Non pour la ventilation Bilevel à la phase aigue de la prise en charge du SDRA

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Oui pour le Bilevel à la phase aigue du SDRA!!!!

Novembre **1999**-Novembre **2019**

Définition

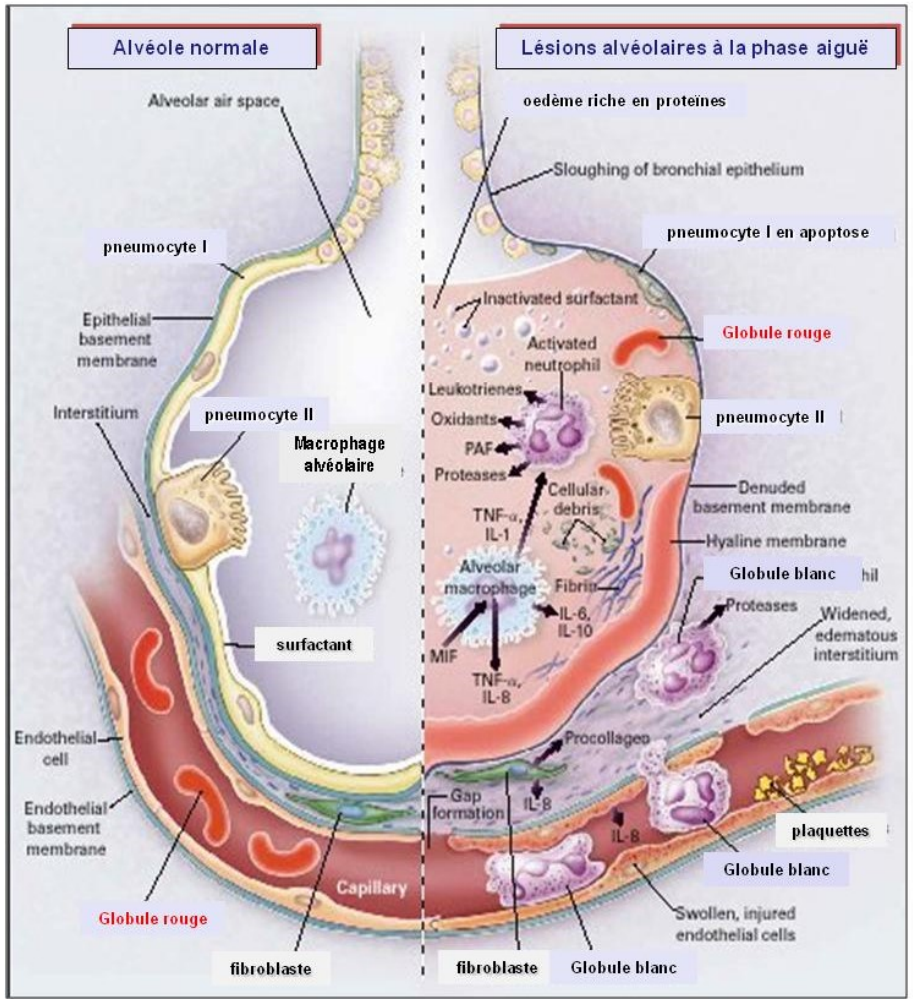
- Le syndrome de détresse respiratoire aiguë « SDRA » **est la forme la plus sévère de la défaillance pulmonaire et de l'insuffisance respiratoire aigue**

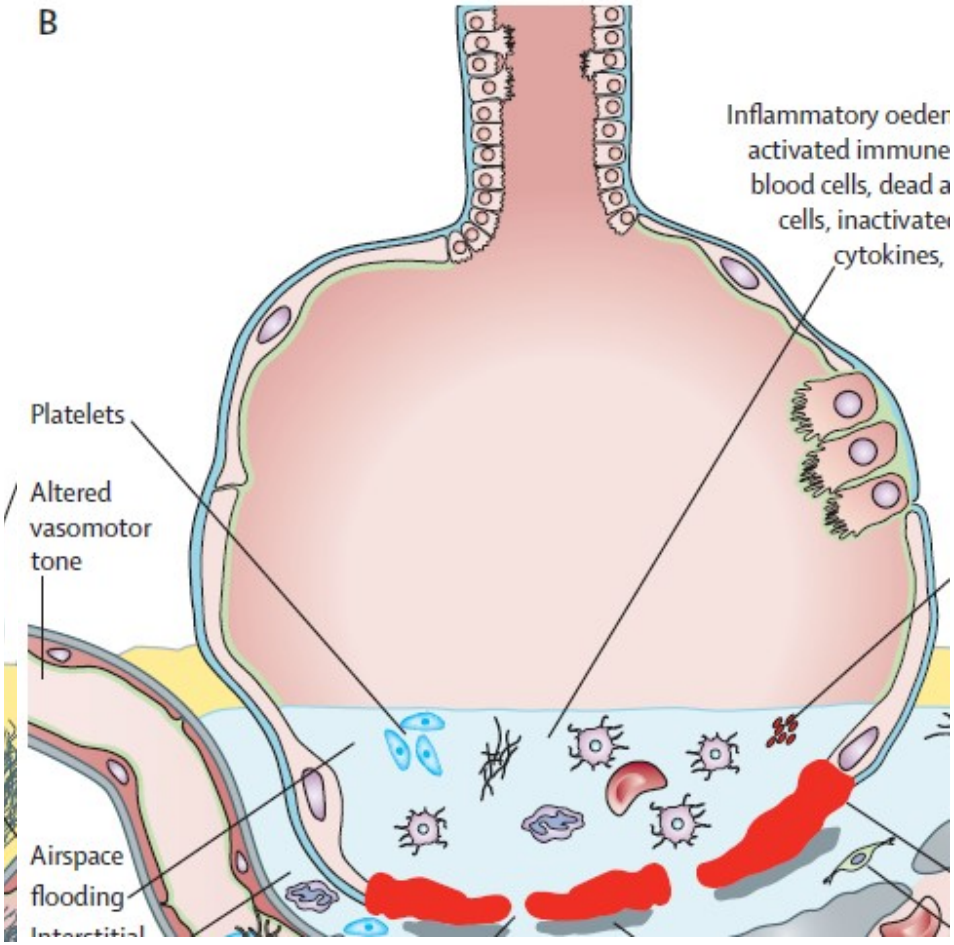
- Le SDRA se caractérise par une altération **« lésion »** de la membrane alvéolo-capillaire (MAC).

- Cette atteinte de la MAC est secondaire à une réaction inflammatoire dont l'origine peut être pulmonaire et/ou extra pulmonaire.

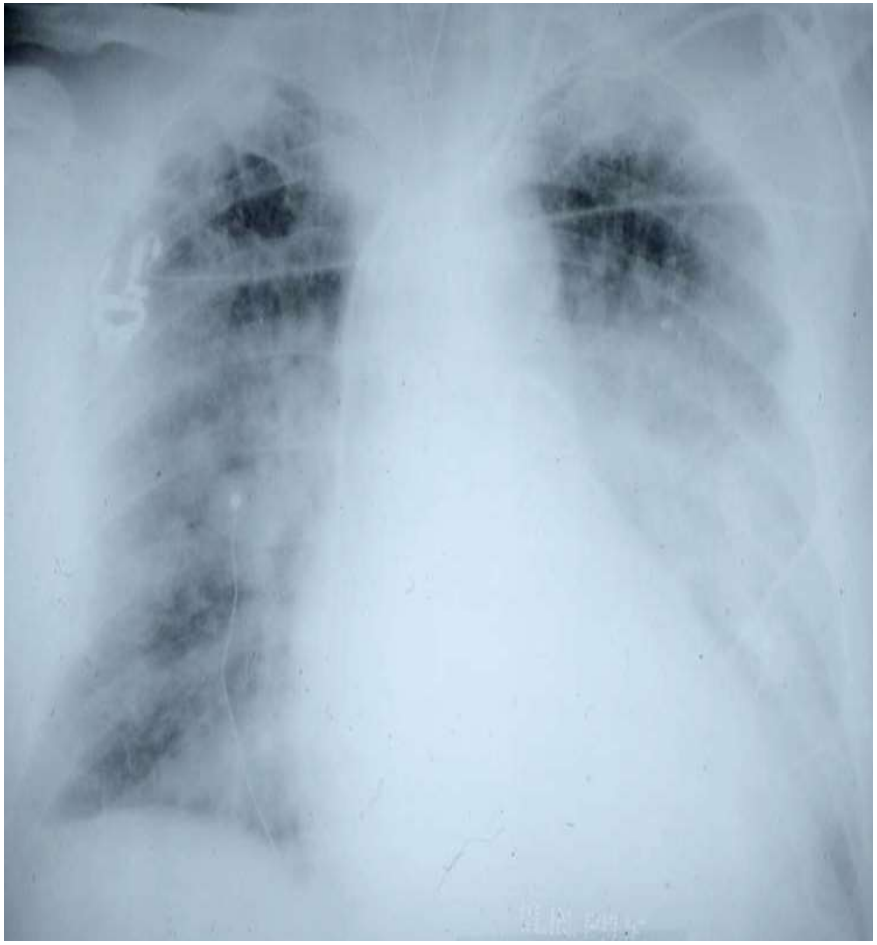
- PEC: **unités de soins intensifs**

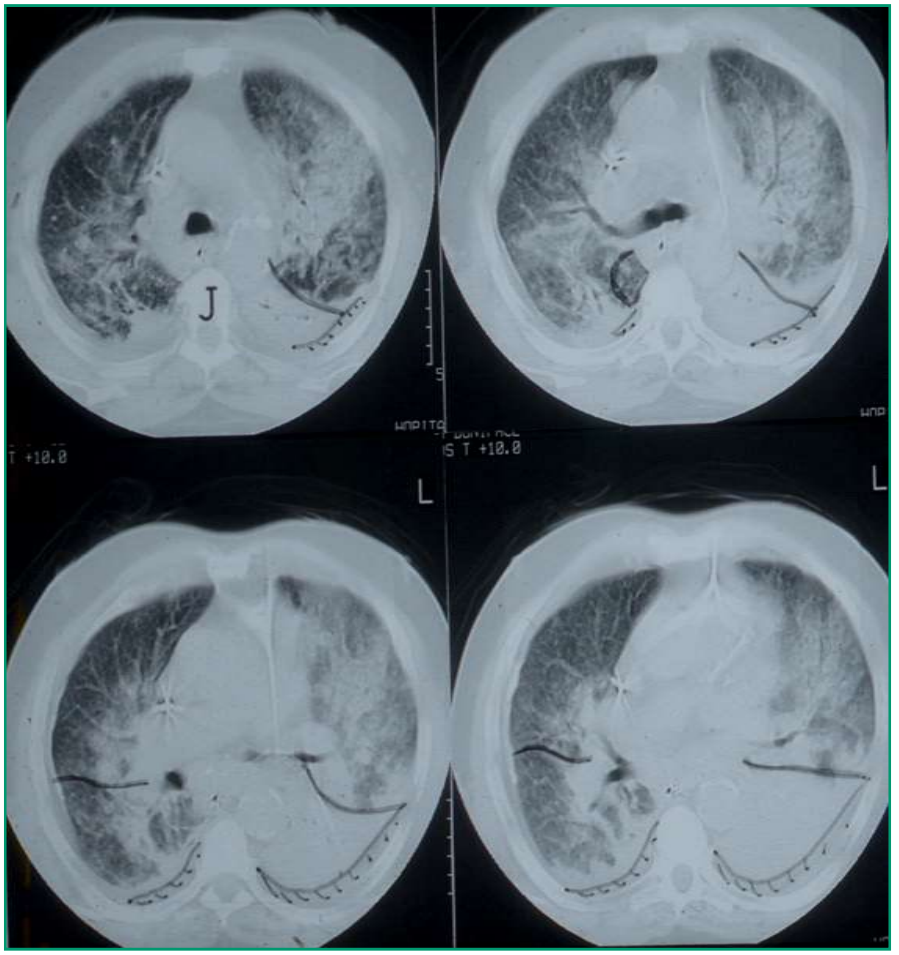
Acute respiratory distress syndrome





Présentation radiologique des **SDRA « diffus »**





JJ Rouby Intensive Care Medicine 26 : 1046-1056 , 2000

SDRA

Apparition	Détérioration rapide à l'intérieur d'une semaine d'une clinique connue ou nouvelle/aggravation des symptôr
Image radiologique[1]	Opacités bilatérales – non complètement expli épanchement, affaissement pulmonaire/lobaire
Origine de l'oedème	Détresse respiratoire non reliée à une insuffisanc une surchage volémique (échographie cardiac examen suggéré pour confirmation
	LÉGER / MODÉRÉ
Oxygénation[2]	

Introduction

1. **Traitement étiologique**

2. **La prise en charge est symptomatique (VM),** a pour objectifs principaux:

- **Limiter** les lésions induites par la ventilation (**VILI**).

- **Réduire** le shunt intra-pulmonaire

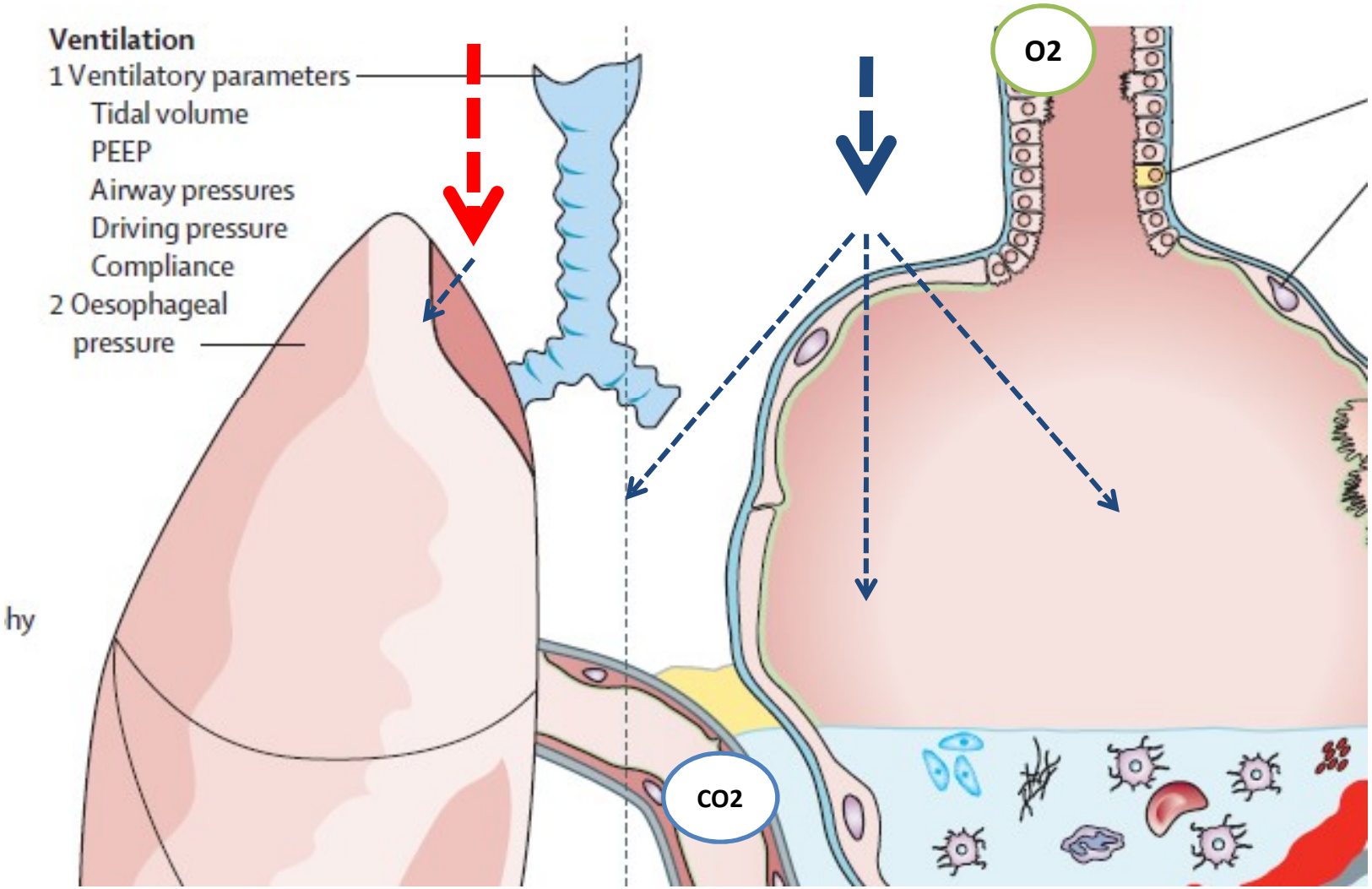
- **Restaurer** la compliance et les volumes pulmonaires afin de lutter contre l'hypoxémie.

