V Jornada d'Infermeria Intensiva (SOCMIC)

Atenció al malalt amb Ventilació No Invasiva

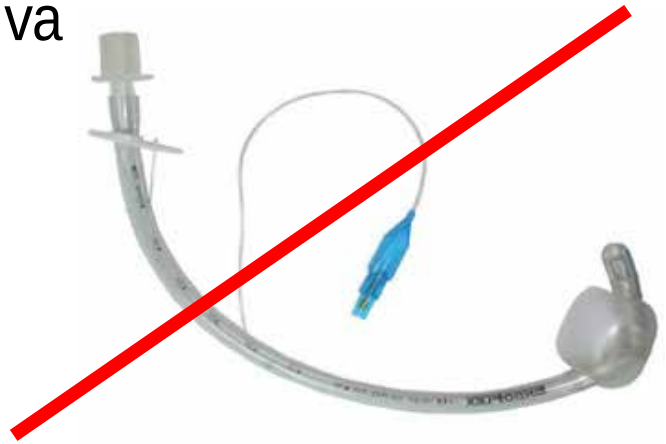
10-Febrer-2015

Gemma Via

Hospital Universitari de Bellvitge IDIBELL

Ventilació mecànica no invasiva

- Suport ventilatori a pressió positiva



- OBJECTIUS
  - **Millorar l'intercanvi de gasos**
    - Corregir hipoxèmia
    - Corregir hipercàpnia
  - **Reduir el treball respiratori**
- BENEFICIS: Sense necessitat de via aèria artificial.

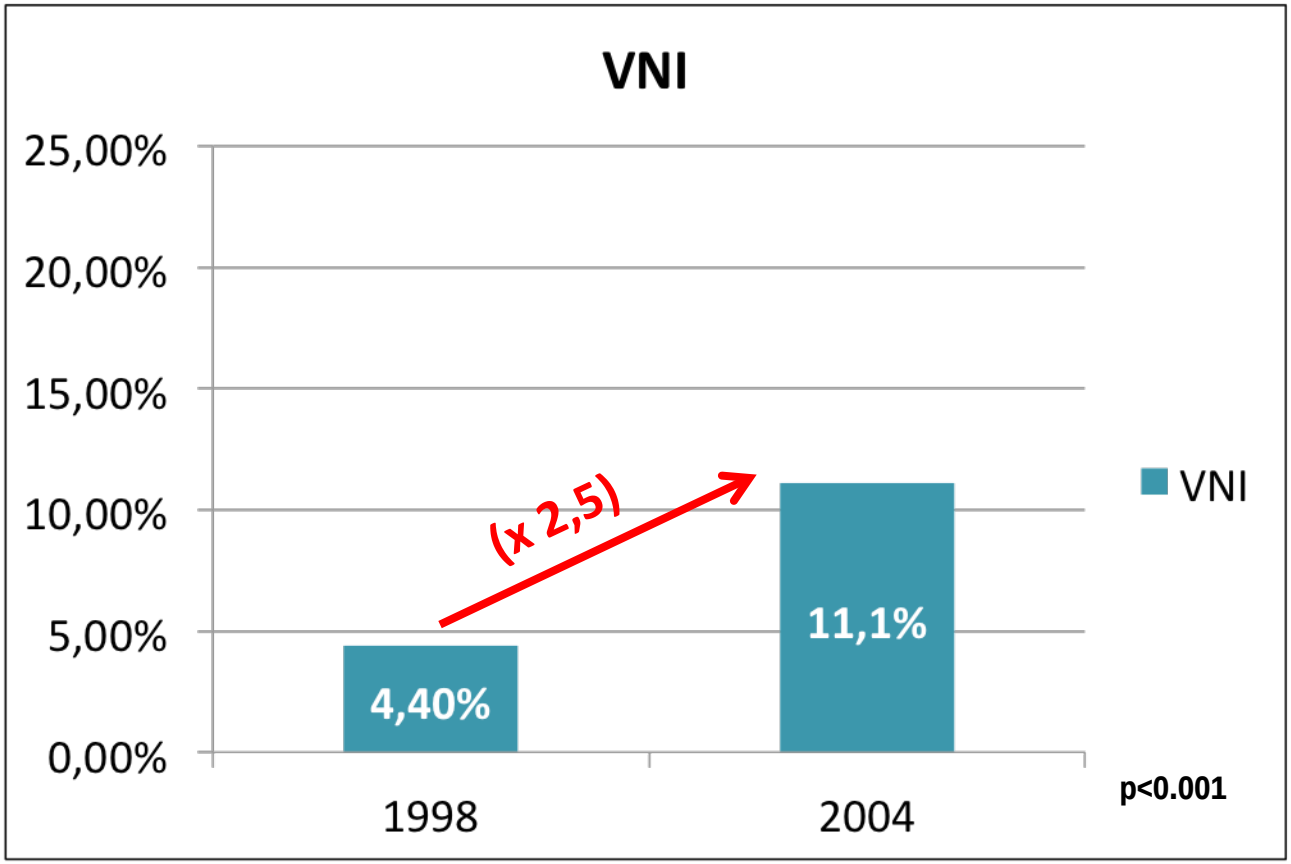
EVITAR INCONVENIENTS IOT

- Sedació
- Risc infecció
- Lesions via aèria superior

Evolution of Mechanical Ventilation in Response to Clinical Research

Andrés Esteban[1], Niall D. Ferguson[2], Maureen O. Meade[3], Fernando Frutos-Vivar[1], Carlos Apezteguia[4], Laurent Brochard[5], Konstantinos Raymondos[6], Nicolas Nin[1], Javier Hurtado[7], Vinko Tomicic[8], Marco González[9], José Elizalde[10], Peter Nightingale[11], Fekri Abroug[12], Paolo Pelosi[13], Yaseen Arabi[14], Rui Moreno[15], Manuel Jibaja[16], Gabriel D'Empaire[17], Fredi Sandi[18], Dimitros Matamis[19], Ana María Montañez[20], and Antonio Anzueto[21], for the VENTILA Group*

Am J Respir Crit Care Med,2008;177:170-177



349 UCIS a 23 països. 4968 pacients consecutius

Evolution of Mechanical Ventilation in Response to Clinical Research

Am J Respir Crit Care Med,2008;177:170-177

TABLE 3. CHARACTERISTICS AND OUTCOMES OF PATIENTS RECEIVING NONINVASIVE POSITIVE-PRESSURE VENTILATION

	1998 Cohort (*n* = 61)	2004 Cohort (*n* = 186)	*P* Value
Age, mean (SD), yr	64 (14)	62 (17)	0.45
Simplified Acute Physiology Score II, mean (SD) (points)	39 (14)	36 (15)	0.18
Use by reason for initiation of ventilation, n (%)			
COPD	22/133 (17)	48/109 (44)	<0.001
Asthma	1/13 (8)	9/29 (31)	0.21
Acute respiratory failure	35/897 (4)	109/1,083 (10)	<0.001
Gas exchange			
Prior to noninvasive ventilation			
pH, mean (SD)	7.31 (0.09)	7.32 (0.10)	0.73
Pa_{CO_2}, mean (SD), mm Hg	58 (23)	53 (22)	0.23
Ratio Pa_{O_2} to F_{IO_2}, mean (SD)	172 (83)	175 (90)	0.84
Need for intubation, n (%)	19 (31)	65 (35)	0.59
ICU mortality among all noninvasive positive-pressure ventilation patients	18/61 (30)	44/186 (24)	0.36
Mortality in failed noninvasive ventilation, n (%)	9/19 (47)	31/65 (47)	0.98
Mortality in successful noninvasive ventilation, n (%)	9/42 (21)	13/121 (10)	0.08

Definition of abbreviations: COPD = chronic obstructive pulmonary disease; ICU = intensive care unit.

x 2

X 3

Insuficiència respiratòria aguda (ARF)

	TIPUS 1 IRA HIPOXÈMICA
DEFINICIÓ	**HIPOXÈMIA sense hipercàpnia.** Fracàs oxigenació
CRITERIS	§ **pO_2<60mmHg aire ambient** § Normocàpnica § Gradient A-a incrementat
CAUSA	§ Desequilibris V/Q § Shunt § Defectes difusió § Inadequada FiO2
PATOLOGIES	EAP, SDRA, Pneumònia, Atelectàsies, T. toràcics.

Insuficiència respiratòria aguda (ARF)

	TIPUS 2 IRA HIPERCÀPNICA
DEFINICIÓ	**HIPERCÀPNIA amb hipoxèmia.** Fracàs en la ventilació.
CRITERIS	§ pO_2 <60mmHg § IRA AGUDA**: pCO_2 >50mmHg** § EX. MPOC: pCO_2 por sobre del basal amb **pH<7.30** § Gradient A-a normal
CAUSA	§ Fracàs bomba (centre respiratori, nervis, WOB) § Desequilibris V/Q § Hipoventilació alveolar § Augment espai mort
PATOLOGIES	MPOC, Asma, COMA, NM, Post-operats, Intoxicats

Quan apliquem VNI?

Ventilació mecànica no invasiva

- **On?**
  - Al servei d'urgències
  - A la UCI, unitats de reanimació
  - A unitats cures intermitges, semicrítics
  - A unitats de pneumologia
  - A unitats d'hematologia

Modalitats

PHILIPS V-60 RESPIRONICS

2. Modes

2.1 Standard
CPAP (continuous positive airway pressure)
S/T (spontaneous with timed backup)
PCV (pressure control ventilation)
2.2 Optional
AVAPS (average volume assured pressure support)
PPV (proportional pressure ventilation)*

CARINA DRAGER

Spontaneous ventilation:

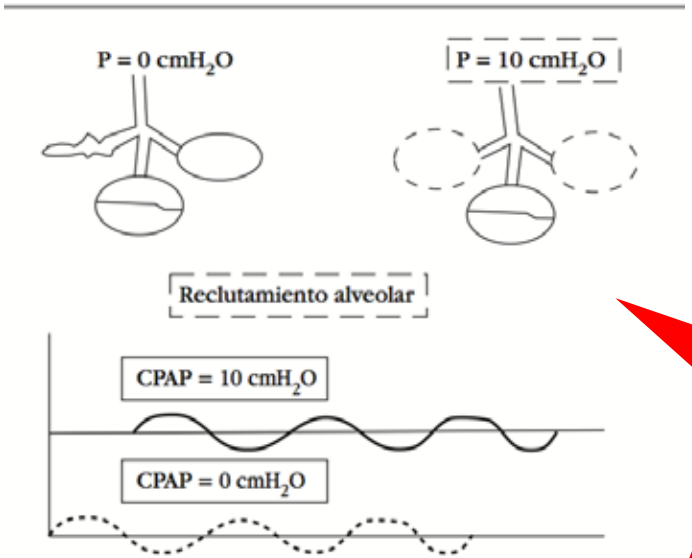
- SPN-PS (+ Volume Guarantee)
- SPN -CPAP

Mandatory ventilation:

- VC-SIMV Autoflow
- PC-BIPAP
- PC-AC

CPAP: Continuous positive airway pressure

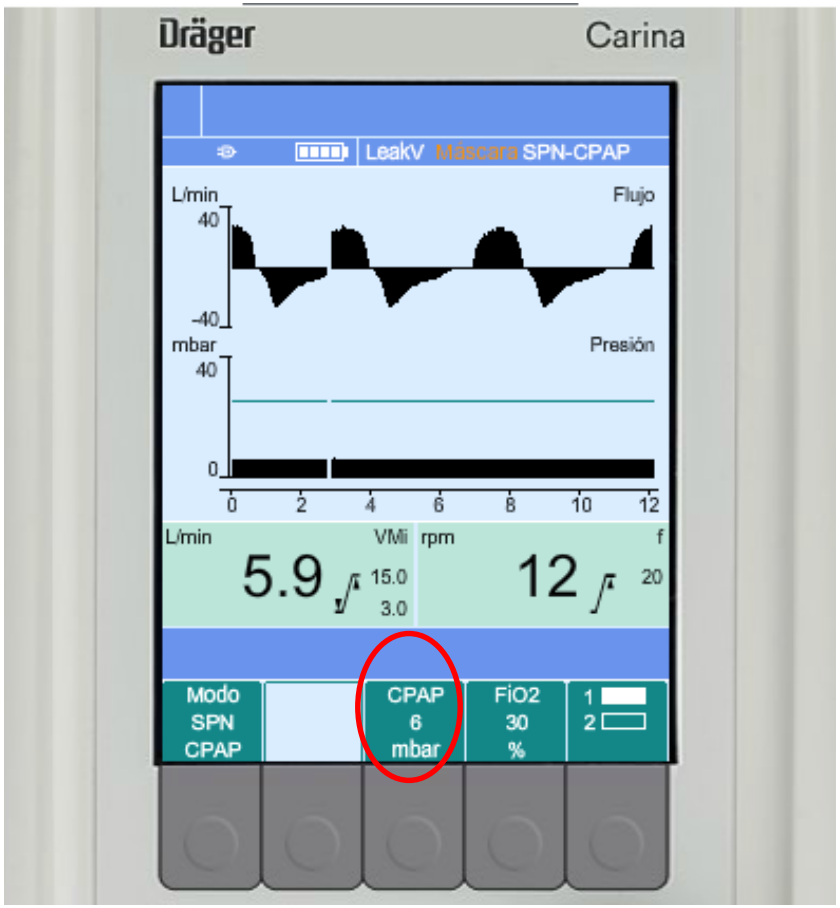
OBJECTIU= MILLORAR OXIGENACIÓ



§ Un **ÚNIC** nivell de pressió positiva constant a tot el cicle respiratori.
En espiració es comporta com a PEEP

- ü **Millora l'oxigenació.**
- ü **Evita el col·lapse alveolar**
- ü **Contrarresta PEEP intrínseca**
- ü **Augment CRF**

