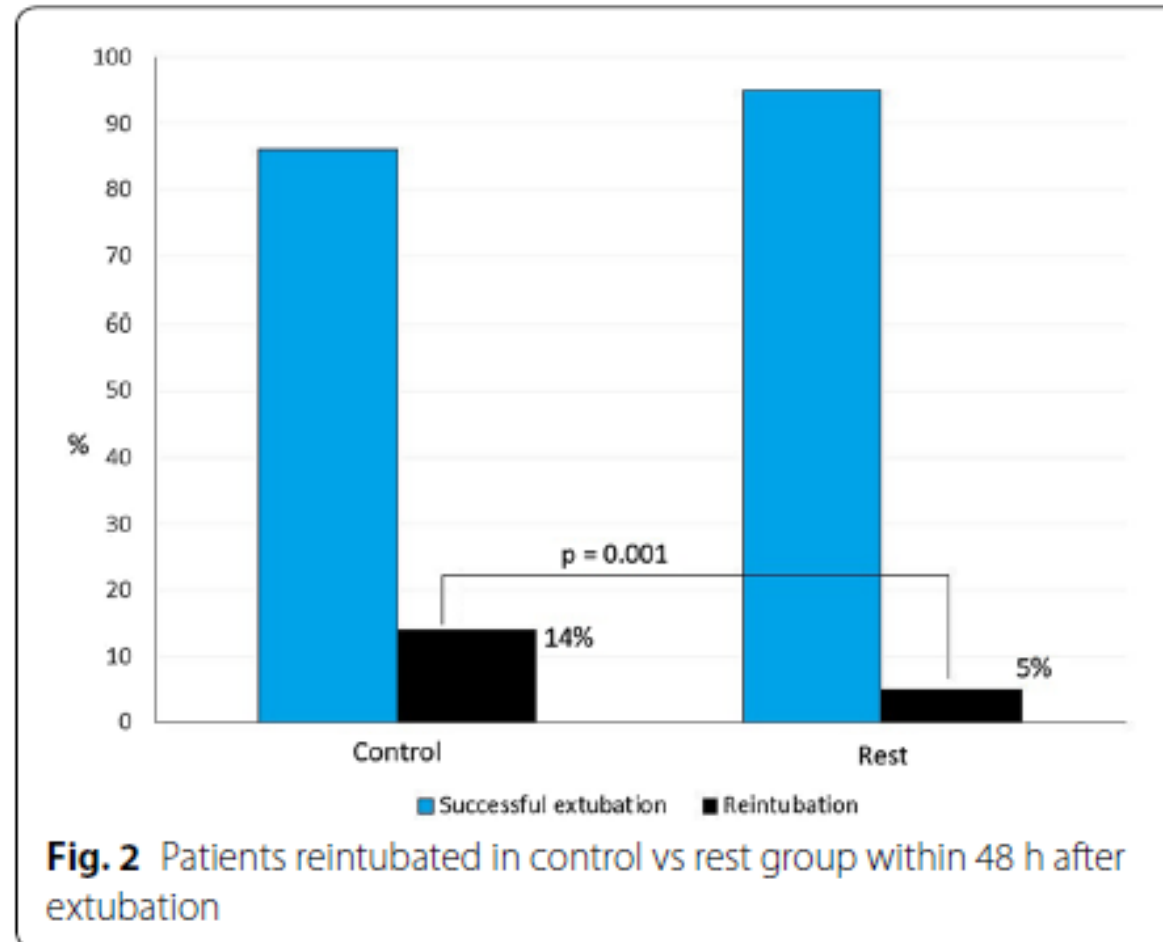
El repòs

# Reconnection to mechanical ventilation for 1 h after a successful spontaneous breathing trial reduces reintubation in critically ill patients: a multicenter randomized controlled trial



