

Hospital
del Mar

Parc
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MAR
Barcelona



GRUP DE TREBALL
Unitats de Cures Agudes
Cardiològiques

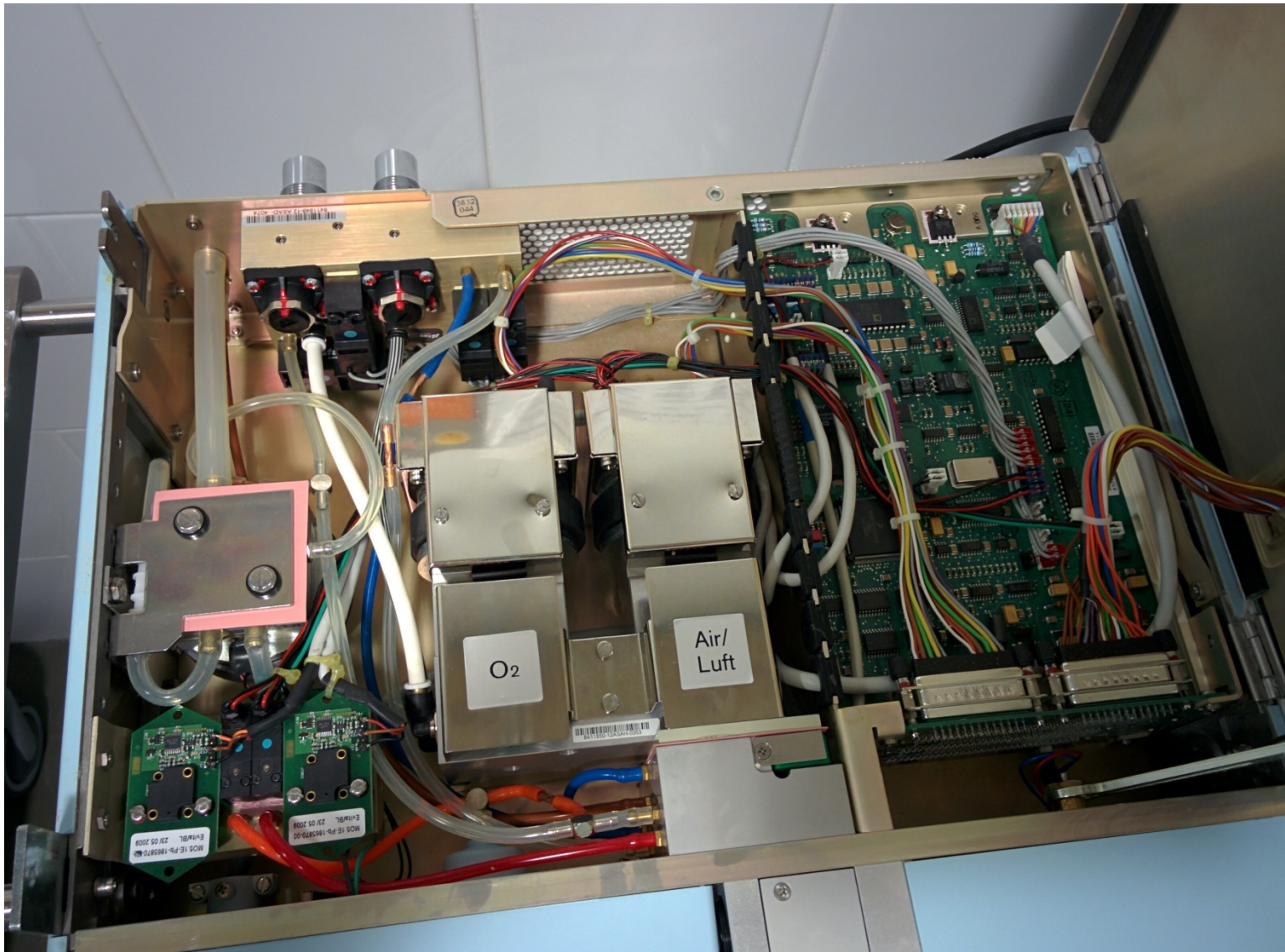


Ventilación mecánica invasiva

Situaciones difíciles

22 de Noviembre de 2019

Francisco José Parrilla Gómez
Especialista en Medicina Intensiva



Parametrización Básica A-C/V

- Parámetros que debemos ajustar
 - Vt: 6-8ml/kg del PBW

Predicted Body Weight (PBW)

Men: $50 + 0,91(\text{altura en cm} - 152,4)$

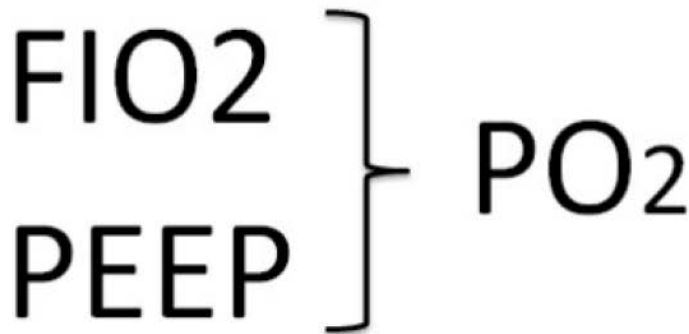
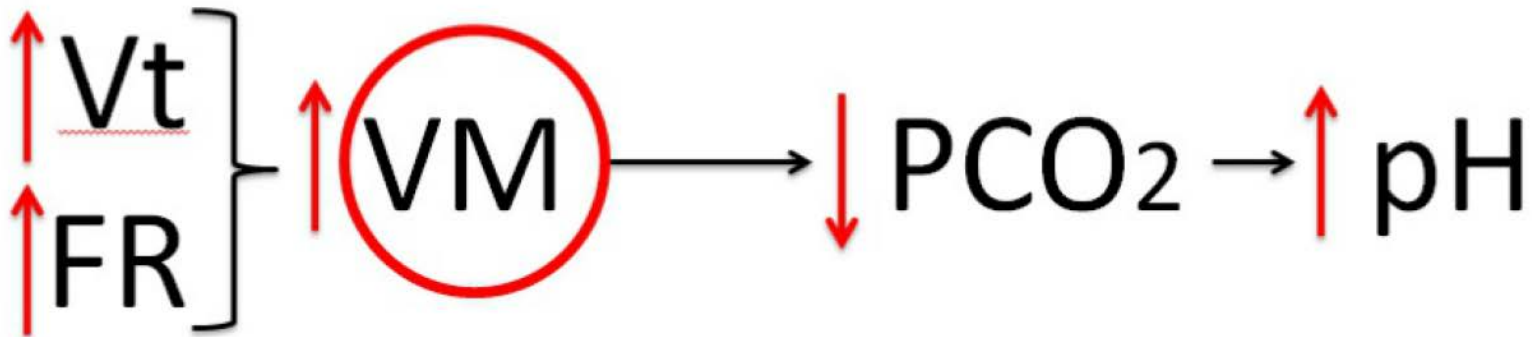
Women: $45,5 + 0,91(\text{altura en cm} - 152,4)$

- Frecuencia respiratoria
- FIO₂: objetivo PaO₂ > 80mmHg en pacientes cardiológicos
- PEEP





Parametrización Básica A-C/V



Legenda:

Vt: Volumen Tidal (Volumen Corriente)

VM: Volumen Minuto (litros/min)

PCO₂: presión parcial CO₂

PO₂: presión parcial de O₂

FIO₂: fracción inspirada de O₂

PEEP: presión al final de la espiración

Parametrización Básica A-C/V

- Parámetros que debemos ajustar
 - Tiempo inspiratorio ($\leq 1s$) y/o Tiempo de Pausa
 - Flujo inspiratorio: $\approx 40-60l/min$
 - **Alarmas**
 - V_t
 - FR
 - VM
 - Presión vía aérea