Introduction

- La ventilation **« protectrice »** actuellement recommandée +++

- L'association d'une sédation profonde et d'une curarisation est initialement nécessaire dans plus de 50 % des cas

Acute respiratory distress syndrome



www.thelancet.com **Published online April 28, 2016 http://dx.doi.org/10.1016/S0140-6736(16)00578-X**

Cependant…

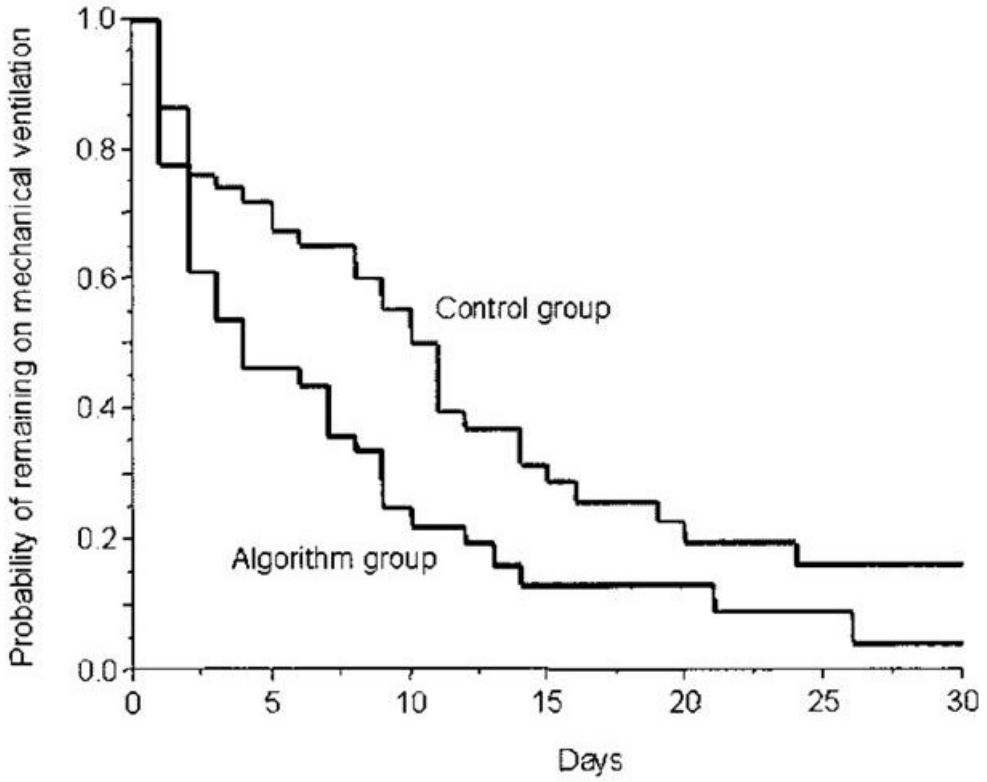
- **Des données émanant d'une littérature récente soulignent:**

- L'importance de **rationaliser l'usage de la sédation, et**

- **Un bénéfice** au **maintien d'une activité contractile du diaphragme.**

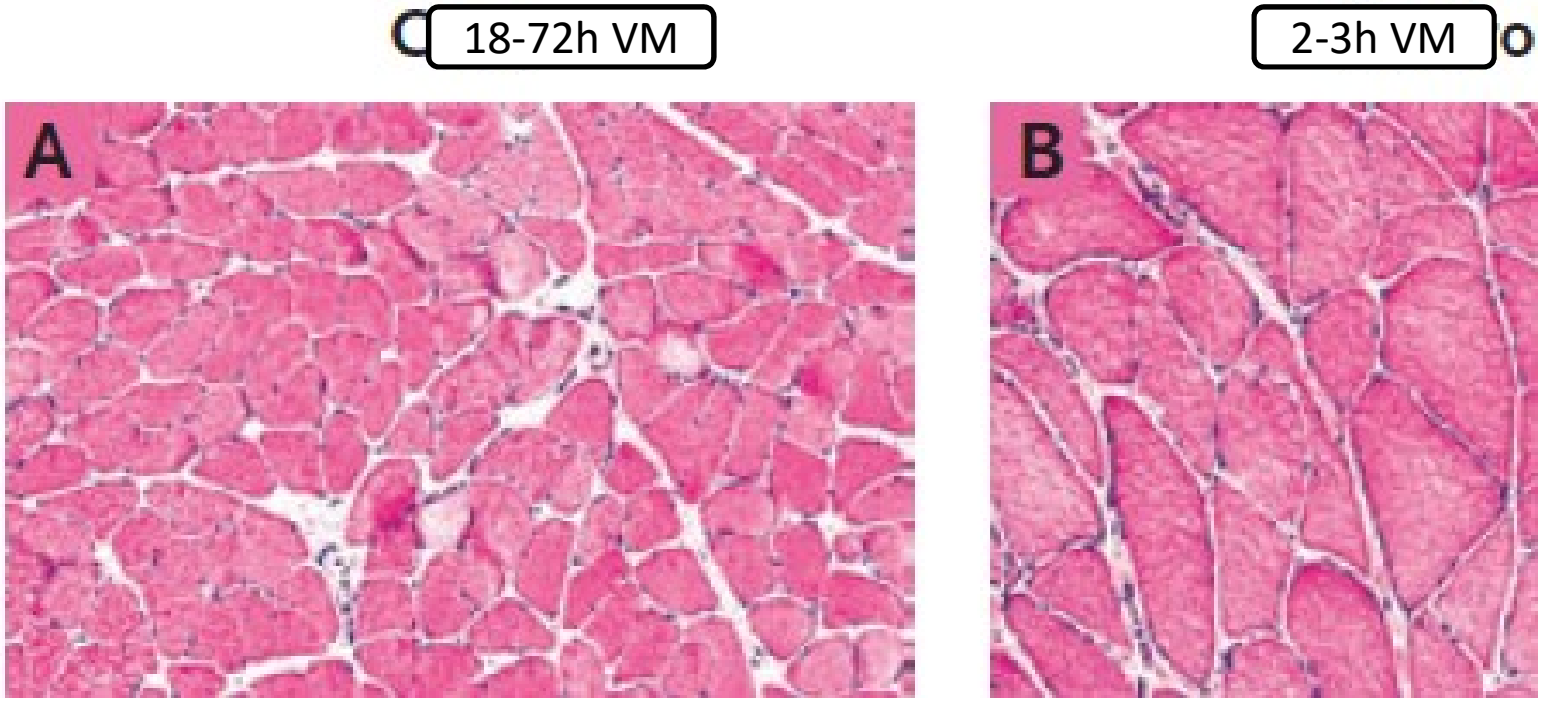
1. Adapter la sédation

4.4 days [2.1–9.8] Vs **10.3 days** [3.5–17.2]; **p:0.014**



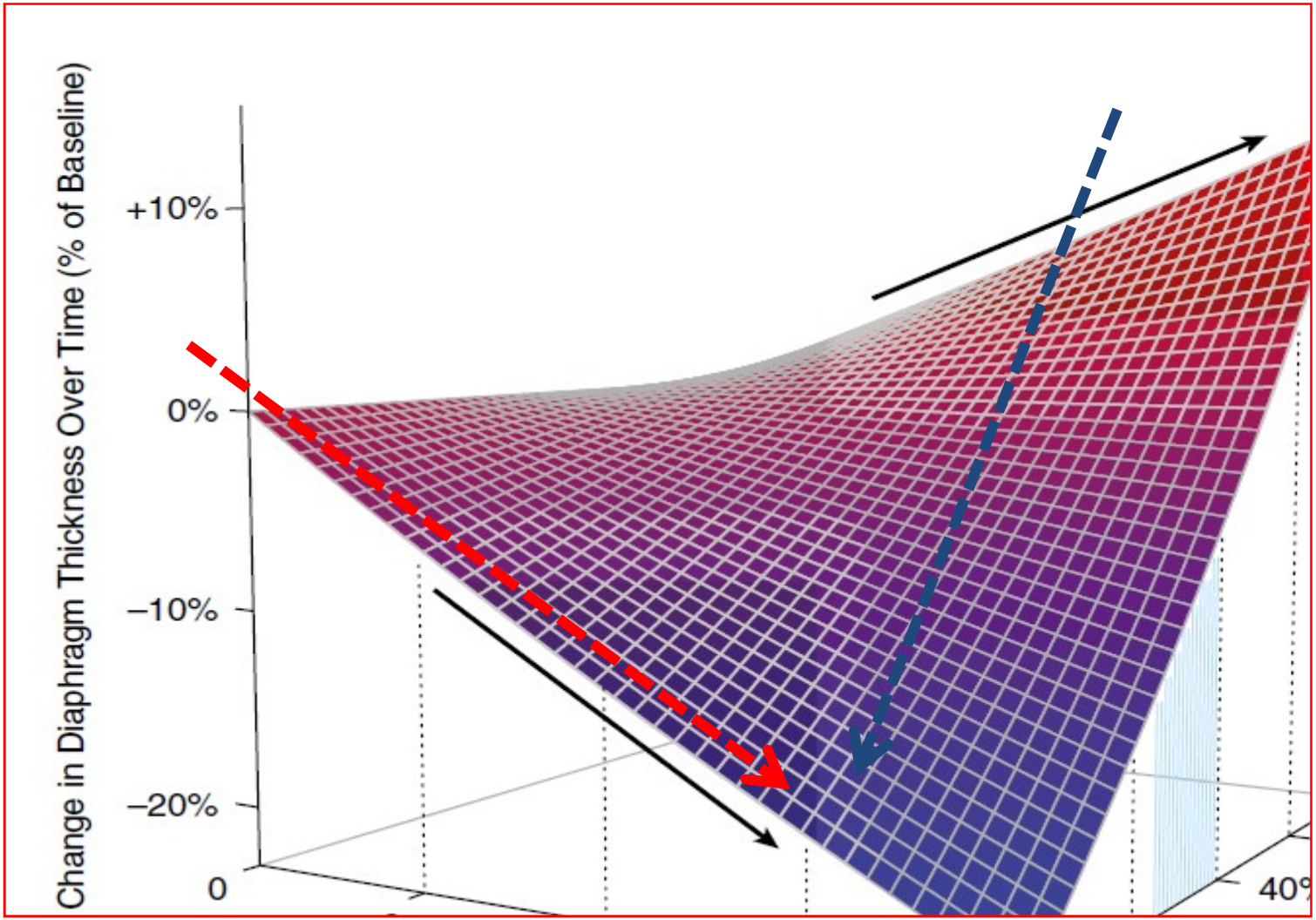
Crit Care Med. 2005 Jan;33(1):120-7.

2. Restaurer une activité diaphragmatique



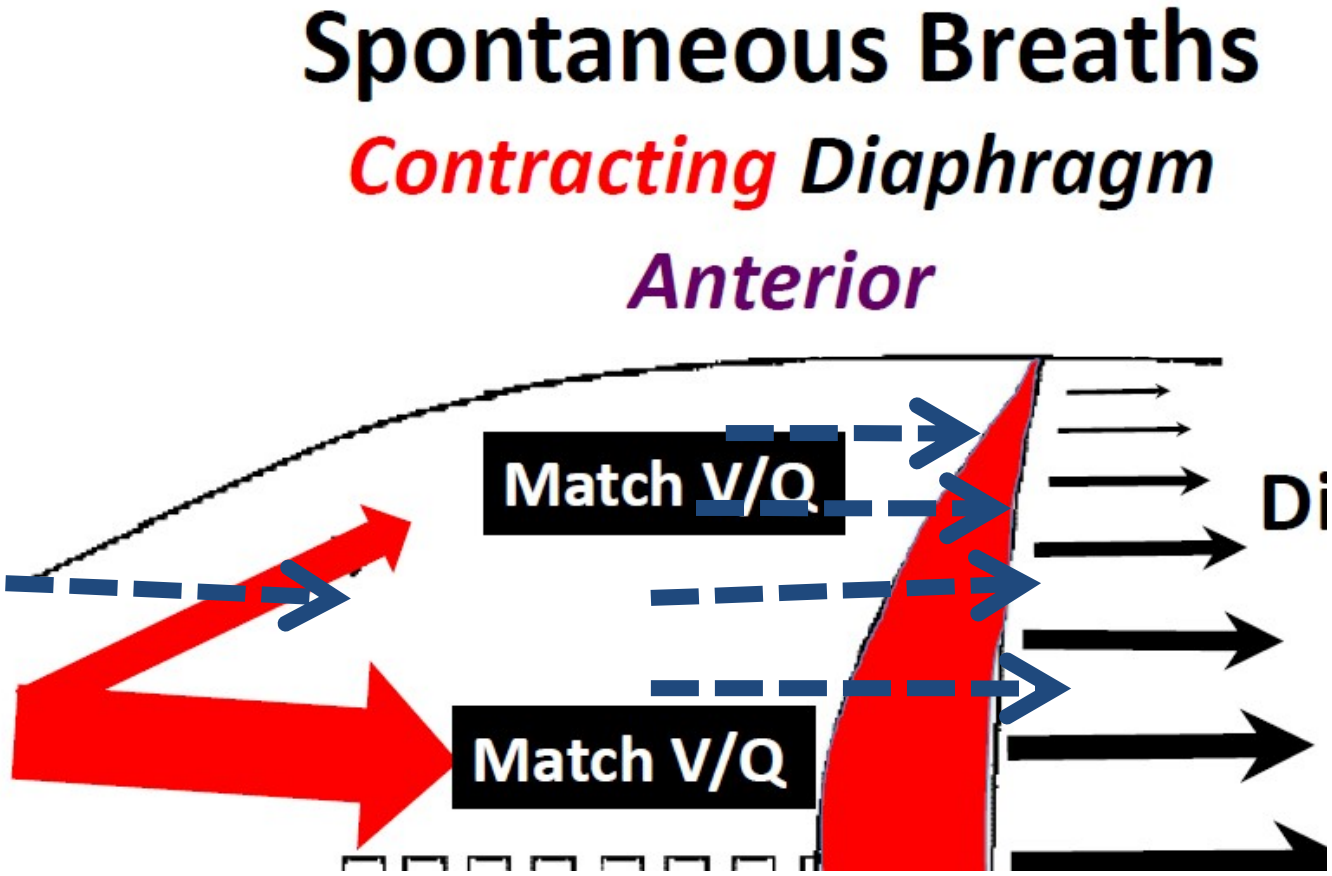
N Engl J Med. 2008 Mar 27;358(13):1327-35

2. Restaurer une activité diaphragmatique



Ewan C. Am J Respir Crit Care Med Vol 192, Iss 9, pp 1080–1088, Nov 1, 2015

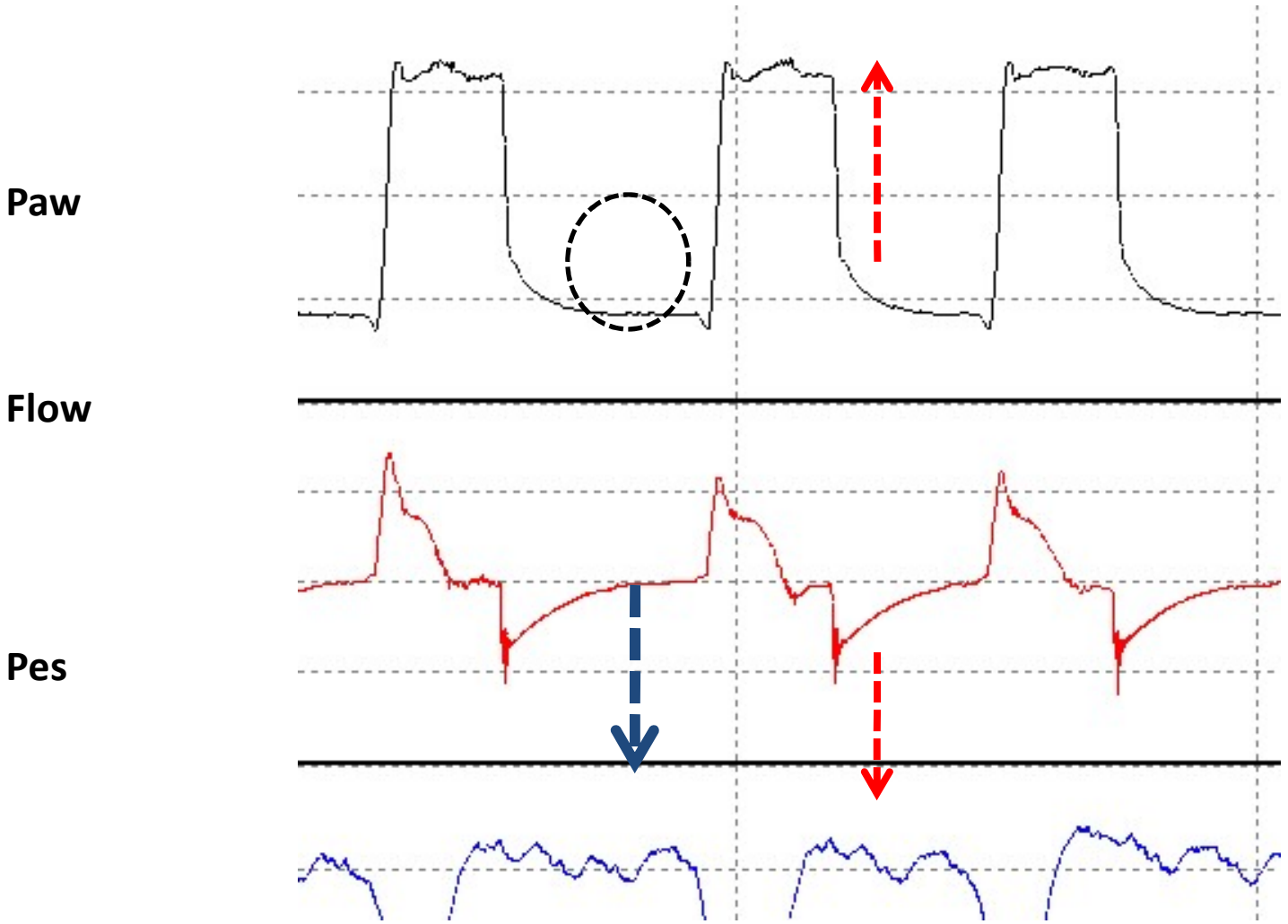
3. Améliorer le recrutement alvéolaire et l'oxygénation