*Intensive Care Med*  
DOI 10.1007/s00134-017-4911-0

M. Mar Fernandez<sup>1\*</sup>, Alejandro González-Castro<sup>2</sup>, Monica Magret<sup>3</sup>, M. Teresa Bouza<sup>4</sup>, Marcos Ibañez<sup>5</sup>, Carolina García<sup>6</sup>, Begoña Balerdi<sup>7</sup>, Arantxa Mas<sup>8</sup>, Vanesa Arauzo<sup>9</sup>, José M. Añón<sup>10</sup>, Francisco Ruiz<sup>11</sup>, José Ferreres<sup>12</sup>, Roser Tomás<sup>13</sup>, Marta Alabert<sup>14</sup>, Ana Isabel Tizón<sup>15</sup>, Susana Altaba<sup>16</sup>, Noemi I lamas<sup>17</sup> and Rafael Fernandez<sup>18</sup>



L'OAF

# Nasal High-Flow versus Venturi Mask Oxygen Therapy after Extubation

## Effects on Oxygenation, Comfort, and Clinical Outcome

Salvatore Maurizio Maggiore<sup>1</sup>, Francesco Antonio Idone<sup>1</sup>, Rosanna Vaschetto<sup>2</sup>, Rossano Festa<sup>1</sup>, Andrea Cataldo<sup>1</sup>,  
Federica Antonicelli<sup>1</sup>, Luca Montini<sup>1</sup>, Andrea De Gaetano<sup>3</sup>, Paolo Navalesi<sup>4,5,6</sup>, and Massimo Antonelli<sup>1</sup>

American Journal of Respiratory and Critical Care Medicine Volume 190 Number 3 | August 1 2014

**Table 2.** Need for Ventilatory Support during the 48-Hour Study Period

	Control Group (n = 52)	NHF (n = 53)	P Value
Noninvasive ventilation, n (%)	8 (15.4)	2 (3.8)	0.042
Endotracheal intubation, n (%)	11 (21.2)	2 (3.8)	0.005
Cause of endotracheal intubation			
Hypercapnia with respiratory acidosis, n (%)	0	0	N/A
Changes in mental status, n (%)	1 (1.9)	1 (1.9)	0.989
Oxygen desaturation or hypoxia, n (%)	6 (11.5)	1 (1.9)	0.047
Unbearable dyspnea with respiratory muscle failure, n (%)	4 (7.7)	1 (1.9)	0.162
Persistent hypotension, n (%)	2 (3.8)	0	0.149
Inability to clear secretions, n (%)	6 (11.5)	1 (1.9)	0.047

*Definition of abbreviation:* NHF = nasal high-flow oxygen therapy.

# Effect of Postextubation High-Flow Nasal Cannula vs Conventional Oxygen Therapy on Reintubation in Low-Risk Patients

## A Randomized Clinical Trial

Gonzalo Hernández, MD, PhD; Concepción Vaquero, MD; Paloma González, MD; Carles Subira, MD; Fernando Frutos-Vivar, MD; Gemma Rialp, MD; Cesar Laborda, MD; Laura Colinas, MD; Rafael Cuenca, MD; Rafael Fernández, MD, PhD

Table 2. Primary and Secondary Outcomes

Variable	Oxygen Therapy		Difference Between Groups (95% CI)	P Value
	High-Flow (n = 264)	Conventional (n = 263)		
<b>Primary Outcome</b>				
All-cause reintubation, No. (%)	13 (4.9)	32 (12.2)	7.2 (2.5 to 12.2)	.004 <sup>a</sup>
<b>Secondary Outcomes</b>				
Postextubation respiratory failure, No. (%)	22 (8.3)	38 (14.4)	6.1 (0.7 to 11.6)	.03 <sup>a</sup>

Reasons for reintubation, No. (%)				
Respiratory causes for reintubation				
Cardiorespiratory arrest	0	1 (0.4)		
Agitation	1 (0.4)	0		
Inability to clear secretions	0	5 (1.9)		
Hemodynamic impairment <sup>a</sup>	1 (0.4)	1 (0.4)		
Persistent postextubation respiratory failure	2 (0.8)	16 (6)		.02 <sup>b</sup>