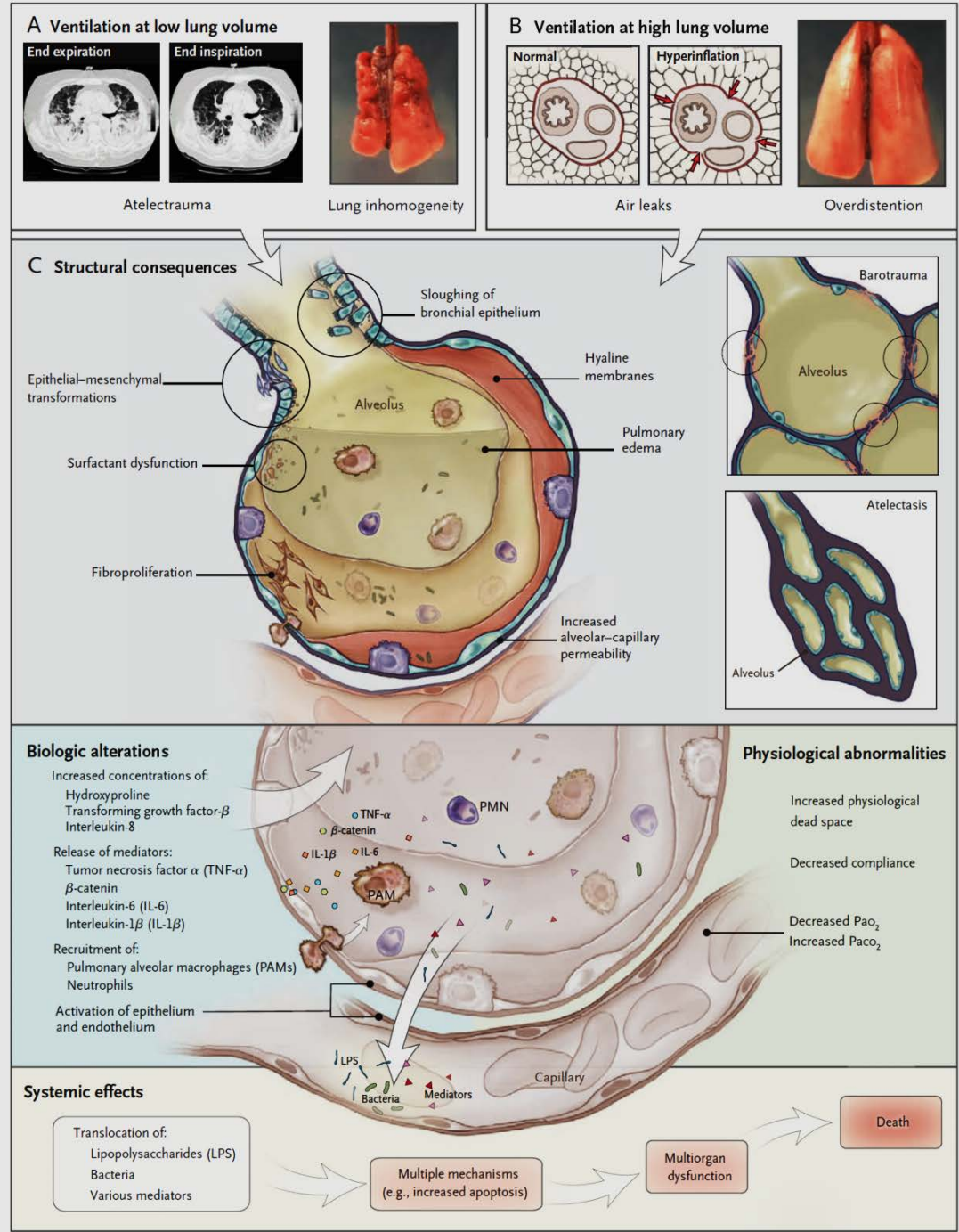
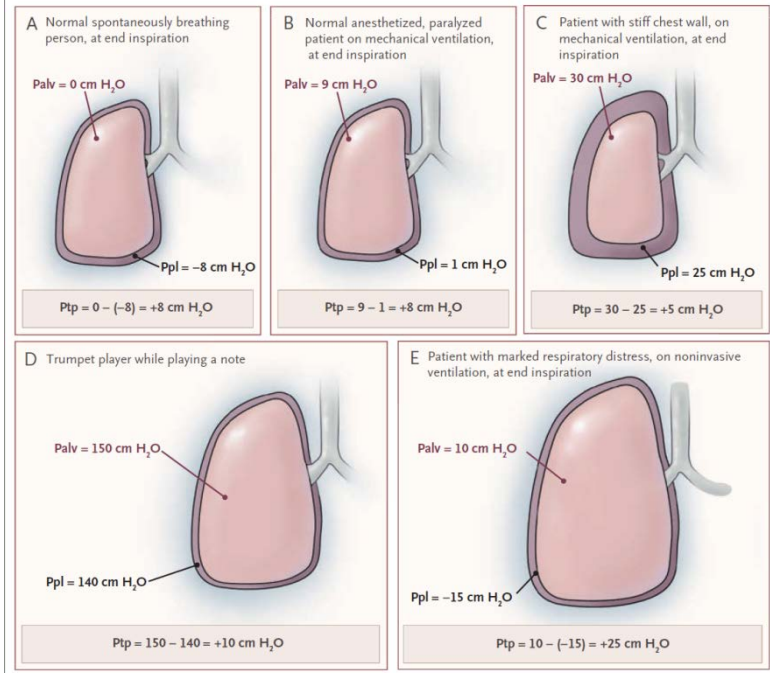
REVIEW ARTICLE

CRITICAL CARE MEDICINE

Simon R. Finfer, M.D., and Jean-Louis Vincent, M.D., Ph.D., Editors

Ventilator-Induced Lung Injury

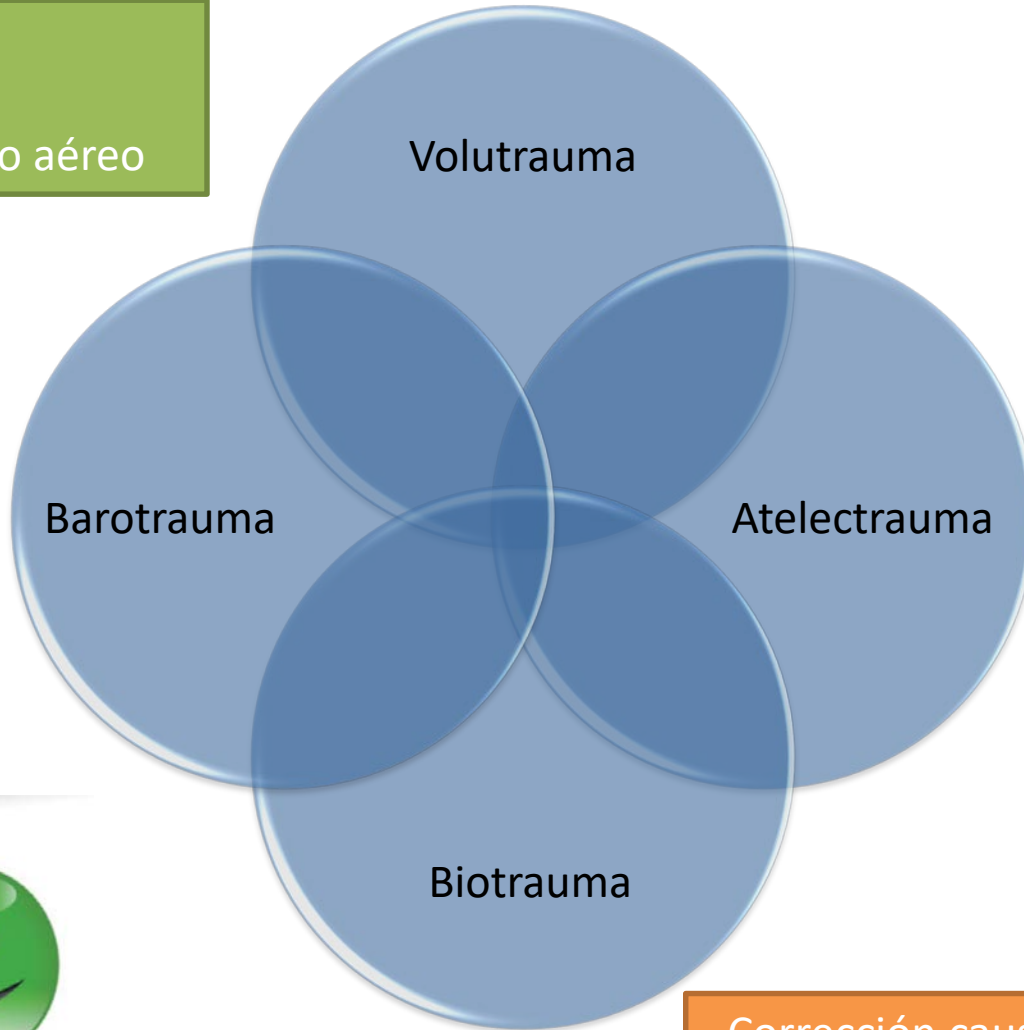
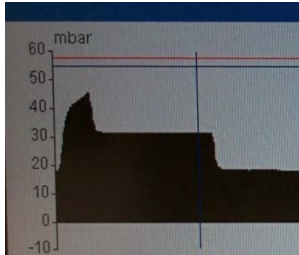
Arthur S. Slutsky, M.D., and V. Marco Ranieri, M.D.