CPAP: Continous positive airway pressure

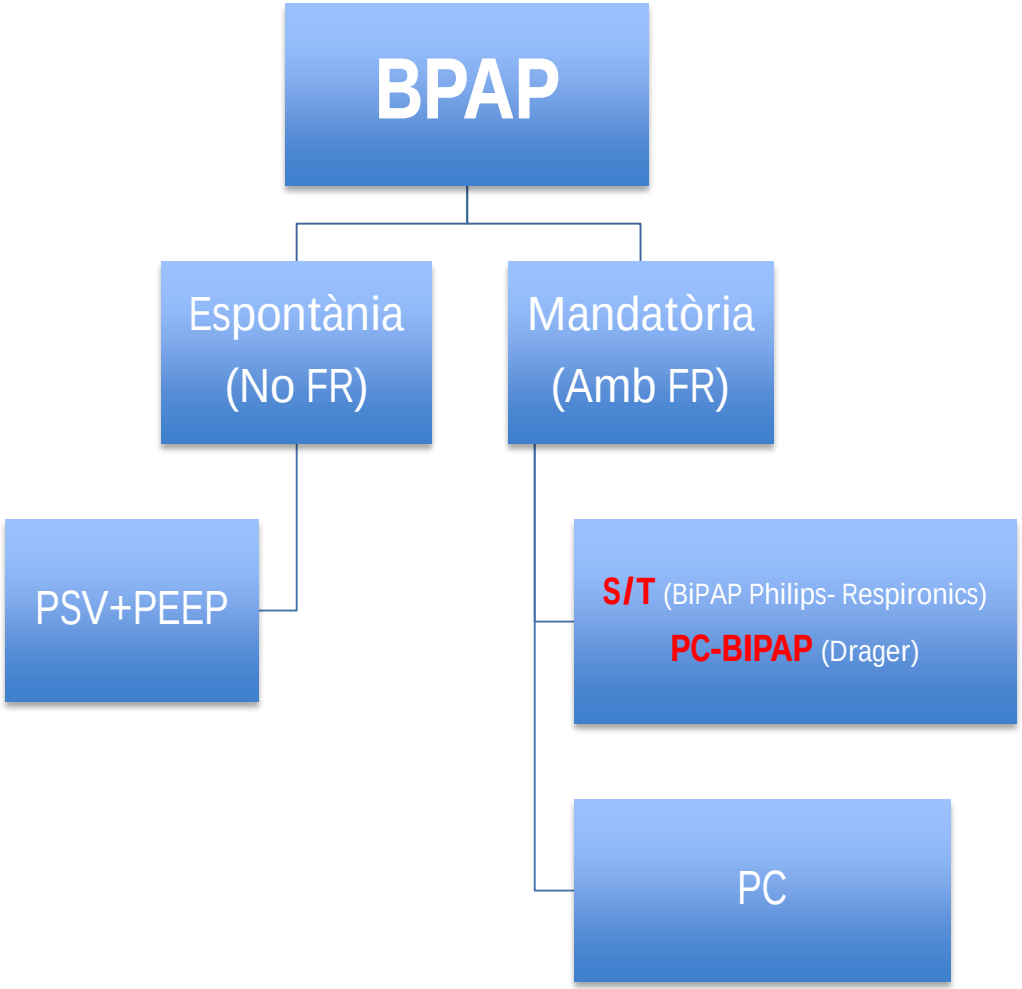


Ajustes			Mediciones		
CPAP	6	mbar	Ppico	11	mbar
FiO2	30	%	Pmedia	10.3	mbar
Vent.Apn.	On		PEEP	6	mbar
VTapnea	700	mL	VTi	497	mL
fapnea	12	rpm	f	12	rpm
Pmax	20	mbar	VMi	5.9	L/min
			VMfuga	42.1	L/min

Aj.Vent | Alarmas | Valores | Config. | Desbloqu Bloquead

BPAP: Dos nivells de pressió

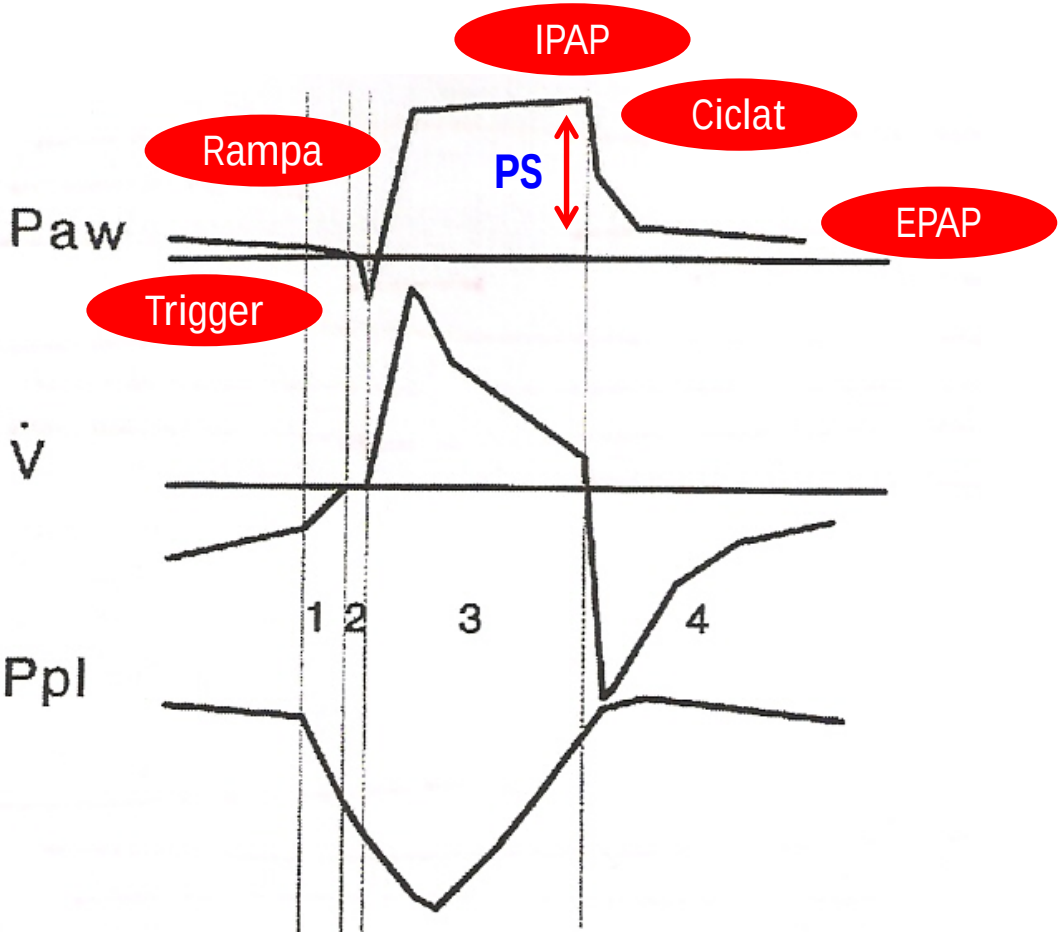
IPAP= Pressió positiva fase inspiratòria
EPAP = PEEP: Pressió positiva fase espiratòria



El doble nivell de pressió pot aplicar-se tant en modalitats espontànies com mandatòries

BPAP (NIPSV): Pressió suport + PEEP

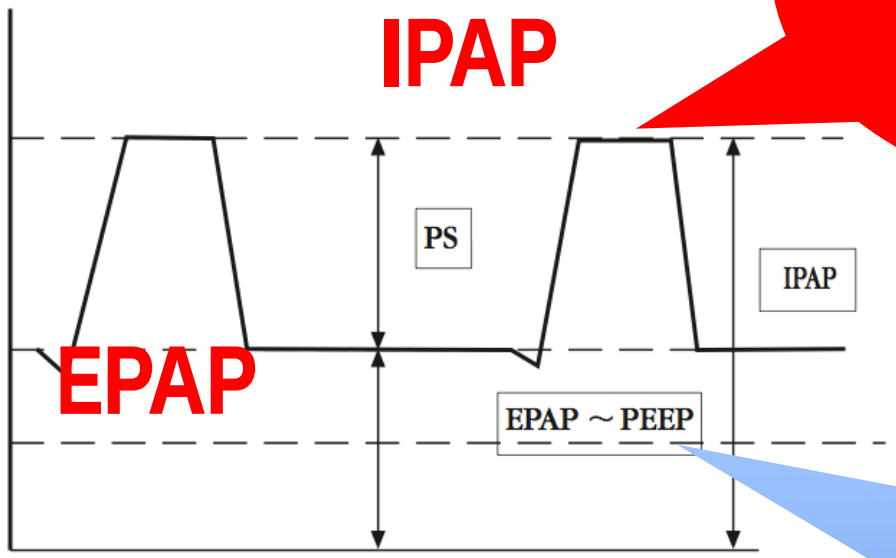
Modalitat Espontània



BPAP (NIPSV): Pressió suport +PEEP

Modalitat Espontània

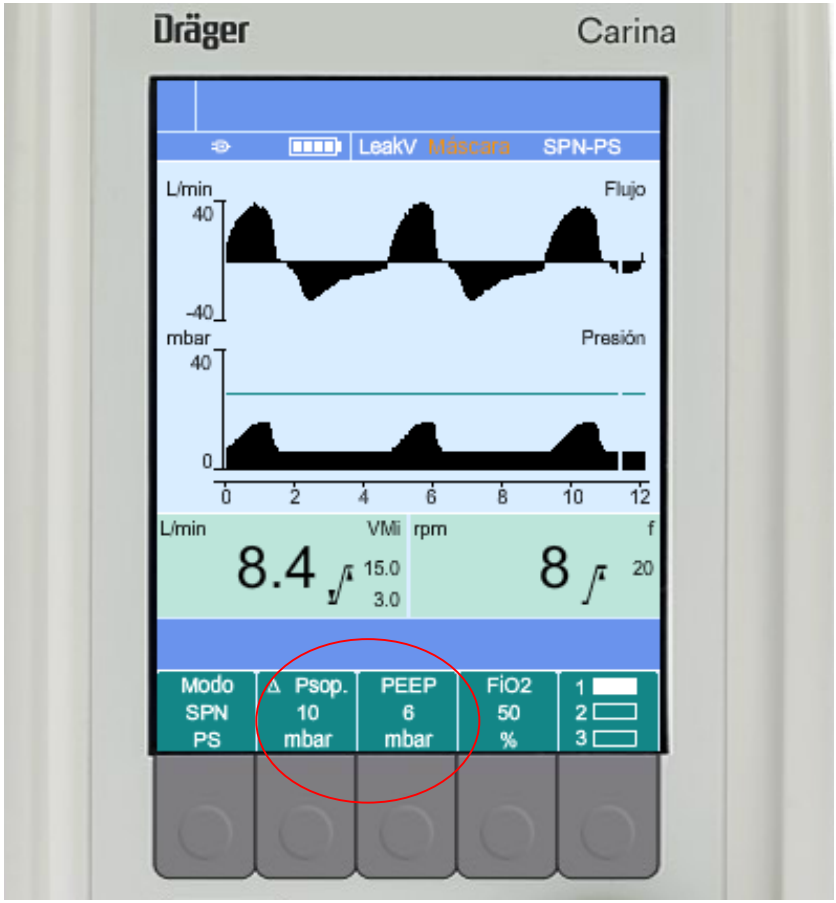
- ü Redueix treball respiratori
- ü Augmenta Vtidal
- ü Corregeix hipercàpnia
- ü Millora ventilació
- ü Millora oxigenació.



PS = IPAP-EPAP

- ü Millora oxigenació.
- ü Evita col·lapse alveolar.
- ü Augmenta CRF
- ü Contrarresta Auto-PEEP

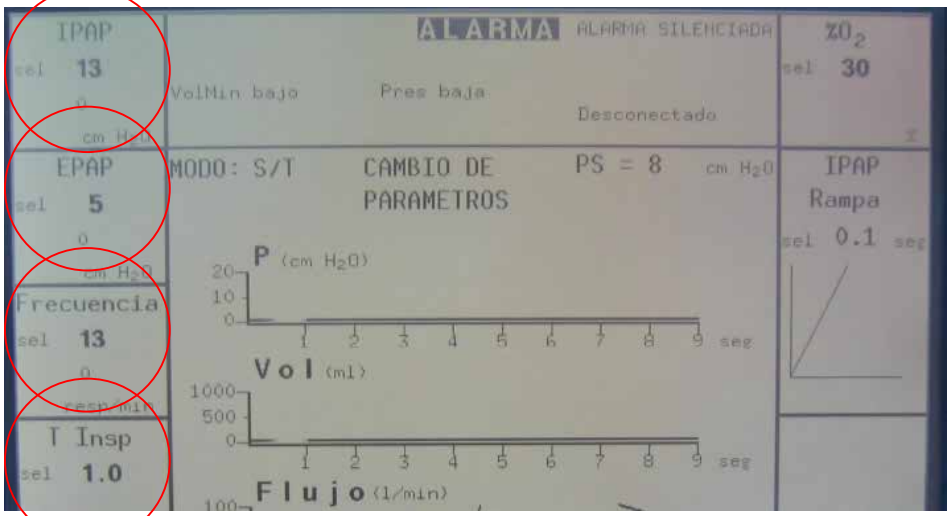
BPAP (NIPSV): Pressió suport +PEEP



Quina és la IPAP?

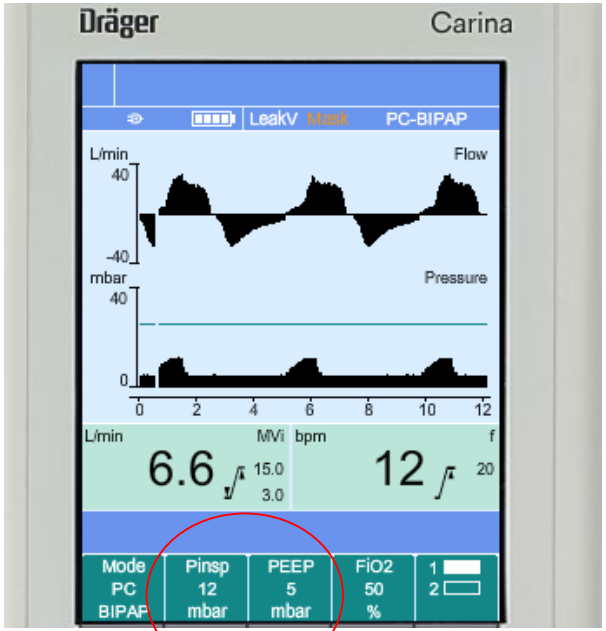
Quan acaba la inspiració?