La VNI

# Noninvasive ventilation to prevent respiratory failure after extubation in high-risk patients\*

Crit Care Med 2005 Vol. 33, No. 11

Stefano Nava; Cesare Gregoretti; Francesco Fanfulla; Enzo Squadrone; Mario Grassi; Annalisa Carlucci; Fabio Beltrame; Paolo Navalesi

Table 1. Criteria for enrollment

- 
- Mechanical ventilation >48 hrs  
Successful weaning trial  
Plus one or more of the following high-risk scenarios for reintubation features:
1. More than one consecutive failure of weaning trial
  2. Chronic heart failure
  3.  $Paco_2 >45$  mm Hg after extubation
  4. More than one comorbidity (excluding chronic heart failure)
  5. Weak cough defined as Airway Care Score (10) values  $\geq 8$  and  $<12$
  6. Upper airways stridor at extubation not requiring immediate reintubation
- 

	VNI (n=48)	Standard (n=49)	P
Reintubation, n° (%)	4 (6,6%)	12 (24,4%)	0,027



# Non-invasive ventilation after extubation in hypercapnic patients with chronic respiratory disorders: randomised controlled trial

Lancet 2005; 374: 1082-88

Miguel Ferrer, Jacobo Sellarés, Mauricio Valencia, Andres Carrillo, Gumersindo Gonzalez, Joan Ramon Badia, Josep Maria Nicolas, Antoni Torres

	Non-Invasive ventilation (n=54)	Control (n=52)	Odds ratio (95% CI)	p
<b>Outcome variables</b>				
Respiratory failure after extubation	8 (15%)	25 (48%)	5.32 (2.11-13.46)	<0.0001