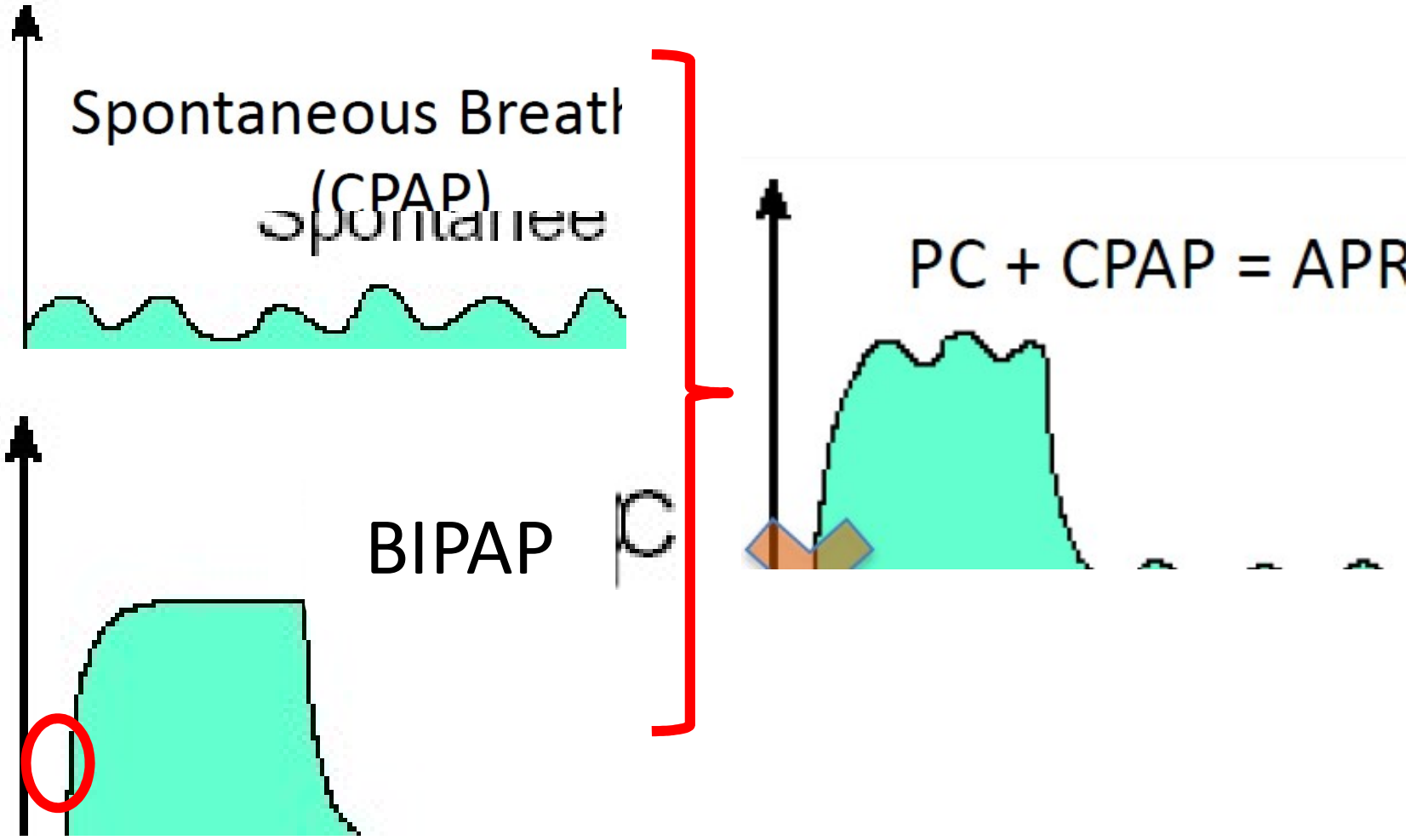
Curr Opin Crit Care. 2002 Feb;8(1):51-7.

Description du mode Bilevel positive airway pressure

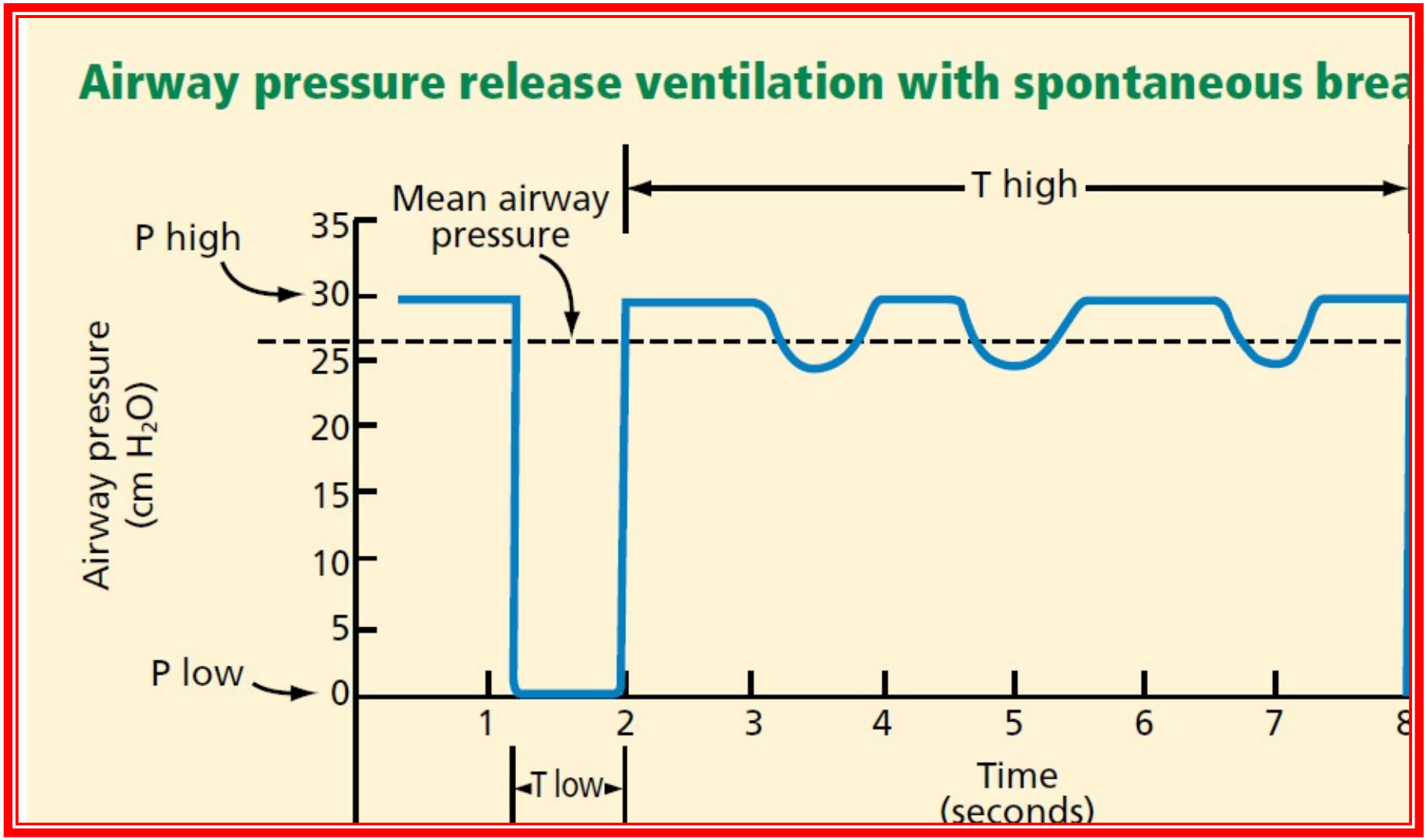
Description du mode *Bilevel positive airway pressure*



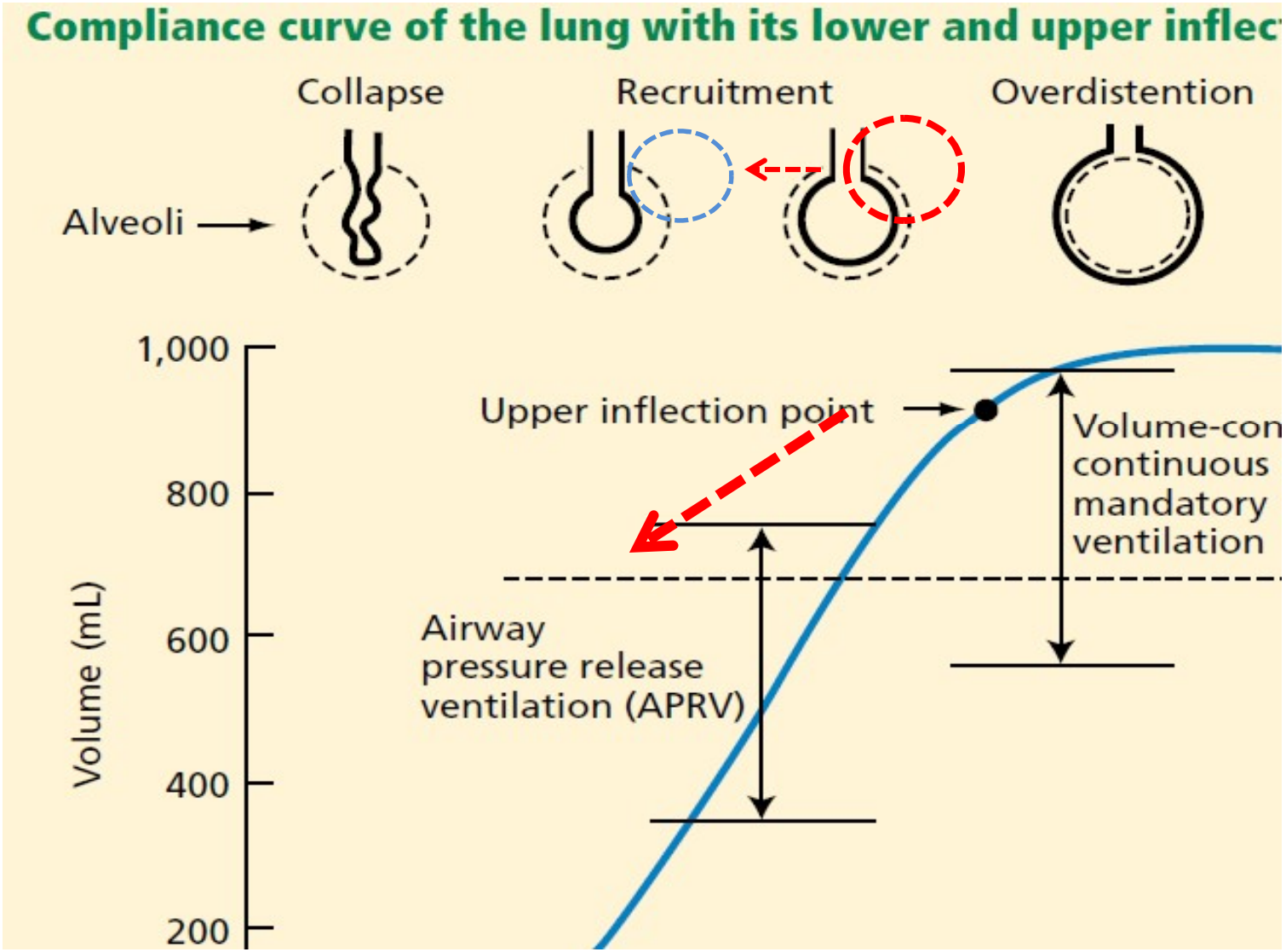
Description du mode *Bilevel positive airway pressure-airway pressure release ventilation*



Description du mode *Bilevel positive airway pressure-airway pressure release ventilation*



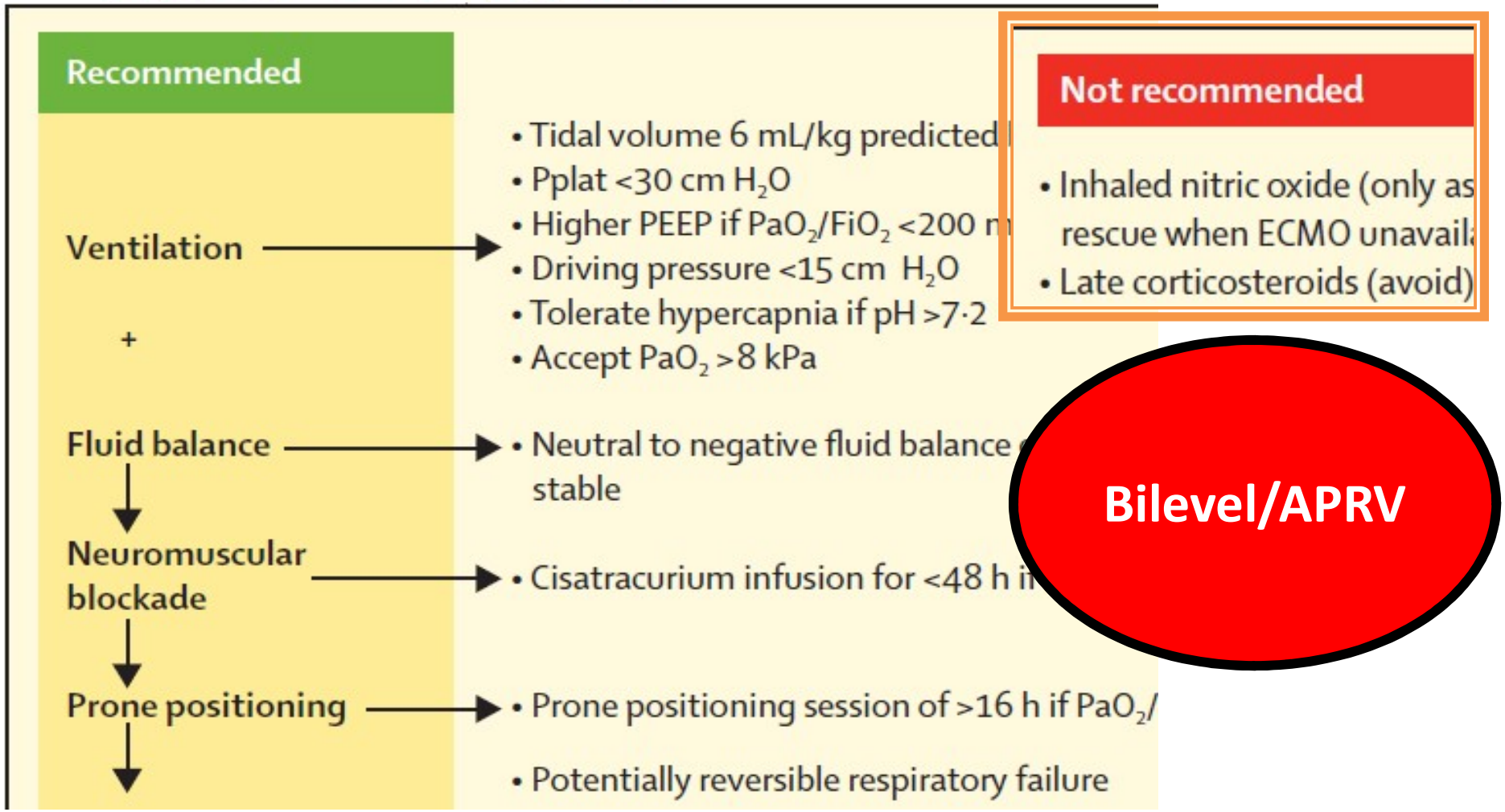
Airway pressure release ventilation: an alternative mode of mechanical ventilation in acute respiratory distress syndrome.



Cleve Clin J Med 2011;78(2):101-110.

Cependant…!