Complicaciones



Vt
Pplat
Atrapamiento aéreo

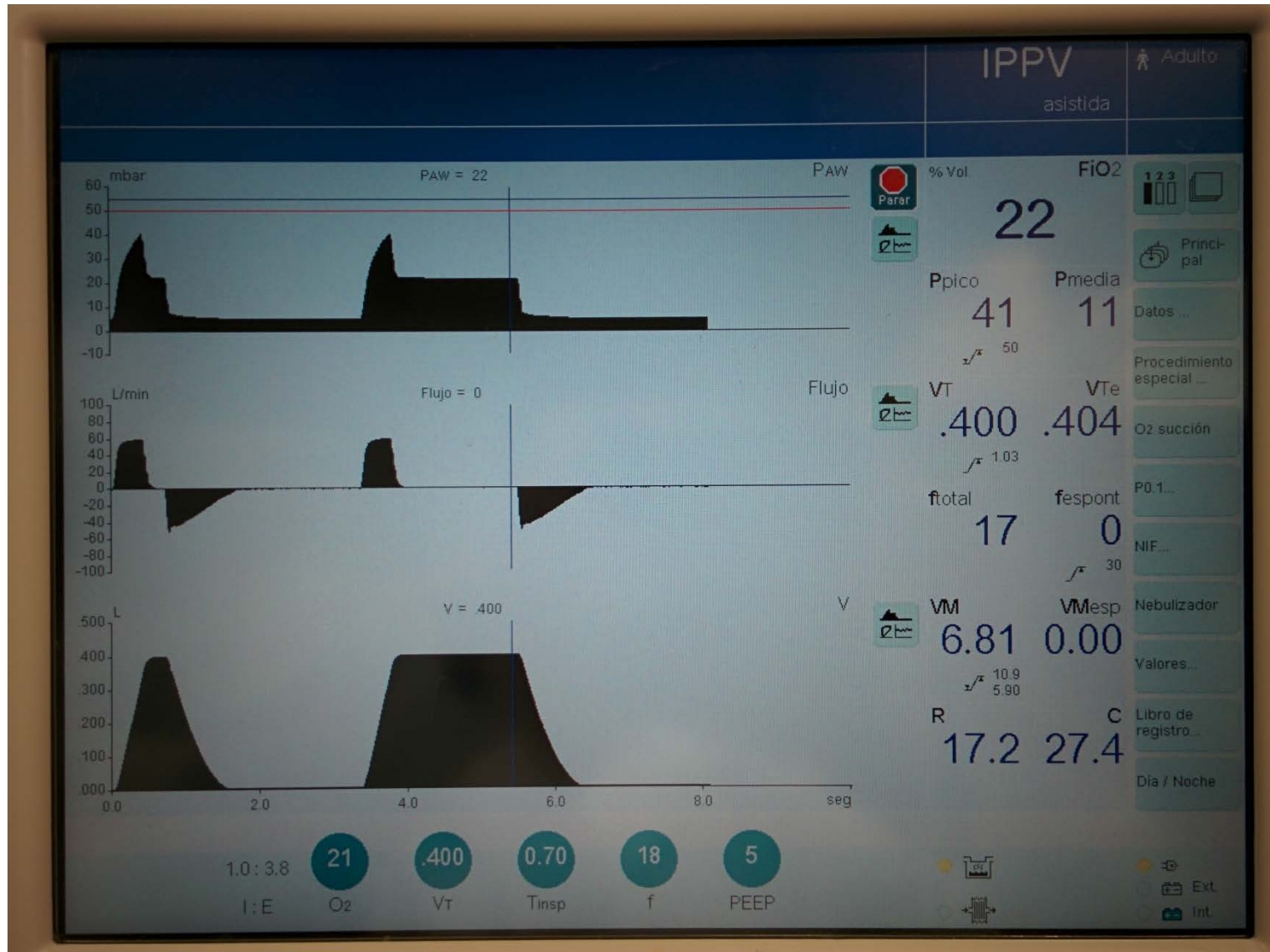


PEEP

Corrección causa
de base



Pausa Inspiratoria

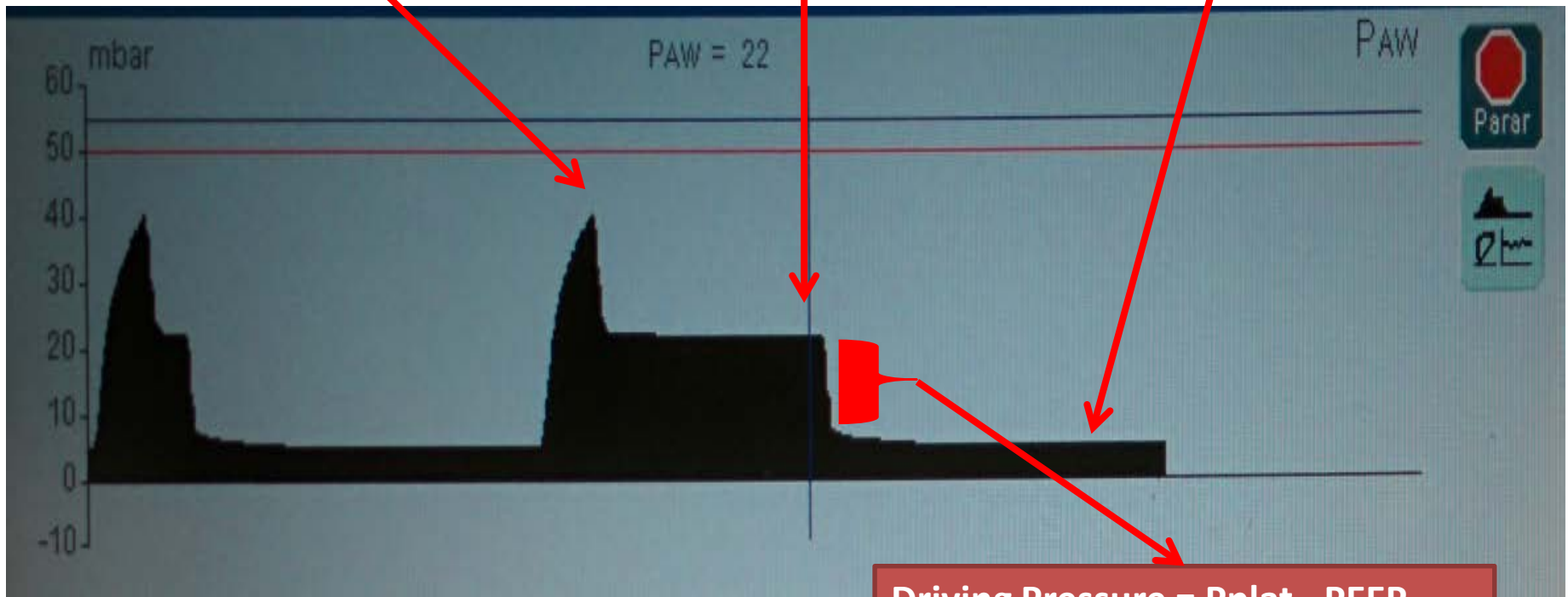


Pausa Inspiratoria

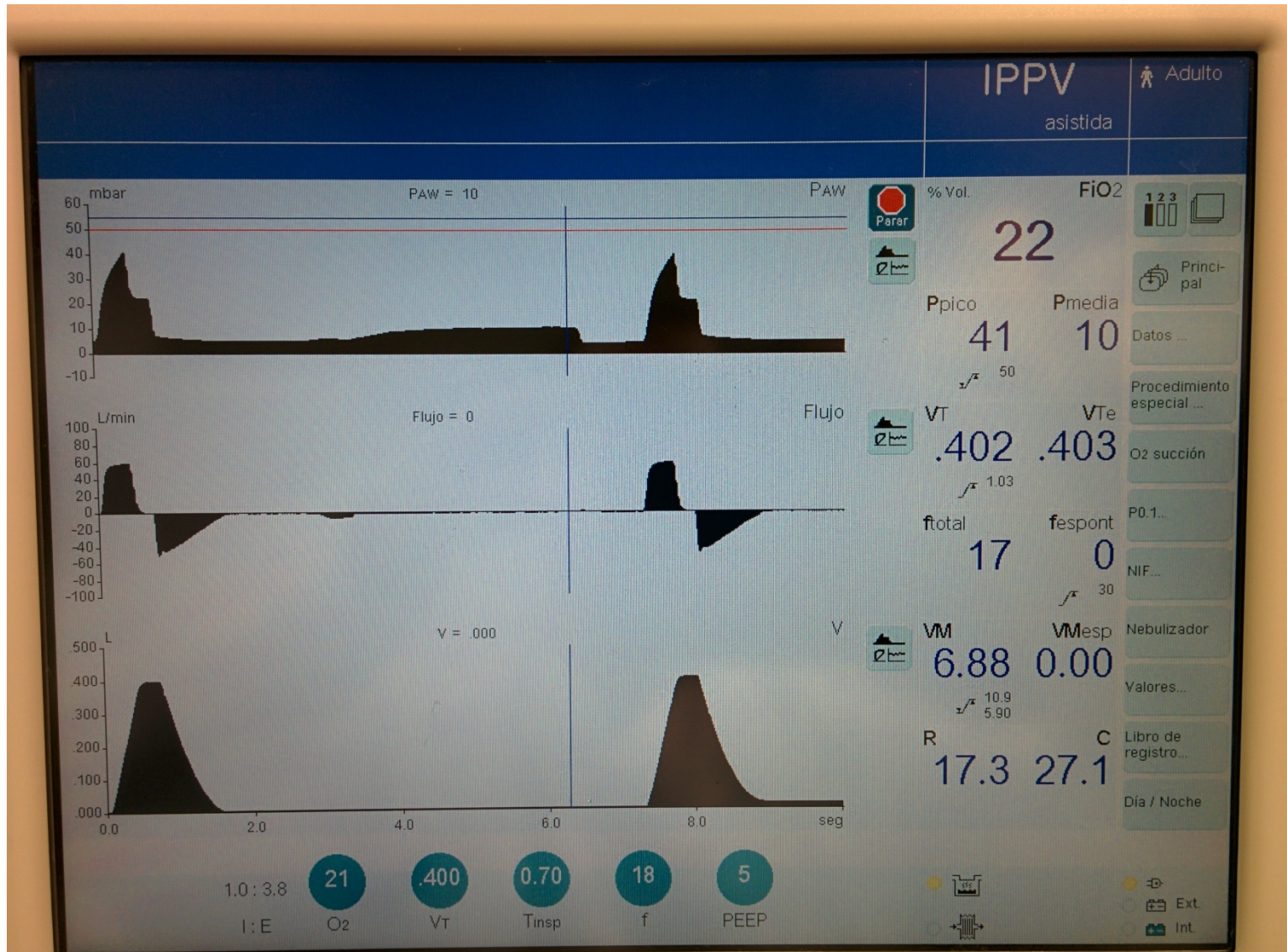
Presión Pico

Presión Plateau
< 28-30cmH2O

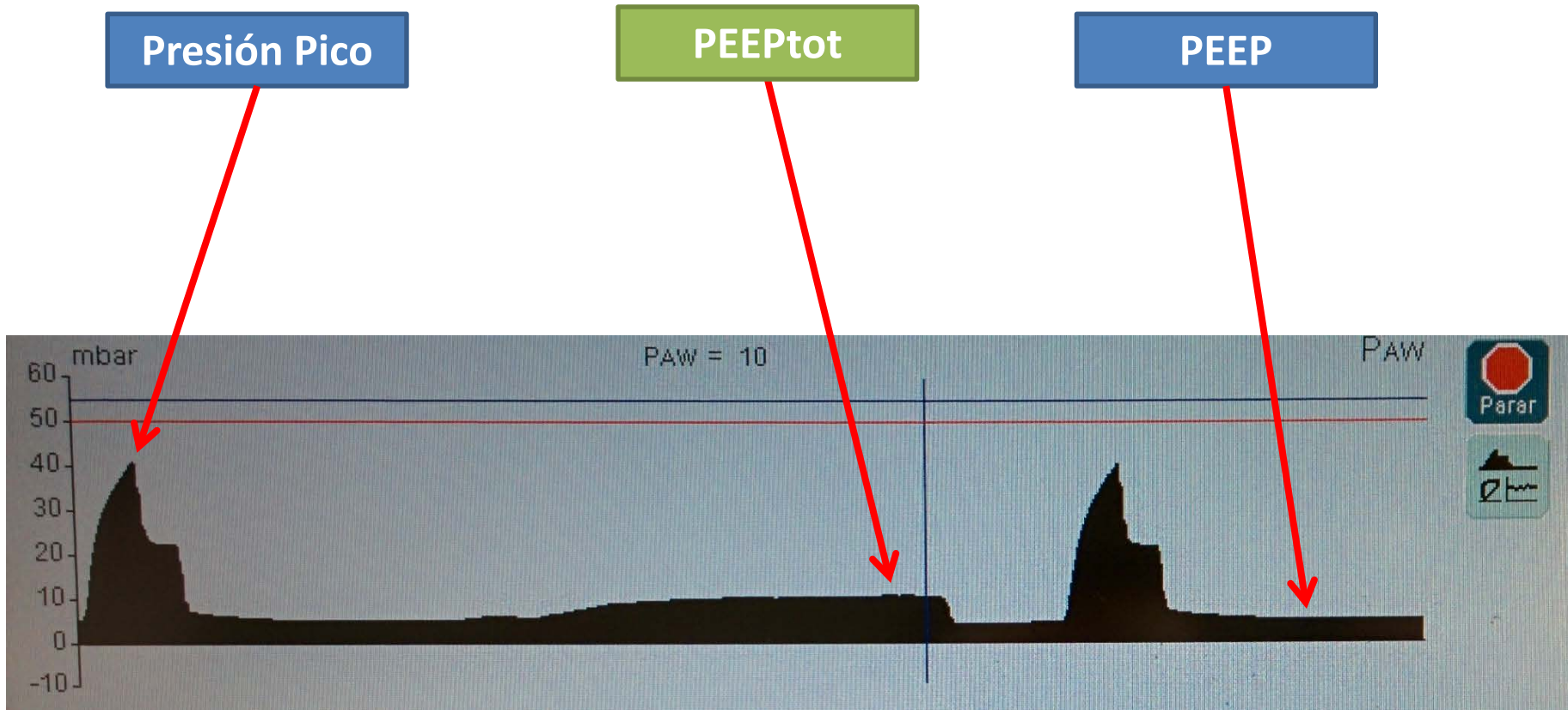
PEEP



Pausa espiratoria



Pausa espiratoria



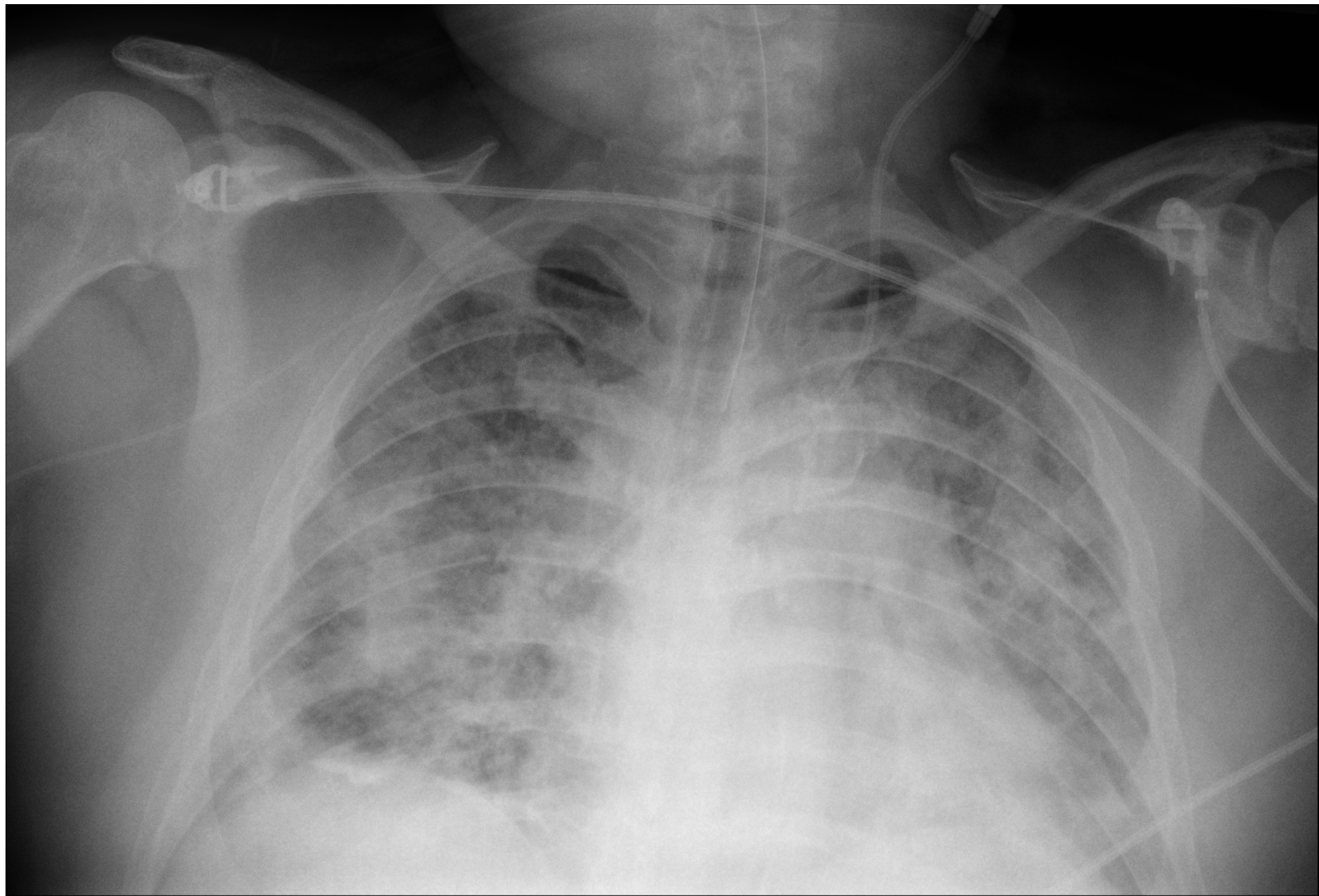
autoPEEP

=

PEEPtot

-

PEEP



SPECIAL ARTICLE

Driving Pressure and Survival in the Acute Respiratory Distress Syndrome

Marcelo B.P. Amato, M.D., Maureen O. Meade, M.D., Arthur S. Slutsky, M.D., Laurent Brochard, M.D., Eduardo L.V. Costa, M.D., David A. Schoenfeld, Ph.D., Thomas E. Stewart, M.D., Matthias Briel, M.D., Daniel Talmor, M.D., M.P.H., Alain Mercat, M.D., Jean-Christophe M. Richard, M.D., Carlos R.R. Carvalho, M.D., and Roy G. Brower, M.D.

Amato, M. B. et al. (2015). Driving pressure and survival in the acute respiratory distress syndrome. *New England Journal of Medicine*, 372(8), 747-755.