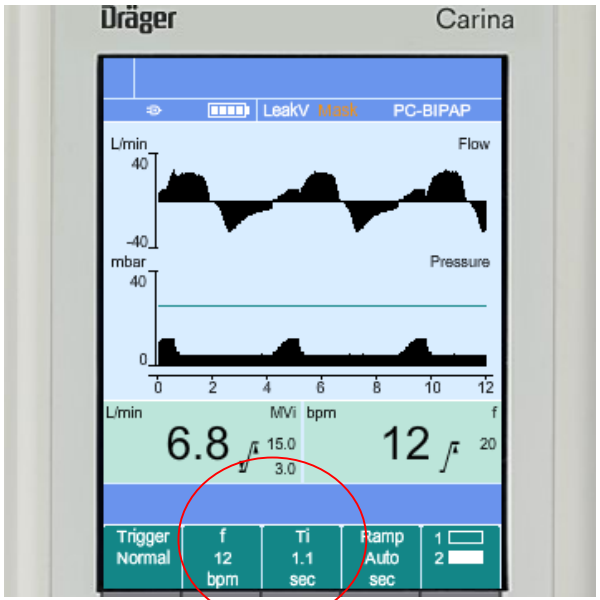
BPAP: Modalitats amb FR



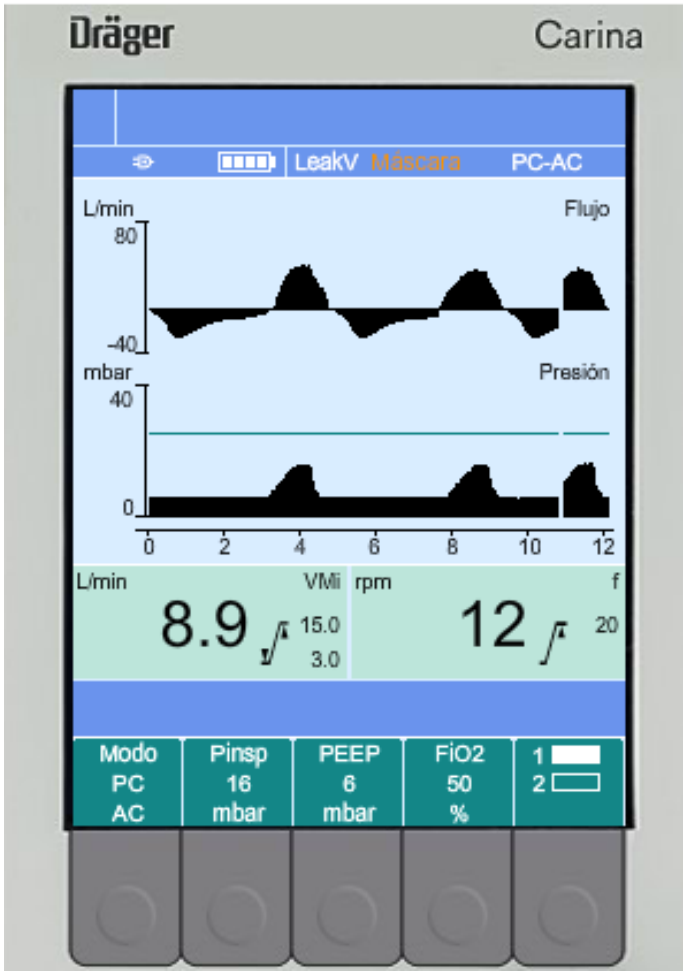
MODO S/T (SPONTANEOUS/TIMED)

MODO PC BIPAP





Modalitats mandatòries: PC



MODO PC

- FR
- Pinsp
- Temps inspiratori
- EPAP = PEEP

L'èxit de la VNI depèn de...

- Selecció adient del pacient.
- Selecció adequada de la interfase.
- Personal format i amb experiència
- Inici precoç del tractament
- Selecció del ventilador.
- Monitorització

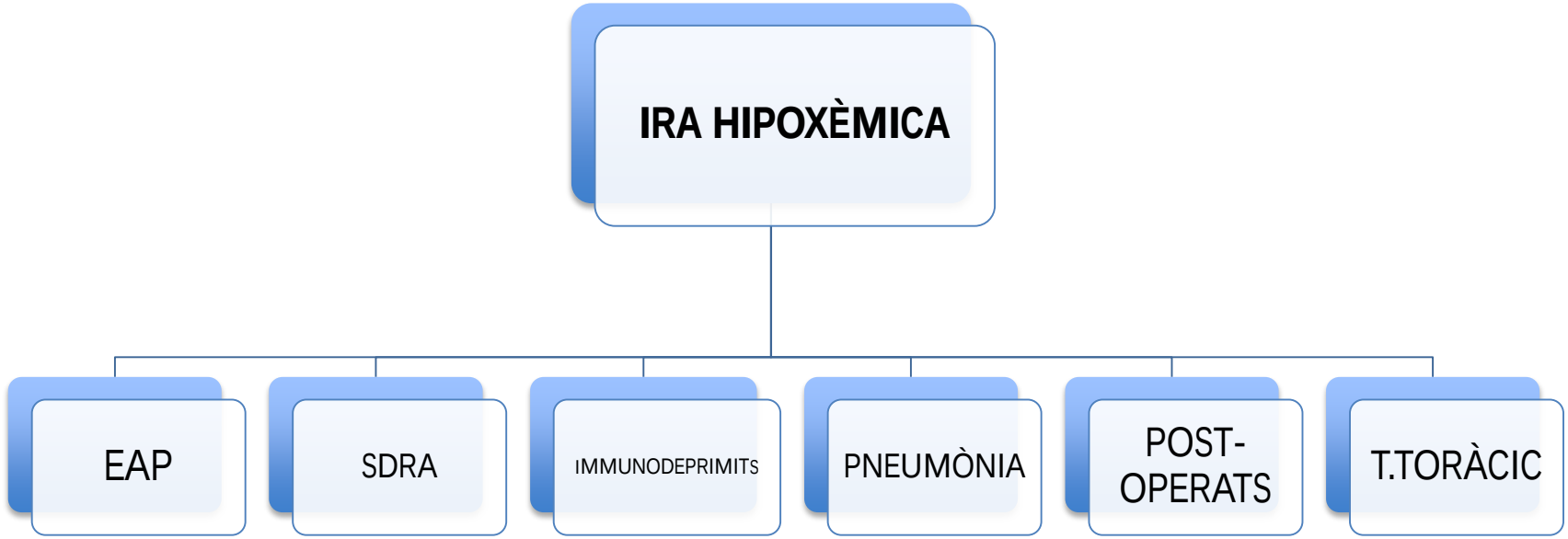
Indicacions VNI a l'IRA

GRAU DE RECOMANACIÓ I EVIDÈNCIA IRA	
A	**EXACERBACIÓ MPOC (Hipercàpnia, acidosi)**
	EDEMA AGUT DE PULMÓ D'ORIGEN CARDIOGÈNIC
	IMMUNODEPRIMITS
B	POST-OPERATS ABDOMINAL/TORÀCIC/CARDÍAC
	WEANING MPOC
	PNEUMÒNIA MPOC
	IRA POST-EXTUBACIÓ
C	TRAUMATISME TORÀCIC
	PNEUMÒNIA DE LA COMUNITAT (NO MPOC)
	SDRA
	ASMA

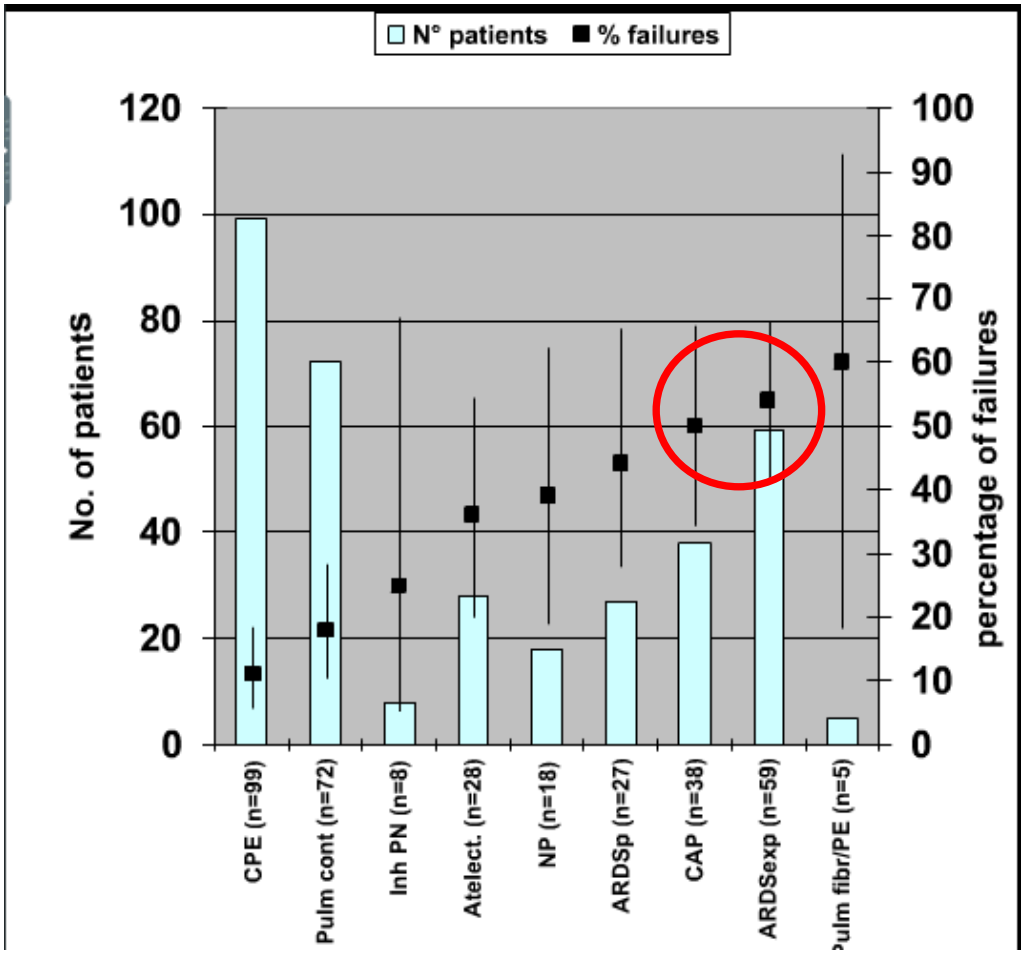
Efecte de la VNI en les diferents patologies

IRA HIPOXÈMICA

PaO_2/FiO_2 <200



IRA hipoxèmica



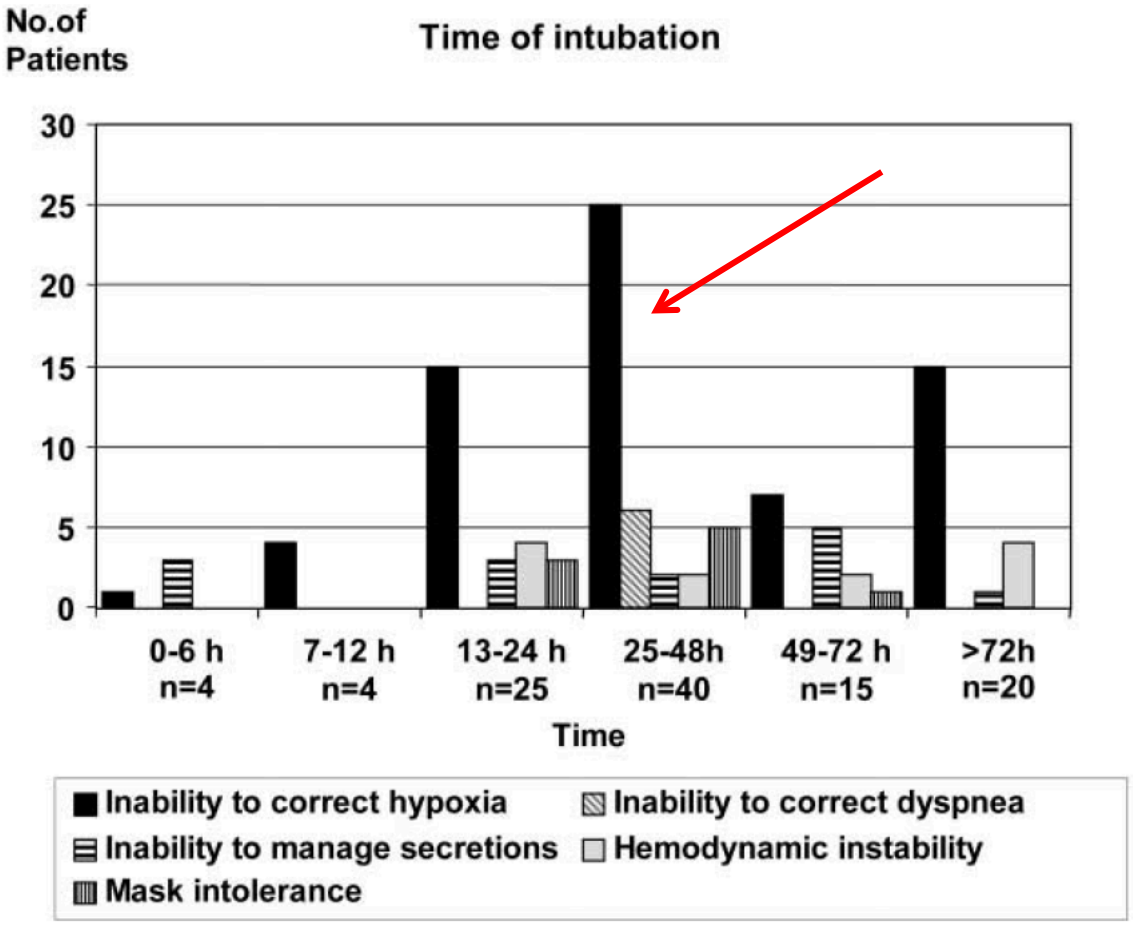
- Estudi multicèntric: 7 UCI Europa i 1 USA
- 354 pacients consecutius amb IRA; 86 ARDS
- Fracàs NIV: 30% (108)
- Per subgrups necessitat IOT: ARDS (51%)
- Pneumònia comunitat (50%)

Antonelli et al. ICM 2001;27:1718-1728

Predictors of failure of noninvasive positive pressure ventilation in patients with acute hypoxemic respiratory failure: a multi-center study

Antonelli et al. ICM,2001;27:1718-1728

Fig. 1 Timing of endotracheal intubation. One hundred and eight (30%) of the 354 patients required endotracheal intubation. Reasons for intubation were as follows: inability to correct hypoxia, 67 (62%); inability to manage secretions, 14 (13%); hemodynamic instability, 12 (11%); mask intolerance, 9 (9%); inability to correct dyspnea, 6 (5%). The principal reason for failure of patients with community-acquired pneumonia, pulmonary ARDS, and extrapulmonary ARDS was the inability to correct hypoxemia [15 (79%) patients with CAP, 25 (78%) patients with extrapulmonary ARDS, and 11 (92%) patients with pulmonary ARDS]. Seventy-three patients (68%) were intubated within 48 h of initiating NPPV

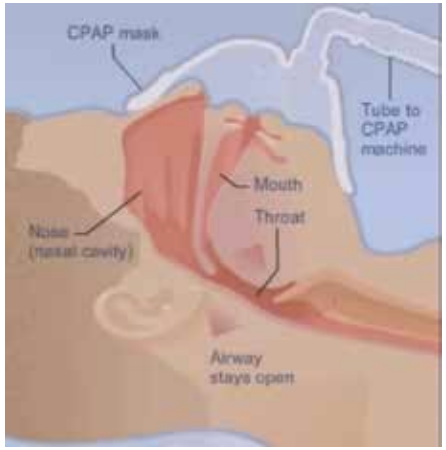


Predictors: Edat >40; SAPSII>35; SDRA o CAP i PaO_2/FiO_2<146 després 1h NIV

VNI en l'EAP

- Quins beneficis aporta la VNI en l'EAP?
- Hi ha alguna modalitat que sigui més efectiva?
- Hi ha més complicacions isquèmiques cardíaques pel fet d'aplicar la VNI en l'EAP?