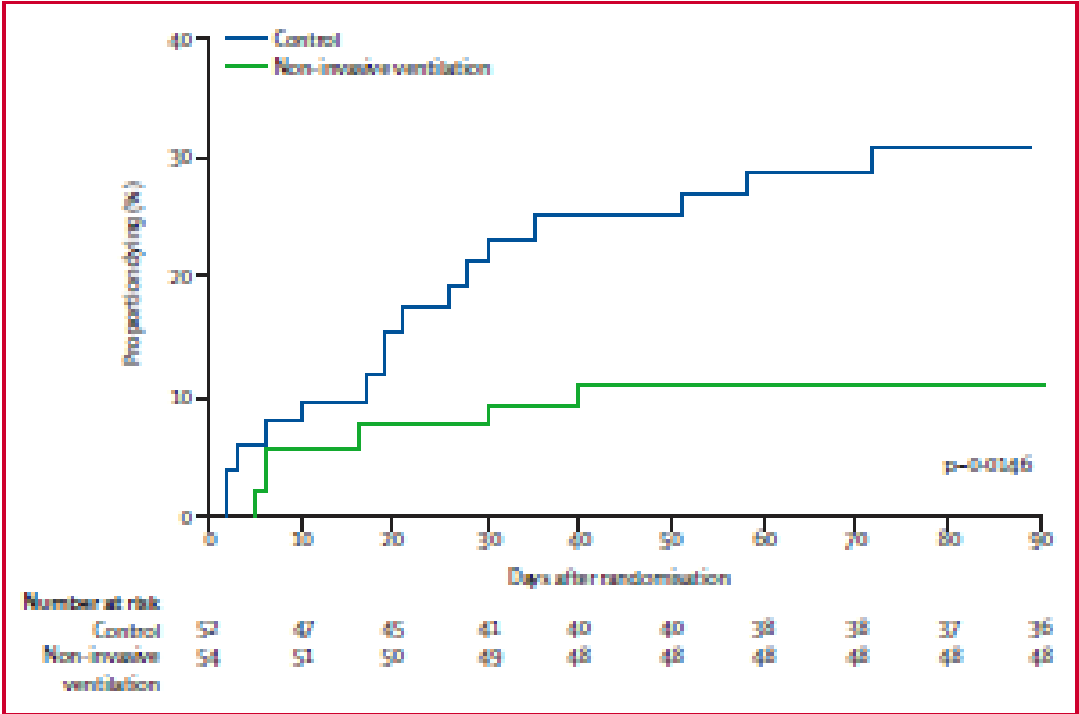


Figure 3: Kaplan-Meier 90-day mortality curve

# Effect of Postextubation High-Flow Nasal Cannula vs Noninvasive Ventilation on Reintubation and Postextubation Respiratory Failure in High-Risk Patients

## A Randomized Clinical Trial

JAMA. 2016;316(15):1565-1574. doi:10.1001/jama.2016.14194  
Published online October 5, 2016.

Gonzalo Hernández, MD, PhD; Concepción Vaquero, MD; Laura Collnas, MD; Rafael Cuena, MD; Paloma González, MD; Alfonso Canabal, MD, PhD; Susana Sanchez, MD; María Luisa Rodríguez, MD; Ana Villasclaras, MD; Rafael Fernández, MD, PhD

Table 2. Primary and Secondary Outcomes

	No. (%)		Difference Between Groups (95% CI) <sup>a</sup>
	Noninvasive Mechanical Ventilation (n = 314)	High-Flow Conditioned Oxygen Therapy (n = 290)	
<b>Primary outcome</b>			
All-cause reintubation <sup>b</sup>	60 (19.1)	66 (22.8)	-3.7 (-9.1 to ∞) <sup>c</sup>
Postextubation respiratory failure <sup>b</sup>	125 (39.8)	78 (26.9)	12.9 (6.6 to ∞) <sup>c</sup>

I pel tractament del fracàs?

# Noninvasive Positive-Pressure Ventilation for Postextubation Respiratory Distress

A Randomized Controlled Trial

JAMA, June 26, 2002—Vol 287, No. 24

**Table 2.** Outcomes for the Study Groups\*

Outcomes	NPPV (n = 39)	Standard Therapy (n = 42)	P Value
Reintubation, No. (%)	28 (72)	29 (69)	.79
Pneumonia, No. (%)	16 (41)	17 (40)	.81
Duration of ventilation†			
Mean (SD)	8.4 (7.4)	17.5 (28.0)	.11
Median (range)	6.7 (0.5-28.6)	8.9 (2.0-146.7)	.12
ICU length of stay			
Mean (SD)	15.1 (10.9)	19.4 (25.0)	.32
Median (range)	11.9 (3.6-41.7)	10.8 (2.3-152.7)	.72
Hospital length of stay			
Mean (SD)	32.2 (25.4)	29.8 (28.4)	.69
Median (range)	19 (6-111)	22 (4-162)	.51
ICU survival, No. (%)	33 (85)	32 (76)	.34
Hospital survival, No. (%)	27 (69)	29 (69)	.99