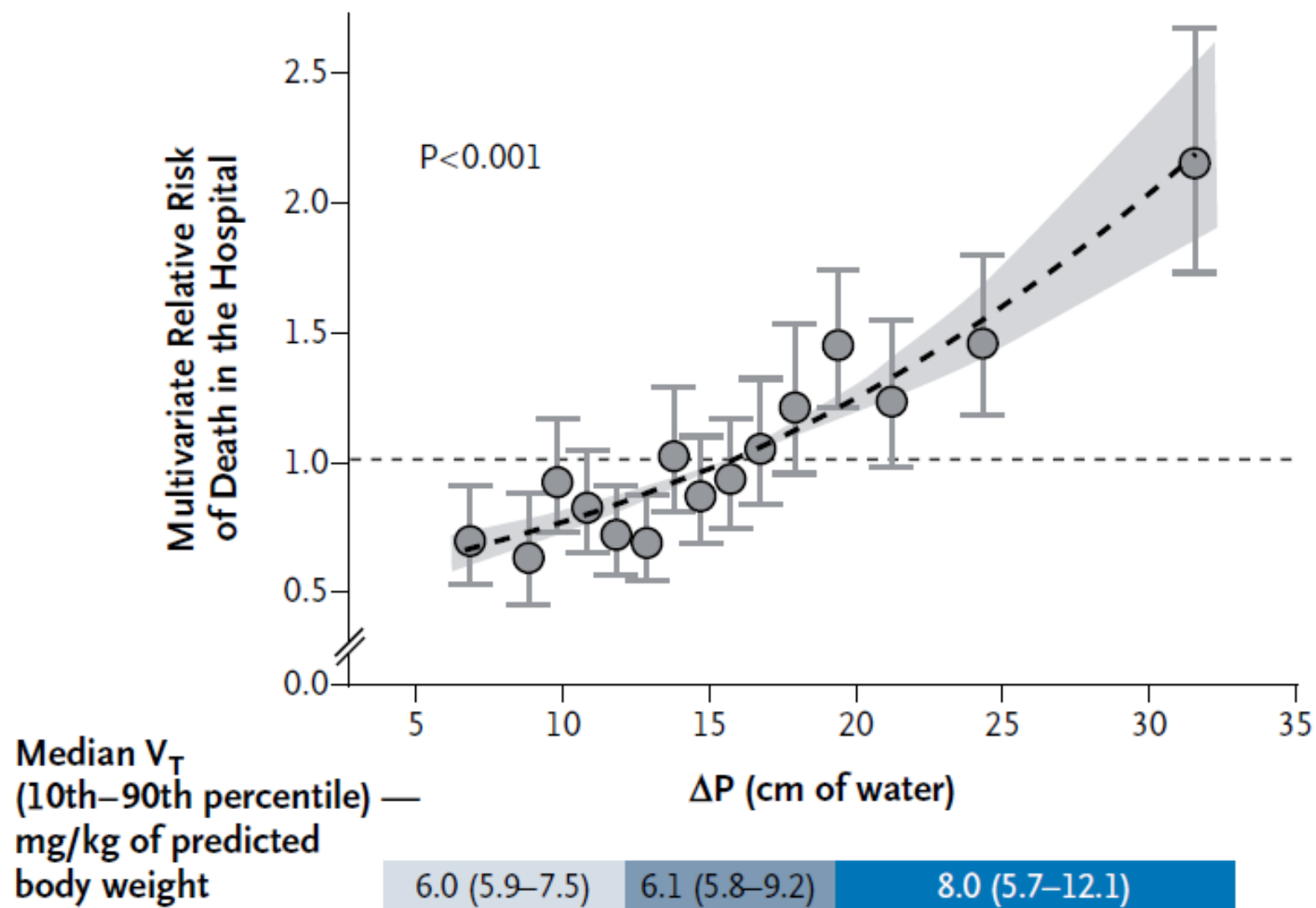


Figure 2. Relative Risk of Death in the Hospital versus ΔP in the Combined Cohort after Multivariate Adjustment.

Recomendaciones para ventilación en SDRA

- **Volúmenes Tidal $\leq 6\text{ml/kg}$ PBW**
- **Presión Plateau $< 28\text{cmH}_2\text{O}$**
- **PEEP alta** pero conservando siempre Presión Plateau $< 28\text{cmH}_2\text{O}$
- **Valorar nuevamente de forma frecuente**
- **Avisar a Medicina Intensiva (mayor motivo si $\text{DP} \geq 12\text{cmH}_2\text{O}$)**



RECOMMENDED

Mechanical ventilation optimization in ARDS

Always
 $P_{plat} \leq 28-30 \text{ cmH}_2\text{O}$

A high positive end-expiratory pressure, low tidal volume ventilatory strategy improves outcome in persistent acute respiratory distress syndrome: A randomized, controlled trial*

Jesús Villar, MD, PhD, FCCM; Robert M. Kacmarek, PhD, FCCM; Lina Pérez-Méndez, MD, PhD; Armando Aguirre-Jaime, PhD; for the ARIES Network

The New England
Journal of Medicine

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VOLUME 342

MAY 4, 2000

NUMBER 18



VENTILATION WITH LOWER TIDAL VOLUMES AS COMPARED
TRADITIONAL TIDAL VOLUMES FOR ACUTE LUNG INJURY
AND THE ACUTE RESPIRATORY DISTRESS SYNDROME

THE ACUTE RESPIRATORY DISTRESS SYNDROME NETWORK*

The NEW ENGLAND
JOURNAL of MEDICINE

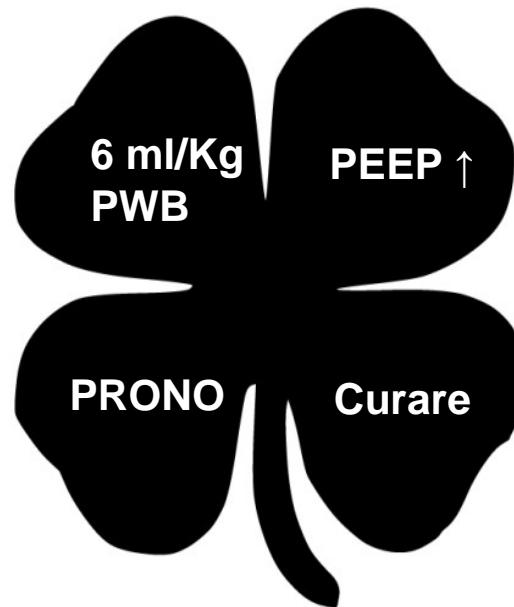
ESTABLISHED IN 1812

JUNE 6, 2013

VOL. 368 NO. 23

Prone Positioning in Severe Acute Respiratory Distress
Syndrome

Guérin C, Reignier J, Richard J-C, et al



$\text{PaO}_2/\text{FIO}_2 \leq 150 \text{ mmHg}$

The NEW ENGLAND
JOURNAL of MEDICINE

ESTABLISHED IN 1812

SEPTEMBER 16, 2010

VOL. 363 NO. 12

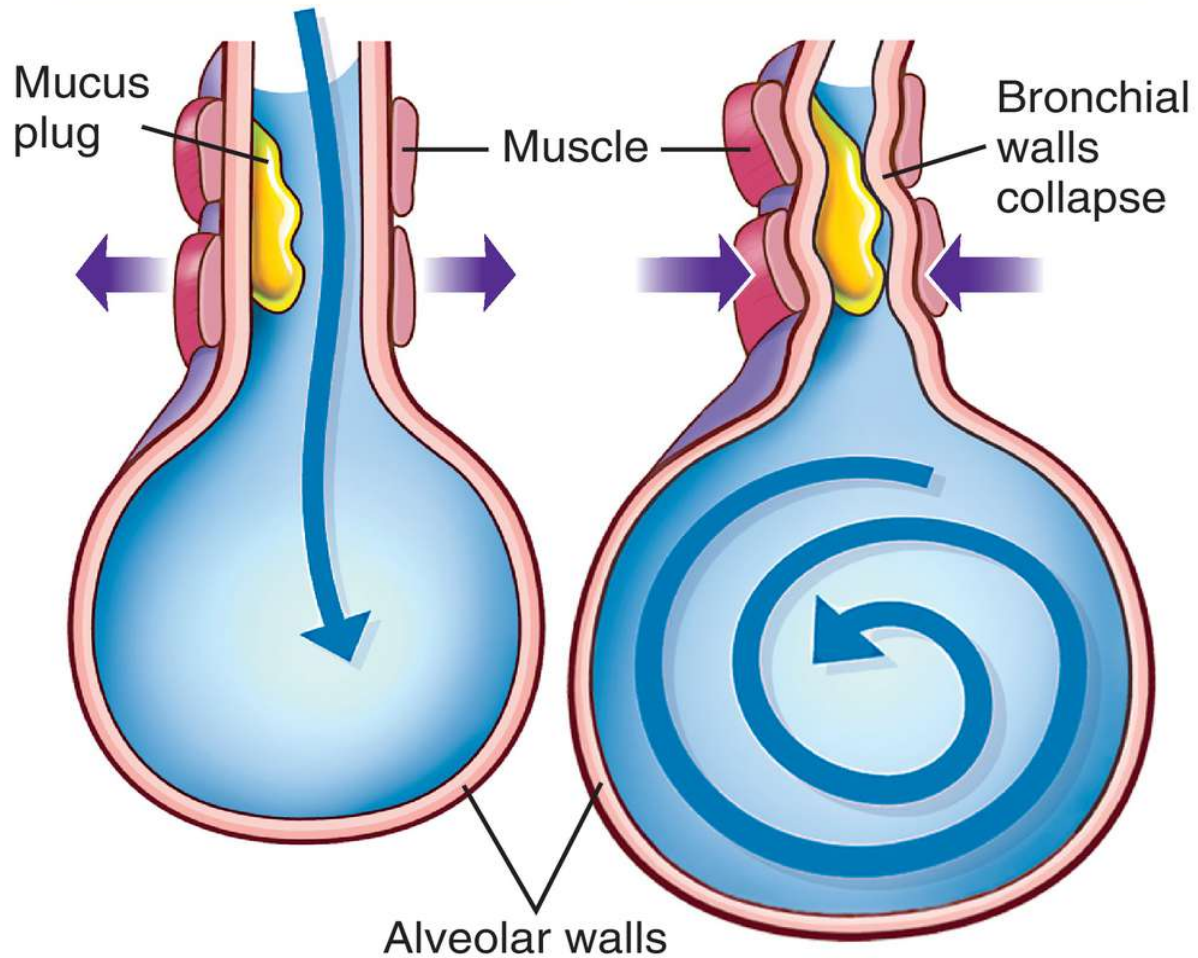
Neuromuscular Blockers in Early Acute Respiratory
Distress Syndrome