Acute respiratory distress syndr



www.thelancet.com Published online April 28, 2016 http://dx.doi.org/10.1016/S0140

Papazian *et al. Ann. Intensive Care* (2019) 9:69
https://doi.org/10.1186/s13613-019-0540-9

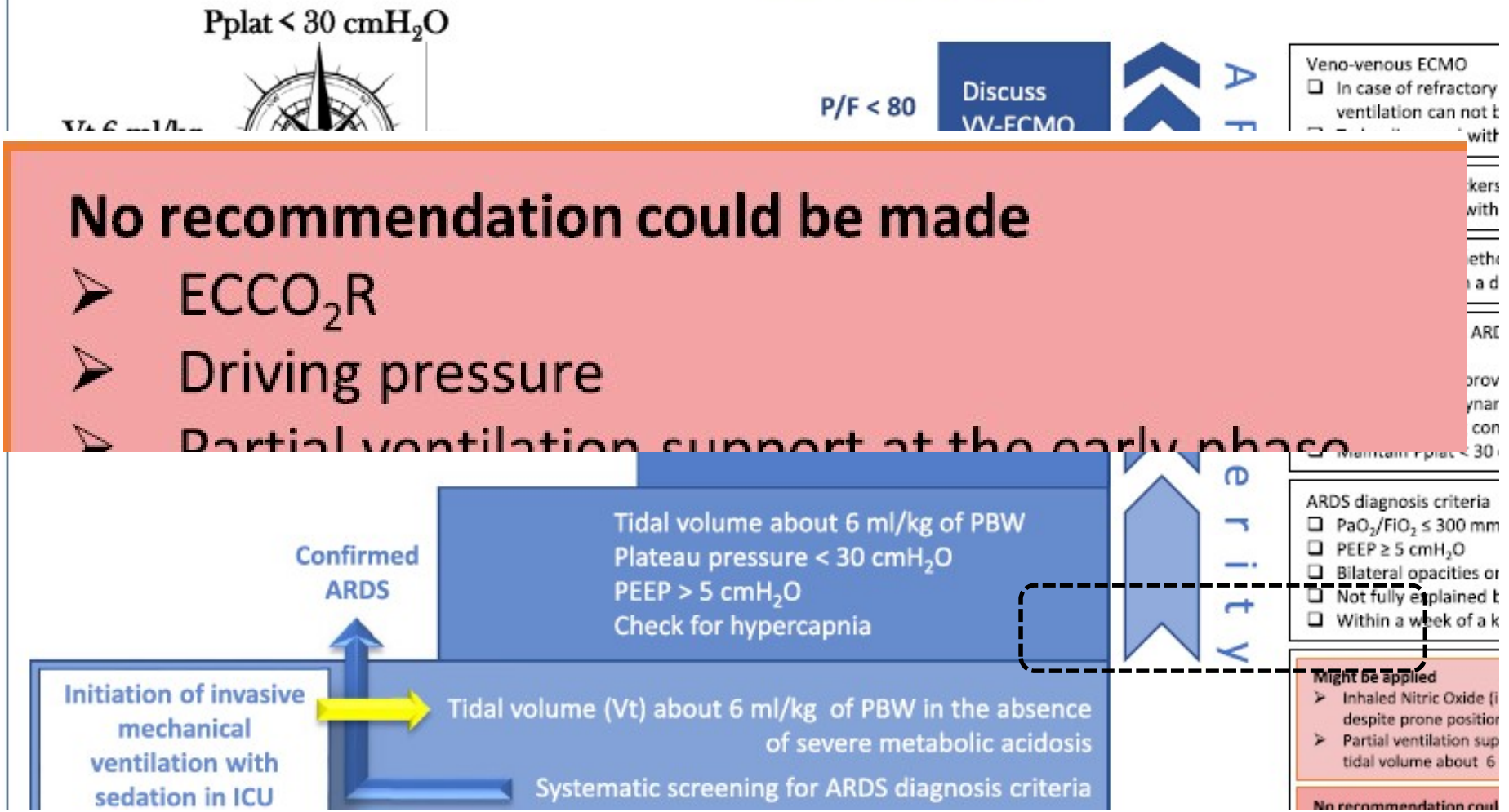
Annals of I

REVIEW

Formal guidelines: management of acut respiratory distress syndrome

Laurent Papazian[1*], Cécile Aubron[2], Laurent Brochard[3], Jean-Daniel Chiche[4], Alain Combes[5]

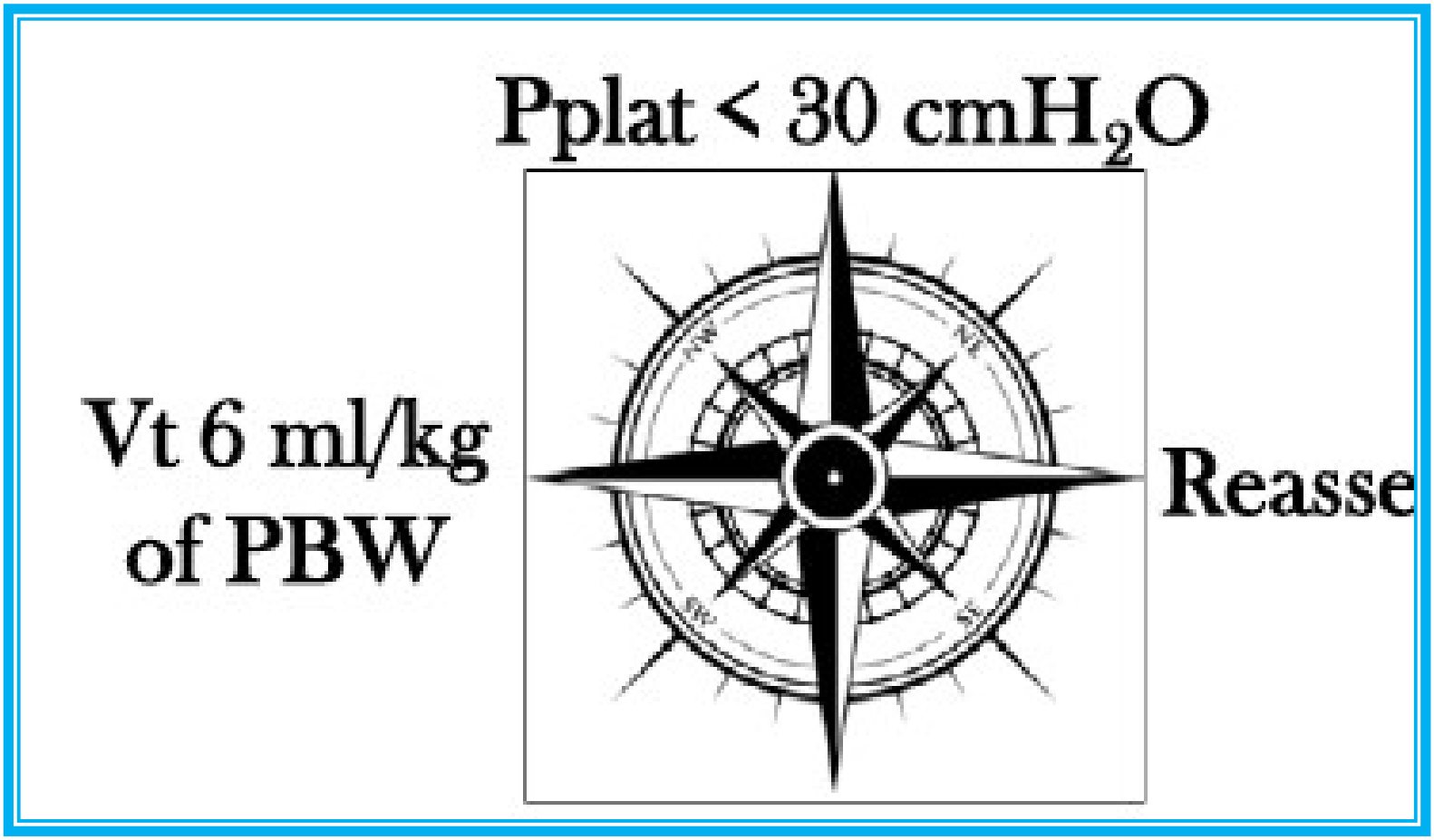
Early management of ARDS in 2019



No recommendation could be made

- $ECCO_2R$
- Driving pressure
- Partial ventilation support at the early phase

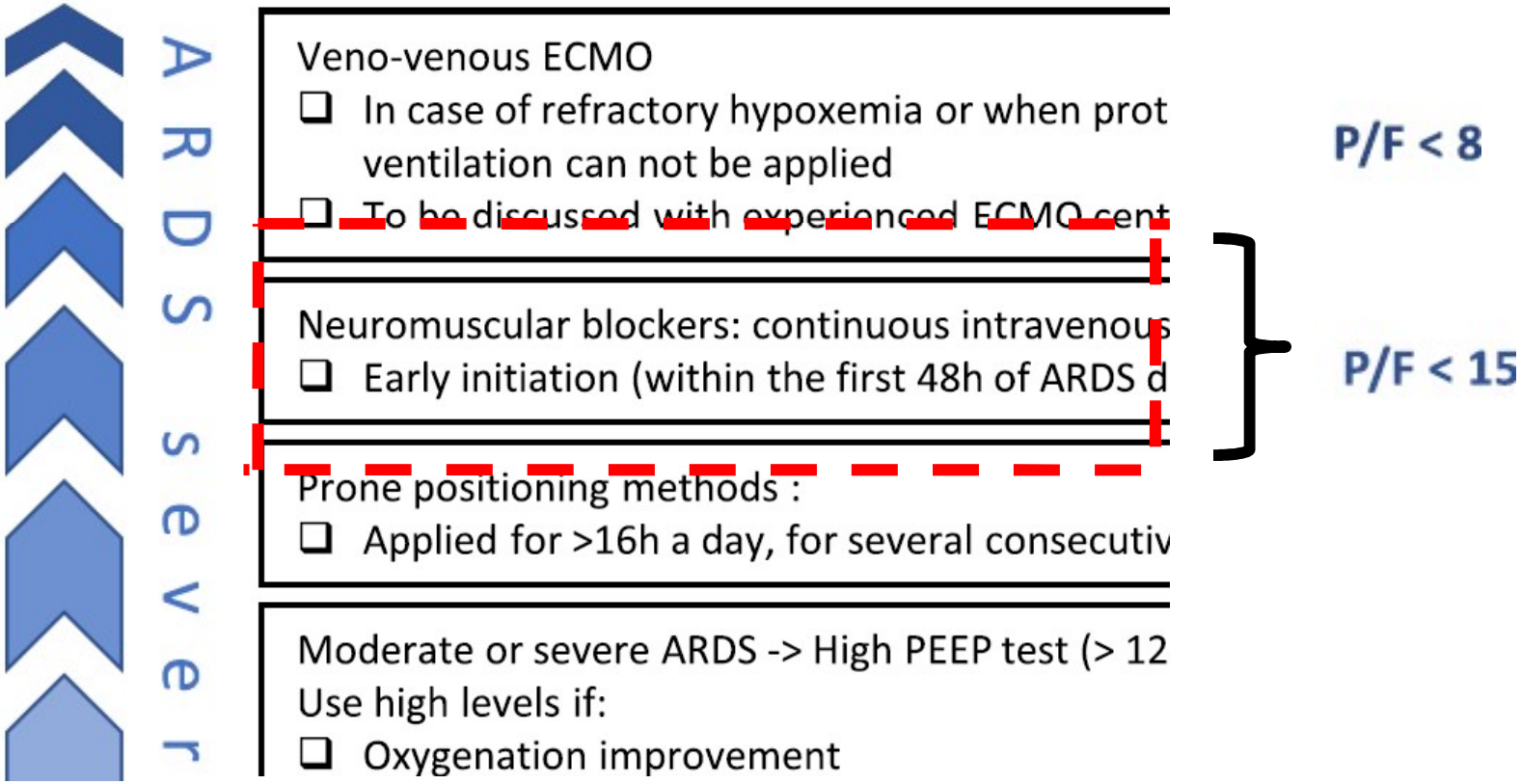
Therapeutic algorithm regarding early ARDS management (**EXPERT OPINION**)



Papazian *et al. Ann. Intensive Care (2019) 9:69*

Therapeutic algorithm regarding early ARDS management (EXPERT OPINION)

1. A tidal volume around 6 mL/kg of predicted body weight (PBW) should be used as a first approach in patients with recognized ARDS (GRADE 1 +)



BIPAP-APRV in severe acute Respiratory Distress Syndrome

- **Non applicable pour plusieurs Raisons:**

1. Nécessité de curarisation:

(Grade 1 +)

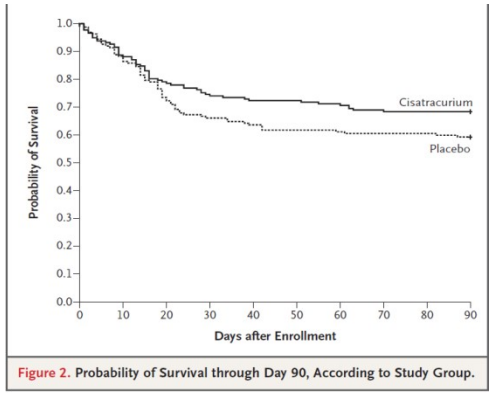
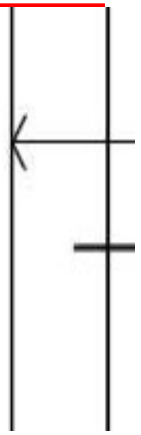


Figure 2. Probability of Survival through Day 90, According to Study Group.

N engl j med 363;12nejm.org september 16, 2010

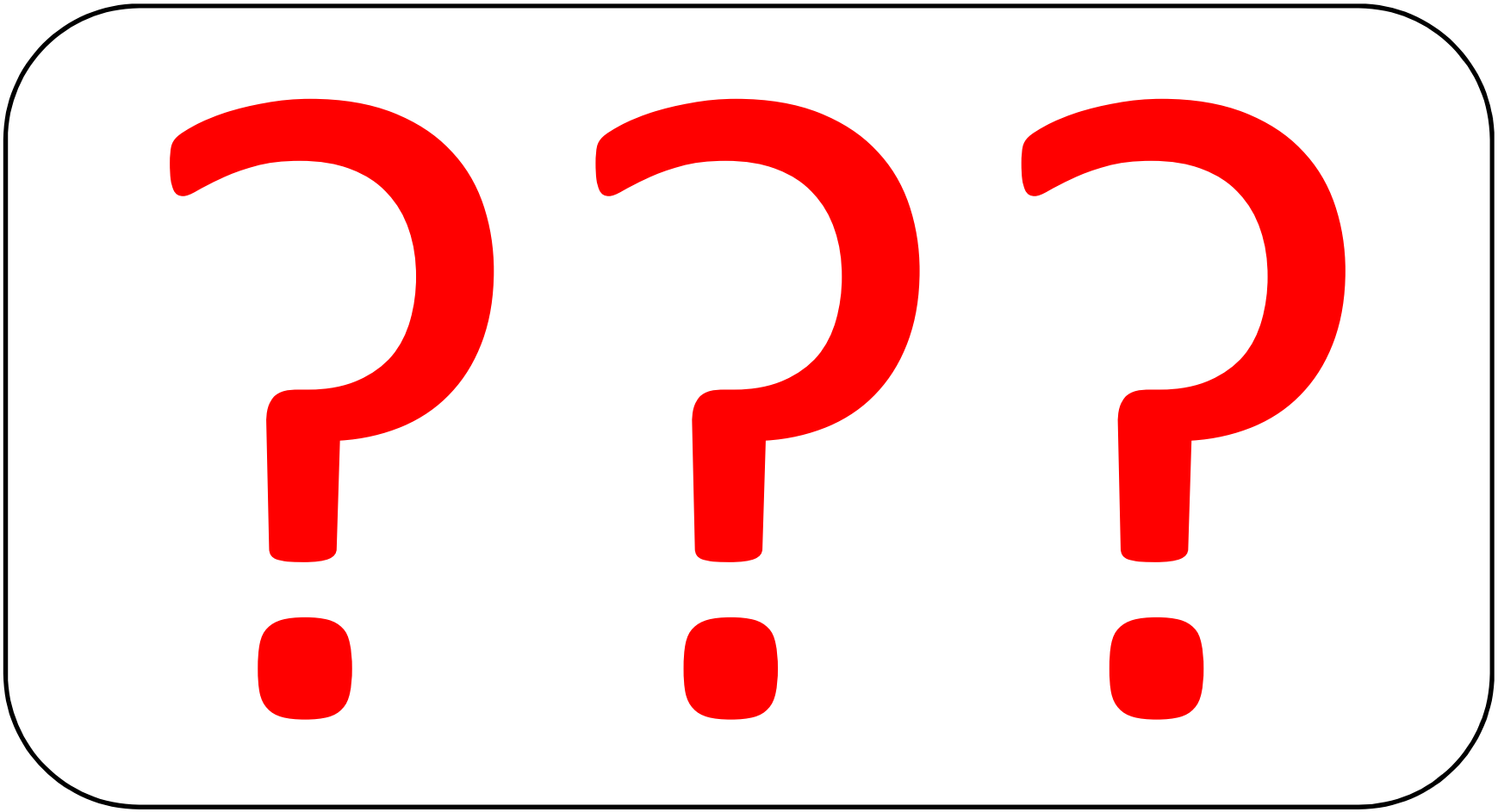
2.

	ARDS	Mancebo_2006	0,548	0,276	1,087	0,085
	ARDS	Chan_2007	0,593	0,078	4,498	0,613
	ARDS	Fernandez_2008	0,554	0,157	1,952	0,358
	ARDS	Taccone_2009	0,810	0,530	1,238	0,330



Abroug et al. Critical Care2011,15:R6

APRV has been available since 1986!!!