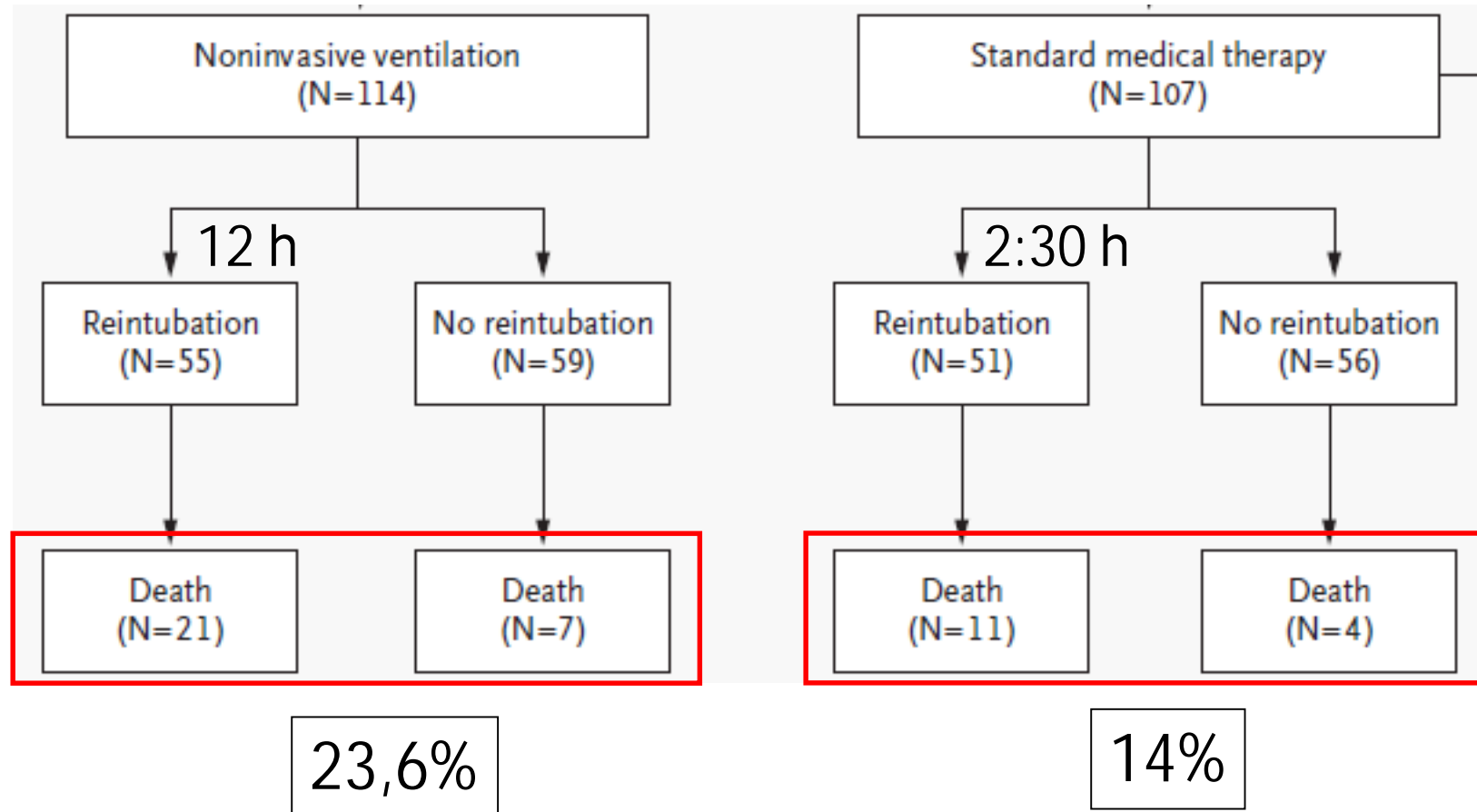
\*NPPV indicates noninvasive positive pressure ventilation; ICU, intensive care unit.

†Duration of mechanical ventilation includes only time using conventional ventilator.

# Noninvasive Positive-Pressure Ventilation for Respiratory Failure after Extubation

Andrés Esteban, M.D., Ph.D., Fernando Frutos-Vivar, M.D.,  
Niall D. Ferguson, M.D., Yaseen Arabi, M.D.,  
Carlos Apezteguía, M.D., Marco González, M.D., Scott K. Epstein, M.D.,  
Nicholas S. Hill, M.D., Stefano Nava, M.D., Marco-Antonio Soares, M.D.,  
Gabriel D'Empaire, M.D., Inmaculada Alía, M.D., and Antonio Anzueto, M.D.

N Engl J Med 2004;350:2452-60.  
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# I què fem quan fracassen?