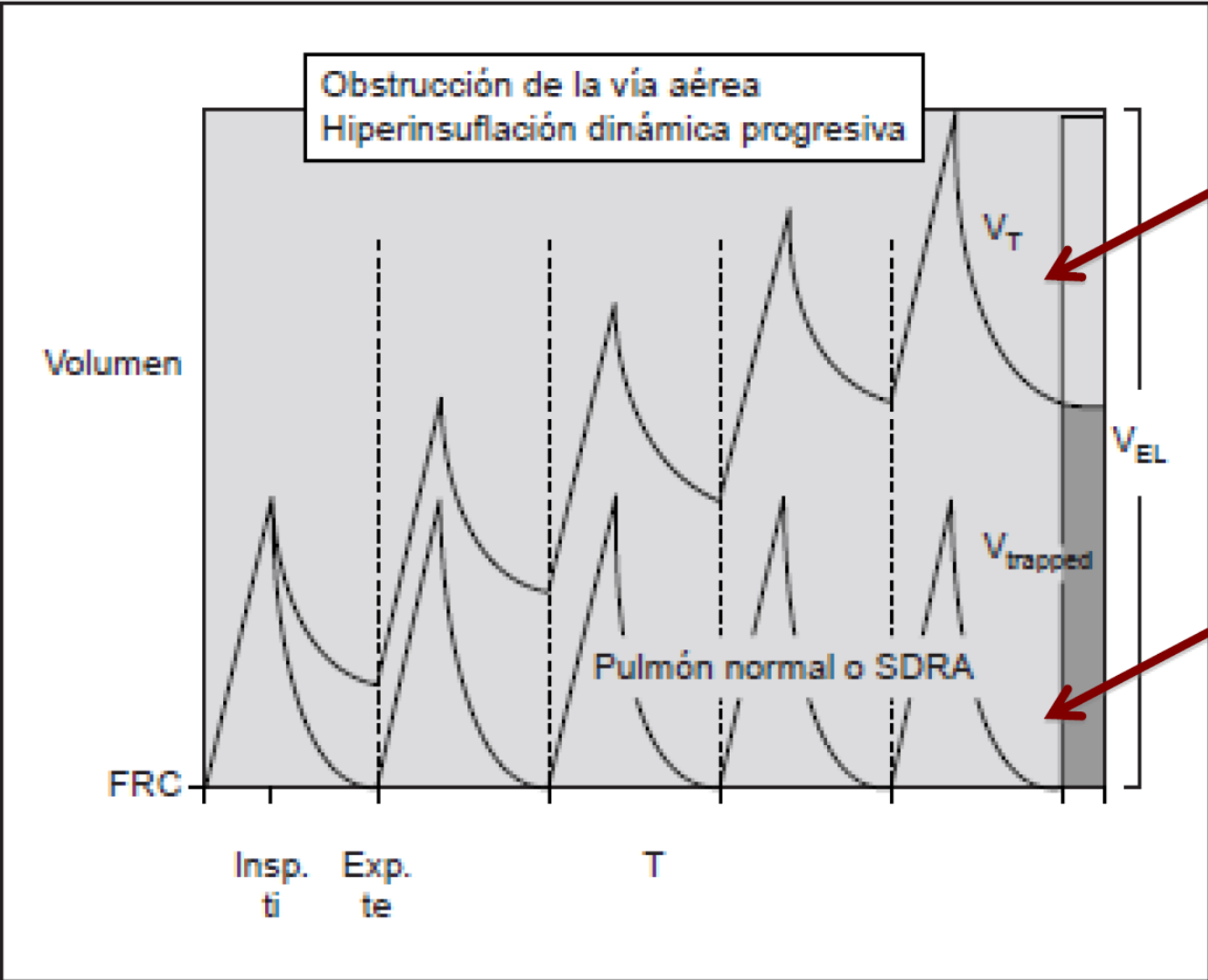
Papazian L, Forel J-M, Gacouin A, et al



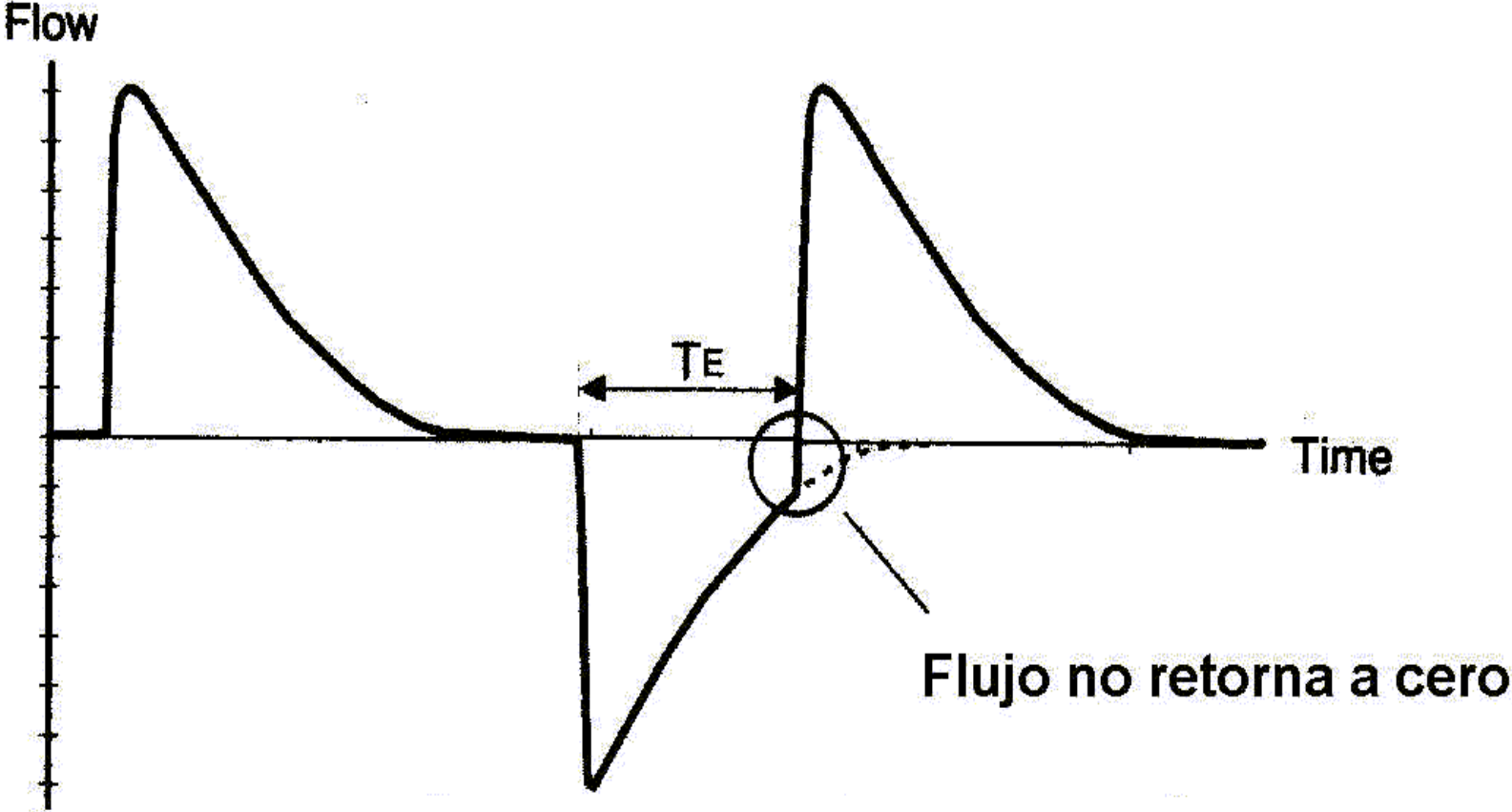
**Air movement
during INSPIRATION**

**Air movement
during EXPIRATION**

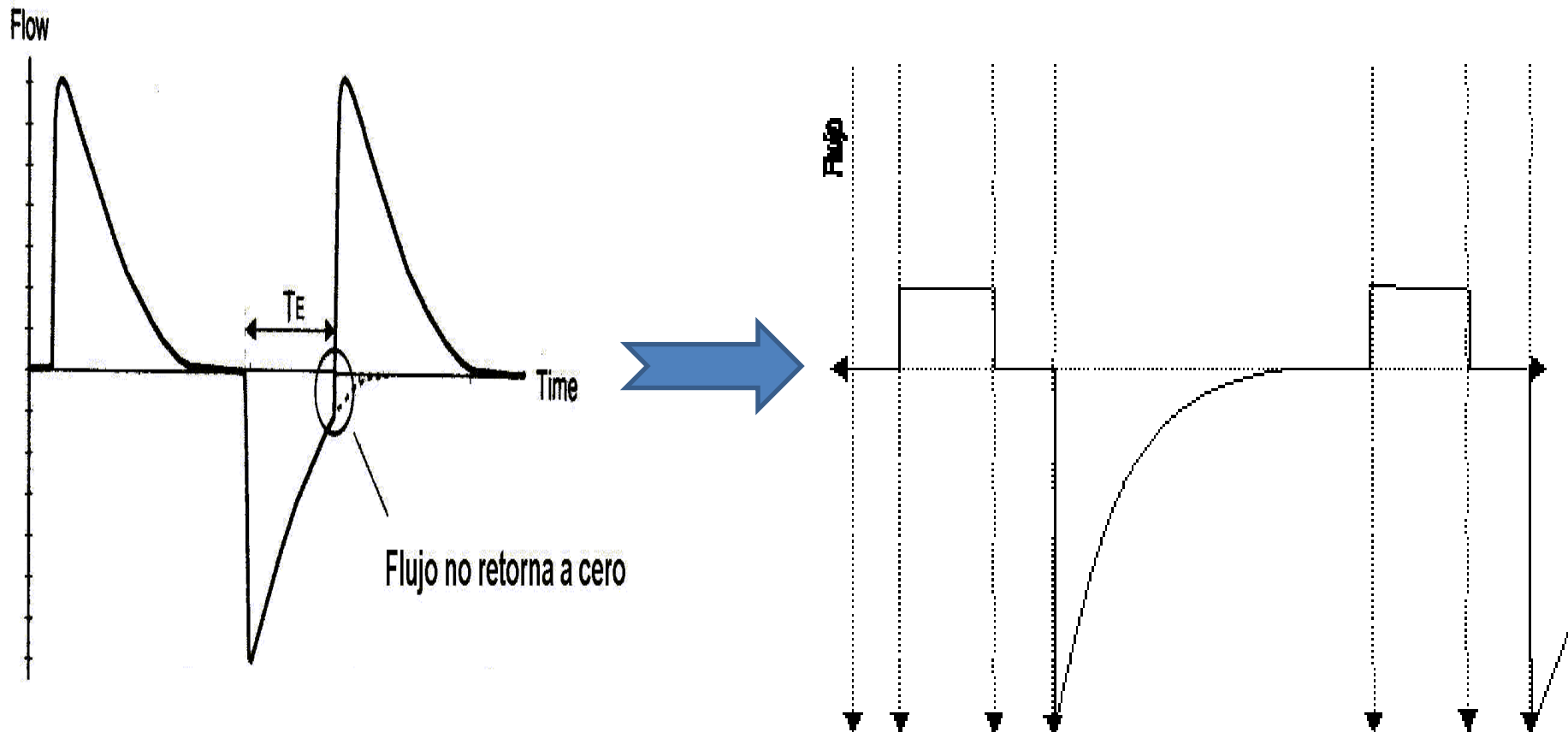




Aumento del atrapamiento aéreo



Atrapamiento aéreo



CHEST

Official publication of the American College of Chest Physicians

PEEP, auto-PEEP, and waterfalls.