A Randomized Prospective Trial of Airway Pressure Ventilation and Low Tidal Volume Ventilation in Adu Patients With Acute Respiratory Failure

TABLE 1. Patient Demographics and Baseline Physiology Parameters

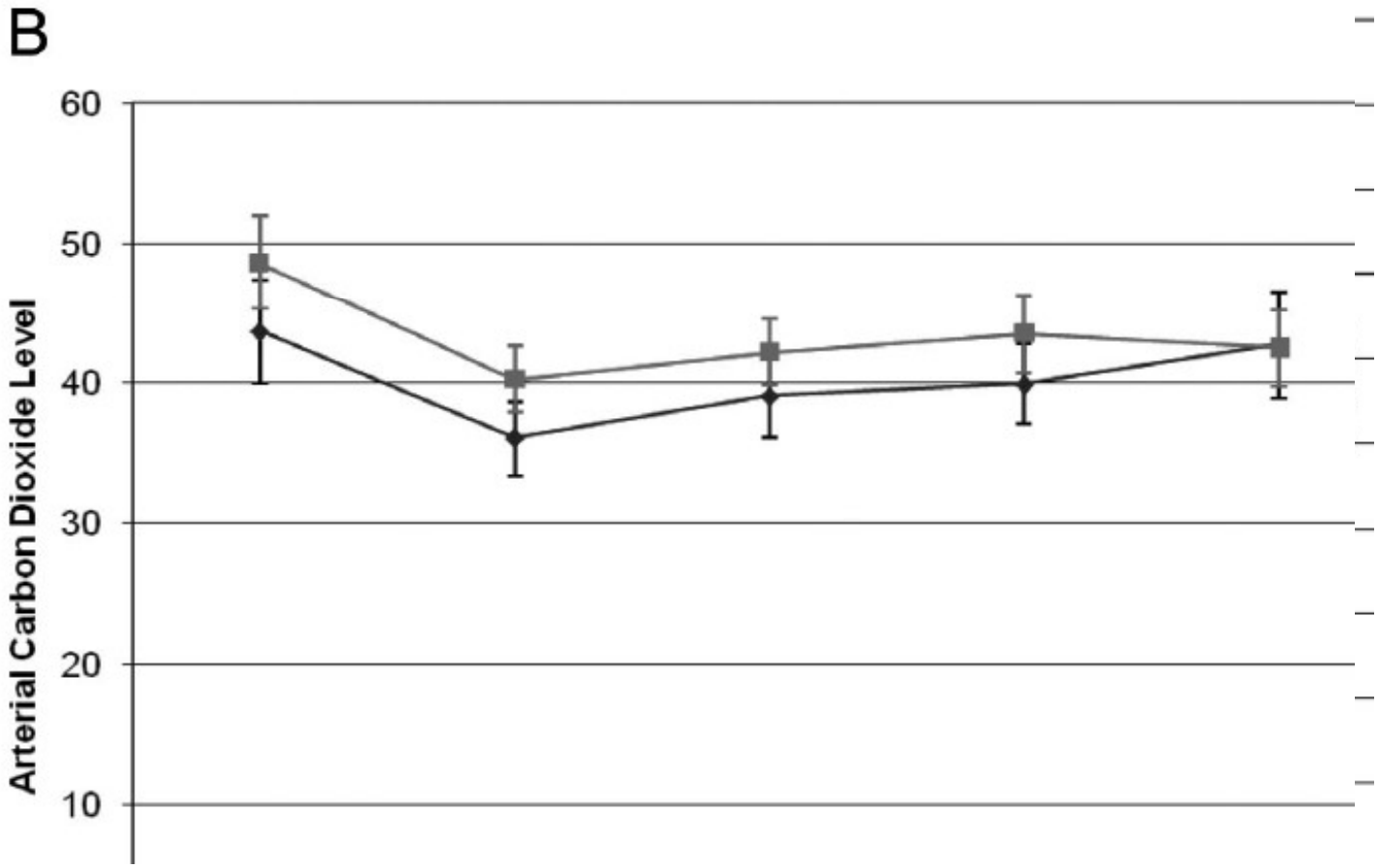
Parameter	APRV
Age (yr)	40.5 ± 14.1
Gender, n (%)	
Male	24/31 (77.4)
Female	7/31 (22.6)
ISS	30.3 ± 9.8
GCS score	5.3 ± 4.1
APACHE II	20.5 ± 5.3
ARDS, n (%)	8/31 (25.8)

A Randomized Prospective Trial of Airway Pressure Ventilation and Low Tidal Volume Ventilation in Adu Patients With Acute Respiratory Failure

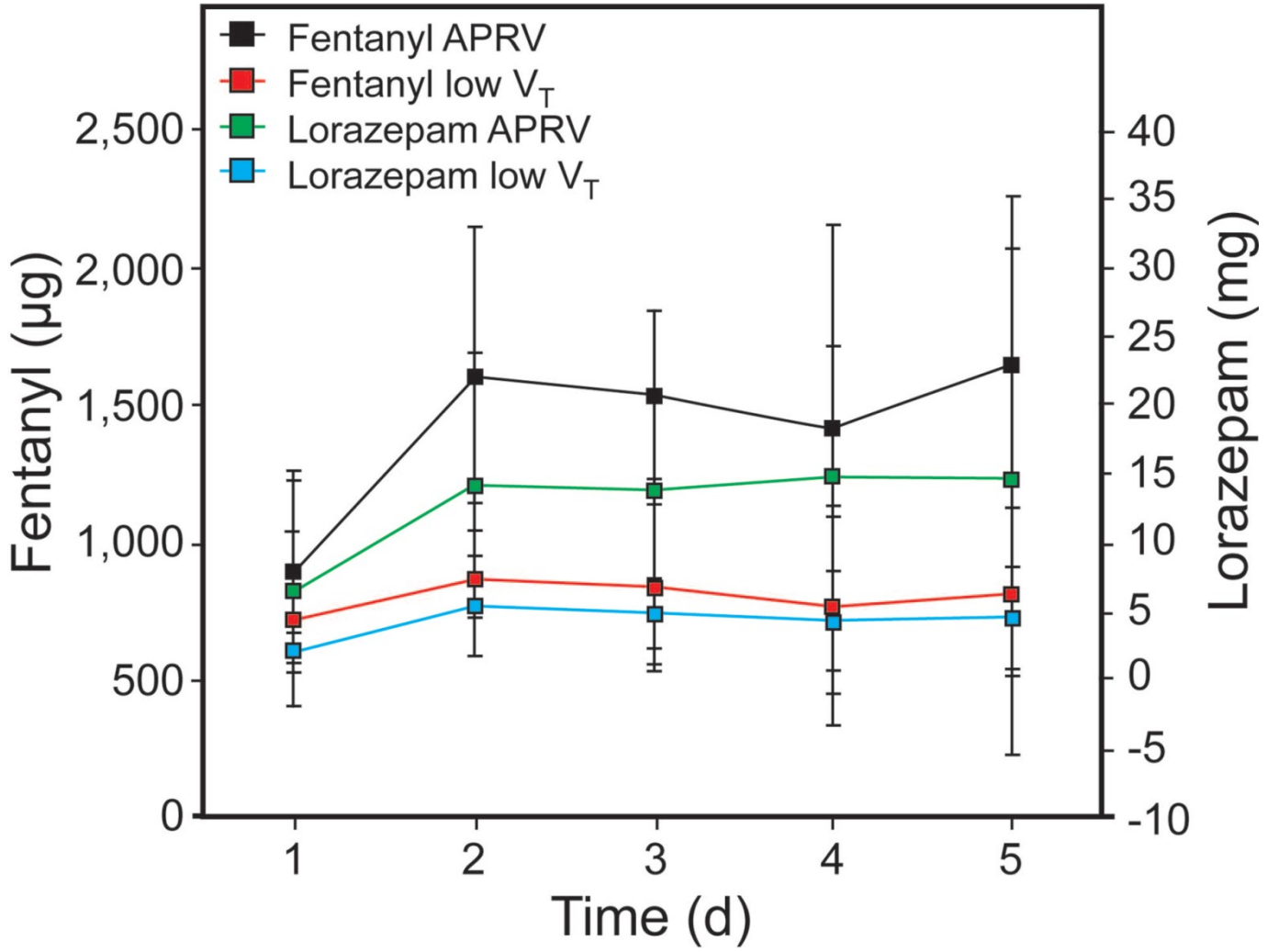
TABLE 2. Outcome Data

Dependent Measure	APRV
Ventilator days	10.49 ± 7.23
ICU length of stay (d)	16.47 ± 12.83
Pneumothorax	0
VAP per patient	1.00 ± 0.86
Tracheostomy (%)	61.3
Failure of modality (%)	12.9

A Randomized Prospective Trial of Airway Pressure Ventilation and Low Tidal Volume Ventilation in Adu Patients With Acute Respiratory Failure



A Randomized Prospective Trial of Airway Pressure Ventilation and Low Tidal Volume Ventilation in Adu Patients With Acute Respiratory Failure



A Randomized Prospective Trial of Airway Pressure Ventilation and Low Tidal Volume Ventilation in Adu Patients With Acute Respiratory Failure

- **Conclusions:**

1. For patients sustaining significant trauma requiring mechanical ventilation for greater than 72 hours, APRV **seems** to have **a similar safety profile** as the LOVT.
2. Trends for APRV patients to have **increased ventilator days**, **ICU LOS**, and **ventilator-associated pneumonia**

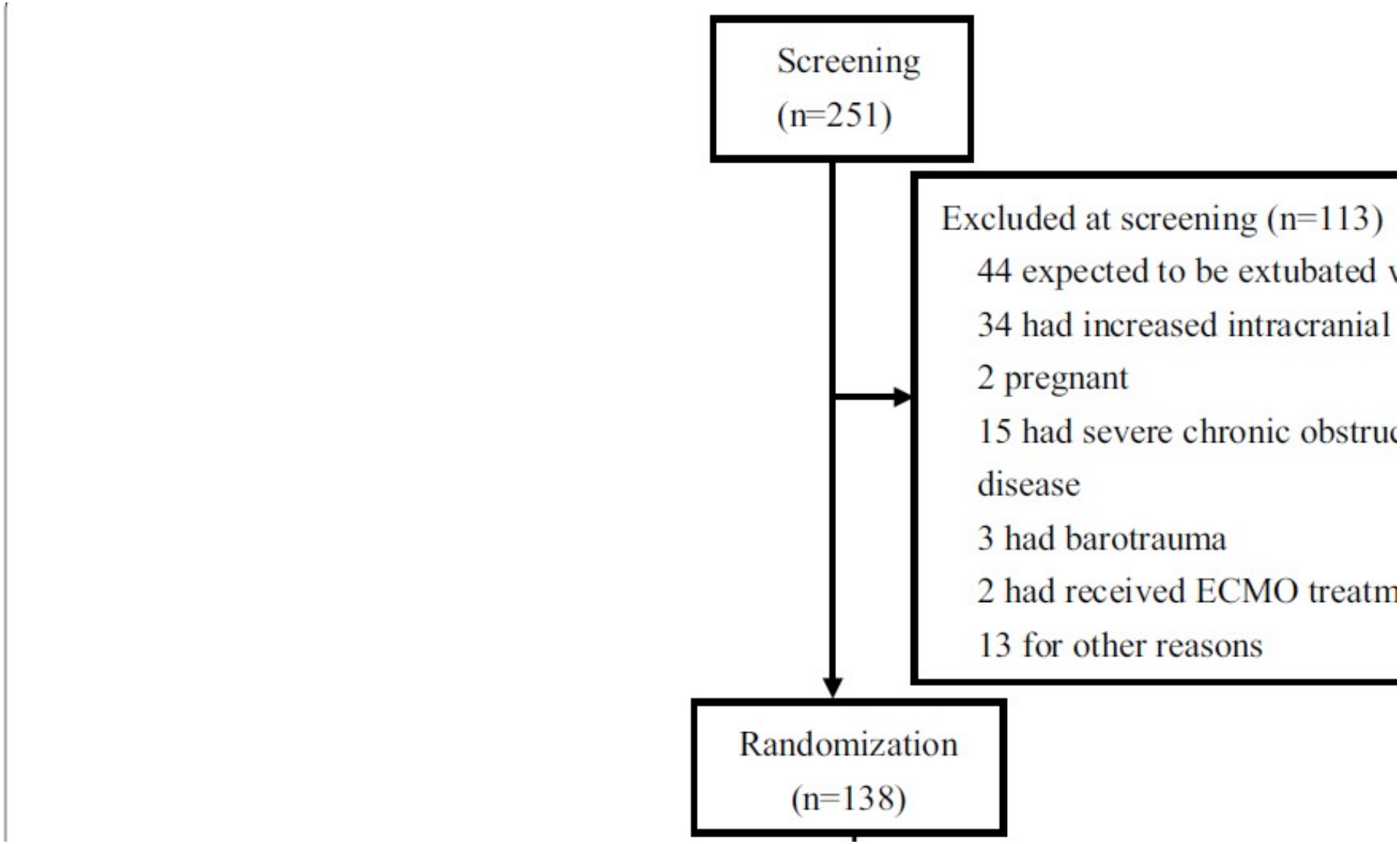
Intensive Care Med (2017) 43:1648–1659
DOI 10.1007/s00134-017-4912-z

ORIGINAL

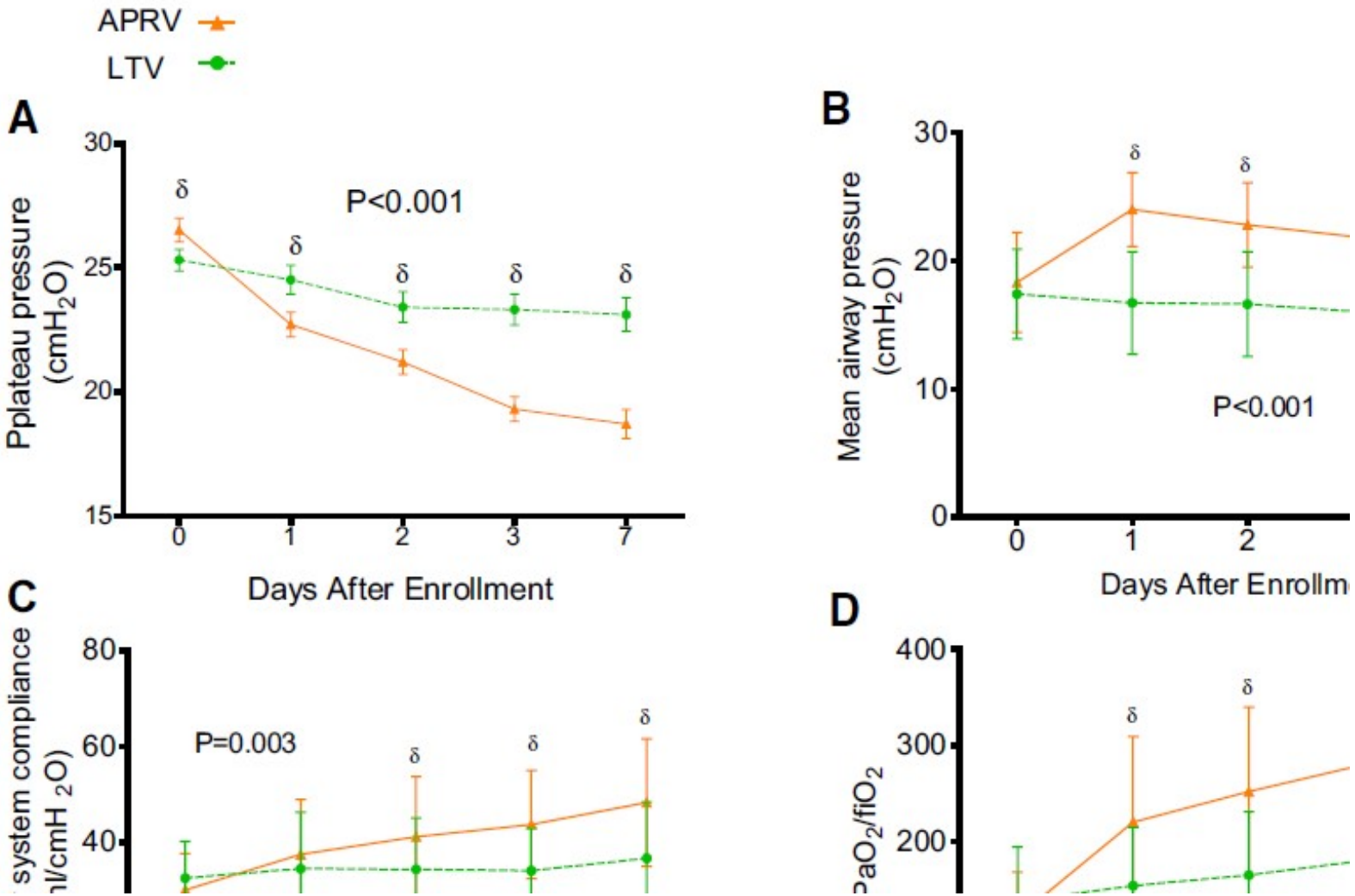
Early application of airway pressure release ventilation may reduce the dura of mechanical ventilation in acute respi distress syndrome

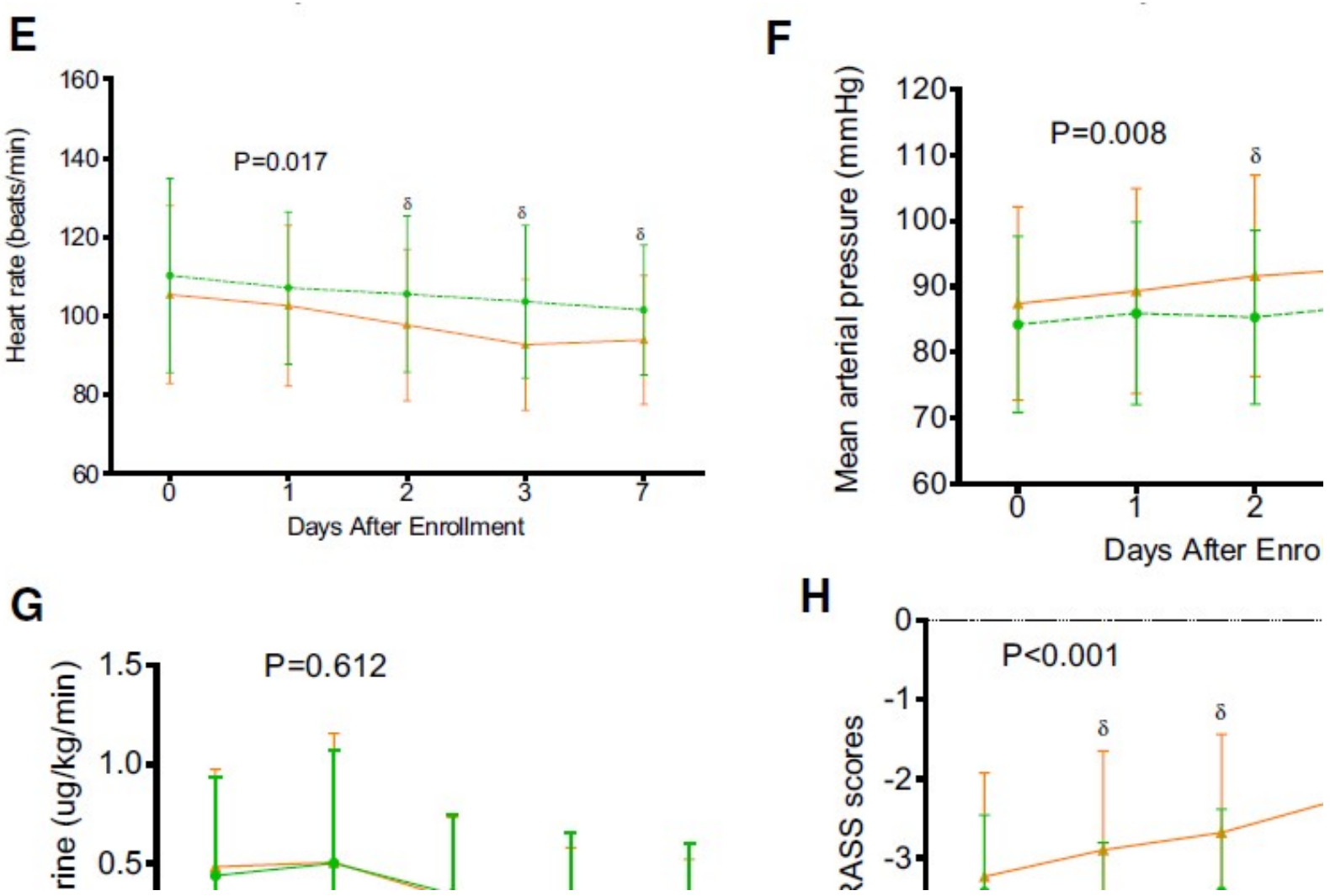
Yongfang Zhou, Xiaodong Jin, Yinxia Lv, Peng Wang, Yunqing Yang, Guopeng Liang, Bo W