Direct reintubation	22/58 (38%)	9/24 (37%)	0.97
High-risk patients	20/51 (39%)	8/22 (36%)	0.82
Low-risk patients	2/7 (29%)	1/2 (50%)	0.57
Rescue noninvasive ventilation	34/58 (59%)	13/24 (54%)	0.71
High-risk patients	29/51 (57%)	12/22 (54%)	0.85
Low-risk patients	5/7 (71%)	1/2 (50%)	0.57
Reintubation after NV	13/34 (38%)	3/13 (23%)	0.33
High-risk patients	12/29 (41%)	3/12 (25%)	0.32
Low-risk patients	1/5 (20%)	0/1 (0%)	0.62

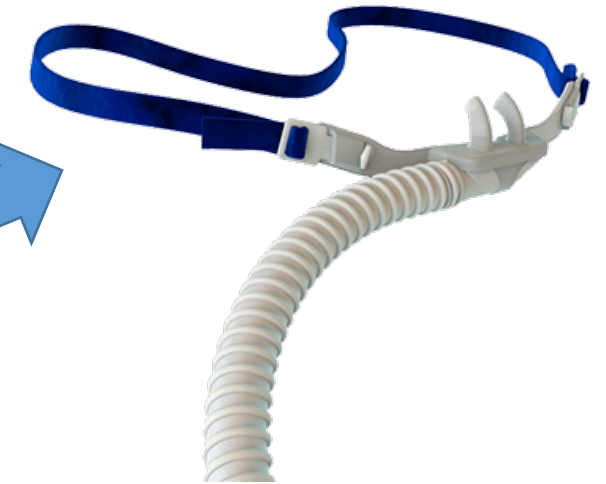
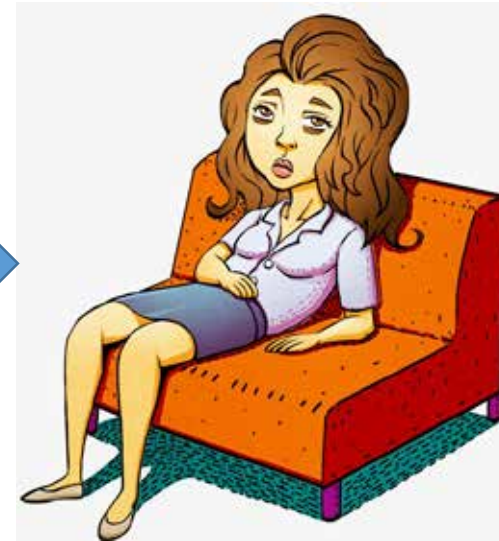
## Conclusions

- La millor SBT encara no sabem quina és.
- L'ús de protocols de weaning per infermeria podrien reduir els dies de VM a les nostres UCI.
- L'ecografia és una eina útil per predir l'evolució del weaning i orientar el tractament dels pacients que no toleren la SBT.
- La reconnexió al ventilador, l'OAF i la VNI han demostrat ser tractaments efectius per la profilaxi del fracàs respiratori.
- La VNI per tractar el fracàs respiratori postextubació no ha demostrat ser eficaç. Encara que el seu ús està àmpliament extés.

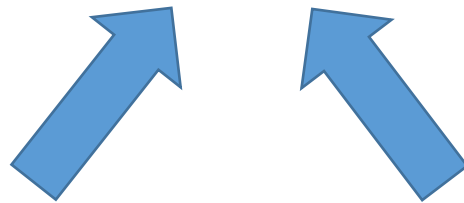
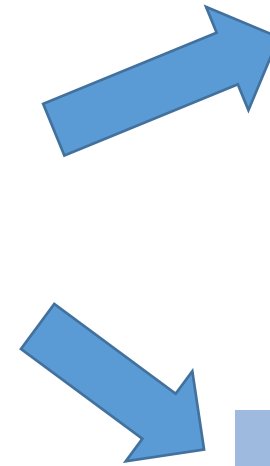
La profilaxi

Repòs

SBT



L'ecografia







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