M J Tobin and R F Lodato

Chest 1989;96:449-451
DOI 10.1378/chest.96.3.449

The online version of this article, along with updated information and services can be found online on the World Wide Web at:
<http://chestjournal.chestpubs.org/content/96/3/449.citation>

[Minerva Anesthesiol.](#) 2012 Feb;78(2):201-21.

Epub 2011 Nov 18.

Auto-PEEP in respiratory failure.

[Laghi F¹](#), [Goyal A.](#)

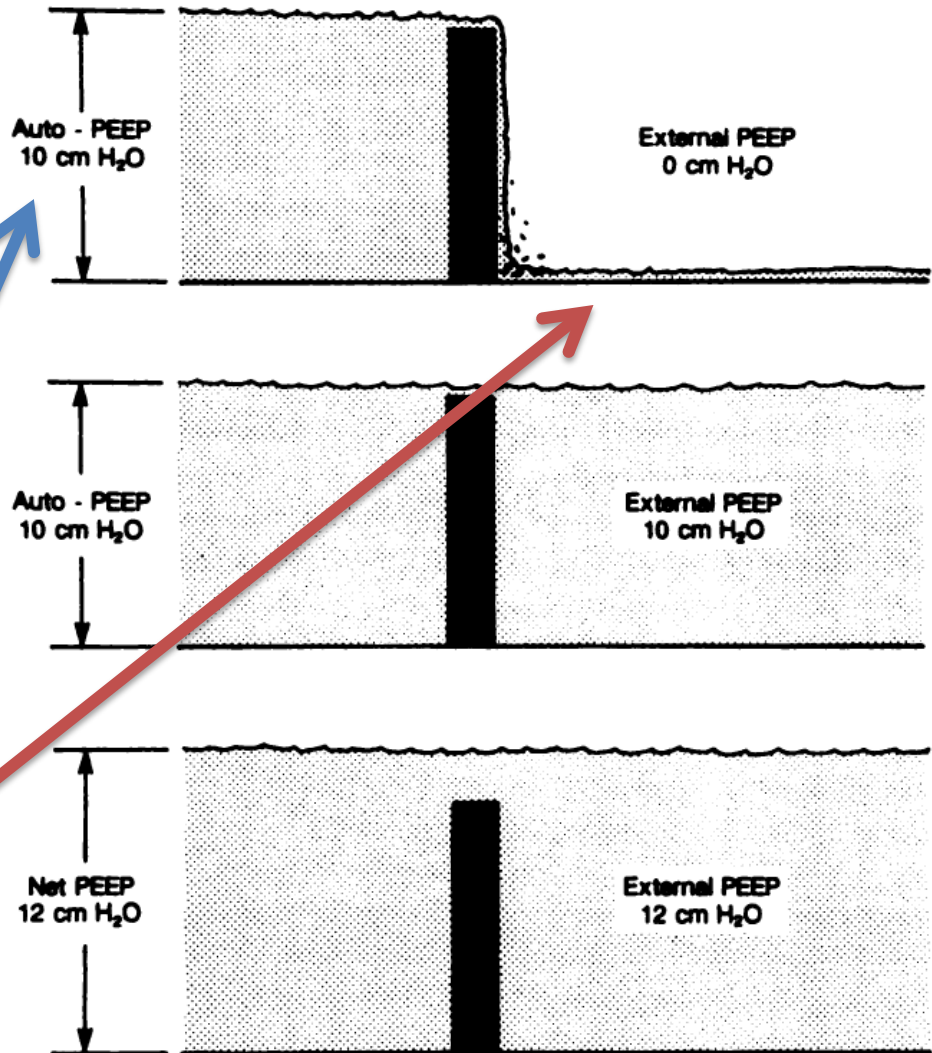
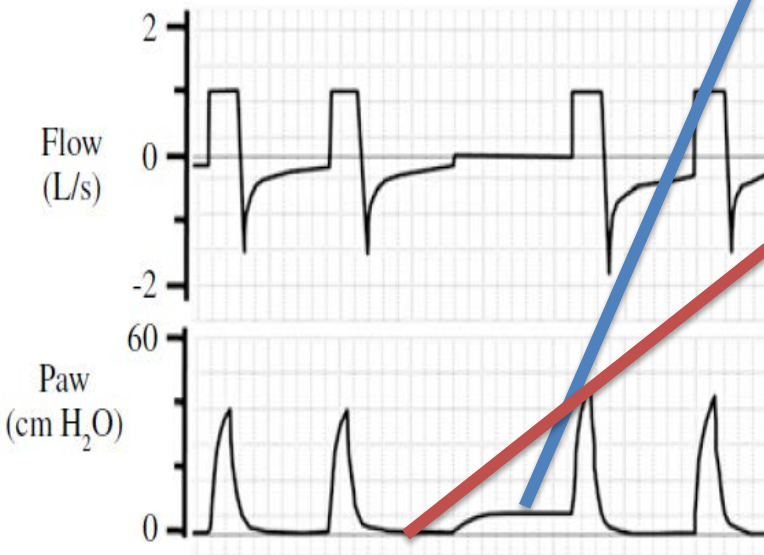


FIGURE 1. The analogy of a waterfall over a dam (indicated by the solid block) is used to explain the effect of external PEEP ("downstream pressure") on auto-PEEP ("upstream pressure") during expiration. See text for details.



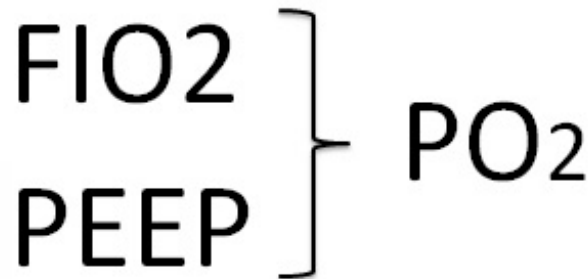
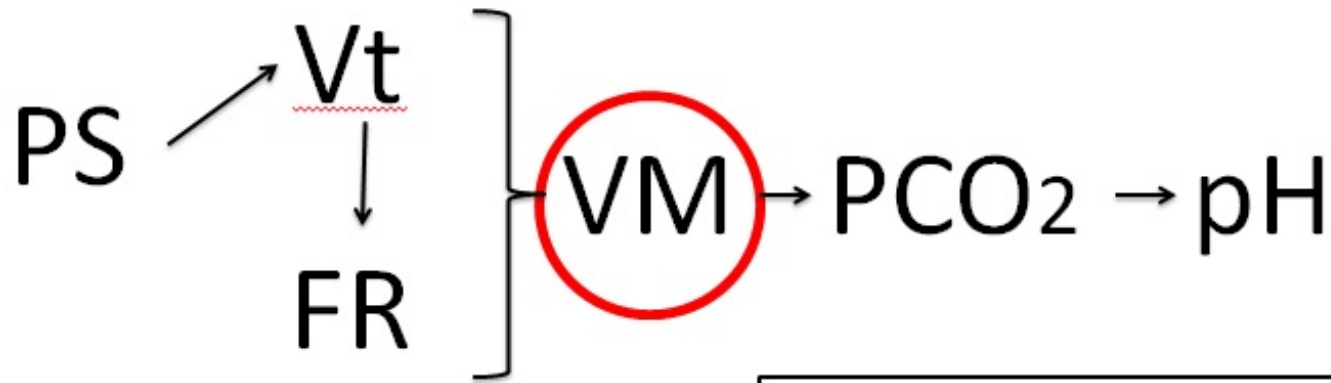
Pausa espiratoria

Recomendaciones para ventilación en EPOC

- **Volúmenes Tidal pequeños**
- **Aumentar Tiempo Espiratorio**
 - Reducir Tiempo Inspiratorio
 - Reducir Frecuencia Respiratoria
- **PEEP al 80% del valor de autoPEEP**
- **Valorar nuevamente de forma frecuente**
- **Avisar a Medicina Intensiva**