Efectes de la VNI en el EAP



Ocupació de l'alvèol.
Disminució compliance

↓

Shunt
HIPOXÈMIA

↓

Pressió intratoràcica

↓ WOB

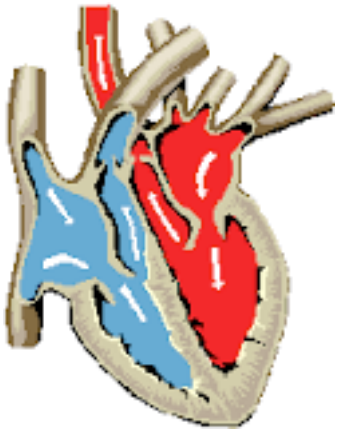
↓ Demanda d'O2 muscles respiratoris

↓ Demanda cardíaca d'O2

↓ Pressió negativa intrapleural

↓ Efectes hemodinàmics per ↓ retorn venòs

↓ Precàrrega VD
↓ Postcàrrega VE

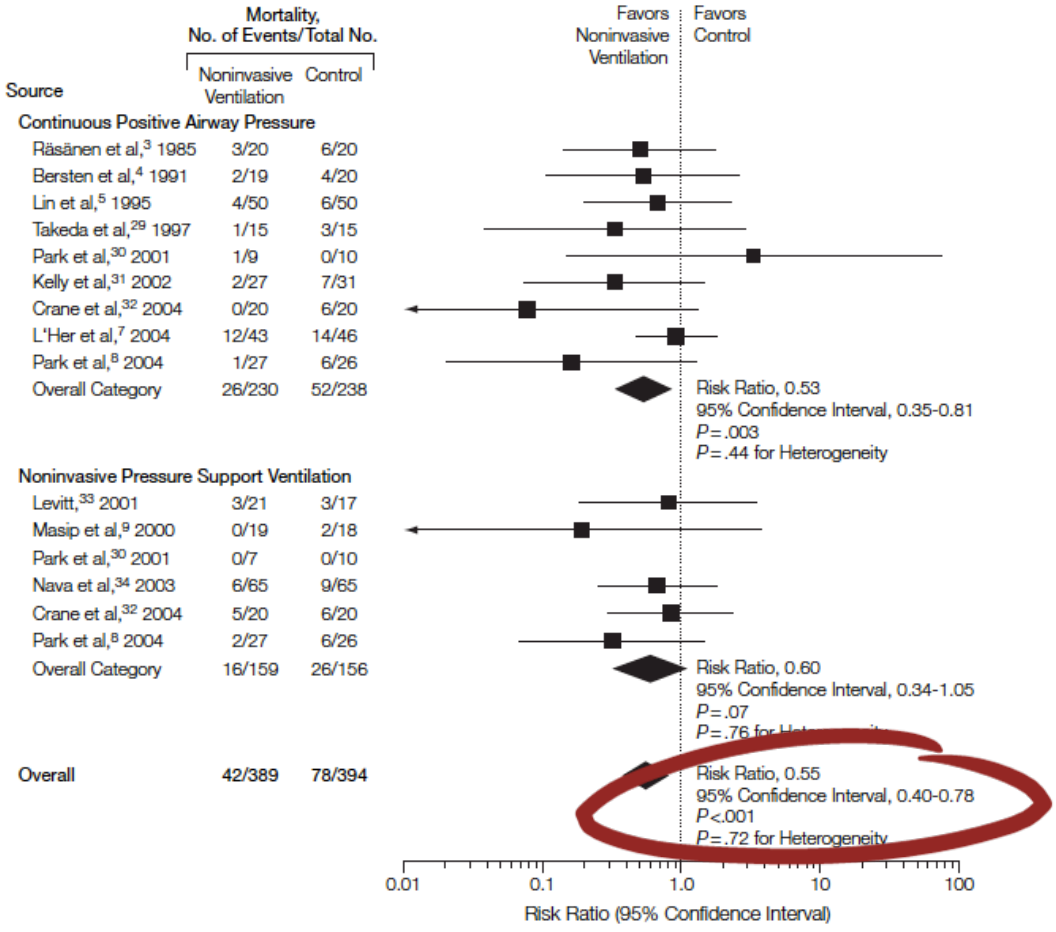


Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

Systematic Review and Meta-analysis

Masip J. JAMA 2005;294:3124-30

Figure 2. Effects of Noninvasive Ventilation on Death



Data markers are proportional to the amount of data contributed by each trial.

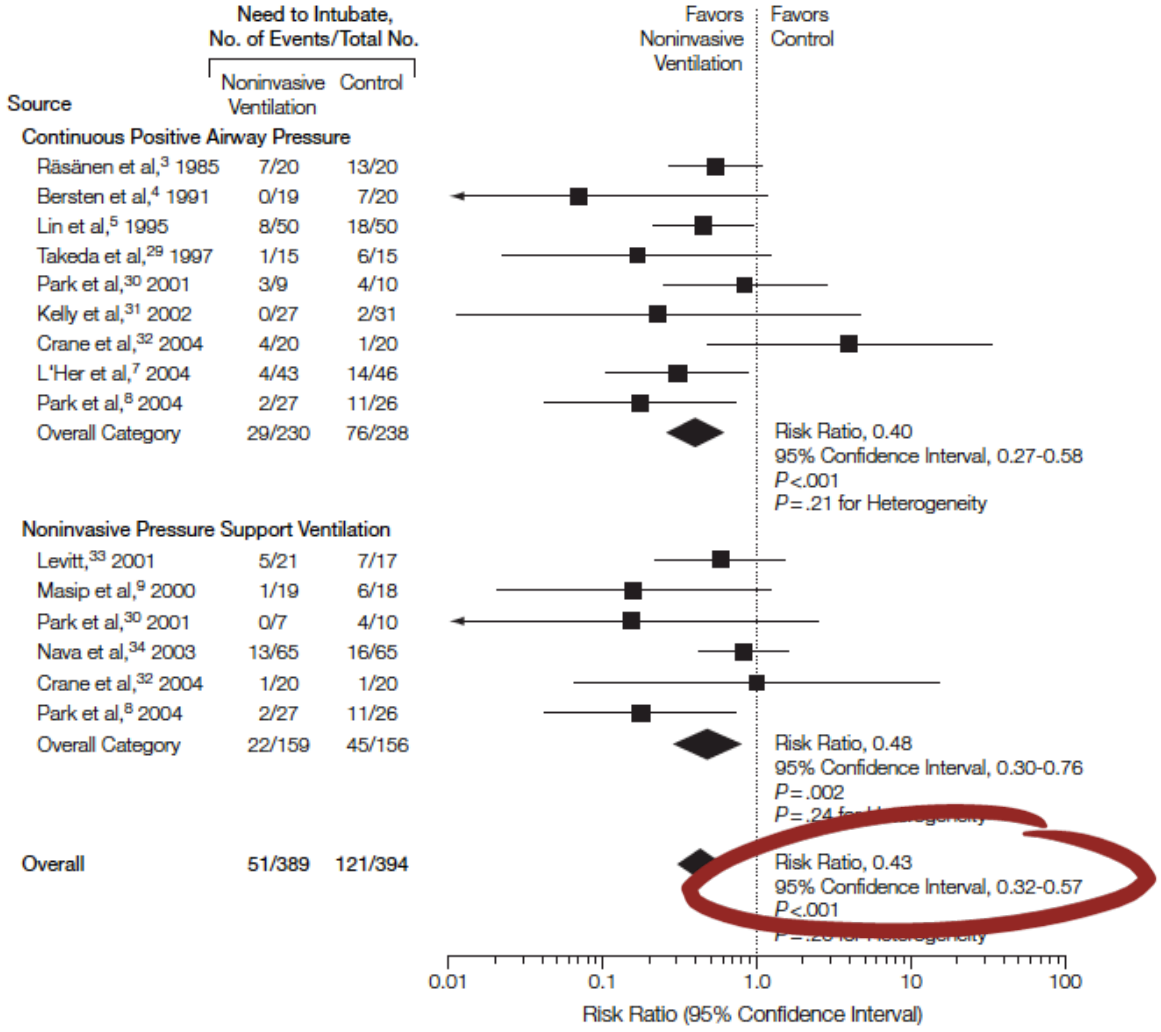
MORTALITAT

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

Systematic Review and Meta-analysis

Masip J. JAMA 2005;294:3124-30

Figure 3. Effects of Noninvasive Ventilation on Need to Intubate



Necessitat IOT

Research

Open Access

Efficacy and safety of non-invasive ventilation in the treatment of acute cardiogenic pulmonary edema – a systematic review and meta-analysis

João C Winck[1], Luís F Azevedo[2,3], Altamiro Costa-Pereira[2,3], Massimo Antonelli[4] and Jeremy C Wyatt[5]

Crit Care, 2006;10:R69

No més complicacions isquèmiques

c) Acute myocardial infarction

Study or sub-category	CPAP n/N	NPPV n/N	RD (random) 95% CI	RD (random) 95% CI
Mehta et al, 1997	4/13	10/14		-0.41 [-0.75, -0.06]
Crane et al, 2004	3/20	9/20		-0.30 [-0.57, -0.03]
Park et al, 2004	0/27	0/27		0.00 [-0.07, 0.07]
Bermudez et al, 2002	7/39	7/41		0.01 [-0.16, 0.18]
Bellone et al, 2004	3/22	2/24		0.05 [-0.13, 0.23]
Park et al, 2001	1/9	0/7		0.11 [-0.17, 0.39]
Total (95% CI)	130	133		-0.05 [-0.18, 0.08]

Total events: 18 (CPAP), 28 (NPPV)

Test for heterogeneity: Chi² = 14.50, df = 5 (P = 0.01), I² = 65.5%

Test for overall effect: Z = 0.79 (P = 0.43)

-1 -0.5 0 0.5 1

Favours CPAP Favours NPPV

*Take home message

- Hi ha evidència robusta dels beneficis de la VNI vs. tto convencional en l'EAP sobre la millora de l'intercanvi de gasos, la reducció en la mortalitat i la necessitat de IOT.
- Tractament precoç de 1ª línia a UCIES
- Tant CPAP com BPAP són igualment efectives
- No hi ha més complicacions isquèmiques quan s'utilitza NIV.

VNI en SDRA

- Puc aplicar la VNI en malalts amb SDRA amb bons resultats?
- Hi ha algun factor que m'ajudi a predir si la NIV fracassarà en aquests pacients?
- Puc causar dany?
- Hi ha alguna modalitat que vagi millor?

SDRA

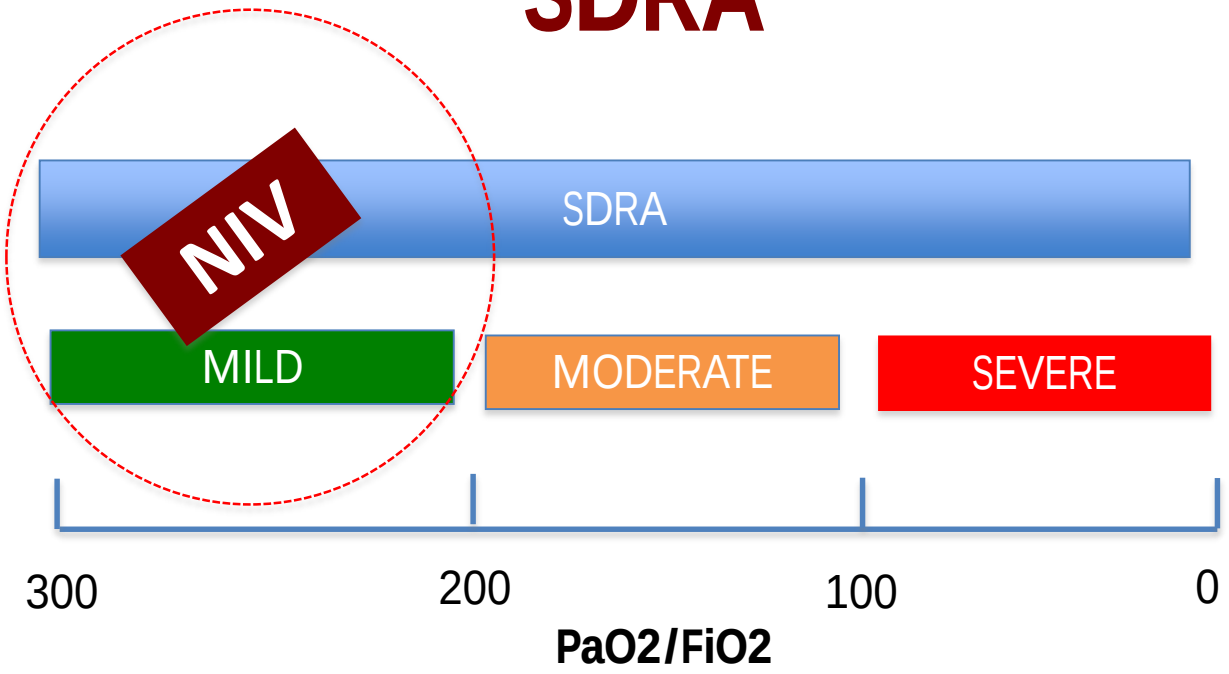


Table 1. ARDS Berlin definition.