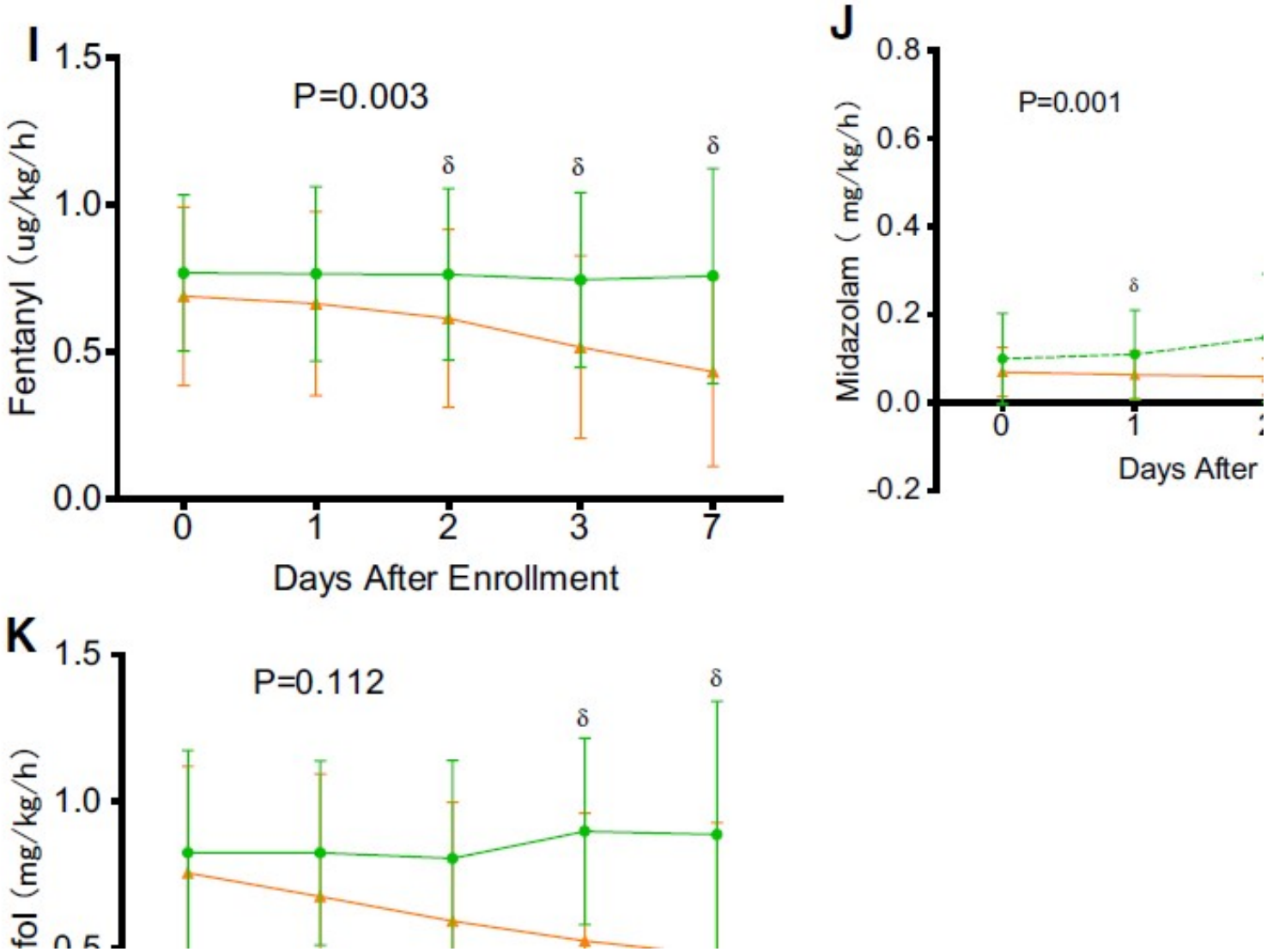
Intensive Care Med (2017) 43:1648–
DOI 10.1007/s00134-017-4912-z

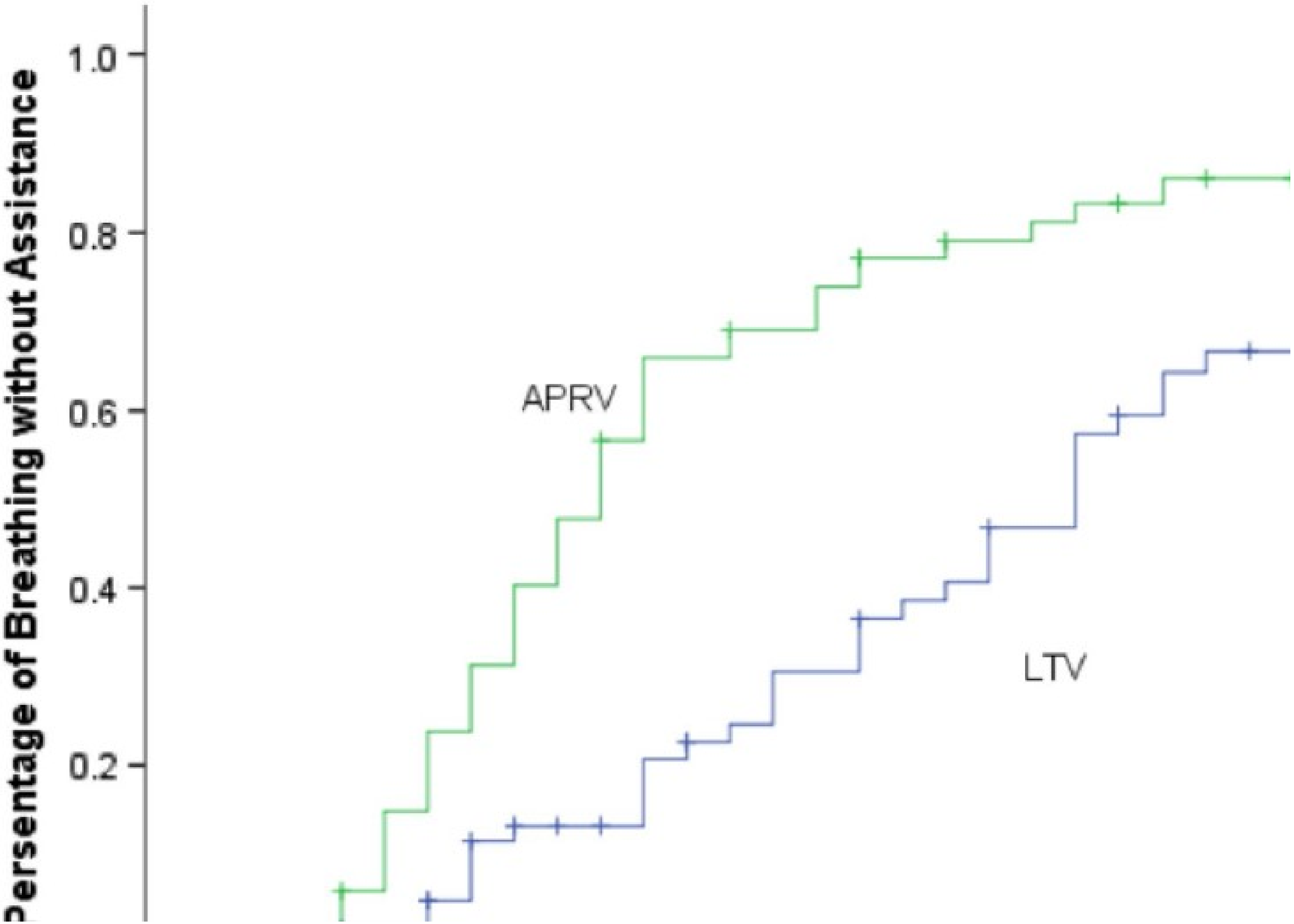

Screening
(n=251)
Excluded at screening (n=113)
44 expected to be extubated
34 had increased intracranial
2 pregnant
15 had severe chronic obstruc
disease
3 had barotrauma
2 had received ECMO treatm
13 for other reasons
Randomization
(n=138)

Patient Characteristics	APRV group (n = 71)	LTV group (n = 67)
Male sex	50 (70.4%)	41 (61.2%)
Age (years)	51.5 ± 15.0	52.0 ± 15.1
Predicted body weight (kg)	61.7 ± 8.2	60.5 ± 7.3
APACHE II score at admission	22.0 ± 7.9	20.2 ± 7.6
Duration of mechanical ventilation (h)	24.6 ± 12.6	22.1 ± 13.5
Duration of ICU stay before inclusion (h)	25.6 ± 12.6	23 ± 13.3
Coexisting one or more diseases	23 (32.4%)	34 (50.7%)
pH	7.37 ± 0.09	7.38 ± 0.10
$PaCO_2$ (mmHg)	40.1 ± 7.4	41.7 ± 10.5
PaO_2:FiO_2 at baseline	121.7 ± 46.8	138.3 ± 56.1
PaO_2:FiO_2 ≤ 150	47(66.2%)	41(61.2%)
Vasopressor	40 (56.3%)	46 (68.7%)


APRV
LTV
A
Pplateau pressure (cmH2O)
30
25
20
15
P<0.001
δ
0
1
2
3
7
Days After Enrollment
B
Mean airway pressure (cmH2O)
30
20
10
0
P<0.001
0
1
2
Days After Enrollm
C
system compliance
80
60
40
P=0.003
D
PaO2/fiO2
400
300
200


E
Heart rate (beats/min)
160
140
120
100
80
60
P=0.017
δ
δ
δ
0
1
2
3
7
Days After Enrollment
F
Mean arterial pressure (mmHg)
120
110
100
90
80
70
60
P=0.008
δ
0
1
2
Days After Enro
G
rine (ug/kg/min)
1.5
1.0
0.5
P=0.612
H
RASS scores
0
-1
-2
-3
P<0.001
δ
δ


I
P=0.003
Fentanyl（ug/kg/h）
1.5
1.0
0.5
0.0
0
1
2
3
7
δ
δ
δ
Days After Enrollment
J
P=0.001
Midazolam（mg/kg/h）
0.8
0.6
0.4
0.2
0.0
-0.2
0
1
δ
Days After
K
P=0.112
fol（mg/kg/h）
1.5
1.0
δ
δ



1.0
0.8
0.6
0.4
0.2
Persentage of Breathing without Assistance
APRV
LTV

Main Outcome variables	APRV (n = 71) [b]	LTV (n = 67) [b]	P value
No. of days of ventilation	8 [5–14]	15 [7–22]	0.001
Successful extubation	47 (66.2%)	26 (38.8%)	0.001
Tracheostomy	9 (12.7%)	20 (29.9%)	0.013
Neuromuscular blocker	2 (2.8%)	9 (13.4%)	0.021
Prone position	2 (2.8%)	10 (14.9%)	0.012
High-frequency oscillatory ventilation	1 (1.4%)	3 (4.5%)	0.355

APRV is the 'best' ventilation mode in (early) acute lung injury/ARDS !!!

Non….Limites de l'étude

1.
   - **Not blinded +++**
   - **Taille de l'échantillon**
2.
   - **Le Caractère Monocentique +++**
   - **Randomisation par des enveloppes!!!**
3.
   - ***Deux groupes non comparables: ATCDS de maladies chroniques (COPD, renal dysfunctionand malignancy) : 32% vs 51 % (p: 0.029)***
4.
   - **Groupe LVC (6ml/kg) plus grave: Plus de choc: (68.7% vs. 56.3%)**
   - **Pas de Monitorage Hémodynamique!!!**

Non….Limites de l'étude

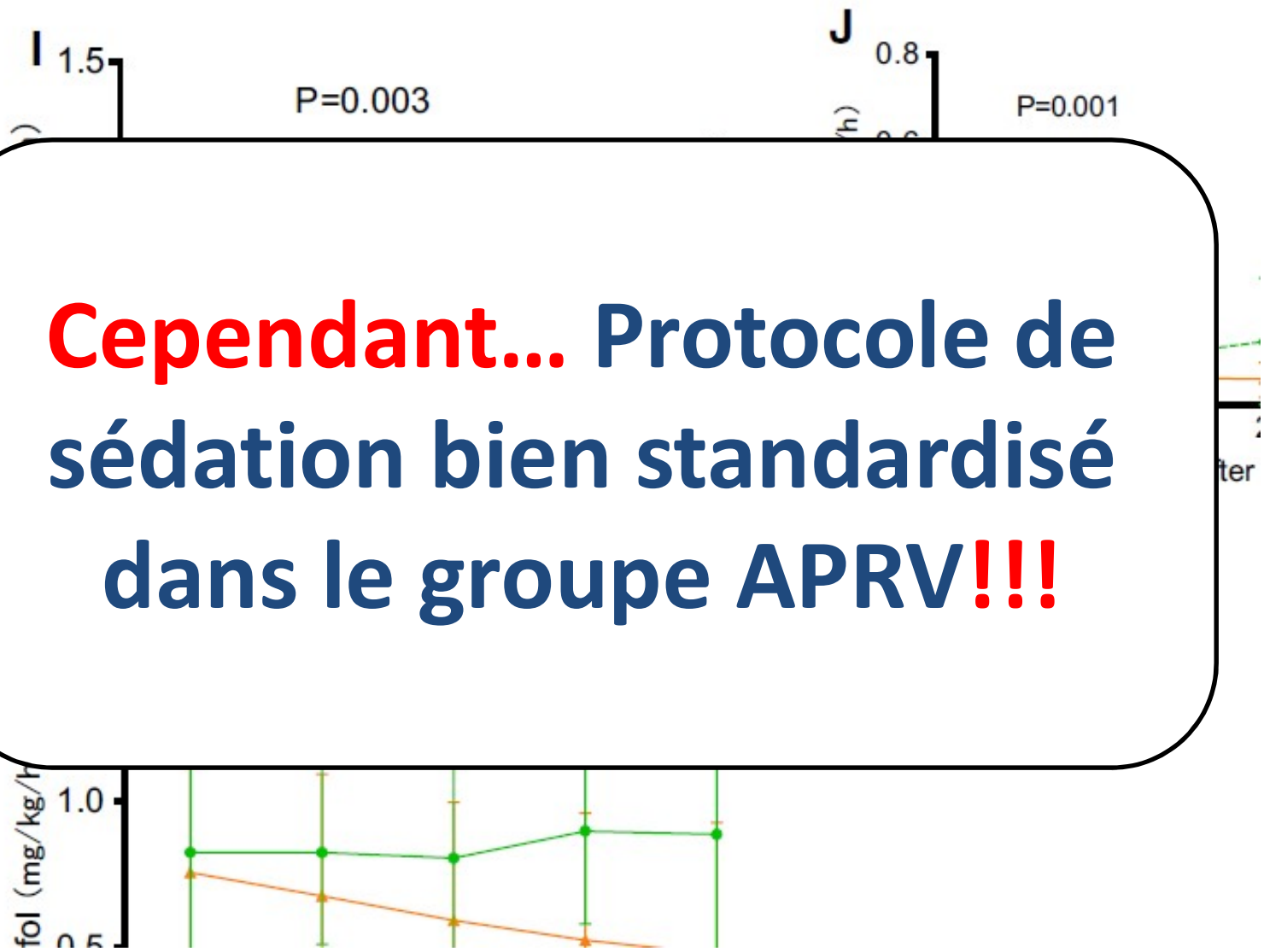
5. • Echec d'extubation:> 60% groupe LVC (6 ml/kg) (!!!)

6. • PaO2:FiO2 ≤ 150 (> 60%):
Décubitus ventral: 2.8 % vs 15% (!!!)

7. • PaO2:FiO2 ≤ 150 (> 60%):
Utilisation des curares: 2.8% vs 13.4% (!!!)

8. • High-frequency oscillatory ventilation (HFO):1.5% vs 4.5%

Non….Limites de l'étude



Cependant… Protocole de sédation bien standardisé dans le groupe APRV!!!