Parametrización Básica PS

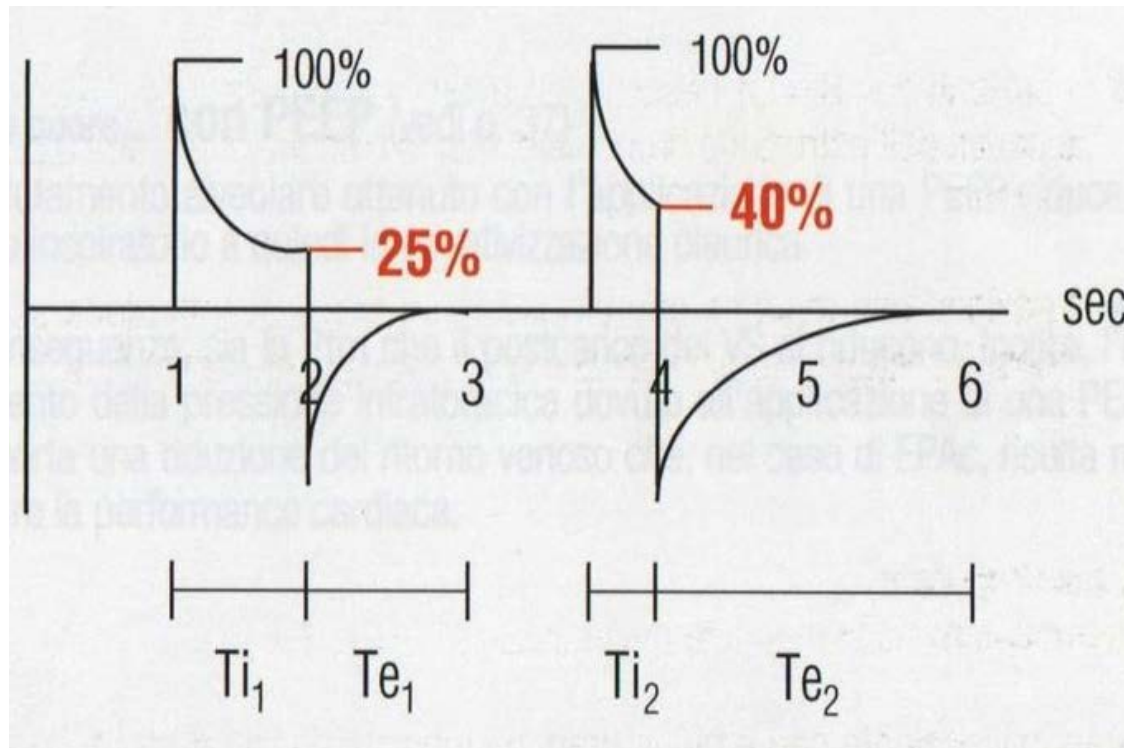


Leyenda:
PS: Presión Soporte
Vt: Volumen Tidal (Volumen Corriente)
VM: Volumen Minuto (litros/min)
PCO2: presión parcial CO2
PO2: presión parcial de O2
FIO2: fracción inspirada de O2
PEEP: presión al final de la espiración



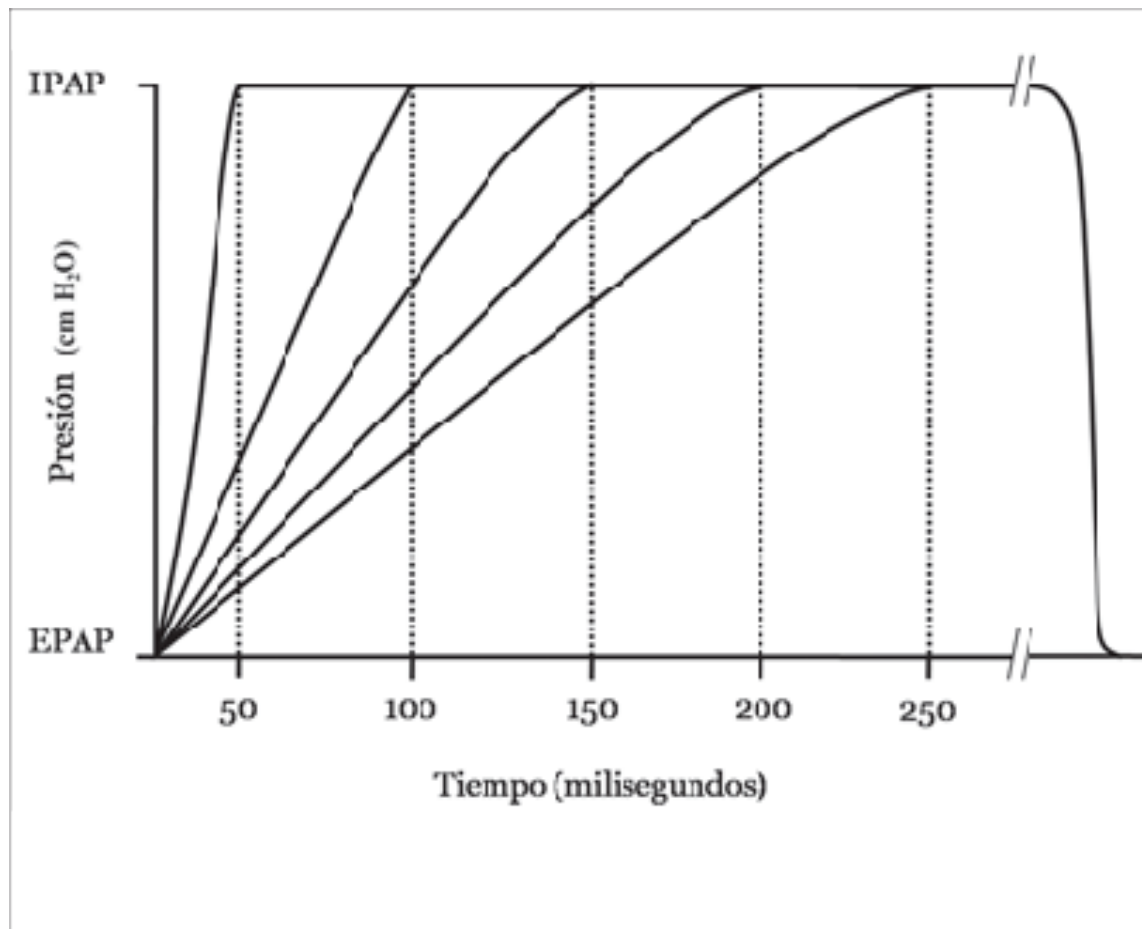
Parametrización Básica PS

- Ciclado espiratorio (por defecto 25% del pico de flujo máximo inspiratorio; si EPOC aumentar a $\approx 40\%$)



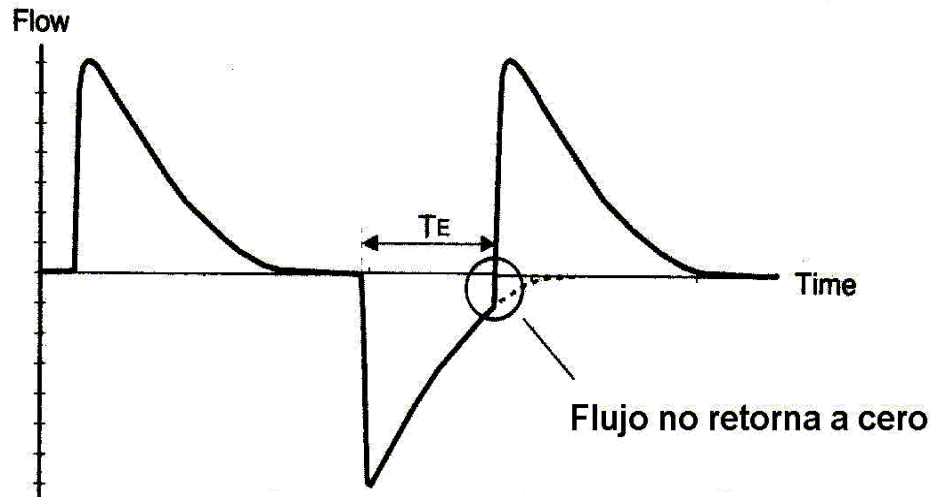
Parametrización Básica PS

- Rampa en VMNI



Precaución.....

- V_t generado $\approx 8\text{ml/kg PBW}$
- Curva flujo espiratorio



Edema Agudo de Pulmón

- Aplicar PEEP y no hacer daño...



Non-invasive positive pressure ventilation (CPAP or bilevel NPPV) for cardiogenic pulmonary oedema (Review)

Vital FMR, Ladeira MT, Atallah ÁN



**THE COCHRANE
COLLABORATION®**

VMNI profiláctica

Panel: Risk factors for extubation failure

Factors related to patient and comorbidities

- Age >65 years^{7,84,85}
- Moderate or severe cardiorespiratory disease⁷
- Body-mass index >30⁸⁹

Factors related to acute pathology

- Neurological disease⁸²
- Airway patency problem⁸⁵
- Inability to deal with respiratory secretions⁸⁵
- APACHE II >12 on extubation day^{4,84}
- Difficult or prolonged weaning⁸⁵
- ARF of cardiac origin⁴
- Pneumonia as the reason for intubation⁸¹
- Positive fluid balance⁸¹

Factors related to functional parameters

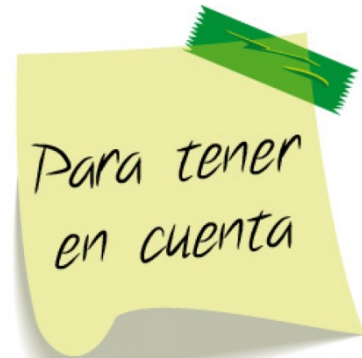
- Respiratory rate >35 breaths/min¹
- Rapid shallow breathing index >105⁸⁸
- MIP >-20 to -25 cm H₂O^{1,82}
- Peak expiratory flow <60 L/min⁸⁶
- P_{0.1} ≤4.5 cm H₂O⁸²
- VC ≤10 mL/kg^{1,82}
- P_{0.1}/MIP <0.3⁸⁷

APACHE II=Acute Physiologic Assessment and Chronic Health Evaluation II. ARF=acute respiratory failure. MIP= maximum inspiratory pressure. P_{0.1}=airway occlusion pressure at 0.1 s. VC=vital capacity.

Ventilatory support after extubation in critically ill patients

Salvatore Maurizio Maggiore, Mariangela Battilana, Luca Serano, Flavia Petrini

Lancet Respir Med 2018;
6: 948-62



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Gracias

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