The Berlin definition of acute respiratory distress syndrome	
Timing	Within 1 week of a known clinical insult or new or worsening respiratory symptoms
Chest imaging[a]	Bilateral opacities — not fully explained by effusions, lobar/lung collapse, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure or fluid overload. Need objective assessment (e.g., echocardiography) to exclude hydrostatic edema if no risk factor present
Oxygenation[b]	
Mild	200 mmHg < PaO_2/FIO_2 ≤300 mmHg with PEEP or CPAP ≥5 cmH_2O[c]
Moderate	100 mmHg < PaO_2/FIO_2 ≤200 mmHg with PEEP ≥5 cmH_2O
Severe	PaO_2/FIO_2 ≤100 mmHg with PEEP ≥5 cmH_2O

***Acute Respiratory Distress Syndrome. The Berlin definition. JAMA.* 2012;307(23):2526-2533.**

A multiple-center survey on the use in clinical practice of noninvasive ventilation as a first-line intervention for acute respiratory distress syndrome*

Antonelli et al. Crit Care Med,2007;35 (1):18-25

Table 2. Outcome variables and complications after study entry

	Avoided Intubation (n = 79)	Required Intubation (n = 68)	*p* Value
Outcome variables			
Improvement of gas exchange after 1 hr, n (%)	32 (41)	20 (29)	.21
Sustained improvement of gas exchange, n (%)	59 (75)	12 (18)	<.001
Duration of NPPV (hrs) without discontinuation, median (25th–75th)	42 (24–51)	24 (21–47)	.002
ICU length of stay (days), median (25th–75th)	6 (3–11)	7 (3–18)	.24
Skin breakdown, n (%)	8 (10)	9 (13)	.32
ICU mortality, n (%)	5 (6)	36 (53)	<.001
Hospital mortality, n (%)	15 (19)	38 (54)	<.01
Complications after study entry, n (%)			
None	58 (73)	19 (28)	<.001
Sepsis	13 (16)	19 (28)	.11
Severe sepsis or septic shock	6 (7)	16 (23)	.01
Ventilator-associated pneumonia	2 (2)	14 (20)	.001

Noninvasive Ventilation in Severe Hypoxemic Respiratory Failure

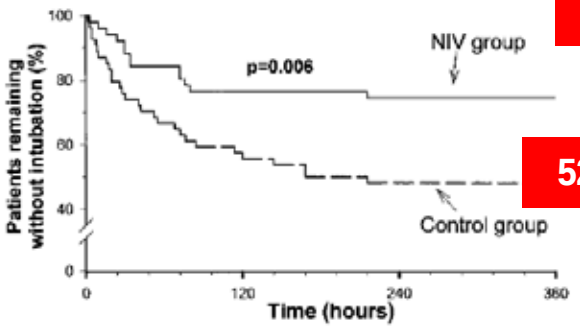
A Randomized Clinical Trial

Am J Respir Crit Care Med,2005;172:1112-1118

Miquel Ferrer, Antonio Esquinas, Miguel Leon, Gumersindo Gonzalez, Antonio Alarcon, and Antoni Torres

Unitat de Vigilància Intensiva Respiratòria, Institut Clínic de Pneumologia i Cirurgia Toràcica, Institut d'Investigacions Biomèdiques August Pi i Sunyer, Hospital Clínic, Universitat de Barcelona, Barcelona; Unidad de Cuidados Intensivos, Hospital Morales Meseguer, Murcia; and Unidad de Cuidados Intensivos, Hospital Arnau de Vilanova, Lleida, Spain

RCT multicèntric; 105 pacients hipoxèmia severa; pO2 60mmHg amb FiO2 0,5



25% TOT

52%TOT

ure 2. Kaplan-Meier curves for patients remaining without intubation er entry into the protocol. In the overall population, the cumulative obability of remaining without intubation was higher in the noninvasive ntilation (NIV) group (log-rank test). Time denotes the hours after tients were entered into the study.

TABLE 3. MULTIVARIATE ANALYSES OF RISK FACTORS FOR INTUBATION*

	Adjusted Odds Ratio	95% CI	p Value
Noninvasive ventilation†	0.20	0.07–0.58	0.003
Cardiogenic pulmonary edema†	0.14	0.04–0.56	0.005
ARDS	28.5	3.2–249.8	0.003

Definition of abbreviations: ARDS = acute respiratory distress syndrome; CI = confidence interval.

* Together with the randomized groups (noninvasive ventilation or control), the variables tested for association to intubation are shown in the online supplement.

† Adjusted odds ratio and 95% confidence intervals below one mean a beneficial effect on intubation.

*Take home message

- Aplicació precoç (Mild SDRA) amb cautela i pacients seleccionats sense inestabilitat hemodinàmica
- Els resultats no són bons amb taxes d'IOT del 50% .
- Factors predictors de fracàs: edat, gravetat, i no millora de la PaO_2/FiO_2 després d'1h amb VNI.

NO DEMORAR la IOT.

- Major risc de mortalitat, complicacions sèptiques i estada a la UCI

Physiologic Effects of Noninvasive Ventilation during Acute Lung Injury

Am J Respir Crit Care Med,2005;172:1112-1118

Erwan L'Her, Nicolas Deye, François Lellouche, Solenne Taille, Alexandre Demoule, Amanda Fraticelli, Jordi Mancebo, and Laurent Brochard

Réanimation Médicale–Unité INSERM U492, Hôpital Henri Mondor, Creteil Cedex, France

Quina modalitat va millor?

TABLE 2. RESPIRATORY PATTERN AND HEMODYNAMIC PARAMETERS DURING THE FIVE STUDY PERIODS

Variable	Initial*	CPAP	PSV10/PEEP10	PSV15/PEEP5	Final‖
V_{TE}, Ml	524 ± 212	394 ± 224†	483 ± 247	591 ± 279‡§	535 ± 229
RR, breaths/min	29 ± 10	28 ± 11	28 ± 11	26 ± 9†	30 ± 12
$\dot{V}_E$, L/min	15.7 ± 4.4	12.3 ± 3.4	14.6 ± 3.8	17.6 ± 5.4‡	15.6 ± 5.3
Leaks, %	25 ± 13	39 ± 18†	36 ± 18	37 ± 22†	24 ± 15
MAP, mm Hg	77 ± 13	79 ± 16†	77 ± 16	75 ± 16	84 ± 17†
HR, beats/min	100 ± 13	100 ± 9	95 ± 14	96 ± 16	99 ± 14

TABLE 4. RESPIRATORY DRIVE, EFFORT, AND DYNAMIC INTRINSIC POSITIVE END-EXPIRATORY PRESSURE DURING THE FIVE STUDY PERIODS

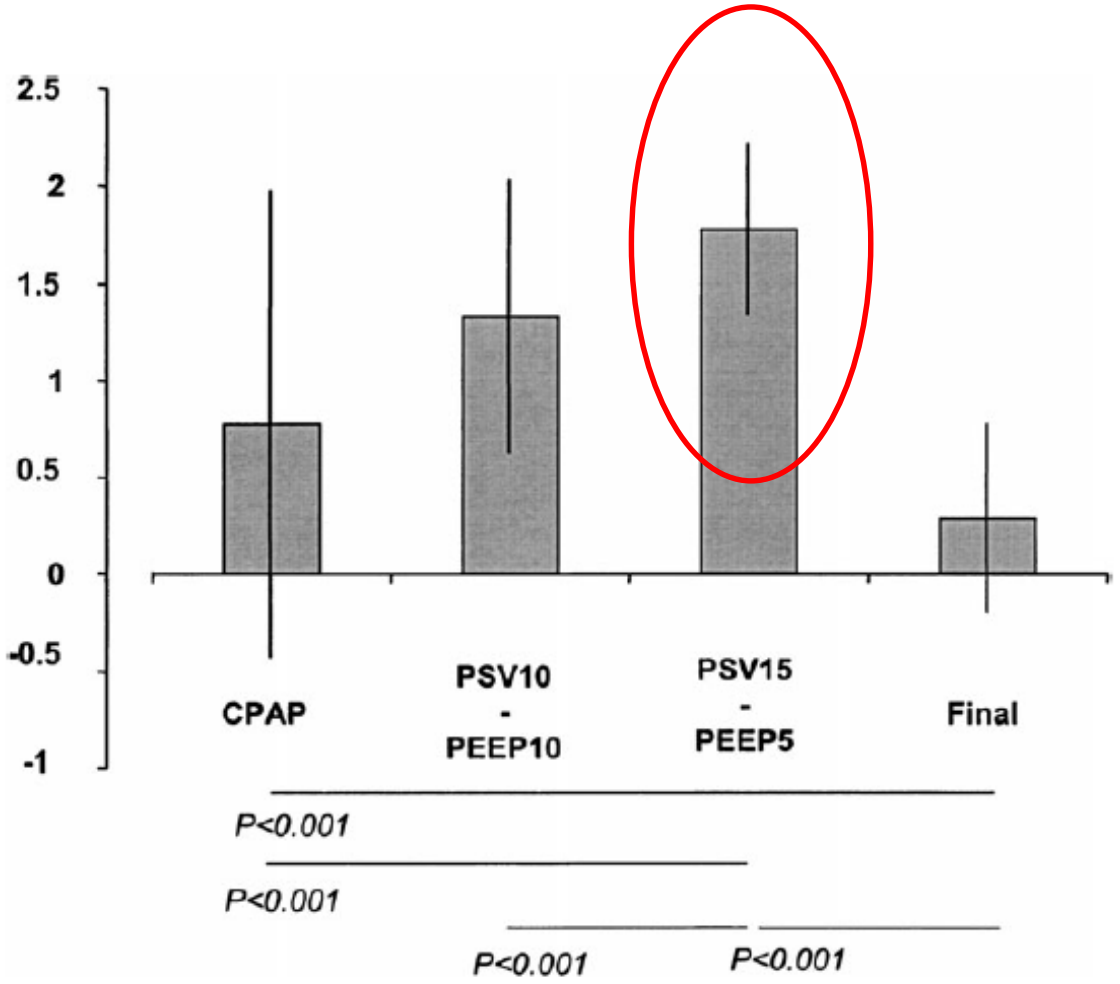
Variable	Initial*	CPAP	PSV10/PEEP10	PSV15/PEEP5	Final¶
PTPes, cm $H_2O \cdot$ s/min	180 ± 101	174 ± 110	102 ± 57‡§	100 ± 41‡§	207 ± 127
PTPdi, cm $H_2O \cdot$ s/min	257 ± 144	216 ± 174	124 ± 103‡‖	115 ± 102‡‖	291 ± 202
WOB/min, J/min (n = 8)	12.8 ± 7.2	8.7 ± 6.9	6.5 ± 3.8‡	7.7 ± 4.1†	15.3 ± 10.0
WOB/L, J/L (n = 8)	0.85 ± 0.49	0.70 ± 0.42	0.45 ± 0.19‡‖	0.44 ± 0.20‡‖	0.93 ± 0.53
PEEPi,dyn, cm H_2O	0.9 ± 1.0	0.3 ± 0.4†	0.3 ± 0.4‡	0.5 ± 0.8	0.8 ± 1.1
Pdi, cm H_2O	11.0 ± 5.4	10.3 ± 7.1	5.8 ± 4.4‡§	5.4 ± 4.4‡§	12.0 ± 7.0
$P_{0.1}$, cm H_2O	2.7 ± 1.5	2.6 ± 1.0	1.6 ± 0.6†‖	± 0.6‡§	2.4 ± 1.4

Physiologic Effects of Noninvasive Ventilation during Acute Lung Injury

Am J Respir Crit Care Med,2005;172:1112-1118

Erwan L'Her, Nicolas Deye, François Lellouche, Solenne Taille, Alexandre Demoule, Amanda Fraticelli, Jordi Mancebo, and Laurent Brochard

Réanimation Médicale–Unité INSERM U492, Hôpital Henri Mondor, Creteil Cedex, France



*Take home message

- Encara que la CPAP millora l'oxigenació, els efectes són menors que BPAP en la reducció del treball, l'esforç inspiratori i la percepció de la dispnea.

VNI en immunodeprimits

- Puc aplicar la VNI en malalts immunodeprimits amb bons resultats?
- Quan s'ha d'aplicar per obtenir el major benefici?
- Quins són els beneficis d'aplicar VNI en el malalt immunodeprimit?
- Podem identificar factors predictors de fracàs?

Early CPAP prevents evolution of acute lung injury in patients with hematologic malignancy

Squadrone et al. ICM 2010;36:1666-1674

QUAN?

Table 3 Study outcome variables

	Control ($n = 20$)	CPAP ($n = 20$)	Relative risk (95% CI)	P value
Intubation and invasive	8	2	0.5 (0.29–0.85)	0.03
noninvasive ventilation requiring intubation (no.)				

ICU intensive care unit, *CPAP* continuous positive airway pressure

PRECOÇ

RCT prospectiu; 40 pacients càncer hematològic (QMT+Tx) ALI hipoxèmia (Pa/Fi <300)

ORIGINAL ARTICLE

Noninvasive Ventilation in Immunosuppressed Patients with Pulmonary Infiltrates, Fever, and Acute Respiratory Failure

Gilles Hilbert, M.D., Didier Gruson, M.D., Fréderic Vargas, M.D., Ruddy Valentino, M.D., Georges Gbikpi-Benissan, M.D., Michel Dupon, M.D., Josy Reiffers, M.D., and Jean P. Cardinaud, M.D.

N Engl J Med 2001; 344:481-487 | February 15, 2001 | DOI: 10.1056/NEJM200102153440703

TABLE 2. OUTCOMES OF TREATMENT.*

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

*Plus–minus values are means ±SD. CI denotes confidence interval, PaO_2 the partial pressure of arterial oxygen, FiO_2 the fraction of inspired oxygen, and ICU intensive care unit.

†The causes of death in the intensive care unit in the noninvasive-ventilation group and the standard-treatment group were as follows: severe sepsis or septic shock (consequent to ventilator-associated pneumonia in 1 and 2 patients, respectively) with multiorgan failure, 8 and 11; cardiogenic shock, 1 and 2; ventilator-associated pneumonia with prompt multiorgan failure, 1 and 4; and hemorrhagic shock consequent to severe gastrointestinal bleeding, 0 and 1.

Noninvasive Ventilation for Treatment of Acute Respiratory Failure in Patients Undergoing Solid Organ Transplantation

A Randomized Trial

Antonelli at al. JAMA 2000;283(2):235

1h

Table 2. Outcome Variables*

Variable	Noninvasive Ventilation Group (n = 20)	Standard Treatment Group (n = 20)	*P* Value
Initial improvement in ratio of PaO_2 to fraction of inspired oxygen	14 (70)	5 (25)	.005
Sustained improvement in ratio of PaO_2 to fraction of inspired oxygen without intubation	12 (60)	5 (25)	.03
Patients intubated within 24 h of study entry	3 (15)	10 (50)	.02
Patients requiring intubation	4 (20)	14 (70)	.002
Failures per subgroup of patients			
Acute respiratory distress syndrome (pulmonary etiology)†	2/5 (40)	2/2 (100)	.28
Acute respiratory distress syndrome (extrapulmonary etiology)†	1/3 (33)	4/5 (80)	.28
Pneumonia†	1/2 (50)	1/2 (50)	.83
Cardiogenic pulmonary edema†	0/4 (0)	5/5 (100)	.007
Pulmonary embolism	0/1 (0)	0/1 (0)	.99
Mucous plugging or atelectasis†	0/5 (0)	2/5 (40)	.22
Duration of mechanical ventilation, d‡§	4 (5)	5 (6)	.58
Duration of mechanical ventilation in survivors, d‡	2 (0.7)	1.6 (2)	.50
Duration of use for all invasive devices present at study entry, d‡	5 (5)	9 (6)	.05
Length of intensive care unit stay, d‡	7 (5)	10 (6)	.18
Length of intensive care unit stay in survivors, d‡	5.5 (3)	9 (4)	.03
Intensive care unit deaths‖	4 (20)	10 (50)	.05
Intensive care unit deaths per subgroup of patients†			
Acute respiratory distress syndrome	3/8 (37)	4/7 (57)	.40
Pneumonia	1/2 (50)	1/2 (50)	.80
Cardiogenic pulmonary edema	0/4 (0)	4/5 (80)	.04
Pulmonary embolism	0/1 (0)	0.1 (0)	.99
Mucous plugging or atelectasis	0/5 (0)	1/5 (20)	.50
Hospital deaths¶	7 (35)	11 (55)	.17

*Values are expressed as number (percentage) unless otherwise indicated.
†Values are expressed as No./total (percentage).
‡Values are expressed as mean (SD).
§Duration of mechanical ventilation in patients randomized to standard treatment group refers to those patients who failed standard treatment and were intubated.
‖All deaths were due to complications that occurred after intubation.
¶In the 2 years preceding this study, our overall institutional mortality for solid organ transplant recipients was 24%, and for those developing acute hypoxemic respiratory failure, 53%.