Non….Limites de l'étude

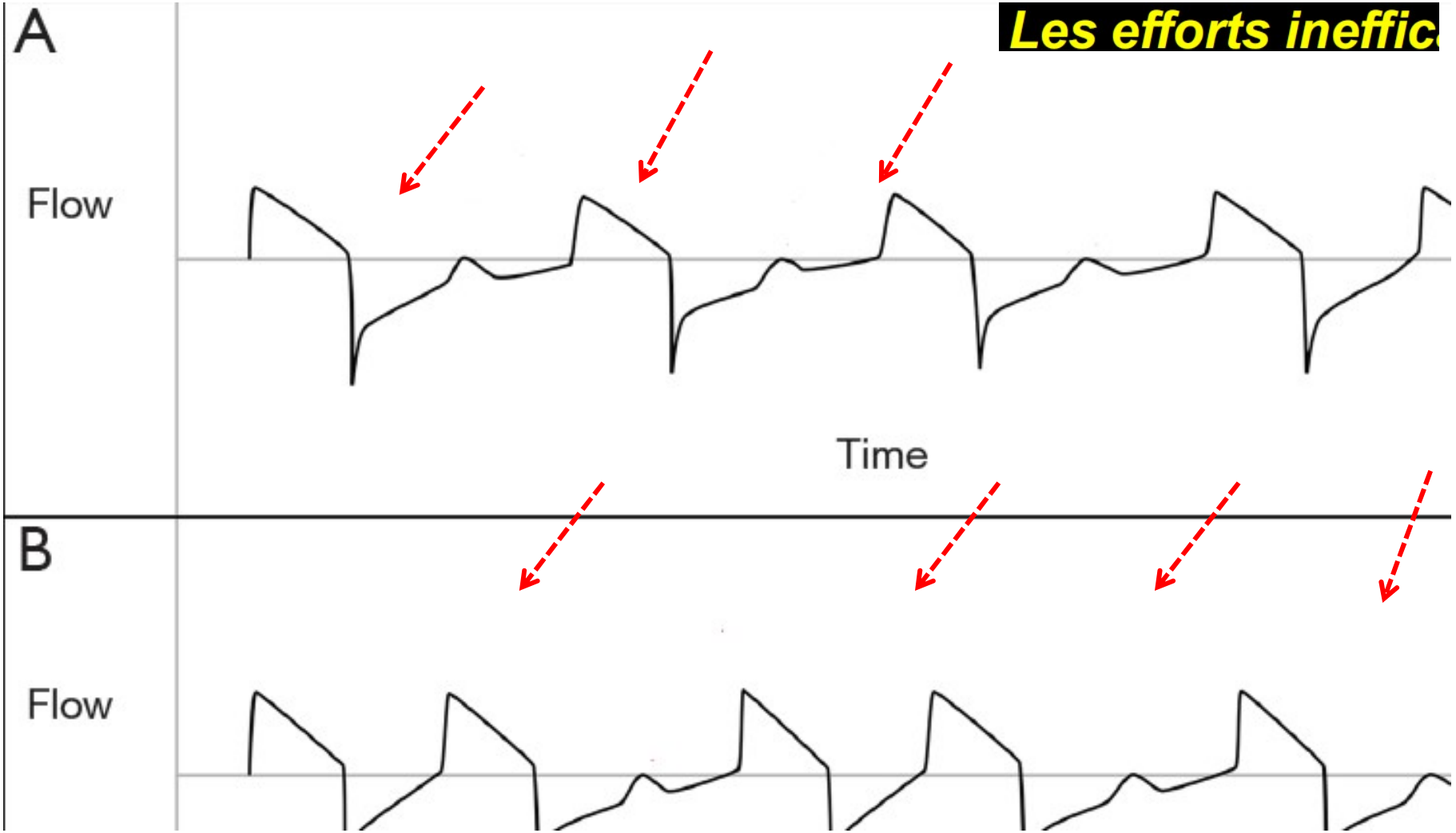


Figure 1: **Graphical representation of the flow-time curves of two images included as Figure SS2 in the electronic supplemental material (ESM2) of the Zhou *et al. study***

Carsetti *et al. Ann. Intensive Care* (2019) 9:44
https://doi.org/10.1186/s13613-019-0518-7

Annals of I

RESEARCH

Airway pressure release ventilation during acute hypoxemic respiratory failu a systematic review and meta-analysis of randomized controlled trials

Carsetti *et al. Ann. Intensive Care* (2019) 9:44
https://doi.org/10.1186/s13613-019-0518-7

Annals of

Study or Subgroup	CV Mean [days]	CV SD [days]	CV Total	APRV Mean [days]	APRV SD [days]	APRV Total	Weight	Mean Difference IV, Random, 95% CI [days]	Year
Putensen et al. 2001	30	7.75	15	23	7.75	15	15.5%	7.00 [1.45, 12.55]	2001
Li et al. 2016	9.5	3.2	26	7.4	3.3	26	49.3%	2.10 [0.33, 3.87]	2016
Zhou et al. 2017	20.67	16.67	67	14.67	9.84	71	20.4%	6.00 [1.40, 10.60]	2017
Hirshberg et al. 2018	10.5	11.24	17	6.47	4.5	18	14.8%	4.03 [-1.70, 9.76]	2018
Total (95% CI)			**125**			**130**	**100.0%**	**3.94 [1.44, 6.45]**	

Heterogeneity: Tau² = 2.50; Chi² = 4.75, df = 3 (P = 0.19); I² = 37%
Test for overall effect: Z = 3.08 (P = 0.002)

Mean D
IV, Random,

-10 -5
Favours CV

Fig. 3 ICU LOS. *APRV* airway pressure release ventilation, *CV* conventional ventilation

Study or Subgroup	CV Events	CV Total	APRV Events	APRV Total	Weight	Risk Difference M-H, Random, 95% CI	Year
Zhou et al. 2017	25	67	17	71	81.5%	0.13 [-0.02, 0.29]	2017
Hirshberg et al. 2018	10	17	6	18	18.5%	0.25 [-0.06, 0.57]	2018
Total (95% CI)		**84**		**89**	**100.0%**	**0.16 [0.02, 0.29]**	
Total events	35		23				

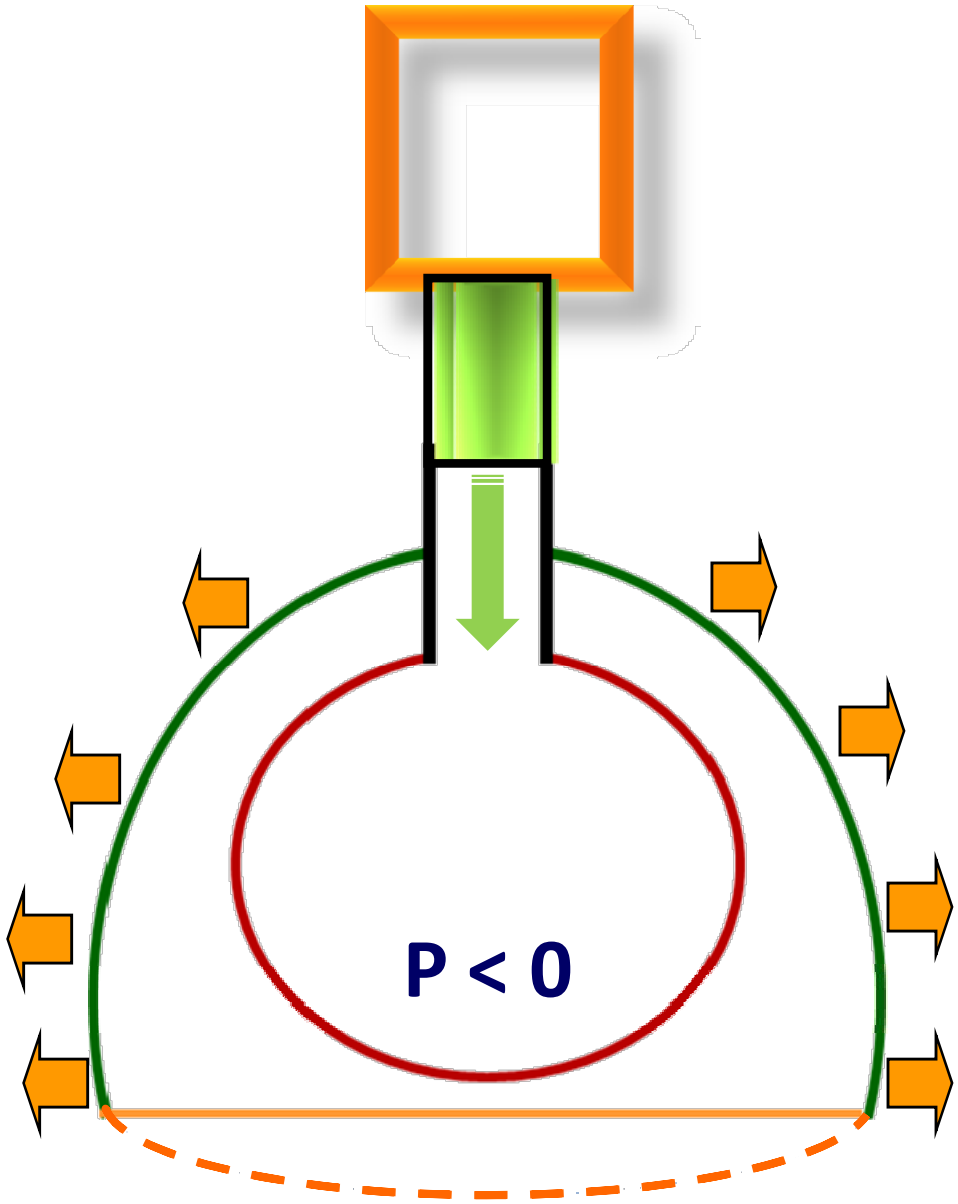
Risk Differe
M-H, Random,

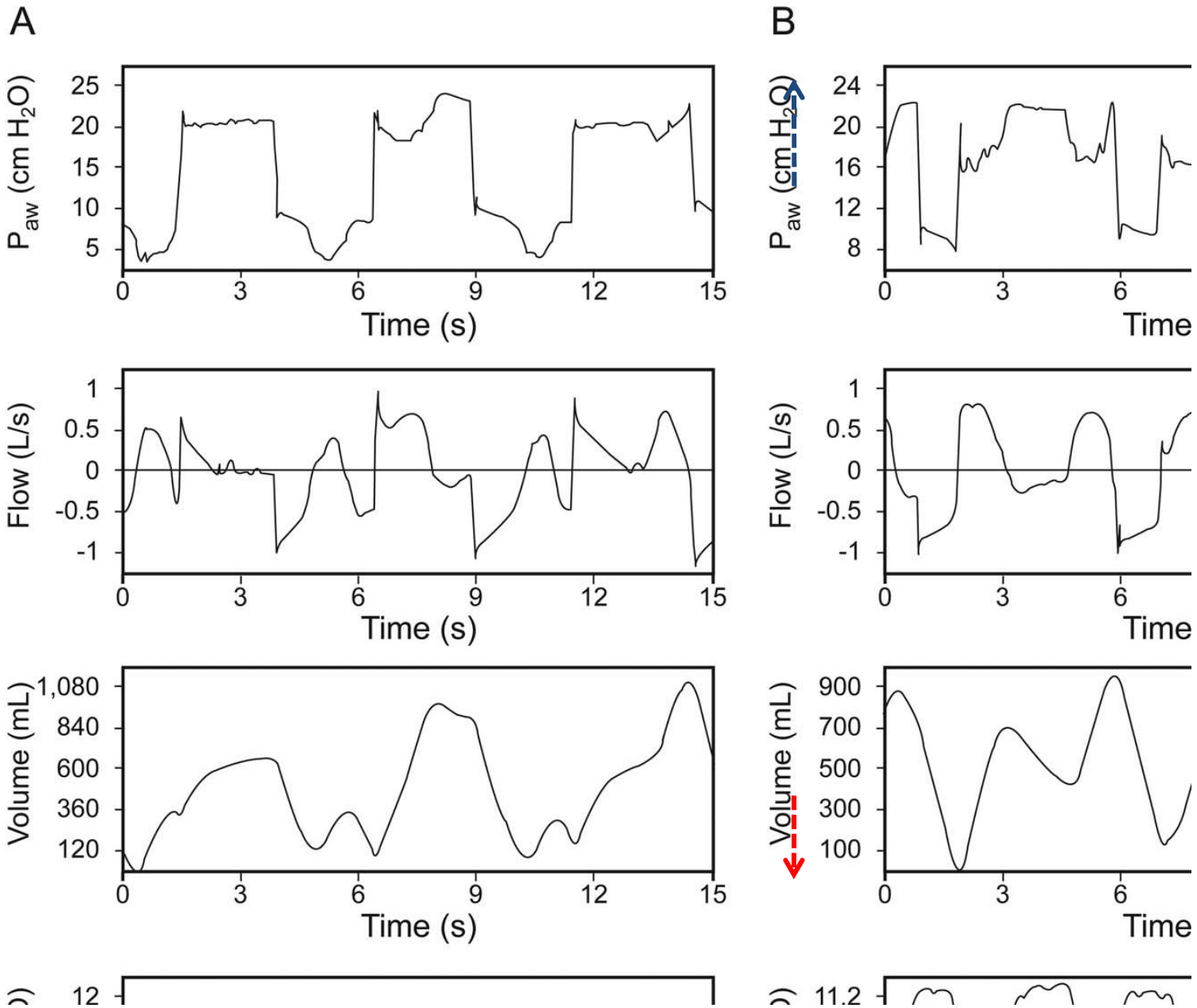
Conclusion

1. This study showed a higher number of **ventilator-free days at 28 day** and a **lower hospital mortality** in acute hypoxemic patients treated with APRV than conventional ventilation.

2. However, these results **need to be interpreted with caution because** of the **low quality evidence** supporting them and the moderate heterogeneity found.

3. Other well-designed RCTs need to be conducted to confirm our findings.


P < 0


A
B
P_{aw} (cm H_2O)
25
20
15
10
5
0
3
6
9
12
15
Time (s)
24
16
8
Time
Flow (L/s)
1
0.5
0
-0.5
-1
Volume (mL)
1,080
840
600
360
120
900
700
500
300
100
12
11.2

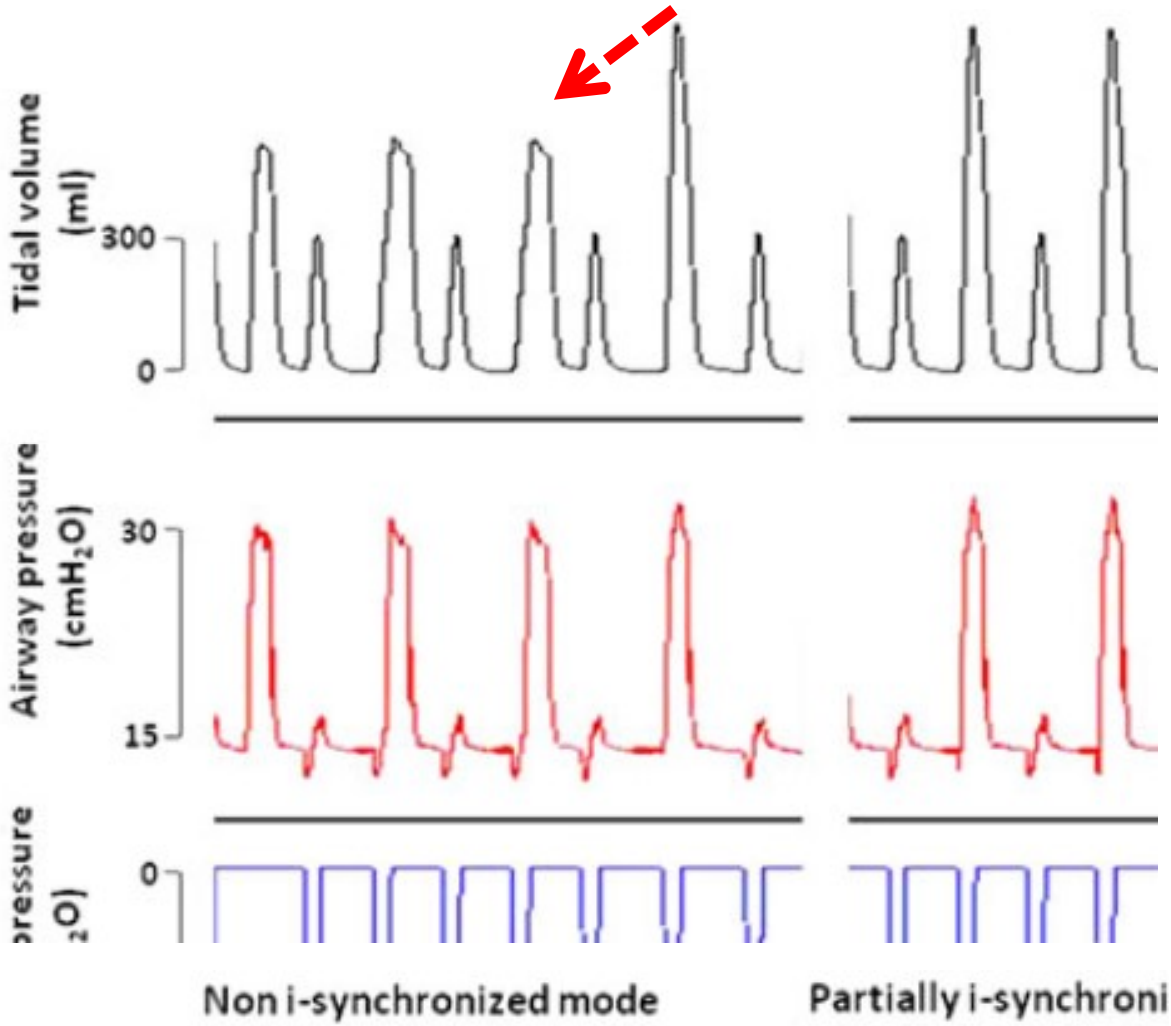
Risque de déclencher des Vc

Risques:

1. Augmentation PTP

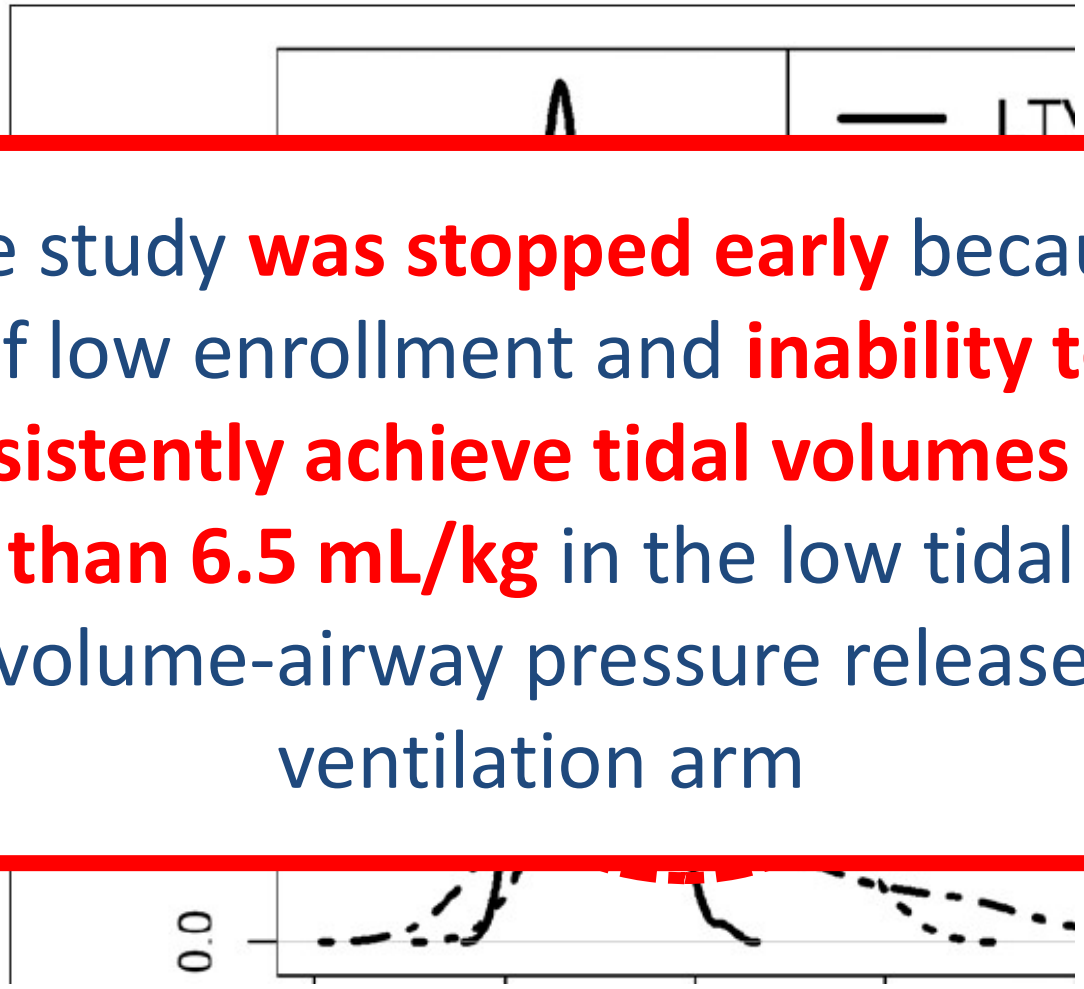
2. Volotraumatisme

Potentially harmful effects of inspiratory synchronization during pressure preset ventilation



Intensive Care Med (2013) 39:2003–2010DOI 10.1007/s00134-013-3032-7

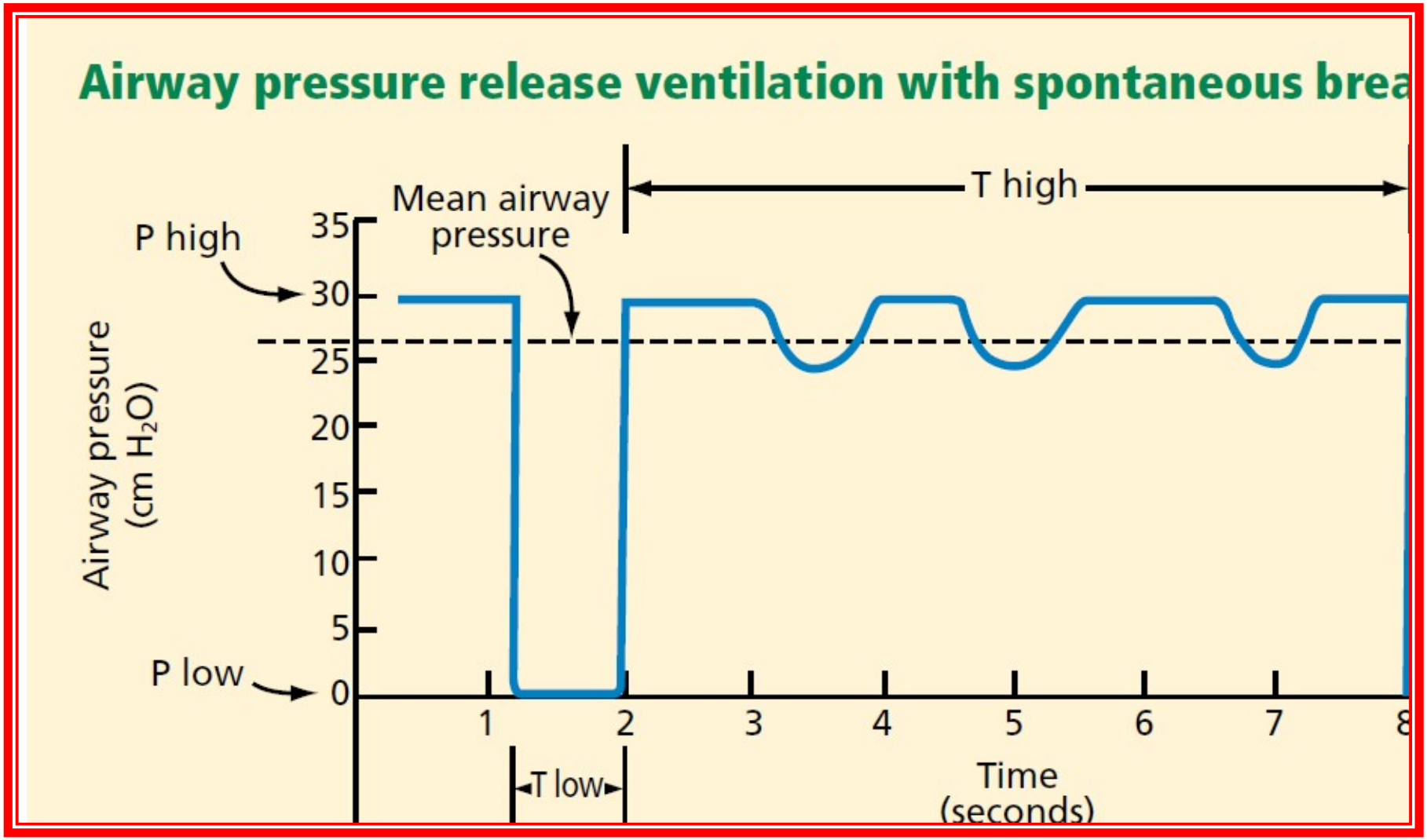
Randomized Feasibility Trial of a Low Tidal Volume-Airway Pressure Release Ventilation Protocol Compared With Traditional Airway Pressure Release Ventilation and Volume Control Ventilation Protocols



The study **was stopped early** because of low enrollment and **inability to consistently achieve tidal volumes less than 6.5 mL/kg** in the low tidal volume-airway pressure release ventilation arm

Crit Care Med. 2018 Dec; 46(12): 1943–1952.

Retentissement Hémodynamique

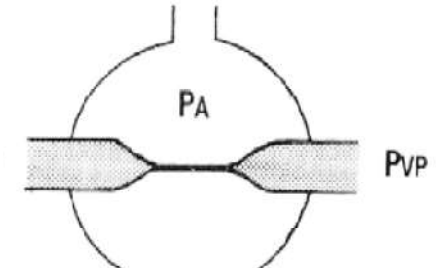


Retentissement Hémodynamique

1. Diminution du retour Veineux +++

2. Augmentation de la post Charge du VD

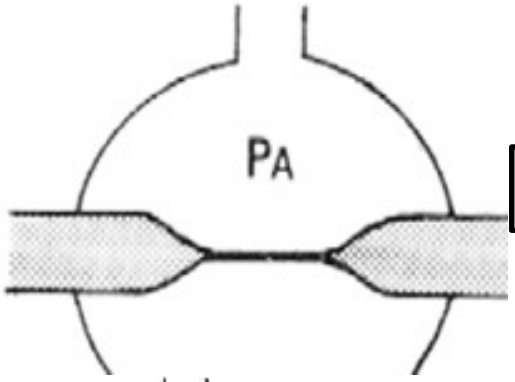
Retentissement Hémodynamique



A

$P_{alv} > P_{PA} > P_{PV}$

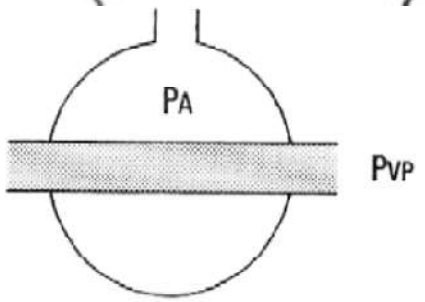
Zone 1



B

$P_{PA} > P_{alv} > P_{PV}$

Zone 1

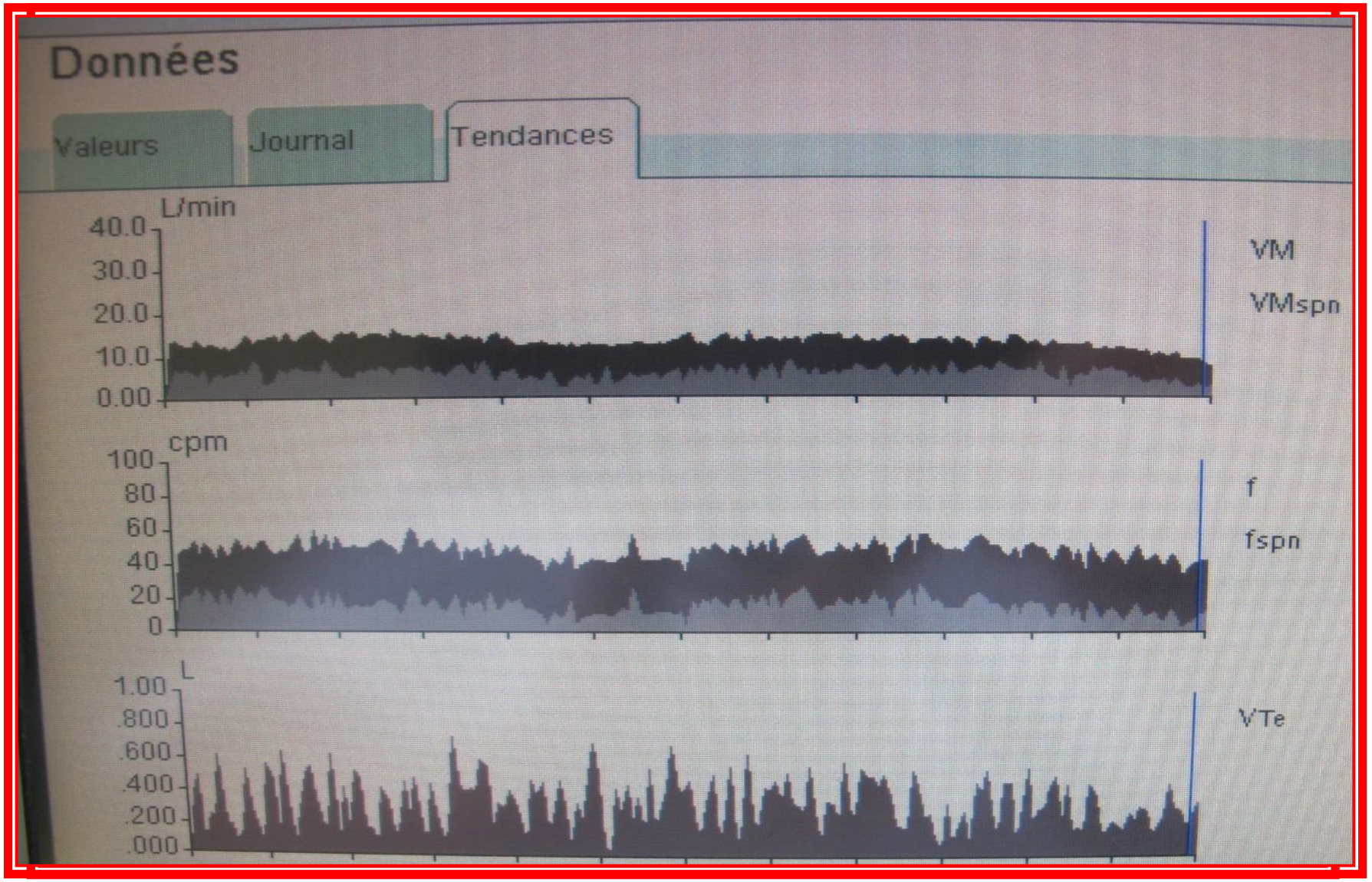


C

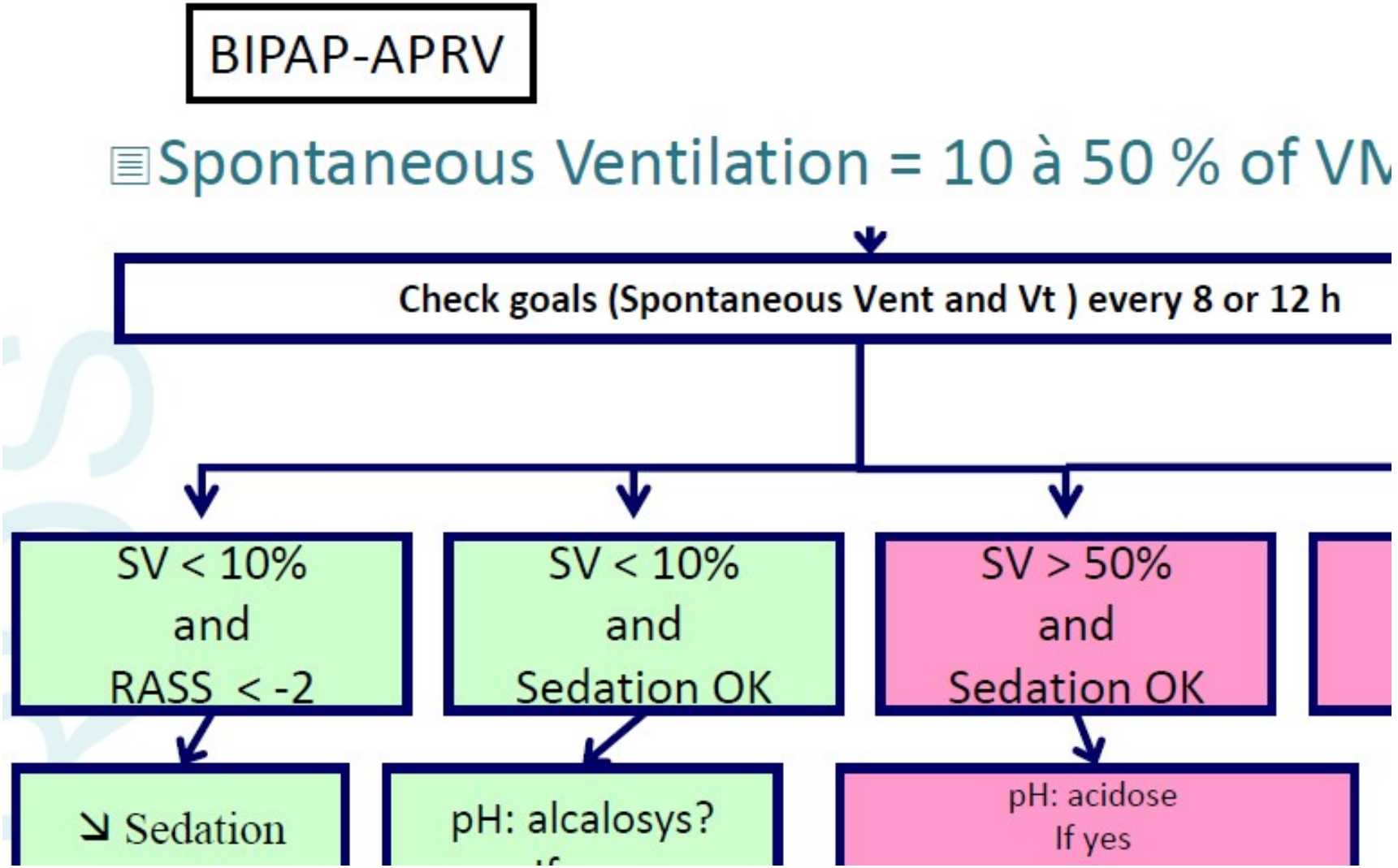
$P_{PA} > P_{PV} > P_{alv}$

Zone 3

Enfin…


Données
Valeurs
Journal
Tendances
L/min
40.0
30.0
20.0
10.0
0.00
VM
VMspn
cpm
100
80
60
40
20
0
f
fspn
L
1.00
.800
.600
.400
.200
.000
VTe

Management of spontaneous ventilation



Au Total: BIPAP-APRV

1. • « BIPAP-APRV »: Modes intéressants puisqu'ils autorisent la ventilation spontanée

2. • L'effet bénéfique de la VS sur l'oxygénation et la mécanique respiratoire a pu être démontré par quelques études

3. • Mais, on ne peut pas les recommander: non connaissance de leur fonctionnement!

Au Total

4. • **« BIPAP-APRV »: un risque de Barotraumatisme et de Volotraumatisme**

5 • **« BIPAP-APRV »:** est un **mode difficile à ajuster**. En l'absence de bénéfice, il est préférable de ventiler les patients atteints de SDRA avec le mode que l'on maîtrise le mieux +++.

6 • Sur le plan scientifique; malgré sa description depuis 30 ans**: 3 études Randomisées (1 arrêtée)!!!**

Conclusion

- **Non pour le mode Bilevel à la phase aigue lors du SDRA**

Essai (BiRDS)

www.clinicaltrials.gov

NCT01862016

Merci pour votre attention