Predictors of noninvasive ventilation failure in patients with hematologic malignancy and acute respiratory failure*

Mélanie Adda, MD; Isaline Coquet, MD; Michaël Darmon, MD; Guillaume Thiery, MD; Benoît Schlemmer, MD; Élie Azoulay, MD, PhD

Critical Care Med. 2008;36(10):2766-2772

Table 4. Results of the multivariate logistic regression model: independent predictors of NIV failure

	Odds Ratio	95% Confidence Interval	*p*
Respiratory rate under NIV (breaths/min)	1.18/point	1.05–1.33	0.005
Delay from ICU admission to NIV	2.00/day	1.02–3.94	0.04
Need for vasopressors	6.50	1.59–26.53	0.009
Need for renal replacement therapy	18.31	1.99–168.65	0.01
Criteria for ARDS at the time of NIV	77.71	6.88–878.38	0.0004

Goodness of fit (Hosmer-Lemeshow chi square *p* value) = 0.64.
ARDS, acute respiratory distress syndrome; ICU, intensive care unit; NIV, noninvasive ventilation.

Estudi retrospectiu 10 anys; 99 pacients tumors hematològics amb IRA

*Take home message

- L'aplicació de la VNI en malalts immunodeprimits ha mostrat bons resultats amb reducció de la mortalitat, reducció de la necessitat d'IOT i menors complicacions sèptiques.
- El benefici és major si s'aplica precoçment.
- Factors predictors de fracàs: taquipnea, no millora de la PaO_2/FiO_2 després d'1h, gravetat, i retard en l'inici de la VNI.
- Si no s'observa millora: **NO DEMORAR la IOT.**

VNI en pacients amb pneumònia de la comunitat

§Es beneficien els malalts amb pneumònia de l'aplicació de VNI?

§Hi ha algun subgrup de pacients que es beneficiï més?

Andres Carrillo
Gumersindo Gonzalez-Diaz
Miquel Ferrer
Maria Elena Martinez-Quintana
Antonia Lopez-Martinez
Noemi Llamas
Maravillas Alcazar
Antoni Torres

Non-invasive ventilation in community-acquired pneumonia and severe acute respiratory failure

ICM 2012; 38:458-466

184 pacients
(102)Pneumònia “de novo”
(82)Pneumònia en pacients respiratoris i IC.
Fracàs NIV (46% vs 26%)

Table 3 Multivariate analysis of variables independently associated with non-invasive ve

	Adj. OR	95% CI	*p* value	AUC	Optimal cut-off
Maximum SOFA during NIV	1.442	1.187–1.753	<0.001	0.86	≥7
Worsening X-ray infiltrate 24 h after onset of NIV	84.23	16.74–423.8	<0.001	–	–
Heart rate 1 h after NIV onset, min^{-1}	1.064	1.029–1.100	<0.002	0.68	≥104
PaO_2/FiO_2 ratio 1 h after NIV onset, mmHg	0.980	0.965–0.996	0.012	0.78	<144
HCO_3 1 h after NIV onset, mEq/L	0.802	0.711–0.905	<0.001	0.77	<23

Adj. OR adjusted odds ratio, *CI* confidence interval, *SOFA* Sepsis-Related Organ Failure

Table 5 Multivariate analysis of variables independently associated with hospital mortality

	Adj. OR	95% CI	*p* value	AUC	Optimal cut-off	S (
Maximum SOFA during ICU stay	1.342	1.158–1.556	<0.001	0.86	≥12	
NIV failure	6.78	1.65–27.95	0.008	–	–	
Older age (years)	1.118	1.056–1.185	<0.001	0.68	≥72	

mortality.

The Clinical Respiratory Journal

Original Article

Clin Respir Journal 2014. Online first

Early non-invasive ventilation treatment for respiratory failure due to severe community-acquired pneumonia

Antonello Nicolini ✉, Gianluca Ferraioli, Maura Ferrari-Bravo, Cornelius Barlascini, Mario Santo, Lorenzo Ferrera

Methods

We prospectively assessed 127 patients with sCAP and severe acute respiratory failure [oxygen arterial pressure/oxygen inspiratory fraction ratio (PaO_2/FiO_2) <250]. We defined successful NIV as avoidance of intubation and the achievement of PaO_2/FiO_2 >250 with spontaneous breathing. We assessed predictors of NIV failure and hospital mortality using univariate and multivariate analyses.

Results

NIV failed in 32 patients (25.1%). Higher chest X-ray score at admission, chest X-ray worsening, and a lower PaO_2/FiO_2 and higher alveolar-arteriolar gradient ($A\text{-}aDO_2$) after 1 h of NIV all independently predicted NIV failure. Higher lactate dehydrogenase and confusion, elevated blood urea, respiratory rate, blood pressure plus age ≥65 years at admission, higher $A\text{-}aDO_2$, respiratory rate and lower PaO_2/FiO_2 after 1 h of NIV and intubation rate were directly related to hospital mortality.

Conclusions

Successful treatment is strongly related to less severe illness as well as to a good initial and sustained response to medical therapy and NIV treatment. Constant monitoring of these patients is mandatory.

*Take home message

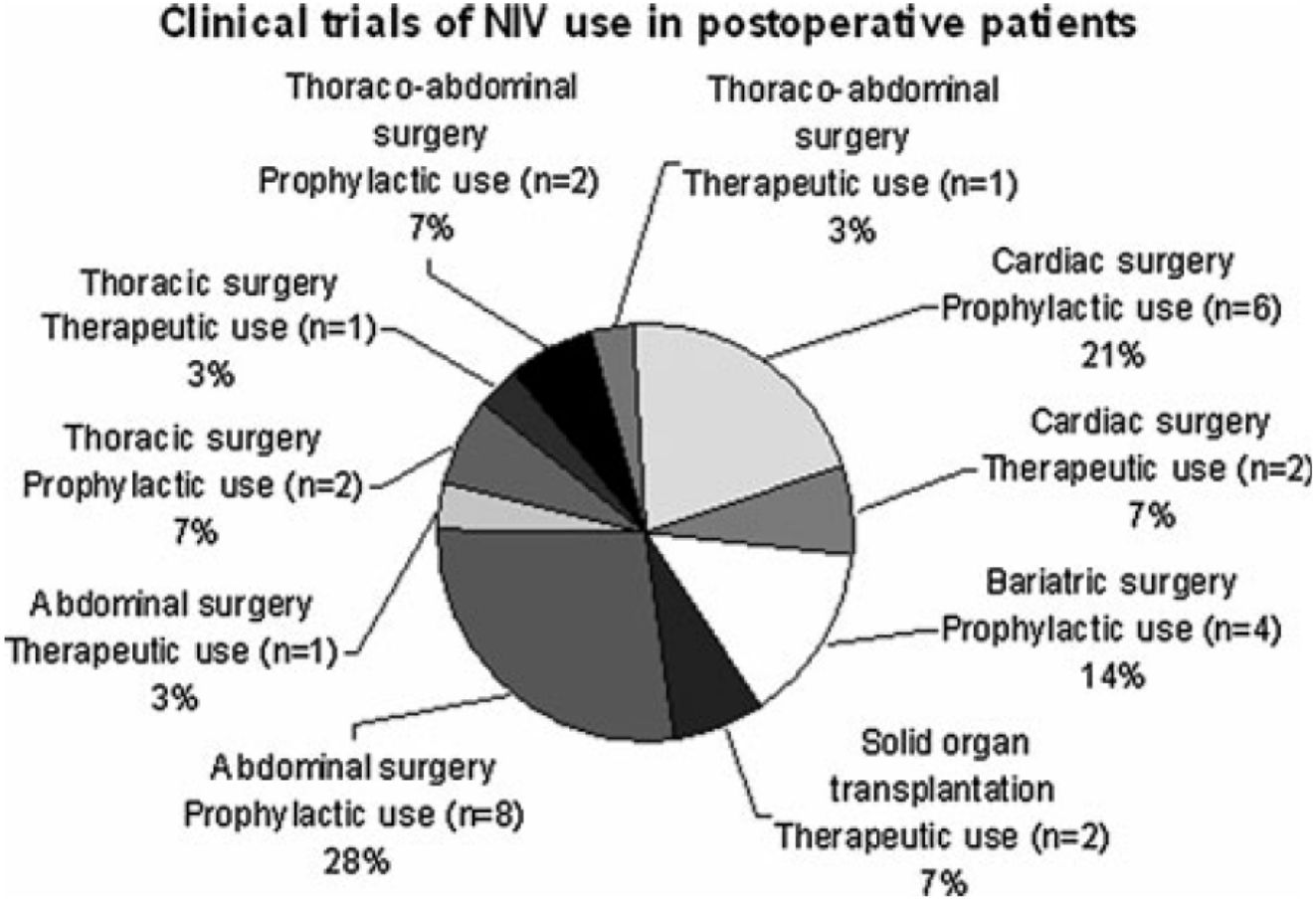
- L'aplicació de la VNI en la pneumònia de la comunitat no ha obtingut bons resultats amb taxes d'IOT entre el 25%- 50% .
- El subgrups més beneficiats són la pneumònia en pacients amb patologia cardíaca o respiratòria prèvia.
- Factors predictors de fracàs: Gravetat, empitjorament de la Rx tòrax, no millora de la PaO_2/FiO_2 després d'1h amb VNI.

NO DEMORAR la IOT.

Non-invasive ventilation in postoperative patients: a systematic review

Chiumello et al. ICM 2011;37:918-929

Post-operats



Noninvasive Ventilation Reduces Intubation in Chest Trauma-Related Hypoxemia

A Randomized Clinical Trial

Traumatisme toràcic

Gonzalo Hernandez, MD, PhD; Rafael Fernandez, MD, PhD; Pilar Lopez-Reina, MD; Rafael Cuena, MD; Ana Pedrosa, MD; Ramon Ortiz, MD; and Paloma Hiradier, MD

Chest 2010;137 74-80

Estudi prospectiu 50 pacients t.toràcic. PaO2/FiO2<200

Table 3—*Cox Regression Multivariate Analysis of the Risk Factors for Intubation*

	Constant	OR (95% CI)	*P* Value
NIMV	−2.06	0.12 (0.02 - 0.61)	.01
APACHE II at study entry, points	0.11	1.1 (0.98 - 1.27)	.08
Male	−1.26	0.28 (0.02 - 2.87)	.3
Age, y	−0.01	0.98 (0.95 - 1.02)	.4
Chronic heart failure	0.65	1.9 (0.18 - 20.41)	.6

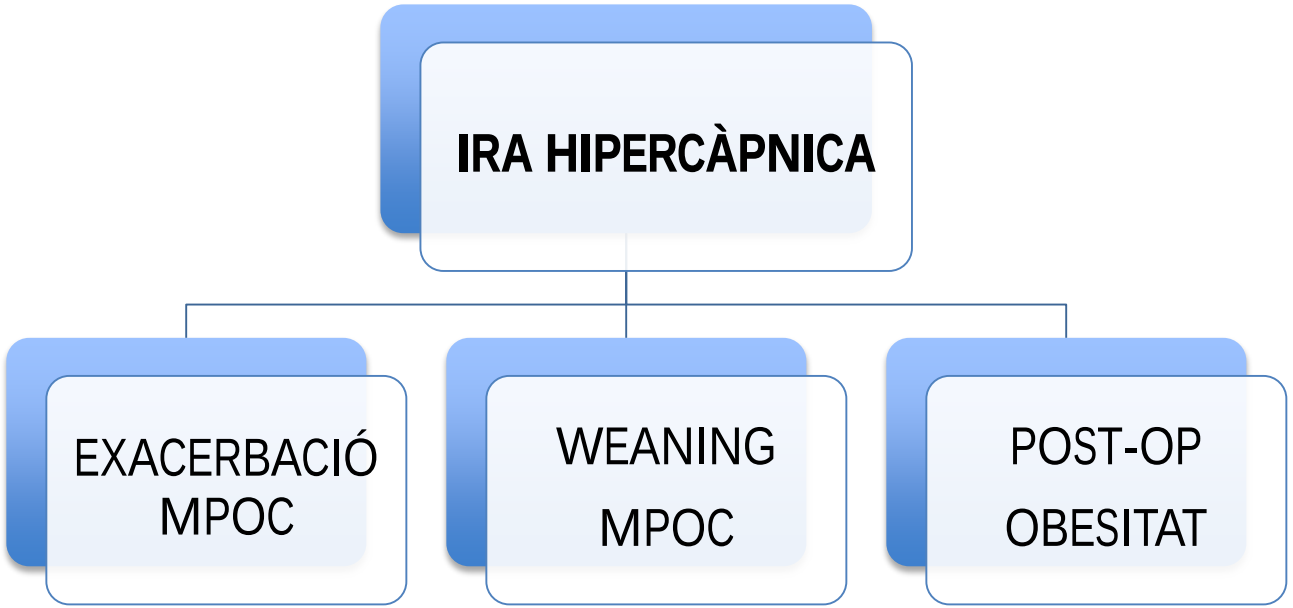
OR = odds ratio. See Table 1 for expansion of other abbreviations.

*Take home message

- L'aplicació de la VNI (tant CPAP com BPAP) ha mostrat bons resultats en pacients post-operats especialment en cas de cirurgia abdominal, toràcica i càrdio-vascular, així com en els traumatismes toràcics. L'evidència encara és limitada.

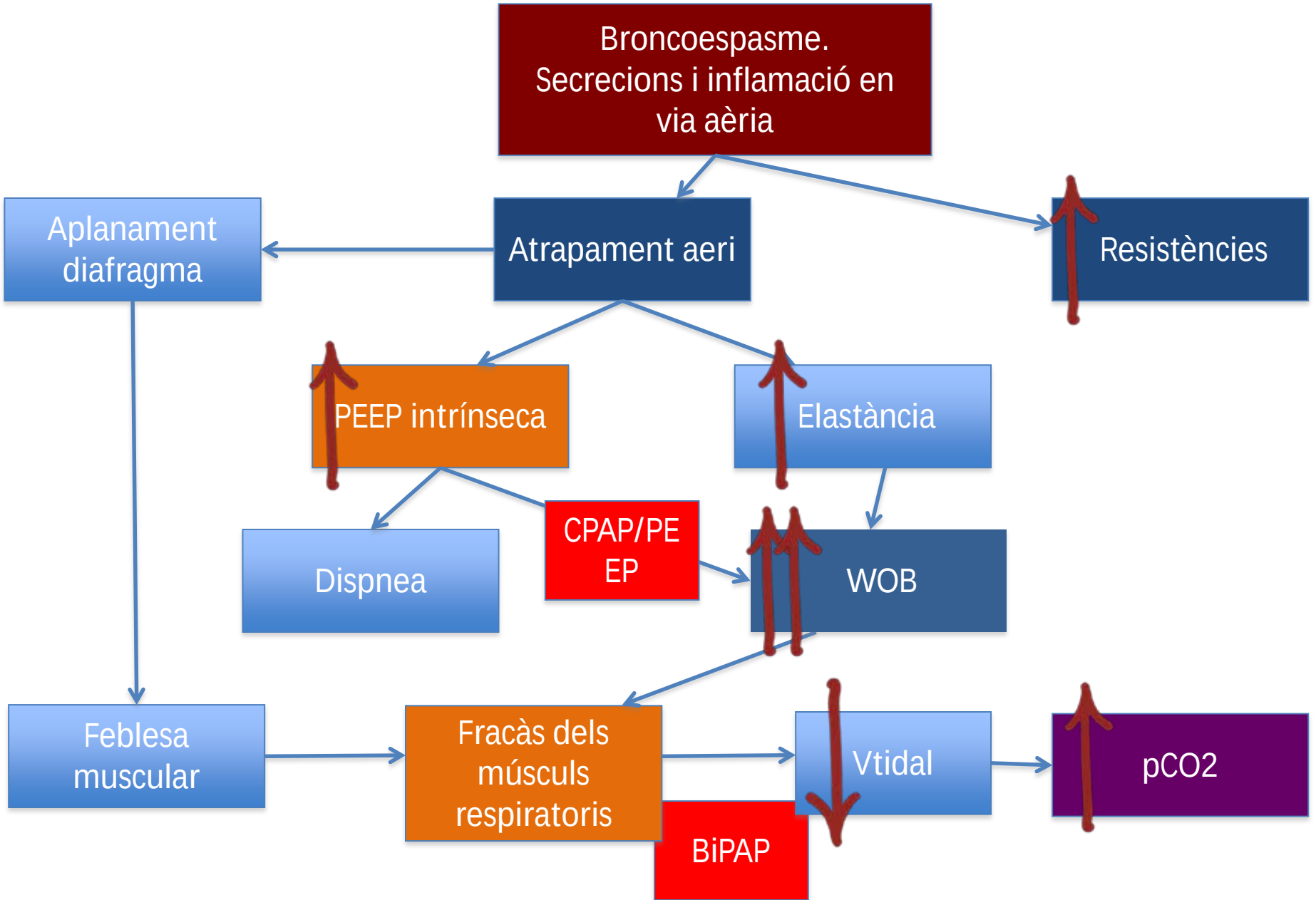
- Els principals beneficis són la millora en l'intercanvi de gasos i la reducció en la necessitat d'IOT.

IRA HIPERCÀPNICA



- § $pCO_2 > 50mmHg$; $pH < 7.30$
- § Augment dispnea
- § FR > 30 rpm
- § Augment treball respiratori. Respiració paradoxal. Utilització musculatura accessòria

Efectes VNI en el MPOC



[Intervention Review]

Non-invasive positive pressure ventilation for treatment of respiratory failure due to exacerbations of chronic obstructive pulmonary disease

Cochrane Database Syst Rev 2004;CD004104

Felix SF Ram[1], Joanna Picot[2], Josephine Lightowler[3], Jadwiga A Wedzicha[4]

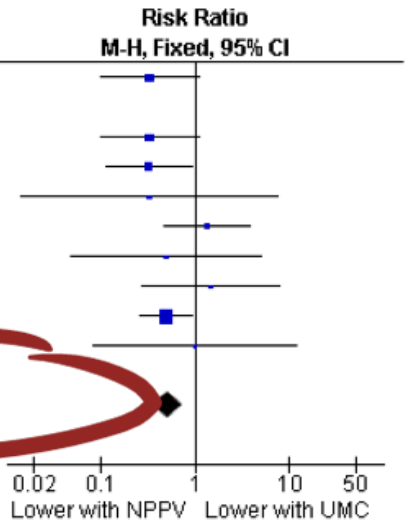
MORTALITAT

Figure 3. Forest plot of comparison: 1 NPPV +Usual Medical Care vs Usual Medical Care - Overall, outcome: 1.2 Mortality.

Study or Subgroup	NPPV Events	NPPV Total	UMC Events	UMC Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Avdeev 1998	3	29	9	29	13.8%	0.33 [0.10, 1.11]
Barbe 1996	0	10	0	10		Not estimable
Bott 1993	3	30	9	30	13.8%	0.33 [0.10, 1.11]
Brochard 1995	4	43	12	42	18.6%	0.33 [0.11, 0.93]
Celikel 1998	0	15	1	15	2.3%	0.33 [0.01, 7.58]
Conti 2002	6	23	5	26	7.2%	1.36 [0.48, 3.86]
Dikensoy 2002	1	17	2	17	3.1%	0.50 [0.05, 5.01]
Khilnani 2002	3	20	2	20	3.1%	1.50 [0.28, 8.04]
Plant 2000	12	118	24	118	36.7%	0.50 [0.26, 0.95]
Servillo 1994	1	5	1	5	1.5%	[0.08, 11.93]
Total (95% CI)		**310**		**312**	**100.0%**	**0.52 [0.35, 0.76]**
Total events	33		65			

Heterogeneity: Chi² = 6.94, df = 8 (P = 0.54); I² = 0%

Test for overall effect: Z = 3.37 (P = 0.0008)



- Meta-anàlisi: **14 RCT** (758 pacients). MPOC amb hipercàpnia PCO2>45mmHg
- Comparació**: tto.habitual +NPPV vs tto habitual.**
- **Reducció mortalitat (11%vs21%)**

[Intervention Review]

Non-invasive positive pressure ventilation for treatment of respiratory failure due to exacerbations of chronic obstructive pulmonary disease

Cochrane Database Syst Rev 2004;CD004104

Felix SF Ram[1], Joanna Picot[2], Josephine Lightowler[3], Jadwiga A Wedzicha[4]

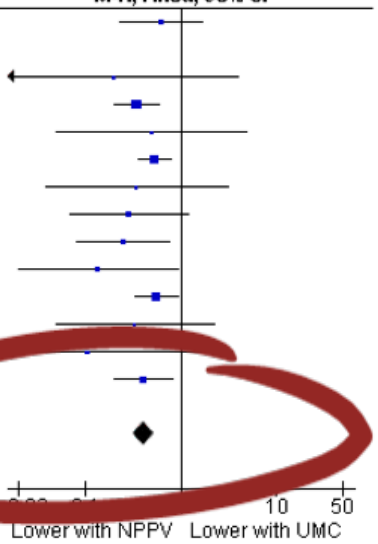
IOT

Figure 4. Forest plot of comparison: 1 NPPV +Usual Medical Care vs Usual Medical Care - Overall, outcome: 1.3 Intubation.

Study or Subgroup	NPPV Events	NPPV Total	UMC Events	UMC Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Avdeev 1998	5	29	8	29	5.2%	0.63 [0.23, 1.68]
Barbe 1996	0	10	0	10		Not estimable
Bott 1993	0	30	2	30	1.6%	0.20 [0.01, 4.00]
Brochard 1995	11	43	31	42	20.3%	0.35 [0.20, 0.60]
Celikel 1998	1	15	2	15	1.3%	0.50 [0.05, 4.94]
Conti 2002	12	23	26	26	16.2%	0.53 [0.36, 0.78]
del Castillo 2003	1	20	3	21	1.9%	0.35 [0.04, 3.09]
Dikensoy 2002	2	17	7	17	4.5%	0.29 [0.07, 1.18]
Khilnani 2002	3	20	12	20	7.8%	0.25 [0.08, 0.75]
Kramer 1995	1	11	8	12	5.0%	0.14 [0.02, 0.92]
Plant 2000	18	118	32	118	20.7%	0.56 [0.34, 0.94]
Servillo 1994	1	5	3	5	1.9%	0.33 [0.05, 2.21]
Thys 2002	0	7	3	5	2.6%	0.11 [0.01, ...
Zhou 2001	7	30	17	30	11.0%	0.4... 0.85]
Total (95% CI)		**378**		**380**	**100.0%**	**0.42 [0.33, 0.53]**
Total events	62		154			

Heterogeneity: Chi² = 7.58, df = 12 (P = 0.82); I² = 0%

Test for overall effect: Z = 7.20 (P < 0.00001)



§ **Reducció necessitat IOT (16%vs 33%)**

*Take home message

- La VNI en el malalt MPOC redueix el treball respiratori, contraresta la PEEP-intrínseca, corregeix l'acidosi i millora la ventilació i l'oxigenació.
- Hi ha evidència robusta dels beneficis de la VNI vs. tto convencional en l'MPOC sobre la reducció en la mortalitat i la necessitat de IOT .

VNI weaning i post-extubació

1 VNI EN PACIENTS SENSE CRITERIS D'EXTUBACIÓ → **UTILITZACIÓ DE VNI COM A WEANING MPOC**

2 VNI EN PACIENTS AMB CRITERIS D'EXTUBACIÓ

→ **VNI PREVENTIVA**
- A TOTS ELS PACIENTS
- EN GRUPS SELECCIONATS

→ **VNI CURATIVA**
CRITERIS DE FRACÀS POST-EXTUBACIÓ A LES 48H

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

Lancet. 2009;374:1082-1088

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

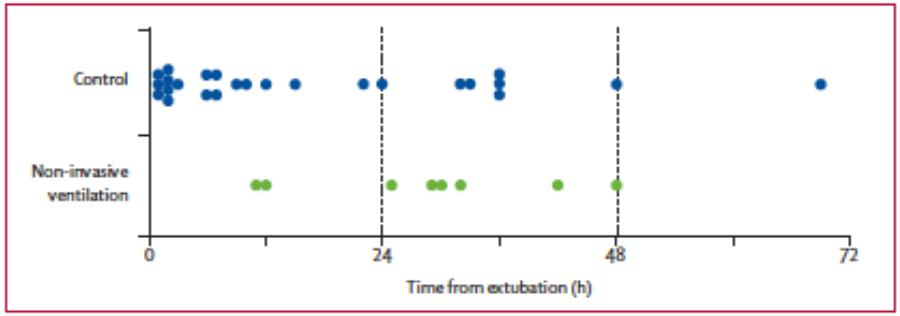
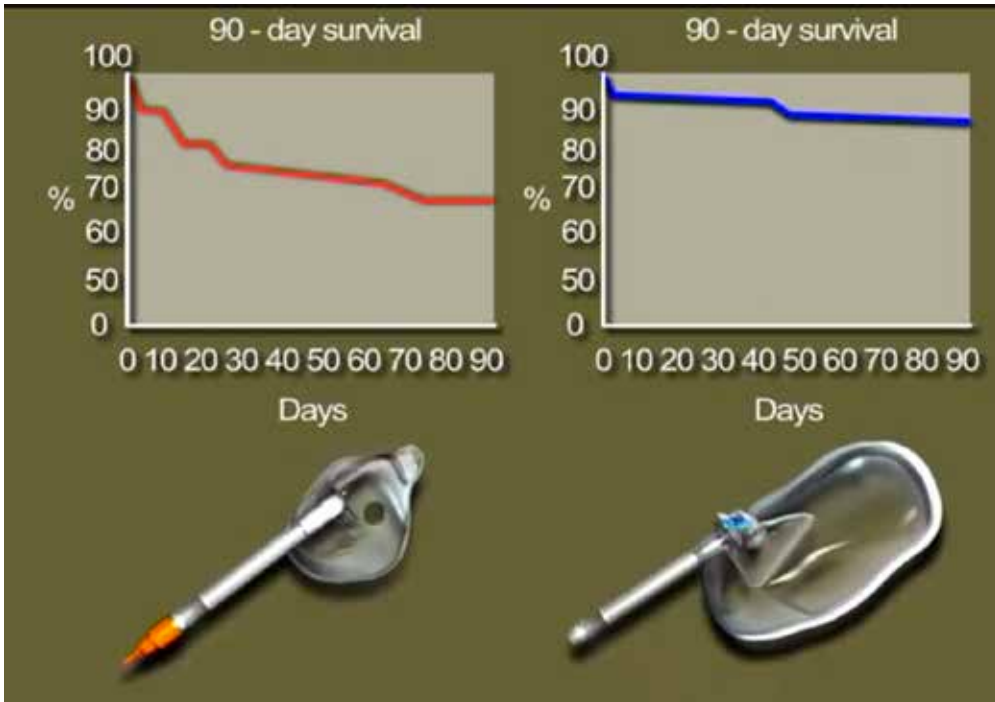


Figure 2: Time elapsed from extubation to development of respiratory failure

	Univariate analysis		Multivariate analysis	
	Odds ratio (95% CI)	p	Adjusted odds ratio (95% CI)	p
Non-invasive ventilation	0·19 (0·07–0·48)	<0·0001	0·17 (0·06–0·44)	<0·0001
Older age*	1·05 (1·00–1·10)	0·0430	..	..

*Age was treated as a continuous variable. Odds ratio shows estimates for every 1 year increase in age.

Table 4: Univariate and multivariate analysis of predictors of respiratory failure after extubation



Early Noninvasive Ventilation Averts Extubation Failure in Patients at Risk

A Randomized Trial

Am J Respir Crit Care Med. 2006;173:164-170

Miquel Ferrer, Mauricio Valencia, Josep Maria Nicolas, Oscar Bernadich, Joan Ramon Badia, and Antoni Torres

Unitat de Cures Intensives i Intermèdies, Servei de Pneumologia, Institut Clínic del Tòrax; and Área de Vigilància Intensiva, Hospital Clinic, Institut d'Investigacions Biomèdiques August Pi i Sunyer, Universitat de Barcelona, Barcelona, Spain

RCT 162 pacients al risc (edat, comorbilitat, gravetat, hipercàpnics): NIV 24h post ext vs tto oxigen

TABLE 3. OUTCOME VARIABLES, LENGTH OF STAY, AND CAUSES OF DEATH FOR NONINVASIVE VENTILATION AND CONTROL GROUPS

	NIV Group (*n* = 79)	Control Group (*n* = 83)	p Value
Respiratory failure after extubation, n (%)	13 (16%)	27 (33%)	0.029
Time elapsed from extubation to respiratory failure after extubation, h after extubation	41 ± 19	25 ± 21	0.022
Reintubation, n (%)	9 (11%)	18 (22%)	0.12
Main causes of respiratory failure after extubation, n*			
Respiratory failure			
With hypercapnia	6	14	
Without hypercapnia	2	8	
Aspiration, excess respiratory secretions	1	3	
Cardiac failure	3	0	
Upper airway obstruction	1	1	
Encephalopathy	0	1	
ICU stay, d	11 ± 8	13 ± 11	0.14
Hospital stay, d	30 ± 23	29 ± 18	0.65
ICU mortality, n (%)	2 (3%)	12 (14%)	0.015
Hospital mortality, n (%)	13 (16%)	19 (23%)	0.41
Causes of death within 90 d of entry into study			
Shock/multiple organ failure	6	13	
Respiratory failure†	2	6	
Cardiac failure/cardiogenic shock	3	1	
Cardiac arrest	2	0	
Other	3	1	
Not determined‡	2	3	

Early Noninvasive Ventilation Averts Extubation Failure in Patients at Risk

A Randomized Trial

Am J Respir Crit Care Med. 2006;173:164-170

Miquel Ferrer, Mauricio Valencia, Josep Maria Nicolas, Oscar Bernadich, Joan Ramon Badia, and Antoni Torres

Unitat de Cures Intensives i Intermèdies, Servei de Pneumologia, Institut Clínic del Tòrax; and Área de Vigilància Intensiva, Hospital Clinic, Institut d'Investigacions Biomèdiques August Pi i Sunyer, Universitat de Barcelona, Barcelona, Spain

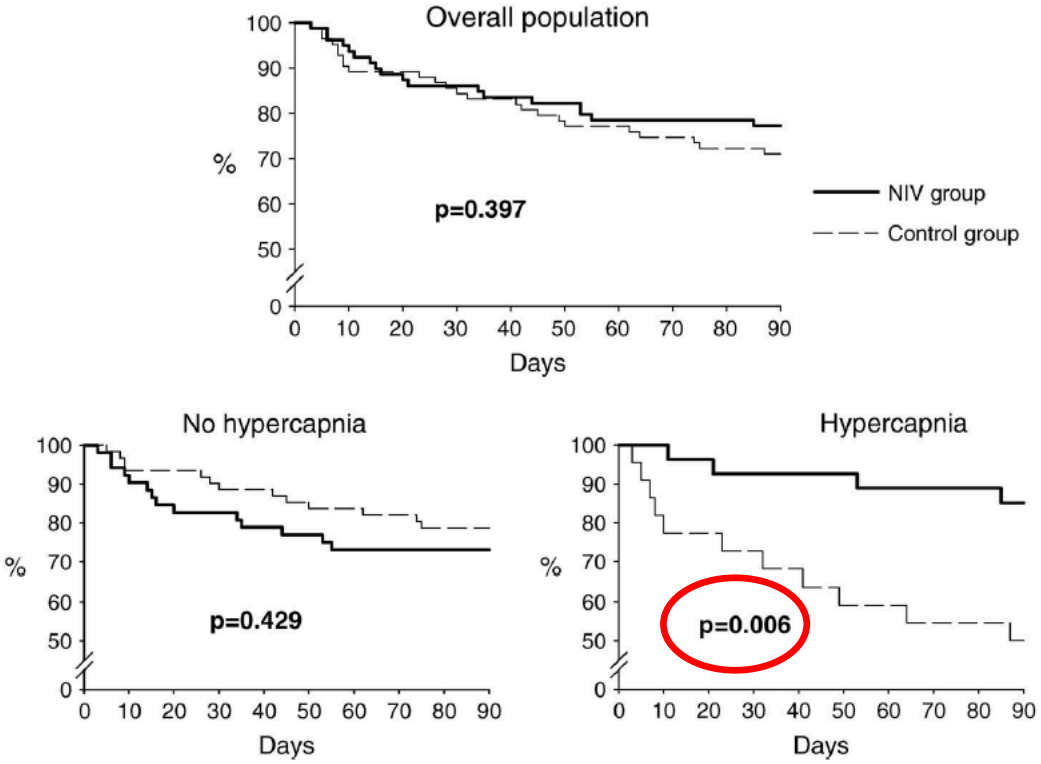


Figure 3. Kaplan-Meier survival curves for patients within 90 d of entry into the protocol. *Top*: Survival of the overall population. *Bottom*: Survival of the subset of patients without hypercapnia (*left*) and of the subset of patients with hypercapnia (*right*) who underwent the spontaneous breathing trial. The cumulative survival probability was significantly higher in the NIV group only in the subset of patients with hypercapnia (log-rank test). Time denotes days after patients were entered into the study.

Eur Respir J 2006; 28: 588–595
DOI: 10.1183/09031936.06.00150705

VNI en l'obesitat

Noninvasive ventilation for prevention of post-extubation respiratory failure in obese patients

A.A. El Solh*, A. Aquilina*, L. Pineda*, V. Dhanvantri*, B. Grant*,# and P. Bouquin*

Estudi comparatiu 62 pacients IMC>35 vs 62 controls històrics. No diferències mortalitat excepte crònics amb hipercàpnia

TABLE 3 Post-extubation complications of critically ill morbidly obese patients

	NIV	Conventional therapy	p-value
Subjects n	62	62	
Respiratory failure	6 (10)	16 (26)	0.03
Reintubation	6 (10)	13 (21)	0.14
Causes of respiratory failure			
Hypoxia	2 (3)	3 (5)	
Hypercapnia	2 (3)	9 (15)	
Respiratory muscle fatigue	1 (2)	2 (3)	
Haemodynamic instability	0	1 (2)	
Inability to clear secretions	0	1 (2)	
Delirium	1 (2)	0	
Hospital-acquired pneumonia	3 (5)	9 (15)	0.13
Bloodstream infection	2 (3)	5 (8)	0.44
ICU stay days	11.8±7.9	18.2±11.2	<0.001
Hospital stay days	20.6±10.6	26.0±11.3	0.007
Hospital mortality	8 (13)	15 (24)	0.17

Data are presented as n (%) and mean±SD, unless otherwise stated. NIV: noninvasive ventilation; ICU: intensive care unit.

*Take home message

- L'aplicació de la VNI com a tècnica de weaning i en el fracàs post-extubació ha obtingut bons resultats en MPOC i malalts amb hipercàpnia.
- El benefici com a teràpia preventiva del fracàs post-extubació en tota la població encara no s'ha demostrat.

Contraindicació VNI

CONTRAINDICACIONS
PCR, XOC O INESTABILITAT HEMODINÀMICA GREU
ARÍTMIES GREUS (TV)
INCAPACITAT PROTEGIR VIA AÈRIA; ALT RISC D'ASPIRACIÓ: COMA (GCS <10), CONVULSIONS
INCAPACITAT PER COOPERAR: AGITACIÓ, CONFUSIÓ
FRACÀS MULTIORGÀNIC
TRAUMATISMES O CIRURGIA FACIAL
CIRURGIA GASTRO-INTESTINAL: sutura esofàgica
HEMORRÀGIA DIGESTIVA ALTA
QUADRES EMÈTICS PERSISTENTS
SECRECCIONS TRAQUEOBRONQUIALS ABUNDANTS
OBSTRUCCIÓ VIA AÈRIA SUPERIOR

Am J Respir Crit Care,2001;163:283-291

Causes de fracàs VNI

Table 1. Potential Causes of Failed Noninvasive Ventilation*

Poor patient selection: severity of illness, diagnosis
Progression of the underlying disease process
Wrong interface: size, leak†
Wrong ventilator: poor leak compensation†
Inappropriate ventilator settings†
Clinician inexperience

* Defined as need for endotracheal intubation.
† May be related to asynchrony.

Hess, DR. Respir Care, 2011;56(2):153-167)

Intensive Care Med (2006) 32:1747–1755
DOI 10.1007/s00134-006-0229-z

ORIGINAL

Factors de risc de fracàs

Alexandre Demoule
Emmanuelle Girou
Jean-Christophe Richard
Solenne Taillé
Laurent Brochard

Increased use of noninvasive ventilation in French intensive care units

Table 2 Independent risk factors for failure of noninvasive ventilation identified by multivariate analysis; Hosmer-Lemeshow $\chi^2 = 7.50$, $p = 0.48$; area under the receiver operating characteristics curve = 0.81

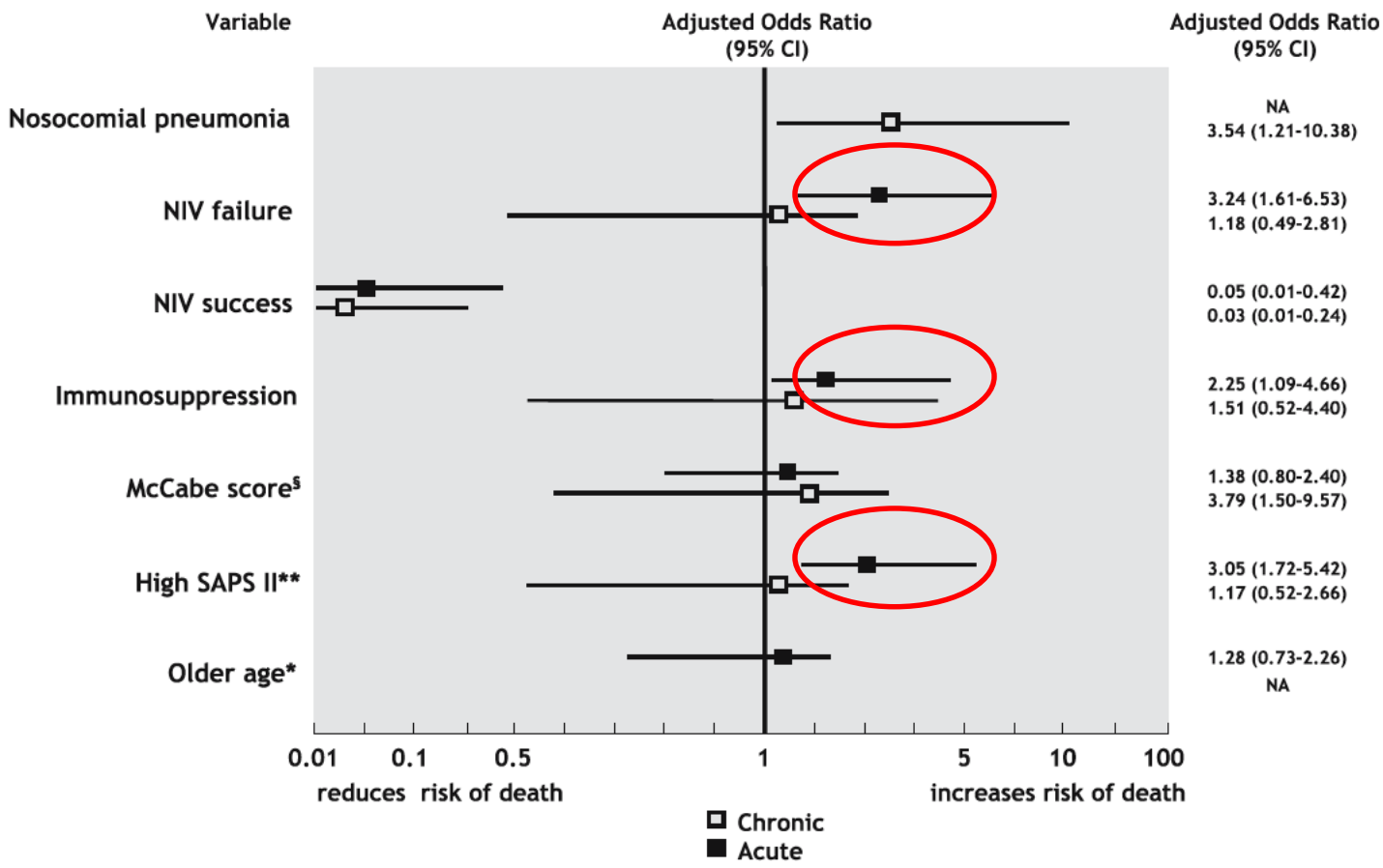
	Adjusted odds ratio	95% confidence interval	*p*
SAPS II[a]	1.07	1.03–1.10	<0.0001
Good NIV tolerance[a]	0.38	0.15–0.93	0.03
De novo ARF[a]	2.17	1.01–4.67	0.04
Body mass index[a]	0.94	0.89–0.99	0.04
NIV with high level of leaks	1.63	0.77–3.42	0.20
$PaO_2/FIO_2 \leq 200$ mmHg	1.29	0.60–2.78	0.14
Respiratory rate ≥ 35 bpm	1.32	0.54–3.19	0.54
Immunosuppression	0.89	0.33–2.41	0.82

[a] Parameters significantly associated with result of NIV
Abbreviations: *ARF* acute respiratory failure, *NIV* noninvasive ventilation, *SAPS* Simplified Acute Physiology Score

Alexandre Demoule
Emmanuelle Girou
Jean-Christophe Richard
Solenne Taille
Laurent Brochard

Benefits and risks of success or failure of noninvasive ventilation

Factors de risc de mortalitat



Treatment of Acute Hypoxemic Nonhypercapnic Respiratory Insufficiency With Continuous Positive Airway Pressure Delivered by a Face Mask

A Randomized Controlled Trial

Criteris d'IOT

Table 5. Indications for Patients Who Underwent Endotracheal Intubation*

Criteria	Oxygen Alone Group (n = 24)	Oxygen Plus CPAP Group (n = 21)	*P* Value
Agitation	16 (67)	13 (62)	.74
Exhaustion	19 (79)	13 (62)	.20
Hemodynamic instability	6 (25)	5 (24)	.93
Cardiac arrest	0	1 (5)	.28
Refractory hypoxemia	10 (42)	7 (33)	.56
Respiratory acidosis	3 (12)	2 (10)	.97
Other	0	1 (5)	.47

*Values are No. (%). CPAP indicates continuous positive airway pressure. Some patients had more than 1 reason for endotracheal intubation, with the most common combination being agitation plus exhaustion (6 patients in the oxygen alone group and 5 in the oxygen plus CPAP group).

Delclaux et al. JAMA 2000;284:2352-60

Èxit i retirada VNI

- Solució causa que va desencadenar la IR.
- Estabilitat hemodinàmica.
- Millora en la funció respiratòria i gasomètrica
- Seqüència de retirada.
  - § Reduir IPAP i EPAP progressivament (2-3cm H20)
  - § Alternar sessions de VMNI amb VMX.
  - § Mantenir VMNI només a la nit.